



Migratory sheep production system and its impact on livelihood security of sheep households in Ajmer district of Rajasthan

RAKESH KUMAR¹, D R SINGH², SHIV KUMAR³, V P CHAHAL⁴, KHYALRAM CHAUDHARY⁵ and SHALOO⁶

Indian Agricultural Research Institute, Pusa, New Delhi 110 012 India

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The contribution of livestock was about 28% to the agricultural gross domestic product in the country (2012). In arid and semi arid areas, the contribution of livestock sector was reported up to 70 and 40%, respectively. Major part of Rajasthan is under arid zone and part of Thar desert, having adverse climatic conditions. India has 71.6 million sheep and ranks third in the world (Livestock Census 2012). Rajasthan ranks second in sheep population and have about 113 lakh sheep, out of which the population of migratory and non-migratory sheep are 26 and 87 lakh in the state, respectively. This accounts for 16% of the total sheep in the country. Sheep are raised both under sedentary and migratory conditions in the state. Besides being a system of production practiced for a long time under pastoral conditions, migratory sheep management, notably temporary migration, owes it to the lack of fodder and water. Further, temporary and permanent migratory sheep accounts for 4 and 22 lakh in the state respectively. Such migratory system is thought critical for survival at the time of distresses like drought and famine for shepherds. Hence sheep migration is perceived as just one of the livelihood strategies open to households. Sheep are raised profitably with low investment (Bhatia *et al.* 2005, Singh *et al.* 2006, Suresh 2011, Kumar *et al.* 2013) and make a valuable contribution to the livelihood of the shepherds through sale of wool and animals. It is movable assets of high liquidity and a source of household nutrition and income generation (Kumar *et al.* 2013). The contribution of this system in livelihood security of households especially after new economic policy has gone down after interplay and intermix of various actors and factors (Kumar *et al.* 2007). This necessitates to examine the sustenance of livelihood security of migratory sheep households in the changed production environment.

Ajmer district was selected purposively on two counts-

Present address: ¹Ph.D Scholar, ²Senior Scientist (rakeshkumar@gmail.com, drsingh@gmail.com, shivkr@ncap.res.in.) Division of Agricultural Economics. ³Principal Scientist, ⁶Scientist, National Centre for Agricultural Economics and Policy Research (⁵krchaudhary@gmail.com, shaloo.lohchab@gmail.com). ⁴Principal Scientist (Agril. Extension; chahal_vp@rediffmail.com), KAB-1, ICAR, Pusa, New Delhi.

(i) having maximum concentration of migratory sheep rearing; and (ii) district is prone to mild and normal type of droughts based on drought analysis on agriculture. Primary data pertaining to year 2010–11 on various socioeconomic variables of households were collected using multistage random sampling technique. From the district, 2 blocks, 4 villages from each block and 8 migratory sheep farmers from each village were selected randomly. Thus the sample size was of 64 farmers. The data on income and other socio-economic variables were collected from sources like migratory sheep rearing, crop production, dairying, farm and non-farm employment and services, and employment at native place and at en-route migration. The household consumption of different food items like cereals, pulses, meat, milk, oils, fats, fruits, vegetables and sugar were collected, from migratory sheep farmers using focused group discussion approach, for 30 days recall period at native place and en-route migration.

The impact of migratory system on livelihood security of the household was assessed using dimensions, like its contribution to the total household income, employment generation and food security to the family. The contribution of migratory sheep rearing to total household income discerned extent of contribution in livelihood security of the households. Extent of contribution of employment in livelihood security was ascertained in terms of employment generation capacity of migratory sheep rearing to households as well as labour by calculating total number of man days employed throughout year. A gender-wise disaggregation of employment generation was assessed for migrating and non-migrating periods.

A status of food security in terms of actual per capita consumption of various food items on per month basis was computed and it was compared to the sample menu plan recommended by the ICMR (2009). The average of non-vegetarian and vegetarian adult man sample diet for moderate type of work was used to compute the recommended diet. The female and children were converted into adult male as per recommended calories. The deficit or surplus in the consumption was observed on the basis of different items of food consumed per person per month as against the recommended dietary norms.

Migration of sheep: Migratory sheep production system is essentially related to search of fodder and water in times of vagaries of nature. In such environment, farmers perceived that migration cost was very less and earning from migration system was more. Adaptation through migration by shepherds according to drought conditions over a period in the study region has sustained their livelihood. The populations of migratory sheep were more than 24 lakh in the state in the triennium ending 2010–11 and showed an increasing trend over 1999–200. The permanent migration sheep population was found to be increasing during 1997–2010 with year to year wide fluctuations. On the other hand, temporary migration was declining during the same period. However, after 2003–04, an increasing trend in permanent migration and decreasing trend in temporary migration was observed with less fluctuations. These systems have responded in consonance with drought conditions in long run. A drought index, that summarizes both degree of hotness (temperature above normal) and degree of dryness (rainfall below normal) has relationship with sheep migratory systems. The droughts have become frequent in the 2000s relative to those in 1980s. In 1980s when there was drought it used to be widespread and intense but afterwards these appear to have become localized and less intense (Birthal *et al.* 2014). The major factor responsible for the decline in the temporary migration was the recurrent droughts in the state which forced the flock owners to shift towards permanent migration and to sell large number of animals for livelihood security. These drought conditions also led to increase in the permanent migration in the recent past.

Socio-economic status: The degree of success of the system depends both on their policies and market opportunities facing farmers (Kumar *et al.* 2004). It encompasses a wide range of policy variables and market opportunities that have bearing on the decisions of migrants in sheep production framework. The average size of flock of landless, small, medium and large farmers were 154, 132, 113 and 99 sheep, respectively, with an overall average size of 121 sheep per flock. Interestingly, landless sheep farmers had maintained large migratory sheep flocks for livelihood security. On the other hand, the family size did not affect flock size. The education level of the sheep farmers was not satisfactory. The average size of land holding was 5.5 ha but about 13% area was irrigated. Poor irrigation facility led to poor cropping intensity (108%) and coarse cereal based cropping pattern in this rainfed region. Arid-semi-arid tropical region is the most vulnerable to climate change. Birthal *et al.* (2014) concluded that the rise in annual temperature has been relatively more in arid-semi-arid tropical region (0.34°C), and less in humid region (0.22°C). A 1°C rise in *kharif* season reduces gross revenue per hectare by 5.4%. Consequence of climate change in the long run will be severe depending on the extent of changes in temperature and rainfall. This has enhanced dependency of farmers on migratory sheep rearing for their livelihood security. The sheep farmers are migrating to neighboring

areas/states during winter and summer seasons and duration of temporary migration is 6 to 7 months.

Impact of migratory sheep system

The impact of migratory sheep rearing on livelihood security of households has been deciphered in terms of employment generation, its contribution to total income besides status of food security.

Employment generation: Sheep rearing is perceived as a major source of employment generation to regions/groups where it is prevalent. Both men and women were involved in sheep rearing business at native place whereas during en-route migration only male members were employed. Per flock employment analysis infers that total migratory sheep rearing generated 170 man-days employment at native place and 263 man days during en-route migration comprising an overall total employment of 433 man-days. The employment generation was higher for landless flocks (488 man-days) and lower for large land owners' flocks (389 man-days). This confirms an inverse relationship between size of flock and size of landholding. Larger the flock size, more the employment. Further, the employment was more during en-route migration (234 and 300 man-days) as compared to native place (189 and 213 man-days) for small and large flocks, respectively. This might be due to longer period (nearly 7 months) on en-route migration compared to native place (nearly 5 months). The hired male labours got employment during en-route migration and female members of family were employed at native place only. From gender point of view, overall employment generated at native place was 143 man-days for male and 27 man-days for female. Nearly 199 man-days for male member of family and 64 man-days for hired male labour could get employment during en-route migration. The results concluded that migratory sheep rearing is a main source of employment among sheep rearing families and landless labours.

Contribution to total income: Among different categories of farmers of small flock-holders, migratory sheep rearing generated 57% of income to landless farmers followed by small (53 per cent), medium (46%) and large farmers (39%). This confirms inverse relationship between size of landholding and contribution of migratory sheep production system to total income. Among different sources of income, cropping activity emerged second major source of income for medium (26%) and large farmers (30%) followed by dairy (19% medium and 23% large) under small flocks holders. Contrary to it, for landless and small farmers 'other sources' of income emerged the second largest contributor to total income. Large flock holders realized 53% of income from migratory sheep rearing followed by other sources (18%) and dairy (15%). Among different categories of farmers in large flock group, landless farmers received 68% of income from sheep rearing followed by small (55%), medium (50%) and large (37%). On an average, about half of total income of all farmers was generated through migratory sheep rearing.

Table 1. Food security status of migratory sheep households (kg/30 days/person)

Items	Balanced diet*	Small flocks	Large flocks	Enroute migration	Surplus (+) or deficit (-) consumption		
					Small flocks	Large flocks	Enroute migration
Cereals	12.38	12.79	13.00	14.14	0.42	0.63	1.77
Pulses	2.33	0.61	0.62	0.74	-1.71	-1.71	-1.59
Meat	0.83	0.34	0.25	0.29	-0.49	-0.58	-0.54
Milk	8.25	10.06	12.12	7.88	1.81	3.87	-0.37
Vegetables	10.88	4.20	3.66	3.11	-6.68	-7.21	-7.77
Fruits	3.75	0.57	0.55	0.44	-3.18	-3.20	-3.31
Sugar	1.16	1.35	1.26	1.69	0.18	0.09	0.52
Oils and fats	0.90	1.10	1.05	0.94	0.20	0.15	0.04

* Average of vegetarian and non- vegetarian sample menu for moderate type of work, National Institute of Nutrition, Hyderabad

Food security status: The actual consumption of various food items was compared to the recommended norms (ICMR 2009) in order to ascertain the status of food security of the migratory sheep farmers. The sample menu gives 2,734 calories, out of which 68% daily energy from carbohydrates (complex and simple), 12% from proteins and 20% from visible and invisible fat are provided. The deficit or surplus was found on the basis of different items of food consumed per person per month as against the required dietary norms. A surplus consumption of cereals and millets, milk, fats and oils and sugar was discerned but all other items of food (pulses, meat, vegetables and fruits) though important from nutritional security standpoint, were consumed less than recommended level by all flock owners at native place (Table 1). Small and large flock households consumed more than the required quantities of cereals, millets, milk and milk products comprising a surplus consumption of 0.42 and 0.63 kg of cereals and 1.81 and 3.87 kg of milk per 30 days per person. It is also inferred that cereals consumption increased during en-route migration but a drastic drop in milk consumption and moderate decrease in fruits and vegetables. The results concluded that migratory sheep household appeared near to food security (energy secure) but were nutritionally insecure due to deficit in consumption of minerals and vitamins. This is a clarion call to enhance nutritional security of these households.

SUMMARY

Major part of Rajasthan is under arid zone and part of Thar desert. Migratory sheep production has entrenched itself well in this region. It continues to be an important source of generation of employment as it generates an employment of about 433 man-days in a year for an average flock of 121 sheep. Landless flocks owners got highest employment (488 man-days) and lower employment for large land owners' flocks (389 man-days). This employment was more during en-route migration compared to native place system. The hired male labours got employment during en-route migration but quite contrary in case of women employment. On an average, about half of total income of all farmers was generated through this system. An inverse relationship between size of landholding and

contribution of migratory sheep production system to total income was found. From food security standpoint, energy security of migratory sheep owners was satisfactory but not nutritionally secure. Intervention by educative means needs to be devised to adopt better combination of food items to achieve their nutritional security. Livelihood of sheep households could be improved making provisions of effective delivery of services, inputs and other facilities besides better coordination with locals during migration.

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