Livelihood Sources and Constraints of Rural Households in Bundelkhand Region

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ABSTRACT

The study has assessed the social status, sources of income and constraints of rural households in livelihood under SRLS programme of NAIP. Data on 404 households was collected from 16 villages from two disadvantageous districts namely Hamirpur and Mahoba of Bundelkhand region. The average land holding size, total income per household per year and average family size was 1.42±0.07 ha, Rs. 44332 and 5.80±0.15, respectively in Hamirpur and 1.71±0.08 ha, Rs. 46671 and 5.97±0.12, respectively in Mahoba district. People of backward castes (>67%) predominate in rural social composition. Marginal and small farmers constitute more than 58 per cent rural population in both the districts. Major sources of income were agriculture, wages and livestock which accounted for 52.4, 32.0 and 15.0 per cent, respectively in Hamirpur and 36.1, 40.3 and 23.6 per cent respectively, in Mahoba district. Wheat is also important crop and production of pulse and oilseed crops in rain-fed fields was low ranged from 3-7 and 2-5 qt. per hectare. Less than 13 per cent area of total cropped area was sown twice in a year in both the districts. Forced migration of people was ranged from 5 to 80 per cent over the villages with an average of 42 per cent. Goat, cow and buffaloes were major livestock species and kept by more than 89 per cent people irrespective of landholding size and caste. Average herd/ flock size of cattle, goat and buffalo were 2.27, 3.05 and 1.84, respectively in Hamirpur and 2.42, 4.06 and 1.84, respectively in Mahoba district. Overall livestock productivity is low and primarily attributed to inadequate feed and fodder. Major livelihood constraints were poor management of rain water, lack of irrigation sources and non-functional irrigation network, top soil erosion, huge gap in production and potential yield of crops and livestock, scarcity of feed-fodder, lack of institutional credit and knowledge gap. Comprehensive programmes are required to uptake and strengthening of rain water harvesting, integrated farming and institutional credit.

Key words: Bundelkhand; Innovation; Income; Sustainable; Non-farm sector; Integrated farming; Migration;

Bundelkhand region consists of seven districts of Uttar Pradesh and six districts of Madhya Pradesh and known for poor level of per capita income and human development in the country. Topographically, Bundelkhand region is situated on Vindhya hilly tract of central India and characterized as drought prone semi-arid region. Most of rain is received through South-West monsoon which become quite weak before reaching to this region. Furthermore, rainfall is highly erratic due to long gaps in monsoon. This region is marked by extremes of temperature i.e. highest (48.6°C) and lowest (-1.2°C). Area under Uttar Pradesh region of

Bundelkhand is 29.6 lakh hectares out of which gross irrigated area is only 37 per cent. Yamuna, Betwa and Ken are main rivers of Hamirpur, and Dhasan is the main river of Mahoba district. All these rivers and canals are seasonal and remain dry during February to July. Bore well become non-functional for a period of 6-9 months due to depletion of ground water level. Major soil types of these districts are Parwa (red) and Kabar (black) with poor water holding capacity. Top soil erosion through water and wind is another big problem, not only of these districts but of entire Bundelkhand due to hilly landscape, very thin vegetation cover, poor soil texture

and high wind velocity which leads to wide spread growth of gullies. Farmer's often realized negative income from agriculture due to drought and high cost of production thus, are reluctant for crop cultivation and prefer to work as labour (*Singh et al., 2013*). Livestock is integral component of rural livelihood and most of household's keep mixed livestock species. Low income or loss in crop farming, uncertain crop production, low productivity of livestock, stray grazing (*anna-pratha*), negligible adoption of technologies, poverty, lack of institutional credit and high incidences of distress migration were major attributes of rural households in Bundelkhand. Two disadvantaged districts namely Hamirpur and Mahoba were selected under Sustainable Research on Livelihood Security (comp-3) of NAIP to develop sustainable livelihood models to address issues of rural poverty and livelihood security.

METHODOLOGY

A baseline survey was conducted during 2009-10 at cluster, village and household levels with the major objective of understanding and documenting the livelihood sources, role and status of integrated livestock-crop production in household's income, socio-economic status of the people and livelihood constraints under NAIP-Comp-3 project. A total of 16 villages were selected and grouped into 8 clusters *viz.*, Barel, Rath, Behooni-Khurd and Etora in Hamirpur and Kulpahar, Belatal, Mahoobkanth and Kharela in Mahoba district. Baseline data (family income, land holding size, livestock size and composition, family size, irrigation status, farm machinery, cropping pattern, crops productivity, livestock productivity, area under fodder crops, feed-fodder availability to livestock, migration duration and pattern etc.) was collected from 404 households belonging to different categories (landholding and social) of people. A sample of 25-30 households was identified from each village and interviewed. Information was also collected on irrigation source, common property resources, etc. from village Patwari and district Panchayat Bhavan. Landholding size was categorized as landless (<0.002 ha), marginal (0.002-1.0 ha), small (1.01-2.0 ha), semi-medium (2.01-4.0), medium (4.01-1-.0 ha) and large (>10 ha) as per *GOI, 2006*. Household income and their sources was collected from owners, verified and corroborated from available physical resources. Income of households from wages during out-migration was not available thus not included in analysis. Ranking of constraints was made on the basis of score obtained as per *Garret* analysis.

RESULTS AND DISCUSSION

Socio-economic profile of rural households: The social structure in adopted villages in both the districts was almost similar (Table 1). The human population of 4 clusters in Hamirpur was 38127 and 26825 in Mahoba district with corresponding family size of 5.80±0.15 and 5.97±0.22. Majority of the population in villages of both districts belong to backward (>67%) followed by schedule caste and tribes (>19%). The proportions of landless, marginal, small, semi-medium and large farmers were 15.2, 41.9, 17.7, 16.6, 8.2 and 0.8 per cent respectively in Hamirpur and 14.0, 37.7, 20.2, 20.2, 5.3 and 2.6 per cent in Mahoba district. Area under irrigation and fodder crops was 51.4 and 4.15 per cent of total cropped area in Hamirpur and 31.7 per cent and 2.29 per cent in Mahoba district. However, irrigated area was partially equipped and functional for a limited period (4-5 months) in a year. With secure irrigation, the land value becomes high and cropping intensity also increased up to 24 per cent. Goat, cows and buffaloes were major livestock species and kept by more than 89 per cent households irrespective of land holding size and reared mostly under mixed crop-livestock production system (Table1). Majority of households (>64%) were literate but were deficient in working knowledge. However, literacy rate among aged male and adult women was only 22 per cent. The detailed information of income from sizable households (>37%) could not be found as they were gone for migration, but majority (>85%) of them belong to marginal, small farmer and landless category. Exposure of households about technological advancement pertaining to crops, livestock and natural resources management, education, general sanitation, health measures and government welfare schemes (loan, credit, development programme etc.) was meager. People were largely avoiding risk for innovations or technology adoption in crop and livestock. Most of women (83%) irrespective of caste and age were involved in crop and livestock activities.

Income sources: Major sources of income in adopted villages were agriculture, wages and livestock which accounted for 52.4, 32.0 and 15.5 per cent, respectively of total income in Hamirpur (Table 2) and 36.1, 40.3

Table 1. Land and social attributes of adopted villages

Particular	Hamirpur	Mahoba
Livelihood Profile		
Human population	38127	26825
Family size (N)	5.80±0.15	5.97±0.22
Age (Y)	43.80±0.75	44.29±1.30
Land holding size (ha)	1.42±0.07	1.71±0.08
Household income (Rs)	44332	46671
Social class		
General (%)	9.06	13.16
OBC (%)	75.00	61.08
SC/ST (%)	14.86	24.56
Minority (%)	1.09	1.12
Landless (%)	15.2	14.0
Marginal farmers (%)	41.9	37.7
Small (%)	17.7	20.2
Semi-medium (%)	16.0	20.2
Medium	8.2	5.3
Large (%)	0.8	2.6
Area sown (ha)	5662	5327
Rain-fed area (ha)	2752 (49.6%)	3693 (69.3%)
Area under fodder crops (ha)	235 (4.15)	121.5 (2.29)
Cattle population	11700	6110
Buffaloes population	8695	5770
Goat population	12510	10230
Sheep population	182	0
Poultry	1260	240
Pig	370	214

Note: Figures in parentheses are percent to total

and 23.6 per cent, respectively in Mahoba districts (Table 3). The overall average annual income per household in Hamirpur district was Rs. 44332 which varied from Rs. 37,424 (Etkor) to Rs. 70,000 (Chilli). Average annual income from crops varied from 19.2 per cent (Behooni Khurd) to 68.0 per cent (Etora); it was 10.3 per cent (Chilli) to 26.7 per cent (Barel) from

livestock and 20.2 per cent (Etora) to 64.4 (Behooni-Khurd) from wages in villages of Hamirpur district. The overall average income per household in Mahoba districts was Rs. 46671 which varied from Rs 33,772 (Sudamapuri) to Rs 84,027 (Bharwara). Contribution of agriculture in total annual income varied from Rs. 19.6 per cent (Sudamapuri) to Rs 56.2 per cent (Budhwara); it was 16.3 per cent (Sudamapuri) to 29.5 per cent (Parthania) from livestock, and 28.5 per cent (Parthania) to 64 per cent (Sudamapuri) from wages in Mahoba district (Table 3). Wages were the major source of income among land less and marginal household category in Hamirpur and land less, marginal and small household category in Mahoba district. Wages remain an important source of income among small and semi-medium farmers in Hamirpur and semi-medium and medium farmers in Mahoba district. The major expenditure of people was on food (60-70%) followed by house construction/ repairing (20-25%), marriages, clothing, health and education (10-30%). Migration was a severe and common phenomenon in all the selected villages (8-35%) of Hamirpur district. More than 35 per cent households of Sarsai, Behooni-Khurd and Bakrai villages were forced for migration. Migration was severe in villages of Mahoba district where more than 40 per cent households (some member or entire family) leave their villages. Livelihood situation was critical in Sudamapuri, Tikaria and Aari villages of Mahoba district, where 80, 75 and 50 per cent population were forced for migration with entire family (except aged persons). Contribution of crops in income increases with the increase in land size and irrigation access. Contribution of livestock in the entire land-holding category was an important source of income except large farmers

Table 2. Average households income from different sources in villages of Hamirpur district

Village	Agriculture (Rs.)	Livestock (Rs.)	Wages (Rs.)	Av. of total income (Rs.)
Etkor	16759 (37.9%)(*27*)	5907 (13.4%)(*27*)	18094 (48.6%)(*32*)	37424 (100%)(*33*)
Barel	20848 (33.7%)(*24*)	14148 (26.7%)(*28*)	26704 (39.6%)(*23*)	46375(100%)(*32*)
Aonta	38746 (68.0%)(*41*)	6675 (10.3%)(*36*)	22008 (21.7%)(*23*)	46702(100%)(*50*)
Sarsai	52778 (61.7%)(*10*)	14800 (19.2%)(*10*)	29400 (30.5%)(*9*)	70000(100%)(*12*)
Chilli	35800 (62.7%)(*10*)	6945 (10.9%)(*9*)	21428 (26.3%)(*07*)	43884(100%)(*13*)
Bihooni-k	9857 (19.2%)(*14*)	7350 (16.4%)(*16*)	28950 (64.4%)(*16*)	39933(100%)(*18*)
Etora	35385 (67.1%)(*39*)	6875 (12.7%)(*38*)	18037 (20.2%)(*23*)	48955(100%)(*42*)
Bakrai	21737 (46.2)(*35*)	8860 (17.2%)(*32*)	21529 (36.6%)(*28*)	37434(100%)(*44*)
Overall	28408 (52.4%)(*200*)	8514 (15.5%)(*196*)	22119 (32.0%)(*161*)	44332(100%)(*244*)

Values in percentage is share of income from different sources, Number in italic parenthesis are number of households in different categories

Table 3. Average households income from different sources in villages of Mahoba district

Village	Agriculture (Rs.)	Livestock (Rs.)	Wages (Rs.)	Av. of total income (Rs.)
Aari	15788 (33.2%)*(8)*	8475 (17.8)*(8)*	23238 (48.9)*(8)*	38000(100%)*(10)*
Budhwara	33900 (56.2)*(8)*	8792 (17.50)*(8)*	26417 (26.3)*(5)*	50250(100%)*(10)*
Bamhori-K	18849(40.7)*(20)*	12946 (29.3)*(21)*	13245 (30.1)*(21)*	44143(100%)*(21)*
Bharwara	31692 (37.7)*(16)*	16515 (19.65)*(16)*	46565 (42.6)*(14)*	84027(100%)*(19)*
Mahobkanth	17308 (33.6)*(16)*	12293 (27.8)*(16)*	17050 (38.6)*(16)*	44178(100)*(18)*
Tikaraia	13857 (33.7)*(21)*	116842 (25.7)*(19)*	17475 (40.5)*(20)*	34500(100)*(25)*
Parthania	33333 (42.1)*(8)*	20000 (29.5)*(8)*	33750 (28.5)*(5)*	67857(100)*(9)*
Sudamapuri	11905(19.6)*(9)*	9155 (16.3)*(11)*	23005 (64.1)*(17)*	33722(100)*(18)*
Overall	20072 (36.1)*(106)*	12579 (23.6)*(107)*	22440 (40.3)*(106)*	46671(100)*(130)*

Values in percentage is share of income from different sources, Number in italic parenthesis are number of households in different categories.

Table 4. Sources of income and livestock composition in different land holding categories

Land holding categories	Landless	Marginal	Small	Semi-medium	Medium	Large	Over all
Hamirpur district (N=274)							
Sources of Income (%)							
Agriculture	5.77	25.62	60.55	73.14	82.77	97.01	48.48
Livestock	17.02	16.93	15.11	14.99	15.57	2.99	15.49
Wages	77.21	57.45	24.34	11.86	1.66	0	36.03
Livestock Composition (No)							
Cattle	1.15	1.84	1.09	1.89	1.44	0	1.61
Buffalo	1.33	1.49	1.82	2.55	2.13	2.50	1.84
Goat	3.11	2.77	3.46	2.89	3.55	0	3.03
Mahoba district (N=130)							
Sources of Income (%)							
Agriculture	2.41	29.29	28.82	55.73	53.27	68.29	36.13
Livestock	9.33	26.45	22.25	24.61	26.70	31.71	23.56
Wages	88.26	44.26	48.94	19.66	20.03	0.00	40.31
Livestock composition (No)							
Cattle	1.00	1.36	1.71	2.06	2.00	2.33	1.65
Buffalo	0.00	1.36	1.77	1.50	2.40	2.00	1.57
Goats	3.13	4.43	4.75	3.08	2.00	1.00	4.01

category in Hamirpur, moreover, livestock contribution was evenly distributed in different landholding categories (Table 4). Present results on livestock contribution were in agreement of those reported by *Birthal and Taneja (2012)*.

Livelihood resource base:

Crops: Crops were the major source of income (>60%) except marginal farmers category in Hamirpur which could be attributed to relatively better irrigation network in five out of eight adopted villages. Whereas relative contribution of crops in all the landholding category of Mahoba district was substantially less as compared to Hamirpur district (Table 4) and could be attributed to

poor irrigation network. Most of area (>75%) in both districts was effectively rain-fed due to very poor infrastructure and efficiency of irrigation resources. Major sources of irrigation were bore-well and canal. Canal are seasonal and bore-well (>35%) become non-functional due to poor access of ground water from February onwards till July (commence of rainfall). Cropping intensity (85-120% over the villages) was quite low due to lack of irrigation facilities. Pulse and oilseed crops dominate in crop farming. Crops were mostly sown only in Rabi-season. Crops sown in Kharif and Zaid season cover hardly 30 and 10 per cent, respectively of cultivable area. Major crops of Rabi-

Table 5. Crop production status in Bundelkhand region

Crop production profile	Hamirpur	Mahoba
Source of irrigation (%)		
Canal (%)	27.22(31)	19.05(14)
Bore-well/tube-well (%)	25(45)	42.86(19)
Hired bore-well (%)	47.78(104)	38.1(18)
Crop production (yield qtls./acre)		
Wheat - I L	8.42±0.15(200)	6.62±0.27(66)
Wheat - DL	4.06±0.61(8)	2.78±0.48(23)
Gram - IL	2.84±0.22(98)	2.80±0.48(21)
Gram - DL	1.87±0.20(21)	1.57±0.19(34)
Pea - IL	3.16±0.19(70)	2.46±0.30(26)
Pea - DL	1.45±0.09(6)	1.03±0.07(12)
Lentil - IL	2.24±0.15(117)	1.90±0.28(17)
Lentil - DL	1.34±0.49(6)	1.01±0.57(3)
Black gram - IL	1.54±0.11(155)	1.72±0.23(28)
Black gram - DL	0.93±0.25(7)	0.80±0.08(3)
Green gram - IL	1.45±0.09(145)	1.74±0.25(22)
Green gram - DL	0.83±0.14(7)	0.77±0.15(3)
Sesame -IL	1.06±0.06(101)	1.04±0.19(23)
Sesame - DL	0.63±0.07(4)	0.53±0.09(8)
Pigeon-Pea - IL	3.09±0.27(19)	2.14±0.47(8)
Pigeon-Pea - DL	1.22±0.21(9)	1.06±0.30(11)

IL   Yield per acre in quintal in irrigated land
DL   Yield per acre in quintal in rain-fed(dry) land
Values in parenthesis are number of observation/farmers

season were gram, lentil, wheat (irrigated area), pea, mustard and arhar (red gram). Crops sown in kharif season were black gram, sesame, green gram, arhar (pigeon pea), jawar (sorghum) and bajra (pearl millet). Pea × mustard in Rabi season and jawar × bajra and arhar in Kharif were mostly sown as intercrop. Production performance of major crops observed in farmer's field is sown in Table 5. Production of pulse (3-7 q/h) and oilseed 2-5 (q/h) crops which cover large sown area (>65%) was quite low than state average which was 9.85 and 8.98 q/h, respectively (*GOI, 2015*). Moreover, under draught conditions the crop yield further decrease to the tune of 40-60 per cent and farmers could not get even cost of cultivation. Average productivity of wheat in an irrigated area was varied from 32 to 51 q/h with an average of 41.0 q/h, which was higher than state average (27.5 q). Major crop rotations practiced in different season were Lentil-sesame, Gram- Sesame, Wheat-Urad and Arhar × Mustard, Bajra. Tube-well and bore-well are the major farm machinery and available with 29 per cent

households. Bullocks are used by more than 11 per cent households in agriculture operations, mostly by marginal and small farmers. Tractor was available with only 2.4 per cent households. Present findings were contrary to livelihood pattern being followed in Indo-gangetic plains where >30 per cent households equipped with farm machinery (*Erenstein et al., 2007*). Low crop productivity could be enhanced 2 to 4 time by ensuring water for irrigation along with innovative management practices. Since farmers of the region are poor thus cannot support initial investment for individual or community water management.

Livestock : Among the livestock, goat was the most common species as 52 per cent households kept goat as secondary and 9 per cent as primary source of income. Cattle and buffaloes were reared by 55 and 31 per cent households, respectively. Poultry and sheep were kept by <2 per cent of households. Average herd/flock size of cattle, goat and buffalo were 1.61, 3.03 and 1.84, respectively in Hamirpur and 1.65, 4.01 and 1.57, respectively in Mahoba district (Table 4). The overall average milk yield of cow, buffaloes and goats was 2.54±0.16, 4.57±0.11 and 0.52±0.24 liter/day respectively in Hamirpur and 2.17±0.12, 4.85±0.16 and 0.62±0.02 liter/day in Mahoba district (Table 6). Present results were in agreement of those reported by *Paris, 2002* and *Birthal et al, 2014* and *Hegde, 2015*. Community grazing land were main feeding sources for livestock (80%) though, grazing land was heavily scarce in bio-mass due to heavy stocking rate and poor management. Goats were largely maintained on grazing and grazing hours for goat varied from 5 to 8 h/day with average of 6.6±0.4 hr. Cows were also maintained on grazing but they were loosed as stray animals, which is called as *anna-pratha*. Similar grazing and feeding practices, breeding practices and mortality pattern of small and large ruminant were reported by *Suresh and Chaudhary (2015)* and *Meena and Chauhan (2008)*. During recent past, herd size of buffaloes and goats has been increasing and sharp decline was observed in cattle. Prophylactic health measures were casual and followed by few (<10%) farmers who kept bovine. Mortality in bovine and goat was 8.9 per cent and 23 per cent, respectively. High mortality in goat was attributed to absolute lacking of prophylactic measures, no concentrate supplementation and inadequate housing. High mortality in goats was major concern of livelihood

Table 6. Livestock feeding and production status in Bundelkhand

Particulars	Hamirpur	Mahoba
Cattle		
Cattle (no.)	2.27±0.20(129)	2.42±0.19(72)
Bullocks (no.)	0.76±0.33(86)	0.36±0.22(41)
Cow(no.)	1.51±0.13(101)	1.70±0.11(70)
MY(lit/day)	2.54±0.16(80)	2.17±0.12(68)
Lactation length (months)	6.75±0.17(81)	5.29±0.13(69)
Green fodder (kg/day)	5.69±0.27(105)	4.51±0.54(63)
Green fodder fed (days)	39±2.7(42)	27±3(22)
Dry fodder- (kg/day)	11.75±0.33(106)	8.44±0.30(70)
Grazing(hr./day)	1.89±0.08(102)	3.88±0.41(64)
Concentrate ration (kg/day)	1.08±0.06(97)	0.85±0.07(66)
Overall mortality in cattle (%)	10.72(168)	7.36(65)
Buffalo		
Buffalo(no.)	1.84±0.09(168)	1.84±0.13(49)
Milk Yield(lit/day)	4.57±0.11(152)	4.85±0.16(48)
Lactation Length (months)	7.49±0.14(147)	6.22±0.12(47)
Green Fodder (kg/day)	8.20±0.23(161)	6.15±0.57(48)
Green Fodder fed (days)	137±1.8(135)	87±2.2(86)
Dry fodder (kg/day)	12.54±0.25(162)	10.10±0.24(48)
Grazing(hr/day)	1.89±0.08(150)	4.57±0.47(47)
Concentrate ration (kg/day)	1.38±0.05(153)	1.29±0.08(48)
Bovine mortality (%)	10.0(178)	9.0(52)
Buffalo conception (%)	65.0(172)	71.0(52)
Buffalo abortion(%)	35.0(147)	31.0(52)
Goat		
Goat (No.)	3.05±0.24(142)	4.06±0.43(82)
Milk Yield (lit/day)	0.52±0.03(133)	0.62±0.02(72)
Goat lactation period (days)	85.0±0.13(133)	76±0.09(72)
Goat mortality (%)	23.5(213)	24.9(98)
Goat abortion (%)	15.0(213)	16(98)
Multiple birth(%)	35(110)	43(30)
Grazing (hr/day)	4.57±0.05(213)	4.23±0.09(98)
Concentrate (kg/day)	0.08±0.05(37)	0.09±0.04(24)
Fodder		
Av. fodder availability/ household(q/year)	13.7(189)	7.2(74)
Av. area under fodder (ha)	0.03(189)	0.02(74)

Values in parenthesis are number of observation

Table 7. Constraints reported by rural households

Critical constraints	Hamirpur Rank	Score	Mahoba Rank	Score
Irrigation/water scarcity	I	7.57	I	7.9
Unemployment	II	7.45	II	7.37
Feed, Fodder scarcity & CPRs	IV	5.45	III	5.96
Rural infrastructure	III	5.85	VI	5.25
Knowledge gap (Ag & Ah)	VIII	5.07	IV	5.55
Soil erosion	VI	5.21	X	4.55
Diseases in livestock & crops	VII	5.20	V	5.34
Breeding bulls/buck Scarcity	IX	4.76	VIII	5.04
Poor Marketing for crop & livestock	V	5.44	VII	5.09
Credit for livestock	X	4.56	IX	4.86
livestock shelter	XI	3.76	XIII	3.01
Termites and Rats	XIIII	2.81	XV	2.64
Stray grazing (ANNA Pratha)	XII	3.57	XI	3.41
Endo-parasites in livestock	XIII	3.03	XII	3.09
Drinking water	XV	2.01	XIII	2.52

as it decreases 50 per cent profit from goat. Similar high mortality in goats with no prophylactic support was reported in villages of Rajasthan and Jharkhand (*Hegde and Deo, 2015*). Milk yield, body weight and survivability in goats were much lower than values reported in Gujarat and Rajasthan maintained under range grazing (*Singh et al., 2009* and *Rai and Singh, 2005*). Constraint analysis (Table 7) clearly indicates scarcity of green fodder and feeds as most important livestock based livelihood constraints. Therefore, for augmenting livestock productivity it is very important to increase feed and fodder resources through increasing fodder crops productivity, area under fodder crops, transfer of technology for value addition of crop residues and unconventional feeds. Rangeland restoration, capacity building of livestock keepers for strategic feeding, technologies adoption on integrated crop-livestock farming are important livestock issues of rural households. Women play major role in livestock daily management, mostly in cleaning of shed, milking, disposal of dung, bringing fodder and grazing of animals. Average time spent by a woman was 3.2±0.5 hr in the range of 1.8 to 7.2 h/d. Organized marketing of animals and their produces was poor with limited institutional support. Majority of animals were sold through middlemen. Veterinary services are very poor and not reaching to majority (>82%) of farmers. All the household (100%) reported purpose of livestock keeping was income followed by sudden need and security against crop failure due to uncertain climate and diseases (67%), family nourishment (46%), crop cultivation (plough, sowing, transportation and thrashing etc.) social status (26%) and manure (21%). Present livestock contribution is almost similar to the findings of *Biradar et al, (2013)* and *Hegde (2015)*.

Wages: This was most important source of income of majority of households comprising of landless, marginal,

small and of those who have good landholding but without assured irrigation in both the districts (Table-4). Majority (30-80% in different villages) of households (entire or part of family) from above categories were migrating at distant locations in different states of India. Out-migration is predominant in those villages which have been repeatedly hit by drought and do not have irrigation facility such as Sudamapuri, Tikaria and Aari in Mahoba and Sarsai, Behooni-Khurd and Bakrai villages of Hamirpur district. Period of migration was about 9-10 months in a year. Since crop and livestock productivity is low therefore many non-migratory families (22-41% over villages) including children and ladies works as labour in nearby cities mainly in building construction and crop cultivation. The period of wages varied from60 to 150 days with an average of 112±7 days. Charges of stationary labour ranged from Rs. 100 to Rs. 150 per day per person.

Constraints: Water scarcity for crops, unemployment, feed fodder scarcity for livestock and very poor productivity of CPRs, knowledge gap in agriculture and livestock, soil erosion, disease in crops and livestock, scarcity of improved breeding bulls and bucks, inadequate marketing facilities for crop and livestock produce, credit for livestock, livestock shelter, termites and rats in crop field and drinking water for livestock and human being were major constraints scored 7.9 to 2.83 and ranked as I to VX (Table 7). Poor biomass in grazing land, scarcity of superior bucks, veterinary services, market structure and credit as major constraints of small ruminant development were also reported by *Dixit et al (2015)* and *Suresh and Chaudhary (2015).*

The main constraint of Bundelkhand region for livelihood is scarcity of water for irrigation on account of erratic rainfall, runoff of rain water, poor irrigation infrastructure; stray grazing of cows and knowledge gap. Uncontrolled runoff from slopes causes land degradation through soil erosion. People face scarcity of water for agriculture, livestock and domestic family uses in most period of the year. Major water resources are canal, open wells, bore wells and ponds. Moreover, canals are driven from dams which further depend upon monsoon. Open- well and bore- well also depend upon monsoon for their recharging.

Soil erosion is a persistent problem further aggravated by the hilly landscape, high wind, thin vegetation cover and poor soil texture leads to widespread growth of gullies. Above these factors leads in mono-cropping and low crop productivity, even negative realized income from crops in case of draught. Low cropping intensity and productivity also lead to scarcity of grains, green and dry fodder to livestock. Productivity of livestock species is very low in want of supplementary feeding, superior bulls/bucks, prophylactic measures and proper housing.

Interventions for enhancing livelihood security and employment : The emerging demand for livestock products offer an opportunity, however, livestock keepers should be motivated and facilitated for adoption of technologies. Feed fodder scarcity, scarcity of high potential bull and bucks, diseases in crops and livestock, and poor access of credit are issues associated with livelihood and food security. Promotions of integrated and diversified farming system will be more profitable to improve sustainable farm income and livelihood security. Large yield gap in crops and livestock could be improved 2 to 3 times through efficient water management (rain & ground), rangeland restoration, community resources development and capacity building of farm people on integrated crop-livestock farming. Thus integrated goat development, poultry farming, bovine health and production improvement, fodder resource development, diversified crop farming, integrated soil and water conservation and capacity building of beneficiaries were identified as major area of improvement.

CONCLUSION

Frequent drought, poor harvesting of rain water, soil erosion, mono-cropping, poverty and out-migration were major characteristics of rural Bundelkhand. Livelihood in the region was determined by rain-fed crops (pulse, oilseed), wages and livestock. Productivity of crops and livestock are low however, has tremendous scope for improvement. Crop production quite often observed with loss. Strengthening of credit is utmost important for adoption of technologies. Agro-climatic conditions of Bundelkhand are more favourable for livestock dominated integrated farming system and has potential for quantum jump in income of villagers. It could possible only by increasing feed-fodder availability, proven sire/buck for genetic potential improvement, efficient health delivery services to livestock and

capacity building of farmers. Goat has huge potential in poverty alleviation due to less investment, quick return and sufficient income, women friendly and wide acceptance. Community pasture development and its management are also necessary for overall livestock development for this region. Popularization of inclusive and participatory goat production models willbe useful for this region.

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