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Trends, Determinants and Constraints of Temporary Sheep Migration in Rajasthan — An Economic Analysis[§]

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Abstract

The study has analysed the temporary migration of sheep as a response to the demand-supply disequilibrium of fodder and water and has explored its trends, determinants and constraints by using the data collected from rural areas of semi-arid Rajasthan. About 32 per cent of the farmers in the study area undertake temporary sheep migration. The migrating farmers have higher holding size of sheep, goat and buffaloes and are better in terms of adoption of improved sheep management practices than non-migrant farmers. The flock size, potential household labour supply and credit absorption behaviour have been reported to positively affect the odds of migration. The farmers face various en-route problems during migration, the major ones being increased morbidity, non-availability of veterinary medicines, resistance from local persons, theft and missing of sheep. The net return per animal per year has been found slightly higher in case of the non-migrant sheep flocks. The study has argued that migration of livestock is to be viewed as a method of production and adaptive mechanism evolved over the years. Efforts to sendentarise migrants without providing alternate fodder sources or productive assets of gainful employment may not be fruitful. In order to sustain the livelihood of the sheep farmers, institutional intervention to enhance accessibility to fodder and feed, veterinary services and strengthening of the extension services is needed.

Key words: Sheep migration, Rajasthan, Sheep farming

JEL Classification: Q11

Introduction

The scarcity of fodder at any time is a function of stocking rate and carrying capacity of the system at that time, which are affected mainly by the level of precipitation and livestock population. The fodder deficiency compels the farmers to adopt suitable coping strategies, among which migration is a prominent one. The role of migration as a coping mechanism against the fodder scarcity is widely discussed in literature

(Rathore, 2004; Narain and Kar, 2005). Some sections practice migratory sheep management as a way of life and have acquired caste/community connotations as well. For example, the *Raika* community of Rajasthan practices regular migrations with their livestock (Rollenfsen and Rathore, 2004). The migration is from the arid western parts of Rajasthan to greener south-western and northern regions. The *Gaddi* community of Himachal Pradesh also practices seasonal migrations with their livestock (Jithendran and Bhat, 2001). Wani *et al.* (2008) have mentioned that the migration of pashmina goats of Leh and Ladakh in Jammu and Kashmir is a regular feature in the region. All these migrations are regularly undertaken by the breeders, have acquired a nature of permanency and are sometimes considered as an intermediate stage between

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the nomadic life and settled agriculture. Emergence of migration as a notable feature of those communities has strong anthropological, socio-political and economic underpinnings.

Temporary sheep migration, on other hand, is a coping strategy to respond to the the risk and uncertainty in the production system in the form of deficit rainfall and drought conditions which suddenly brings disturbances in the demand-supply equilibrium of fodder (Rathore, 2004; Narain and Kar, 2005). Here the farmers may not be in the habit of regular migration, but undertake migration as a response to the situation, for a shorter period, starting from the initiation of the crisis and ends with its cessation. Though migration is an option, its subscription among the farmers is circumvented by their socio-economic condition as well as the affordability of alternate coping mechanisms.

Understanding the process and impact of migration is relevant for the state of Rajasthan, as the state accounts for more than 15 per cent of the total sheep population (GoI, 2007) and about 40 per cent of the total carpet wool production (GoI, 2006) in India. Moreover, the probability of drought is more prominent for Rajasthan as every alternate year turns out to be a drought year for the state (Rathore, 2004). In this backdrop this study has been undertaken with following objectives: (i) to analyse the trend in the migration of the sheep in Rajasthan, (ii) to analyse the factors affecting temporary sheep migration in Rajasthan, (iii) to identify the constraints faced in migration, and (iv) to compare the income and expenditure of migrant flocks with non-migrant flocks.

Methodology

Data

The study used both primary and secondary data. The data regarding the status of migration of sheep in Rajasthan were collected from publications of Government of Rajasthan (GoR, 2007). The primary data were part of a larger study carried to analyse the impact of technological intervention on sheep farming. For this, Tonk and Ajmer districts were purposively selected as some villages of these districts were covered under the transfer of technology (TOT) programme of Central Sheep and Wool Research Institute, Avikanagar. The clusters of villages covered under the TOT programme of the Institute as well as some clusters

of villages not covered under such programme were randomly selected. From each cluster of villages, all the sheep breeders were selected for the survey. Farmers belonging to both the categories of villages undertook sheep migration. Since it was found on statistical analysis (chi square test) that the farmers' participation in the TOT programme was not associated with migration, the data collected through the field survey for the project were used for the analysis. A total of 221 farmers were interviewed by using pre-tested structured survey schedule during November-December 2006.

Statistical and Econometric Analyses

Simple tabular analysis was carried out and t-test and chi-square test were employed for testing the difference of mean and independence of attributes. Logit model (Gujarati, 1999) was used for analyzing the factors affecting migration decision of the breeders.

The logit model was specified as per Equation (1):

$$\ln [P(M) / \{1-P(M)\}] = Z_i = X_i' \beta + E \quad \dots(1)$$

where, P(M) = Probability of migration, X_i' = Vector of explanatory variables, β = Vector of response coefficients, and E = Vector of random disturbance.

Model Specification

This analysis did not consider the anthropological and historical factors that affect migration, but dealt with the temporary migration within the existing socio-economic framework. We put forward the hypothesis that the decision to migrate was affected by various endowments of the farmers — human, production and institutional. The human endowment factors enable the potential migrants to understand and decode the information and thereby help in informed decision-making. Moreover, the risk assessment and bearing behaviour of the farmers are affected by the individual and psychological attributes of the farmers. The production endowment factors affect the choice and/or desirability of various management practices. The risk-bearing ability of the farmers also depends on the production environment, notably in the form of their capital assets. The institutional endowments, in the form of the capability enhancing societal arrangements, influence the decision of the farmers to migrate.

The specific logit model estimated to predict the odds of a farmer migrating was:

$$\ln [P (M) / \{1-P (M)\}] = \alpha + \beta_1 \text{ AGE} + \beta_2 \text{ LIT} + \beta_3 \text{ MALETOT} + \beta_4 \text{ OPHIRR} + \beta_5 \text{ FLOCKSIZE} + \beta_6 \text{ TOTBOVINE} + \beta_7 \text{ CREDIT} + \beta_8 \text{ ORGMEM} + \beta_9 \text{ CASTE} + \mu \quad \dots(2)$$

where, α = Constant, AGE = Age of the farmer, LIT = Literacy status of the farmer, MALETOT = Total male members of the family, OPHIRR = Size of irrigated operational holding, FLOCKSIZE = Flock size, TOTBOVINE = Total bovine holding with the farmer, CREDIT = Dummy variable for credit absorption, MEM = Membership of the farmer in the informal and formal organisations related with farming, CASTE = Caste of the farmer, μ = Random error-term with usual stochastic properties and α and β_i s were the coefficients to be estimated.

Three variables were included in the model to exclusively capture human endowment of the farmers, viz. age of the farmer, and literacy status of the farmer and total male members in the family. It was hypothesised that age of the farmer would have negative influence on the decision to migrate as it would be physically tiresome for the elders to withstand the drudgeries associated with the migration process. Literate farmer would be more forthcoming in the adoption of new technologies compared to the illiterate farmer and might undertake some coping strategies other than migration. On this premise, negative sign was hypothesized for literacy variable. Since migration is a labour-intensive activity, positive sign was expected for labour variable on odds of migration. As migration was mainly undertaken by male members of the family, including children, total male members in the family was used as a proxy for potential household labour supply.

The production endowment of the farmer was represented by three variables, viz. size of irrigated operational holding, sheep flock size and total bovine holding. The operational holding acted as a source of wealth of the farmer and therefore his risk bearing ability, and would negatively affect the migration decision. However, since crop husbandry was circumvented by water availability, the size of irrigated operational holding was used as a proxy for the wealth of farmers, rather than the entire operational holding size. The more the flock size, the more the farmers' incentive for migration so as to avoid competition for

grazing resources. On this premise positive sign was hypothesized for the variable. The bovine would provide larger income on account of milk production and it would contribute towards the nutritional and livelihood security of farmers, thereby reducing the prospects of migration.

The institutional endowment factors were captured by three variables, viz. the dummy variable for credit absorption, membership of the farmers in various formal and informal organisations related with the sheep farming as well as the caste of the farmer. Since the farmer had to travel long distances during migration, he needed financial support to the family members as well as to meet his own expenditure. Part of the expenditure would be met out through occasional sale of the animals and partly through credit. It was expected that the farmers who had better chances of availing credit were more prone to migrate and on this premise, positive sign was hypothesized for the variable. Farmer's contact with various formal and informal organisations would provide them necessary social overhead capital conducive for migration. The caste is a widely prevalent social institution and some community/caste practise migration quite often than others.

Results and Discussion

Trends in Migration of Sheep Population in Rajasthan

Despite efforts of various agencies to sendentitize the migrant population, the official data did not reflect this. The data analyzed over a period of 11 years from 1996-97 to 2006-07 indicated that the total migration did not show any definite trend and was highly unstable (Table 1). The total migration was to the tune of 20 lakhs in 1996-97, it decreased to 8.53 lakhs in 1997-98, increased to 26 lakhs in 2002-03, decreased again to 8.6 lakhs in 2003-04 and then increased to 33 lakhs in 2005-06. The mean value of the total migration over the entire period was to the tune of 19 lakhs, of which about 40 per cent was accounted for by the temporary migration and the rest by the permanent migration. The overall annual growth rate was 0.85 per cent in case of the overall migration contributed by 0.12 per cent growth rate in case of the temporary migration and 0.73 per cent in case of permanent migration. None of the growth rates was statistically significant. The statistical insignificance was mainly on account of high

Table 1. Trend in migration of sheep in Rajasthan: 1996-97 to 2006-07

(in lakhs)

Year	Temporary migration	Permanent migration	Total migration	Temporary migration as percent of total migration
1996-97	4.6	15.7	20.3	22.8
1997-98	2.4	6.2	8.6	27.7
1998-99	3.3	15.4	18.7	17.7
1999-00	14.9	5.7	20.6	72.4
2000-01	6.5	8.4	14.9	43.4
2001-02	9.7	6.7	16.4	59.3
2002-03	20.0	6.1	26.1	76.6
2003-04	2.8	5.8	8.6	32.7
2004-05	4.4	21.1	25.5	17.4
2005-06	10.5	22.4	32.9	32.0
2006-07	2.4	15.8	18.2	13.2
Mean (lakh)	7.4	11.7	19.1	-
Coefficient of variation	78.2	54.9	38.1	-
Growth rate (%)	0.12	0.73	0.85	-

Data Source: Government of Rajasthan (2007)

instability, as could be observed from the values of the coefficient of variation. The share of temporary migration in total migration was also on increase, though with higher rate of instability compared to both permanent and overall migrations. A reflection of the data *vis-a-vis* the pattern of drought in the state indicated that on drought years, the total sheep migration as well as the proportion of temporary migration in total migration recorded sudden increases as could be observed from the figures for the year 2002-03, which was classified as a severe drought year in the state. During that year the total migration reached the level of 26 lakhs, wherein the temporary migration contributed more than 75 per cent.

Though the total sheep under migration did show statistically significant growth rate, the figures became more visible once we related them with the total sheep population in Rajasthan. The sheep population in Rajasthan declined from 16 million heads in 1997 to 10 million heads in 2003 (GoI, 2003). If total migration was considered as a percentage of total sheep population in the state, then the proportion of sheep population in Rajasthan under migration was on increase. Moreover, there was high chance of underestimation of the extent of migration owing to the failure to record all cross-border and within-state migrations. If these factors were also taken into consideration, the share

of sheep under migration might be much higher than what was officially estimated. While permanent migration can be considered as an accepted way of life of some people (of some castes and regions), temporary migration mainly originates as a result of demand-supply imbalance in fodder availability, mainly induced by decline of total rainfall.

Socio-economic Characteristics of Sheep Farmers

Though sheep farming was one of the major occupations of the small-holders of the state, it was undertaken by a large number of the landed class also; about three-fourths of the sheep farmers belonged to semi-medium, medium and large categories of farmers (Table 2). The literacy rate was quite low at 31 per cent; it was the highest in small farmers and the lowest in large farmers. Sheep farming is highly labour-intensive and family size of breeders is often supportive of this extensive system of management under which sheep are predominantly raised. The average size of the family was 7.4, ranging from about 6 in landless farmers to 14 in large farmers. About one-third of the total farming households belonged to the joint family system. However, within the same family, independent ownership as well as management of flock also existed. The average size of operational holding was about 3.6

Table 2. Socio-economic characteristics of sheep farmers

Characteristics	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
No. of farmers	20	15	29	57	56	44	221
Literacy rate (%)	25.0	26.7	55.2	31.6	21.4	6.8	30.8
Family size (No.)	6.0	6.3	6.1	6.8	8.2	14.3	7.4
Joint family (%)	20.0	20.0	34.5	33.3	41.1	27.3	32.6
Operational holding (ha)	0.0	0.5	1.4	2.8	6.1	14.9	3.6
Irrigation (%)	19.1	11.7	23.3	12.1	13.4	14.6	
Livestock holding (No.)							
Sheep	55.0	63.8	56.1	59.0	64.4	70.5	60.9
Goat	4.6	5.5	4.4	4.6	5.9	7.1	5.2
Cattle	0.9	0.6	1.4	2.2	2.4	3.8	1.9
Buffalo	0.7	0.3	1.4	1.8	2.7	4.4	1.8
Total bovines	1.7	0.9	3.1	4.38	5.8	9.7	4.1
Total small ruminants	59.5	69.2	60.5	63.7	70.9	77.6	66.2
Total livestock	61.2	70.1	63.6	68.4	75.8	87.2	70.1
Adult cattle unit	13.2	14.6	14.9	16.5	19.4	24.3	16.9

Data source: Field survey

ha. However, the cultivability of the land was poor as only about 15 per cent of the total land was irrigated.

The average size of sheep holding was 61, ranging from 55 among landless farmers to nearly 70 in large farmers. The pattern of variation indicated a positive association between landholding-size and flock-size. This relation was true for other livestock species like goat, cattle and buffalo also. The total livestock holding with the sheep farmers was about 70, which included on 5 goats, 2 cattle and 2 buffaloes as well. For a comparison of the total livestock holding across different land categories, the independent livestock units were converted into adult cattle unit (ACU). The average ACU holding was about 17. It increased consistently from about 13 in case of the landless farmers to about 24 in the case of the large farmers.

Migration of Sheep Flocks

During the survey year, about 32 per cent sheep farmers undertook short-term migration (Table 3). An analysis into the pattern of migration revealed that the percentage of sheep farmers migrated increased as landholding size increased. The average size of migrated flock was about 70 and it was higher than the average flock size of the entire sheep breeders (61).

A comparison of some of the socio-economic variables of sheep breeders across migrant and non-

Table 3. Distribution of migration status of farmers across land-category

Land-category	Per cent	Flock size (No.)
Landless	25	57
Marginal	28	64
Small	20	70
Semi-medium	43	68
Medium	32	74
Large	40	73
Overall	32	70

Data source: Field survey

migrant categories is provided in Table 4. It was found that migrant farmers had a higher number of male members in the family, which facilitated migration. The literacy rate was also higher among migrant sheep breeders and this might have helped them in accessing credit facility; 39 per cent of the migrant farmers availed credit, *vis-a-vis* 15 per cent in non-migrant farmers, and the difference was statistically significant also. The chi-square test also indicated a significant association between migration and membership in farmer-related organizations. No significant difference was seen between the two categories of sheep breeders in terms of sizes of operational holding, irrigated holding and literacy rate. The ownership pattern of livestock indicated that the migrant farmers had a larger sheep

Table 4 . A comparison of socio-economic variables of migrant and non-migrant farmers

Variables	Non-migrants	Migrants	t / chi square value
Age of the breeder (years)	43.8	43.4	0.3
Family size (No.)	7.1	8.1	-1.7*
Joint family (%)	0.3	0.3	0.1
Total male members (No.)	3.6	4.4	-2.2**
Operational holding size (ha)	3.4	4.0	-1.0
Irrigated holding size (ha)	0.5	0.6	-0.2
Literacy rate (%)	28.0	37.0	1.9
Credit absorption (%)	15.0	39.0	16.0***
Membership in organizations (%)	10.6	11.4	4.2**
Livestock holding size (No.)			
Flock size (No.)	56.6	70.0	-3.3***
Goat	5.5	4.4	1.5
Cattle	1.7	3.1	-4.4***
Buffalo	1.8	1.9	-0.3
Small ruminants	62.2	74.9	-2.9***
Bovines	3.5	5.6	-3.4***
Total livestock	65.2	81.0	-3.5***
Adult cattle units	15.4	20.1	-4.1***

Data source: Field survey

Note: ***, ** and * indicate significance at 1 per cent, 5 per cent and 10 per cent levels, respectively.

flock size; it was 70 in migrant and 57 in non-migrant farmers and the difference was statistically significant also. A larger holding-size in the cases of goats, cattle, total bovines and total livestock was observed in terms of both absolute numbers and adult cattle units with migrant farmers.

The sheep farmers were sensitive to the suitability of the breeds for migration. The native sheep breed in the surveyed areas was *Malpura*, a descript one as per documents (Acharya, 1982). Earlier records and field surveys had indicated that almost all farmers of this region possessed *Malpura* breed only. But gradually this breed is being replaced by *Kheri* — a non-descript breed developed by crossings of *Malpura* and *Marwari* breeds. The *Marwari* breed is known for good walking-capacity for long distances which is a desirable attribute for migration. *Malpura* is endowed with better body weight compared to *Marwari* breed. In order to exploit better walking ability of this breed combined with higher body weight of *Malpura* breed, the farmers developed and popularized crossings of *Malpura* and *Marwari* breeds known as *Kheri*. While 86 per cent of the migrating breeders owned *Kheri*

breed, in the case of non-migrating breeders it was 66 per cent. The chi-square test for independence of attributes could not reject the association of migration and breed composition. The development of new breed by the sheep farmers could be viewed as a response towards the declining rainfall in the region and increasing preparedness to migrate.

Migration and Adoption of Improved Management Practices

The extent of adoption of improved management practices (IMPs) by the migrating and non-migrating breeders was studied by seeking their response in terms of “always”, “sometimes” and “never”, to which respective weightage of 2, 1 and 0, was assigned. The average score for each of these management practices was compiled and tested for its statistical significance (Table 5).

The overall adoption index was calculated by summing the score across the management practices and number of respondents and dividing the total score thus obtained with the maximum obtainable score for all the sheep farmers. The average score was 0.46 for

Table 5. Extent of adoption of selected improved management practices by migrant and non-migrant farmers

Improved management practices	(Mean scores)		
	Non-migrants	Migrants	t-value
Stringent ram selection procedures	1.92	1.86	1.15
Exchange of rams	0.26	0.37	-1.27
Fodder conservation	0.11	0.21	-1.55
Feeding concentrate mixture	0.01	0.30	-5.45***
Artificial insemination	0.21	0.21	-0.12
Treating anoestrous sheep	0.61	0.63	-0.15
Vaccination against sheep pox	1.51	1.24	2.11**
Vaccination against PPR	0.50	1.11	-4.87***
Vaccination against enterotoxaemia	1.64	1.47	1.44
Vaccination against FMD	1.20	1.13	0.51
Drenching against endoparasites	1.56	1.63	-0.91
Cleaning of the barn with lime	0.08	0.06	0.56
Footbath with copper sulphate	0.28	0.39	-1.05
Disinfection against ecto-parasite	0.99	1.16	-1.67*
Feeding of colostrum to newborns	1.18	1.46	-2.09**
Graded marketing of wool	1.72	1.71	0.01
Overall Adoption Index	0.46	0.49	-1.62**

Data source: Field survey

Note: ***, ** and * indicate significance at 1 per cent, 5 per cent and 10 per cent levels, respectively.

the non-migrant and 0.49 for the migrant sheep farmers, the difference being statistically significant at 5 per cent level. The higher score for the migrant farmers was observed in all the important management practices. The statistical test could establish higher adoption in the case of feeding of concentrate mixture to the animals, vaccination against *peste de pestis ruminants* (PPR) disease, disinfection against ecto-parasites and feeding of colostrum to new borns.

Factors Influencing Migration

The major socio-economic factors influencing migration were analyzed by using logit model (Table 6). Though the coefficients could not be interpreted as the impact of variables on the decision to migrate, these could provide an indication of the direction of their influence. The statistically significant variables were: total number of the male members in the family, flock size, credit absorbing nature of the farmers and caste of sheep farmers. The number of male members in the family was used as a proxy for household labour supply; a larger family could spare the services of a male member for migration easily compared to a smaller family. Regarding size of sheep flock, it may be said

that larger the flock size, the higher the probability of migration. It could be to avoid competition with smaller flocks which depend mostly on pasture resources of the native place. The choice for migration depends on his relative preference for bearing the drudgeries of sheep migration over income loss arising out of downsizing the flock size suiting to the carrying capacity of the pasturelands.

En-Route Problems during Migration

The major en-route problems faced during migration were identified by simple tabular analysis. Based on the number of responses to the constraints being faced, the percentages were worked out. The most important en-route problem was 'increased morbidity of the sheep flock' during migration, reported by 96 per cent of the farmers (Table 7), followed by 'non-availability of proper veterinary medicines' (about 75% farmers), resistance from local farmers (64% farmers). The local sheep farmers oppose the migrating flocks due to the fear of losing the feed and fodder for their livestock. Occasionally, this resistance even turned to violent proportions. Other major constraints were loss of livestock due to theft and missing, mental tension of

Table 6. Logit estimates of factors influencing temporary migration of sheep farmers

Variable	Description of variable	Coefficient	Standard error	t-value	Mean
Constant		-3.7851	0.9455	-4.003***	-
AGE	Age of the farmers (years)	-0.0062	-0.015	-0.407	43.66
LIT	Literacy of the farmers (1 for literate and, 0 otherwise)	0.5090	0.3588	1.419	0.3122
MALETOT	Total number of males in the family (No.)	0.1566	0.0730	2.144**	3.8462
OPHIRR	Size of irrigated holding (ha)	-0.0970	0.1461	-0.664	0.5328
FLOCKSIZE	Sheep flock size (No.)	0.0161	0.0060	2.709***	60.86
TOTBOVINE	Total number of bovines (No.)	-0.0006	0.0014	-0.432	4.14
CREDIT	Credit absorption by farmers (1 for yes and 0, otherwise)	1.3658	0.3752	3.64***	0.2217
ORGMEM	Membership in farmers' organization (1 if member, 0 otherwise)	0.1034	0.5446	0.190	0.1086
CASTE	Caste of the farmers (1 for ST, 2=SC, 3=OBC and 4 Others)	1.3551	0.5542	2.445**	0.8462
log likelihood value	-118.67				
N	221				
Chi-square	38.63**				

Note:** and * indicates significance at 1 per cent and 5 per cent levels, respectively.

Table 7. Enroute problems faced by the farmers in migration

(per cent)

Problems	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall	Rank
Lack of market information	20.0	37.5	22.2	45.9	50.0	33.0	40.0	7
Increased morbidity of sheep	100	100	88.9	95.8	94.4	100	95.7	1
Non-availability of medicines	60.0	75.0	44.5	83.3	83.3	83.3	75.8	2
Theft and missing of sheep	60.0	50.0	77.8	54.2	61.1	67.0	60.0	4
Resistance from the locals	20.0	62.5	55.6	83.3	61.1	50.0	64.3	3
Harassment from officials	20.0	12.5	1.1	8.3	11.1	0.0	10.0	9
Deterioration in health of farmers	60.0	37.5	55.6	45.8	44.4	50.0	47.1	6
Lack of liquid money	40.0	0.0	22.2	25.0	44.4	50.0	30.0	8
Mental tension of the breeder	60.0	50.0	44.4	54.2	44.4	50.0	50.0	5
No. of sheep farmers	5	8	9	24	18	6	70	-

Data source: Field survey

the migrant farmers due to long distance travel, separation from the family, drudgeries during travel and insecurity in the remote villages. Lack of marketing and healthcare facilities during migration and harassment by the officials concerned with the restriction of the pastoralists were also important enroute problems faced by the farmers.

Having identified high morbidity as a major problem, an attempt was made to find the availability

of veterinary facilities to the sheep farmers (Figure 1). Almost all the migratory farmers had to avail the services of private veterinarians. A wide prevalence of treatment by the self-prescription of farmers and treatment based on the advice of the salesman of the medical store was also observed. The extent of involvement of the public sector in the health management practices of migratory sheep as well as breeders was conspicuous by its near absence.

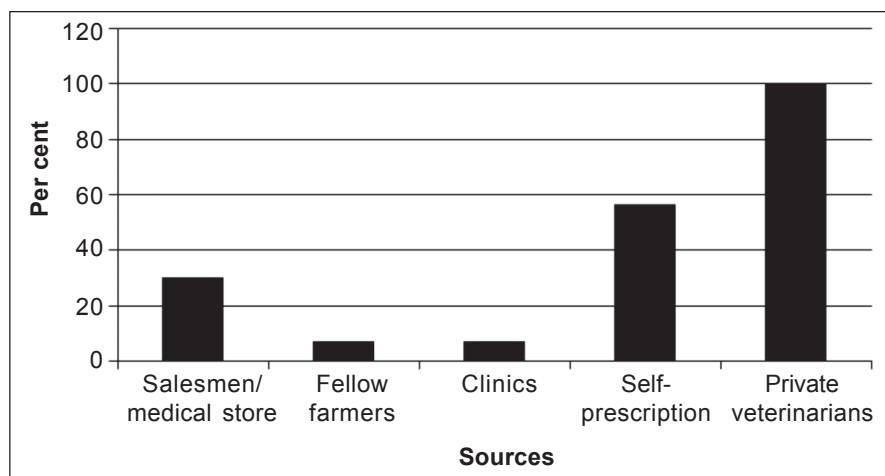


Figure 1. Sources of veterinary treatment across migrating farmers

Strengthening of the institutional veterinary facilities bears the key role in providing relief to the sheep farmers during migration.

Return from and Expenditure of Sheep Farming

An analysis was carried out to examine the return from and expenditure on sheep farming (Table 8). The analysis indicated that for an average flock of nearly 60, the gross return was ₹ 33020 and total expenditure was ₹ 6850, giving a net return of ₹ 26170. Since many

of the fixed assets were heritable in nature and difficult to estimate in the case of sheep, which were usually penned in open, we included only variable cost in the expenditure side. The major items of variable costs were feed and fodder, veterinary care, hired labour and interest on variable capital. More than half of the expenditure was accounted for by the feed and fodder, nearly one quarter by the veterinary expenditure and the remaining by the hired labour and interest on variable capital. Labour-use in sheep farming was mainly

Table 8. Return from and expenditure on sheep farming in Rajasthan

Items	Non-migrant		Migrant		Overall	
	Amount (₹/ flock)	Share (%)	Amount (₹/ flock)	Share (%)	Amount (₹/ flock)	Share (%)
Expenditure						
Feed and fodder	3222	53.1	4857	56.9	3740	54.6
Veterinary care	1484	24.5	2504	29.3	1807	26.4
Hired labour	806	13.3	405	4.7	679	9.9
Interest	551	9.1	776	9.1	623	9.1
Total expenditure	6064	100	8543	100	6850	100
Returns						
Animal sale	24340	78.8	29322	77.8	25918	78.5
Wool sale	2327	7.5	3108	8.3	2574	7.8
Milk sale	1837	6.1	2578	6.8	2072	6.3
Manure sale	2351	7.6	2684	7.1	2456	7.4
Gross return	30885	100	37692	100	33020	100
Net return	24821		29149		26170	
Flock size	57		70		61	
Net return per animal	438		417		429	

Data source: Field survey

accounted for by the family labour. Use of hired labour was low and amounted to only ₹ 679 per year.

The major items providing return were sale of live animals, wool, milk and manure. The live animal sale had the lion's share (78%) in total returns. The sale of wool, milk and manure together accounted for 22 per cent in net returns. However, the income and expenditure pattern exhibited differences across the migration status. The sale of live animal accounted for a slightly higher proportion in case of non-migrants. The overall net return per animal was ₹ 438 in non-migrating flocks and ₹ 417 in migrating flocks, giving rise to the overall net return of ₹ 429 per year.

Policies-related to Migration

Sheep migration and pastoralism have been in conflict with the state for a long time. One major reason for the conflict is the failure to recognize 'migration' as part of the life of some herd owners, notably sheep breeders. The effort of the state has been to sedentarise the migrating population. This approach towards migration is being observed since the colonial period. Kavoori (2005) has described three phases of responses to the pastoralism. During the colonial period, the attitude was dominantly antagonistic as migration was considered as a source of law and order problem. The relation between the sedentary population and the migrants was of conflict, often resulting in violent reactions. Later, with the advent of planned economic development, there were efforts from the state to modernize the migratory population towards newer technologies which were introduced to them in the form of high-yielding breeds and husbandry practices. Gradually, the developmental discourses have given way to newer issues like environmental degradation towards which pastoral grazing practices were considered as a major causative factor. Though there were literature to disprove this belief, the dominant view was for restricting the pastoralism, and even legal measures were resorted to this end.

However, various interventions to sedentarise the migrant population resulted in strained relations between various stakeholders — the migrants, the native population and the state. As some researchers argue, the discussions were not without partisan interests in it. The strategy to sedentarise the migratory population and restricting their movement amounted to "displacing" them from their natural habitat. The alternate solutions

suggested to them could not be adopted by most of the migrant population due to various reasons and were mainly suitable for the farmers having sufficient quantity of land and other capital (Kavoori, 2005). This resulted in non-compliance of the migrants with the sedentarisation efforts. The sporadic droughts in the state accentuated this situation. Despite efforts of various agencies to reduce the migration and to sedentarise them, the number of sheep flocks migrated did not show corresponding trend. Yet another reason for this might be that many of the legislations to curb the pastoralism were pronounced without providing them alternate fodder sources or productive assets. Therefore, attempts to curtail migration sometimes acted as an encroachment towards the livelihood option of the migrant populations.

The above discussion highlights that complete abandonment of migration is not a tenable solution in the near future, on account of the fact that the migration was a way of life and an adaptive mechanism evolved over years, not as an end in itself, but a processes, shaped out of the interaction of various forces emanating from the social, political and economic context. The increasing market orientation of the sheep farmers and encouraging market signals arising in the form of accelerating demand for sheep products, particularly for mutton, from the urban centres, would encourage the farmers to undertake sheep production, and the option of migration would be exercised, more frequently so, with the increasing risk element in the production conditions (say, in the form of deficit rainfall or droughts). The intervention of the state may be to provide institutional services in the form of accessibility to fodder and feed resources, veterinary facilities and market infrastructure to facilitate sheep production. Conservation and regeneration of existing pastures bears the key role in the efforts. This would partially address the compelling factors for migration. In the long-term, providing opportunities for intensive farming as well as gainful non-farm and off-farm employment should be a strategy.

Conclusions

The temporary migration of sheep is a method of production as well as an adaptive mechanism against the risk in production. Various factors like flock size, availability of capital for migration and potential household labour supply influence short-term migration.

During migration, farmers face various constraints, the major one being high morbidity of sheep, lack of facilities to address the health problems of sheep, resistance from the native population and deterioration of health of sheep farmers. The sheep farmers, while migrating absorb elements of modern farming principles. Rather than characterizing migration as an obstruction to the developed way of life, it is to be understood as an evolving socio-economic phenomenon and a response towards shocks in production condition. Addressal of the problem faced by the migratory farmers is important in ensuring their livelihood security and achieving inclusive growth. The institutions of governance have to address various problems faced during migration, notably by improving the availability and accessibility to fodder and feed, healthcare and marketing facilities and strengthening the extension system for better technology dissemination.

References

- Acharya, R.M. (1982) *Sheep and Goat Breeds of India*. Animal Production and Health Paper 30, FAO, Rome.
- Bharara, L.P. (1989) Socio-economic aspects of livestock migration and pastoral nomadism in drought-prone areas of Rajasthan. In: *Livestock Economy of India*, Indian Society of Agricultural Economics and Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Government of India (2003; 2007) *Livestock Census*, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, New Delhi.
- Government of India (2006) *Basic Animal Husbandry Statistics*, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, New Delhi.
- Government of Rajasthan (2007) *Prasasnik Prathivedan. 2006-2007*, Department of Animal Husbandry, Jaipur.
- Gujarati, Damodar (1999) *Basic Econometrics*, McGraw-Hills, New York.
- Jithendran, K.P. and Bhat, T.K. (2001) Epidemiology and control of parasitism in nomadic situations in Himachal Pradesh, *Envis Bulletin: Himalayan Ecology*, **9**: 5-13.
- Kavoori, S. Purnendu (2005) Pastoral underdevelopment and the developmental state: Or why the Government has given up on the pastoralists of Rajasthan?, *Geography Research Forum*, **25**: 28-42.
- Narain, P. and Kar, A. (Eds) (2005) *Drought in Rajasthan: Impact, Coping Mechanism and Management Strategies*. Central Arid Zone Research Institute, Jodhpur.
- Rathore, J. S. (2004) Drought and household coping strategies: A case of Rajasthan. *Indian Journal of Agricultural Economics*, **59**: 689-708.
- Rollenfson, I.K. and Rathore, H.S. (2004) The camel in Rajasthan: Agrobiodiversity under threat, *Annals of Arid Zone*, **43**(3&4): 401-412.
- Wani, S.A., Wani, M.H., Shohaib Yusuf, Shaheen, F.A. and Showkat, Ara (2008) Pastoral nomadism in breeding tract of Changthangi pashmina goats, *Indian Journal of Small Ruminants*, **14**(1): 77-83.