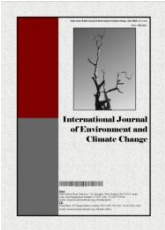

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Livelihood Dependence on Highland Pastoralism (*Doksa*) in Trans-Himalayan Region of Zanskar, Ladakh

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Authors' contributions

This work was carried out in collaboration with all the authors. Author AR designed the study, conducted the field survey and collected the data while the review of literature, statistical analysis and drafting of the manuscript was managed by the authors DA and MAI. All authors read and approved the final manuscript.

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ABSTRACT

A unique system of short-distance vertical transhumance pastoralism has evolved in the Trans-Himalayan region of Zanskar, Ladakh in response to short summer cropping season and vast alpine pasturelands. Cattle are taken to highland pastures for three-and-a-half month in summer season and kept in temporary settlements locally called as *doksa*. The study investigated the herding practices, migration pattern, livestock production and livelihood dependence on highland pastoralism. Purposive sampling technique was administered to withdraw the sample of 6 *doksas* and the data were collected from both secondary and primary sources. Results revealed that 31 herders in the 6 *doksas* possessed a total of 794 milk producing *zhomos.* The *doksas* produced 3 lakh litres of milk, 18000 kg of butter and the same amount of dried protein cake (*chhurpey*). The herders earned incomes of ₹ 122500.00 and ₹ 59375.00 by trading 300-350 kg of butter and 450-500 kg of *chhurpey*, respectively with employment opportunities of 3100 woman-days/year. The poor living conditions at *doksa* and unavailability of alternative economic opportunities for women

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herders has threatened its continuation for cash generation, food and livelihood security and socioeconomic development. Therefore, livelihood diversification using alternative resources is imperative to keep pace with current development and future challenges.

Keywords: Doksa; Ladakh; livelihood; pastoralism; transhumance; Zanskar.

1. INTRODUCTION

Highland pastoralism (*Doksa*) is a livestock production system in the Himalayas which is based on transhumant practices and involves cyclical movements from lowlands to highlands for efficient utilization of seasonally accessible pastures at different altitudes in the Himalayas [1]. The system is based on extensive land use and often involves herd mobility, provides food and ecological services, ensures economic contributions and helps to maintain long-standing civilizations for the human populations in the world's poorest regions [2]. It is a strategy for overcoming temporal and spatial shortages in fodder and forage [3]. Many of the mountain valleys which are occupied by villages and crop land do not provide sufficient land for livestock grazing. At the lower elevations, grazing is supplemented by hay feeding, while at the higher elevations abundant pasture provides ample grazing land. Transhumance is prevalent in those regions of the world where the mountains, highlands or other wastelands are too cold to inhabit and hence, utilized mostly for livestock grazing except in summer [4]. Pastoral nomadism is a subset of transhumance, which includes migration within (short-distance transhumance) and between regions (long-distance transhumance) [5]. In the mountains of South Asia, there is a full range of non-stationary practices in livestock rearing ranging from mountain nomadism through transhumance to combined mountain agriculture [6].

Zanskar is one of the most inaccessible cold and dry regions in the southern part of Ladakh. Highlands of Ladakh is an extension of the Tibetan plateau and the Zanskar, located in the southwest of Ladakh, is under the administrative District Kargil in the Union Territoty [7]. The Zanskar is among the coldest inhabited highlands of the world and it inhabits 11 major glaciers, including Drangdrung - the 2nd largest in Ladakh after Siachen [8]. In summers, the Indian monsoon hits the Greater Himalaya Range contributing to snow accumulation on the glaciers. Vast alpine rangelands are widely used for grazing during summers in the region [9]. Because of the abundance of grazing highland pastures and limited crop land and farming opportunities, livelihoods of the tribal people of Zanskar valley is dominated by agro-pastoral farming, comprising of few short duration crops-like barley, potato, pea, mustard and leafy vegetable, and large population of cattle, horses, yak, sheep and goats. Zanskar valley agro-ecosystem supports livestock population of approximately 20000 sheep, 5000 goats, 15000 cattle and 3500 equine [10]. The valley is also known for its Zanskari horses breed. *Doksa* is the short distance transhumance system of livestock farming practiced in Zanskar during the brief summer season [4]. It is mainly a kind of bovine transhumance where seasonal migrations take place between permanent homesteads in the arid valley and natural highland pastures in the vicinity of glaciers. During the summer season when agricultural workload is high and other financially lucrative employment opportunity might be available, it is fairly common for households to pool their livestock and send their herds with a trusted person or hired professional to the summer pastures, which are mainly common lands. The system is a close equivalent to *Alpwirtschaft* that is practiced in the European Alps, especially in France and Switzerland [11]. The livestock and pasture resources are the important contributor to the livelihood security among the tribal communities in the region. Highland pastoralism represents the only way by which the large tracts of natural pastures are converted into economic products. The pastoralism sector augments the farm family income, reduces the protein gap, provides draught power and manure for cultivation and ensures foreign exchange. In Zanskar, pastoralism mostly provides chief means of livelihood to the local communities and the pastoralism is an integral part of gross state domestic agriculture product. Pasture development integrated with livestock and agricultural progress has great potential to enhance livelihood security, poverty reduction and food security for vulnerable section of society including illiterate, unskilled, resource-poor, jobless, landless and labourers people. Understanding community dependency on natural pastures is critical for designing pastoralism livelihoods vis-a-vis conservation

strategies in the area. The main aim of the study is to provide baseline data on livestock production system, migration pattern, production of livestock products, household consumption and marketing and livelihood dependency on pastoralism by *doksas* pastoralists to promote future management plans for the study area. Keeping these views under consideration the present study was undertaken to identify strategies that could be used to sustain highland pastoralism (*Doksa*) based livelihoods in the Trans-Himalayan region of Zanskar, Ladakh.

2. MATERIALS AND METHODS

2.1 Study Area

Geographically the Zanskar subdivision (Fig. 1) is situated between 32°52'30"-33°52'30" N latitude and 76°14'5"-77°32'4" E longitude within an elevation range of 3500-6478 m above MSL in Kargil District of Ladakh UT [7]. The Zanskar valley can roughly be divided into (i) upper Stod and Lungnak valleys (ii) lower Sham region and (iii) central Zunkhor region. Padum, the administrative headquarter, is located at 3505 m above MSL. Total geographical area of the valley is 7000 km^2 of which the total farmland holding is about only 5000 ha (0.7%). The net sown area is about 2900 ha, that constitutes 57% of total cultivable land. The farming is 100% irrigated and the average household land holding is 2.20 ha. The total human population of the Zanskar is 13773 with literacy of 52% inhabiting in 2283 households. Buddhists form the majority of the population with 5% Muslims in the valley [12]. The region is a high altitude cold desert lying in the rain shadow of the western Himalayas, the temperature varies from 28°C to -30°C and the annual precipitation is around 250 mm, received mostly in the form of winter snowfall [13]. Abundant sunlight, strong winds, low relative humidity, high evaporation rates, meagre growing season precipitation and fluctuating temperatures characterise the general climate. Habitation is spread along the valleys formed by Zanskar river and its two tributaries: Stod and Lungnak. After draining the respective valleys lying in two diametrically opposite directions, these two tributaries merge near Padum, the village with a semblance of a town, and its administrative centre. Hereafter, the river is known as Zanskar till it meets Indus at Nimoo near Leh. Zanskar valley is connected to Kargil by road passing through Penzi La Pass which remains closed from December to May due to heavy snowfall. The valley remains inaccessible for nearly 6 to 7 months in a year due to heavy snowfall plugging the passes that connect the valley from rest of the country.

2.2 Sampling Technique

Although the *doksa* are spread all over Zanskar, those located in Stod region - the high altitude northwest Zanskar connecting Kargil - are important as only this region generate substantial cash income through sale of milk products. Hence, the Stod region located along the road connecting Zanskar valley to Kargil, on both sides of the Penzi-la pass was selected purposively in the Zanskar subdivision for the study. A reconnaissance survey was made before field studies in the region and secondary information relevant to the study was gathered from all possible sources. Based on the baseline information documented by sub-divisional offices, 11 highland pasture settlements (*doksas*) were recognized. Then, after a thorough discussion with experts, 6 *doksas* namely, Shamkashi Yogkma (SY), Shamkashi Kongma (SK), Bao Thang (BT), Lato Marpo (LM), Chakdo Karpo (CK), Oma Tenzey (OT) were purposively selected based on number of herders inhabiting the *doksa*, representativeness and accessibility. The sample was drawn employing purposive sampling technique [14]. This study investigated the local institutional norms and structures, governing the agro-pastoral system in the Zanskar valley using Ex-Post-Facto Research Design [15]. The respondents interviewed were either *doksa* heads or eldest members.

2.3 Data Collection and Analysis

Prior to the survey, a pilot study was undertaken to gain background experience of the local communities and the resources available, helping the researchers to establish good rapport with the local people. Field data collection at the sample *doksa* was carried out collaboratively, involving the inhabitants at every step. Secondary data were collected from the sources including departmental records, village records, institutional technical reports, previous researches and internet. Personal interviews, non-participant observations, focus group discussions and field inventories (Figs. 2 and 3) were the techniques and tools used for data collection for the investigation [16]. The interview schedule was prepared on the basis of earlier works, reconnaissance survey, discussion with the local people and consultation with the experts based on the research objectives for household

survey. All the interviews included an initial visit to the *doksa* and a series of follow up meetings. The qualitative analysis was done on the basis of non-participant observations and interactions with the respondents. The focus group discussions (FGDs) were undertaken involving four to eight herders from similar backgrounds and experiences to discuss several specific issues and explore an insight into different opinions/views. These discussions in *doksa* helped us to cross check and validate the information gathered during the personal interviews.

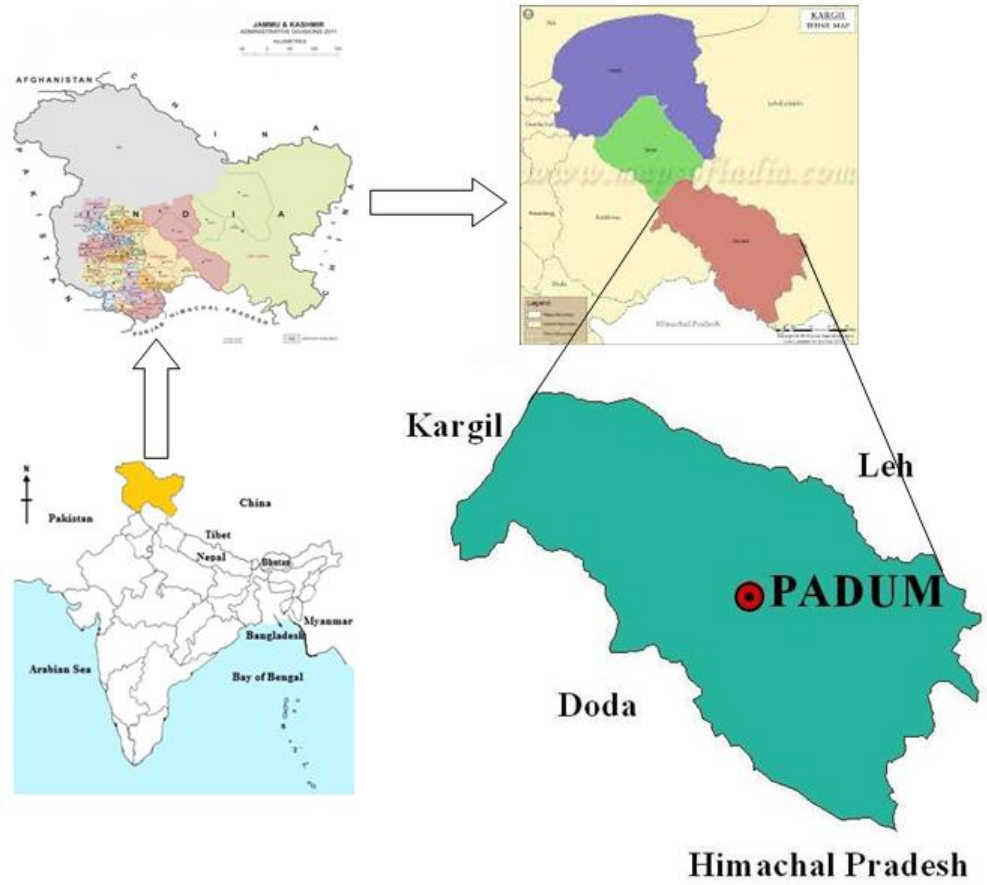

Fig. 1. Location map of the study area

Fig. 2. Structured interview with the respondents at Shamkashi Yogkma *doksa*

Fig. 3. Focus Group Discussion with the herders at Oma Tangtse *doksa*

Field inventories of *doksa* settlements were conducted to assess the available resources and other parameters and trends of changes therein for policy and planning purposes. The inhabitants were encouraged and helped to share the data on knowledge about their agro-pastoral system practices in which, major information on the pattern of seasonal migration, number and type of livestock maintained, problem being faced, milk production, milk processing, institutional grazing norms and ownership pattern of the pasture land. In most of the cases, the data were noted down but in few occasions where this was not feasible, the narratives were audio taped with their permission. Simple descriptive statistics viz., range, frequency (f), mean (x) and percentage (%) were used for analysis of the data [17] and the results were displayed through tables and chart.

3. RESULTS AND DISCUSSION

There were 31 herders in the selected 6 *doksas*; of which 8 were at Oma Tangtse (OT), 6 at Shamkashi Yokma (SY), 5 at Bho Thang (BT), 4 each at Shamkashi Kongma (SK), Chakdo Karpo (CK) and Lato Marpo (LM) (Table 1). All the herders were women aged between 20 and 68 years with average of 39.68 years. Altogether, there were a total of 794 milk producing *zhomos* besides their calves, horses and yaks. The average herd size of *doksas* was 25.61 with a range varying from 20 to 35 (Table 2). Of the total 794 *zhomos* only 178 (22.42%) was owned by the herders themselves. Rest, 616 (77.58%) animals were possessed on butter sharing agreement (*she-mar*) by these herders whereby the owners get 3 kg of butter per month for each milking cattle. The dry cattle were kept out of this system. The herders were mostly from Abran, Chhipra and Hamiling villages which are proximate to these pastures, while the animals were from all 24 villages spread over the Zanskar valley (Table 1). Average milk production was about 4 litres per *zhomo* per day. This produced about 100 litres of yoghurt to be processed every day by each woman. Churning was done manually in a 100 litre container made of wood called *zem*. As the volume to be churned was too large to handle individually by them, it was done in pairs on communal basis. Each bulk of 100 litre yoghurt produced 6-7 kg of butter and the buttermilk left after butter extraction is used to produce dried cottage cheese locally called *chhurpey* [18]. These herders receive provisions from their homes at periodic intervals bought by their family members or by taxi/bus drivers who cross the area on way to Kargil, the district headquarters.

Livelihoods revolves around three principal farming activities; 1st, summer season crop cultivation; 2nd, year round livestock (cattle, yak, sheep and goat) husbandry; and 3rd, summer season nomadic pastoralism, whereby yak, cattle, and horses are taken to high altitude meadows beyond human settlements for about three months (Table 3). An individual household does not possess sufficient resources for self-reliance. Notwithstanding, with limited resources high level of social security prevails due to prevalence of local institutions [19]. This provides assurances - both vertical and horizontal - to the inhabitants to secure a sustainable livelihood in such a harsh environment. Traditionally, farming is small-scale; each family owns marginal or small size of land holding. The principal crop is barley, the mainstay of traditional Zanskari food. Barley is a short duration crop that matures in September before winter sets in. Farmers allocate about two thirds of the cropped area to grow fodders like oat and lucerne. To supplement fodder stock for long winter months, they also collect wild chickpea (*Cicer microphyllum*) and twisted knotweed (*Aconogonum tortuosum*) from wild. Primitive farming is still prevailing in Stod where most of the cultural operations are done manually with the help of draught animals [20]. *Zho* is the main animal used for ploughing the agricultural field while *zho* and *zhomo* both are used for thrashing the harvested crops [21]. Lower in the valleys, farmers grow some heirloom vegetables. Off farm income opportunities are almost non-existent. Sale of agricultural surpluses like fodder and vegetables, meat, wool and milk products generate some cash income. Tourism is limited to a small extent and benefits few households who have created home-stay facilities or have hotels at Padum.

Livestock rearing is the main livelihood mainstay in the Trans-Himalayan region of Zanskar, Ladakh (Table 4). Local people husband yaks, cows or *zho* on the high pastures, where even barley does not grow. During summers, due to less availability of fodder in cropped area, pastoralism is adopted to utilize abundant pastures available on higher slopes in the valley. All the cattle along with horses are taken to high summer grazing camps called *doksa*. These temporary shelters are located beyond human settlements,

between altitudes 3800-4400 m above MSL. Donkey, sheep and goats are kept in villages because they can thrive on poor grazing land available on the fringes. Sheep and goats provide fibre for making cloth locally [22]. Food and nutritional security of the people depend mostly on these animals as they provide meat, milk and milk products [23]. Hides of sheep, goat and young calf are used to pack butter.

Table 1. Details of the herders in the selected *doksas*

Name of *doksa*l herder	Cattle head			Owners' village
	Own	Other's	Total	
I. Shamkashi Yokma (SY)				
1. Dawa Tolma	3	27	30	Hongchet, Nyorek, Karsha
2. Dorjay Tolma	4	22	26	Renam, Karsha, Rezing, Phey
3. Tsewang Tolma	4	26	30	Karsha, Yulsum, Rantaksha
4. Kunzes Dolma	10	10	20	Karsha, Phey, Abran
5. Lobzang Dolma	4	15	19	Ufti, Pipiting, Karsha
6. Padma Lanzes	3	18	21	Nyerok, Youlang, Rantaksha
II. Shamkashi Kongma (SK)				
1. Thukzay	7	18	25	Yulsum, Karsha, Hamiling
2. Lobzang Standon	6	14	20	Tahan, Youlang, Hamiling
3. Skalzang Tolma	6	22	28	Rezing, Yulsum, Hamiling
4. Yangchen Dolma	6	29	35	Karsha, Rantaksha, Skyagam
III. Lato Marpo (LM)				
1. Tsering Yangdol	4	26	30	Tungri, Rantaksha
2. Stanzin Putith	7	13	20	Phey, Tungri, Rantaksha, Langmi
3. Yangchan Dolma	7	23	30	Salapi, Tungri, Phey, Abran
4. Lobzang Kunzom	7	23	30	Langmi, Karsha, Kishrak
IV. Bho Thang (BT)				
1.Tsering Yangchay	8	17	25	Youlang, Karsha, Phey
2. Stanzin Yetok	3	19	22	Tungri, Rantaksha, Phey, Manda
3. Tsering Chodol	2	27	29	Hongchet, Rantaksha, Phey, Tungri, Manda
4. Tsering Dolma	10	20	30	Youlang, Karsha, Phey, Manda
5. Tsering Tolma	8	22	30	Karsha, Phey, Manda, Tungri
***V. Chakdo Karpo* (CK)**				
1. Tashi Lamo	8	13	21	Karsha, Abran
2. Spalzes Angmo	6	14	20	Karsha, Abran, Rantaksha, Youlang, Tungri
3. Chunit Tolma	4	25	29	Karsha, Langmi, Tahan, Abran
4. Stanzin Thangpo	4	16	20	Karsha, Youlang, Yulsum, Khishrak, Abran
VI. Oma Tangtse (OT)				
1. Yangdol Dolkar	9	20	29	Stongde, Karsha
2. Dechen Dolkar	0	26	26	Rezing, Karsha
3. Tsering Angmo Rihan	8	20	28	Ufti, Pipiting, Karsha
4. Tsering Dolma	7	15	22	Karsha,
5. Tsering Angmo Kongma	4	16	20	Karsha
6. Yangchen Dolma	8	18	26	Stongde, Tungri
7. Padma Tsomo	7	22	29	Ufti, Karsha
8. Lobzang Yeton	4	20	24	Ufti, Karsha, Phey

Table 2. Descriptive statistics of selected *doksa*

Doksa	Number of herders	Average age of herders	Number of cattle					
			Own	Other's	Total	Mean	Maximum	Minimum
Shamkashi Yokma (SY)	6	48.00	28	118	146	24.33	30	19
Shamkashi Kongma (SK)	4	36.50	25	83	108	27.00	35	20
Lato Marpo (LM)	4	39.25	25	85	110	27.50	30	20
Bho Thang (BT)	5	27.00	31	105	136	27.20	30	22
Chakdo Karpo (CK)	4	31.25	22	68	90	22.50	29	20
Oma Tangtse (OT)	8	47.38	47	157	204	25.50	29	20
Range	-	20-68	0-10	10-29	19-35			
Total	31	-	178	616	794			
Mean		39.68	5.74	19.87	25.61			

Table 3. Livelihood mainstay in the Trans-Himalayan region of Zanskar, Ladakh

Livelihood source	Season	Species
Crop cultivation	Summer	Barley, oat, lucerne, vegetables, chickpea, knotweed
Livestock husbandry	Year round	Cattle, yak, sheep, goat, donkey
Highland pastoralism	Summer	Yak, cattle, horses, *Zho* (a crossbred of cow and yak), *zhomo* (a female *zho*)

Table 4. Livestock structure in the Trans-Himalayan region of Zanskar, Ladakh

Livestock	Product/by-product	Use
Cattle	Meat, milk, milk	Food, cash, cultural, inheritance, safety net, social, plough, gift
Yak	Meat, milk, wool, leather, dung[a]	Plough, threshing, transport, fertiliser[a], fuel[a], draught power, cash, cultural, social
Sheep	Hides[a]; wool[b], milk	butter packing[a]; clothing[b], cash, cultural, inheritance, safety net, social, gift, social
Goat	Hides[a], wool[b], meat, milk, droppings[c], hair[d], skin[e]	[a]Butter packing; [b]clothing, cash, cultural, inheritance, safety net, social, gift, manure[c], ropes/baskets/coarse blankets[d], garments[e]
Horse	Dung[a]	Transport, cash, social, manure[a]
Zho	Dung[a]	Ploughing, cash, social, cultural, thrashing, manure[a]
Zhomo	Milk, butter, *chhurpey*, yoghurt,	Thrashing, cash, subsistence, cultural, safety net, social
Donkey	Dung[a]	Transport, cash, manure[a]

Pastoralism in the Zanskar valley is based on transhumant practices and involves cyclical movements from lowlands to highlands to graze their animals on seasonally available pastures. This system is very close to *Alpwirtschaft* practiced in Alps region and termed as 'mixed mountain agriculture [24]. As the temperature increases and snow melts on the higher reaches, the herders start to move up from their villages to the highland pastures. The movement of people and their livestock ordinarily commences in the fourth month (*dawazhipa*) of Ladakhi almanac which corresponds to the first fortnight of June. The movement of the herders is rarely delayed; only if snowfall in the preceding winter is heavy in that particular year. These pastoralists remain stationed in the high elevation pastures till second half of September and move back to the low lying villages when the crops are harvested and the animals are needed for thrashing. During encampment at the *doksa*, the stone wall enclosures of permanent nature locally called *pulu* are repaired every year, if required. The roof of the *pulu* is laid fresh with twigs and branches

collected from the bushes growing nearby at the start of the season whenever they move to the *doksa* and they take these back with them at the time of descending to their villages in autumn which is consumed as fuel wood. Generally, each *doksa* had 4-8 *pulus* for individual herders. These herders were generally veteran women who are expert in every aspect of dairying like milking, milk processing, packaging of butter etc.

The *doksas* studied produced about 3 lakh litres of milk and 18000 kg of butter each and *chhurpey* during their stay of approximately 100 days at the *doksa* (Table 5). About 6000 kg of butter corresponding to one third was given to cattle owners at the rate of 10 kg butter per cattle as per the contract. The average production of butter was about 6 kg per day per herders along with an equal amount of *chhurpey*. Every herder produces around 600 kg of butter and *chhurpey* during their stay at the *doksa*; of which some quantity is given to cattle owner in the form of contract; some are kept for religious obligations like lighting of butter lamps and offerings to monasteries during holy festivals and some quantity is consumed locally. After all these deductions, on an average the herders possess about 300-350 kg of butter and 450-500 kg of *chhurpey* which they generally use for trading. The butter is marketed @ ₹ 300-400/kg while *chhurpey* is sold @ ₹ 100-150/kg mainly in Leh and some portion is also exported to all Buddhist and Tibetan settlements all over the country. The sale of butter and *chhurpey* accrue an income of ₹ 122500.00 and ₹ 59375.00 per herder/year, respectively with an employment of 3100 woman-days in the doksa (Table 6).

Zanskari butter has its own brand value and is much in demand among local Ladakhi population where it is sold as a premium product at higher price than the commonly available Amul butter in Leh market. Zanskari butter is considered superior in quality in terms of its flavour, taste, consistency and medicinal value, than any other butter [25]. There is a popular perception in Ladakh is that 'one spoon of Zanskari butter is equal to two spoon of Amul butter'. A study [26] revealed that milk of *Zhomo* of Zanskar contained 6.0% fat, 4.4% protein, 5.4% lactose and 15.5% total solid. Total dry weight of butter was 80.07g per 100g of wet weight (Table 7). Even the essential fatty acids were present at 3 times the level compared with UK (the United Kingdom) butter [26]. The by-product *chhurpey* is also very nutritive with high protein and low fat contents [25]. On wet weight basis, 100 g of it is reported to provide 90.94 g of moisture free weight, 54.40 g protein, 20.98 g of fat and 452 kcal of energy [26]. It is also termed as dried "protein cake" due to its high protein content. It is an essential ingredient of various local cuisines like *Thukpa*, common throughout Ladakh [27]. During winter, the day starts with at least 2 bowlfuls of its hot soup for every soul in Zanskar. *Chhurpey* is also exported to Leh and other Buddhist settlements outside Ladakh, especially to Dharamshala, Dehradun and as far away as Bangalore, where there are Tibetan settlements. *Doksas* also serves as a local 'powerhouse' as it generates energy in the form of dung-cakes. The dung cakes are an indispensable part of the livelihood strategy to survive the long harsh winter months. These cakes are the major fuel of local hearth that provides energy for space and water heating besides cooking [28].

Table 5. Production of milk/by-products in the selected *doksa* of Zanskar, Ladakh

Total no. of *zhomos*	Milk		Butter		*Chhurpey*[a]		Yoghurt (Litres/day /woman)
	Total (lakh/litres/ *doksa*)	Average (litres/*zhomo*/ day)	Total (kg/ *doksa*)	Average (kg/day/ herder)	Total (kg/*doksa*)	Average (kg/day/ herder)	
794	3	4	18000	6	18000	6	100

[a]*Dried cottage cheese*

Table 6. Consumption and marketing of butter and *chhurpey* by the *doksa* herders in the Zanskar, Laddakh

Milk product	Production (kg/herder)	Subsistence (kg/herder)	Sale			Employment (woman-days/year)
			Quantity (kg/herder)	Rate (₹/kg)	Income (₹)	
Butter	600	150-200	300-350	300-400	122500.00	3100
Chhurpey	600	50-100	450-500	100-150	59375.00	

Table 7. Nutritional traits of *Zhomo* milk/by-products

Milk/by-products	Traits	Unit	Value
Milk	Fat	%	6.0
	Protein	%	4.4
	Lactose	%	5.4
	Total solid	%	15.5
Butter	Total dry weight	g/100g of wet weight	80.07
Chhurpey	Protein	g/100g of wet weight	54.40
	Fat	g/100g of wet weight	20.98
	Energy	kcal/100g of wet weight	452

Source: Attenborough et al. [26]; Raj and Sharma [25]

4. CONCLUSION

The *Doksa* system of nomadic pastoralism is the primary livelihood mainstay of the people besides livestock rearing and irrigated agriculture in Stod valley of Zanskar. *Doksa* is an adaptive strategy that incorporates high pastures into the domestic economy. Agricultural production in the homestead is strongly linked to the livestock sector by growing grass and storing hay for the winter provision of fodder. Keeping the large population of livestock out of village during short summer growing season makes cultivation possible down at the valley bases. At the same time, freely available vast patches of lush green alpine pasture endowed with rich and abundant herbage at higher elevations make the livestock farming profitable and generate cash income by the sale of milk products. The natural cold conditions prevailing in these *doksas* situated near permanent snow line helps spoilage-free storage of the product without using electricity, which at that time is not possible down in the valley due to warmer climate. The milk products produced at these *doksas* are not only the main source of income to the herders but also have social, religious and cultural significance. However, the perilous conditions in which the women herders have to toil hard are repelling. In case minimum amenities are not provided at the *doksas* and the voices of these women are not heard, this tradition is bound to perish. If this trend continues the farming community and religious institutions has to look out for alternatives and the pain of transition phase caused due to social change is bound to occur.

CONSENT

Prior Informed Consent (PIC) was taken from every informant to use and publish their knowledge.

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COMPETING INTERESTS

Authors have declared that no competing interests exist among the authors.

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