Original Research Article

Status of Livelihood Security of DairyHouseholds in Bundelkhand: A Comparative Analysis

ABSTRACT

Livestock is an integral part of Indian agriculture. Livestock will continue to play a key role in farming system even in the future. The present study was conducted in Bundelkhand region during 2018-19 to 2020-21 to find out the contribution of livestock to livelihood of dairy farmers of the region. Two districts for each state selected, then, two blocks from each district were selected randomly. Two villages from each block and 20 respondents from each village were randomly selected; thus, making the total sample size of 320 respondents for the study. Duncan's Multiple Range Test was used for comparative analysis of livelihood security indicators for different category of farmers. Based on existing livelihood activities, the majority of the respondents in each category of farmer depend on farming for their livelihood followed by livestock rearing. Dominant livestock system pursued by marginal farmers was Buffalo+ Goat+ Sheep. Dominant livestock system pursued by small farmers was Buffalo+ Goat. Dominant livestock system pursued by semi-medium, medium and large farmers was cattle+ Buffalo. The results revealed that for more than 55 percent of the household's income from livestock was the major contributor to gross income accounting for more than 50 percent of the gross income. In case of economic and social security, Small and semi-medium farmers were not significantly different, whereas, marginal, medium and large farmers were significantly different at the 5 percent level of significance. Small, semi-medium and medium farmers were not significantly different, whereas, marginal and large farmers were significantly different based on health, institutional and overall livelihood security at the 5 percent level of significance.

Comment [O1]: Why?

Keywords: Livestock; Cattle; Systems; Farmers; Dominant; Livelihood

1. INTRODUCTION

Livelihood systems encompass means, relations, and processes of production, as well as household management strategies [1]. The resources and values of specific physical and social environments determine the character of livelihood system components. Food security is not the only goal of the rural population; the need for a sustainable livelihood is more central since it reflects the ability to take hold of other issues like good nutrition and housing which guarantee an improved life. Livelihoods are 'means of making a living', the various activities and resources that allow people to live. Different people have different lifestyles and ways of meeting their needs. Similarly, households perform various activities to gain and maintain their livelihoods. The nature of these livelihood activities depends on the availability of assets, resources, labour, skills, education, social capital, seasonality, agro-climate/agro-ecology, and gender [2-6]. Livestock production is undertaken in a multitude of ways across the planet, providing a large variety of goods and services, and using different animal species and different sets of resources, in a wide spectrum of agro-ecological and socio-economic conditions [7].

A study on the buffalo farming structure and its income in certain parts of Tamil Nadu and reported that among 23 farming structures observed, higher mean income per cattle unit of Rs. 3885.50 was obtained by the farmers in west region holding buffalo, cow, work bullock, goat and poultry combination and the least income of Rs. 1024 was obtained by the farmers holding buffalo and poultry combination [8]. Dairy farming by landless women in the southern state of India conducted in Pondicherry revealed that, no single family was deriving less than 25.00 per cent of its income from dairying. This highlights the importance of dairy cattle to landless families [9]. It was reported that a great majority (85.50%) of the respondents was found to be dependent on farming and animal husbandry. Whereas 10.00 per cent of them were engaged in farming, animal husbandry along with service, while only 4.50 per cent of the respondents were dependent on farming, animal husbandry along with business as a source of income [10].

The result revealed that the contribution of camel milk to household food intake is significant during the dry season [11]. Livestock is an integral part of Indian agriculture. Livestock will continue to play a key role in farming system even in the future. To date, research in the livestock system emphasized much on its production parameters and there is a paucity of information on its contribution to the livelihood of farmers. In view of this, the

present study was taken up with the objective to assess the extent of contribution of livestock to the livelihood of farmers of Bundelkhand region.

The study was taken under the following objectives:

1. To assess the status of livelihood activities and livestock system in the locality
2. To analyse the contribution of livestock to the livelihood
3. To study the comparative analysis of livelihood security among respondents

2. METHODOLOGY

The study was conducted purposively in Bundelkhand region, which comprises of Uttar Pradesh (7 districts) and Madhya Pradesh (6 districts). Two districts from each state viz. Lalitpur and Banda from Uttar Pradesh, whereas, Datia and Damoh from Madhya Pradesh were selected. Then, two blocks from each district were selected randomly. Two villages from each block and 20 respondents from each village were randomly selected; thus, 320 respondents were selected for the study following proportionate stratified random sampling method. The structured interview schedule was developed to understand the livelihood activities and livestock systems pursued by the dairy farmers of Bundelkhand region. Personal interview and observation method was used for data collection. For analyzing livestock systems pursued by the respondents, frequency and percentages were calculated for analysis.The percentage contributionof livestock income to the total householdincome was computed.

Duncan's Multiple Range test (DMRT) was used for comparative analysis of livelihood security indicators for different category of farmers. It is a multiple comparison procedure developed by David B. Duncan in 1955. Duncan's MRT belongs to the general class of multiple comparison procedures that use the range statistic to compare sets of means. It is a post hoc test to measure specific differences between pairs of means.

The *Significant Difference* or the range value:

$$R_p = r_{\alpha,p,v}\sqrt{MSE}n$$

Where, $r_{\alpha,p,v}$is the *Duncan's Significant Range Value* with parameters, *p* (range-value) and *v* (MSE degree-of- freedom), and experiment-wise alpha level α (α_{joint}).

3. RESULTS AND DISCUSSION

3.1 Existing livelihood activities in the study area

A perusal of Table 1 indicated that among the marginal farmers, the majority (58.03%) of the respondents livelihood was based on the farming, followed by 23.46 percent of the respondents livelihood was based on livestock rearing and remaining was earning through

business, service and some other activities. Marginal farmers were having very small land holding which can only produce for their subsistence, they were heavily dependent on other activities like wage labour along with farming. It was revealed that the majority (37.84%) of the respondents livelihood was based on the farming among small farmers, followed by 31.08 percent of the respondents livelihood was based on livestock rearing and remaining was earning through business, service and some other activities. Small farmers were having small land holding which can only produce for their subsistence and surplus could be sold, they were also heavily dependent on other activities like wage labour along with farming and livestock rearing. The result shows that among the semi-medium farmers, the majority (43.59%) of the respondents livelihood was based on the farming followed by 34.62 percent of the respondents livelihood was based on livestock rearing and remaining was earning through business, service and some other activities like wage labour. Above 75 percent of the farmers were directly depend on farming and livestock rearing for their livelihood which means they were heavily dependent on farming and livestock for their livelihood. Table 1 revealed that the majority (36.84%) of the respondents livelihood was based on the farming among medium farmers, followed by 24.56 percent of the respondents livelihood was based on livestock rearing and remaining was earning through business, service and some other activities.

Table 1. Livelihood activities of respondents (n=320)

Livelihood activity	Marginal (n=81)	Small (n=74)	Semi-medium (n=78)	Medium (n=57)	Large (n=30)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Farming	47 (58.03)	28 (37.84)	34 (43.59)	21 (36.84)	9 (30.00)
Livestock rearing	19 (23.46)	23 (31.08)	27 (34.62)	14 (24.56)	4 (13.33)
Business	3 (3.70)	5 (6.76)	7 (8.97)	9 (15.79)	8 (26.67)
Service	2 (2.47)	3 (4.05)	4 (5.13)	6 (10.53)	7 (23.34)
Other activities	10 (12.34)	15 (20.27)	6 (7.69)	7 (12.28)	2 (6.66)

Though medium farmers were having enough land for cultivation, but the less fertile land results in low productivity of crops as well as fodder leads to overall low earning from farming and livestock rearing. From the results given in Table 1, it was found that 30 percent of the respondents among large farmers directly depending on farming for their livelihood, followed by 26.67 percent of the respondents livelihood mainly depend on business, 23.34 percent earning through service while 13.33 percent of the respondents livelihood earning through livestock rearing and around 6.66 percent involve in other activities for their livelihood. Due to large land holding and herd size, large farmers have the highest capability for diversification of their farms.

3.2 Livestock systems pursued by the farmers in the study area

Table 2 indicated that based on the existing livestock system pursued by the marginal farmers, the majority (20.99%) pursued Buffalo + Goat + Sheep system, 16.04 percent of the respondents had Buffalo + Goat, 13.59 percent had Cattle + Goat + Sheep, 11.11 percent had Cattle + Buffalo + Goat and Cattle + Buffalo + Sheep, 9.88 percent had Cattle + Goat and 8.64 percent had Cattle + Buffalo and Cattle + Buffalo + Goat + Sheep livestock systems. From the above results it can be interpreted that in all the eight livestock systems prevalent in the study area, Buffalo + Goat + Sheep system happened to be an important livestock system among the marginal farmers.

Table 2. Livestock production system of respondents (n=320)

Livestock System	Marginal (n=81)	Small (n=74)	Semi-medium (n=78)	Medium (n=57)	Large (n=30)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Cattle + Buffalo	7 (8.64)	11 (14.87)	19 (24.36)	15 (26.32)	7 (23.33)
Cattle + Goat	8 (9.88)	7 (9.45)	6 (7.69)	8 (14.03)	4 (13.34)
Buffalo + Goat	13 (16.04)	19 (25.68)	14 (17.95)	11 (19.29)	5 (16.67)
Cattle + Buffalo + Goat	9 (11.11)	5 (6.75)	9 (11.54)	6 (10.53)	2 (6.66)
Cattle + Goat + Sheep	11 (13.59)	12 (16.21)	8 (10.25)	5 (8.78)	3 (10.00)
Buffalo + Goat + Sheep	17 (20.99)	8 (10.82)	11 (14.11)	7 (12.28)	4 (13.33)
Cattle + Buffalo + Sheep	9 (11.11)	9 (12.17)	6 (7.69)	3 (5.27)	3 (10.00)
Cattle + Buffalo + Goat + Sheep	7 (8.64)	3 (4.05)	5 (6.41)	2 (3.50)	2 (6.67)

Comment [O2]: Is it possible to do abit of inferential statistics? Regression and cross tabulation?

There was an almost equal distribution of livestock systems among marginal farmers as they were not specialized in dairying because the farmers had very small herd size with low productivity and production. Result revealed that based on the existing livestock system pursued by the small farmers, the majority (25.68%) pursued Buffalo + Goat system, 16.21 percent of the respondents had Cattle + Goat + Sheep, 14.87 percent had Cattle + Buffalo, 12.17 percent had Cattle + Buffalo + Sheep, 10.82 percent had Buffalo + Goat + Sheep, 9.45 percent had Cattle + Goat, 6.75 percent had Cattle + Buffalo + Goat and 4.05 percent had Cattle + Buffalo + Goat + Sheep livestock systems. The above results show that in all the eight livestock systems as prevalent in the study area, Buffalo + Goat system happened to be an important livestock system among the small farmers. Among the small farmers buffalo along with goat or sheep, livestock system considered to be the most important livestock system for their livelihood.A perusal of Table 2 revealed that based on the existing livestock system pursued by the semi-medium farmers, the majority (24.36%) pursued Cattle

+ Buffalo system, 17.95 percent of the respondents had Buffalo + Goat, 14.11 percent had Buffalo + Goat + Sheep, 11.54 percent had Cattle + Buffalo + Goat, 10.25 percent had Cattle + Goat + Sheep, 7.69 percent had Cattle + Goat and Cattle + Buffalo + Sheep and 6.41 percent had Cattle + Buffalo + Goat + Sheep livestock systems. Among the semi-medium farmers Cattle + Buffalo livestock system considered to be the most important livestock system for their livelihood.

Result shows that based on the existing livestock system pursued by the medium farmers, the majority (26.32%) of the respondents pursued Cattle + Buffalo system, 19.29 percent of the respondents had Buffalo + Goat, 14.03 percent had Cattle + Goat, 12.28 percent had Buffalo + Goat + Sheep, 10.53 percent had Cattle + Buffalo + Goat, 8.78 percent had Cattle + Goat + Sheep, 5.27 percent had Cattle + Buffalo + Sheep and 3.50 percent had Cattle + Buffalo + Goat + Sheep livestock systems. Among the medium farmers Cattle + Buffalo livestock system considered to be the most important livestock system for their livelihood.It was revealed that based on the existing livestock system pursued by the large farmers, the majority (23.33%) of the respondents pursued Cattle + Buffalo system, 16.67 percent of the respondents had Buffalo + Goat, 13.34 percent had Cattle + Goat, 13.33 percent had Buffalo + Goat + Sheep, 10 percent had Cattle + Goat + Sheep and Cattle + Buffalo + Sheep, 6.67 percent had Cattle + Buffalo + Goat + Sheep and 6.66 percent had Cattle + Buffalo + Goat livestock systems. Among the large farmers Cattle + Buffalo livestock system considered to be the most important livestock system and Cattle + Buffalo + Goat considered to be the least important livestock system for their livelihood.

3.3 Contribution of livestock to the livelihood of the farmers

A perusal of Table 3 revealed that the income from livestock accounts for 41 to 60 percent of total income to 30.32 percent of the households. For another 24.37 percent and 22.50 percent of households, it was around 20 to 40 and <20 percent, respectively. For 14.06 percent of households it was 61 to 80 percent and only 8.75 percent of households had 81 to 100 percent income contribution from livestock income to gross income. Highest Income share from livestock accounts 41 to 60 percent for semi-medium, medium, and large farmers, whereas, 20 to 40 percent for marginal farmers and <20 percent for small farmers.

Table 3.Contribution of livestock to the farmers' income (n=320)

Comment [O3]: Analysis too shallow.....

% Share	Marginal (n=81)	Small (n=74)	Semi-medium (n=78)	Medium (n=57)	Large (n=30)	Total (n=320)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
<20	16 (19.75)	23 (31.08)	17 (21.79)	12 (21.05)	4 (13.33)	72 (22.50)

20- 40	27 (33.34)	14 (18.92)	19 (24.36)	11 (19.29)	7 (23.34)	78 (24.37)
41- 60	21 (25.92)	18 (24.33)	31 (39.75)	18 (31.58)	9 (30.00)	97 (30.32)
61- 80	12 (14.81)	13 (17.57)	7 (8.97)	9 (15.79)	4 (13.33)	45 (14.06)
81- 100	5 (6.18)	6 (8.10)	4 (5.13)	7 (12.29)	6 (20.00)	28 (8.75)

The results revealed that for more than 55 percent of the household's income from livestock was the major contributor to gross income accounting for more than 50 percent of the gross income. The result was in line with the result of [12] who reported that for more than 60 percent of the household income from livestock was the major contributor to gross income accounting for more than 50 per cent of the gross income. This indicates that the contribution of livestock income to total income was significant and relatively higher. Thus, livestock rearing was the principal source of income for the majority of the respondents. At the farm level, the importance of livestockas an income source and the actual sources ofincome vary across farm households and productionsystems, which in turn determines thespecies raised and the products and servicesgenerated. Cash can be generated from sales oflivestock products regularly (milk, eggs) or sporadically(live animals, wool, meat, hides) or fromservices (draught, transport). Dairy produce isthe most regular income generator.Dairy developmenthas been shown to increase income,consumption and repayment capacity in India

3.4 Comparative analysis of livelihood security indicators

As the results depicted in the Table 4 revealed that marginal, small, semi-medium and medium farmers were not significantly different, whereas, large farmers were significantly different from all other farmers based on food, educational and infrastructural security at the 5 percent level of significance. In case of economic and social security, Small and semi-medium farmers were not significantly different, whereas, marginal, medium and large farmers were significantly different at the 5 percent level of significance. Small, semi-medium and medium farmers were not significantly different, whereas, marginal and large farmers were significantly different based on health, institutional and overall livelihood security at the 5 percent level of significance. This comparative analysis shows that large farmers were highly significant at the 5 percent level of significance, whereas, marginal farmers were least significant.

Table 4. Comparative analysis of livelihood security indicators (n=320)

Livelihood Security Indicators	Category of Farmers				
	Marginal (n=81)	Small (n=74)	Semi-medium (n=78)	Medium (n=57)	Large (n=30)

	Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E
FoodSecurity	0.56 ± 0.012b	0.58 ± 0.012b	0.56 ± 0.013b	0.58 ± 0.015b	0.68 ± 0.024a
Economic Security	0.54 ± 0.012c	0.57 ± 0.012bc	0.56 ± 0.012bc	0.59 ± 0.015b	0.70 ± 0.024a
HealthSecurity	0.55 ± 0.010c	0.59 ± 0.014b	0.58 ± 0.014b	0.59 ± 0.016b	0.70 ± 0.026a
Educational Security	0.56 ± 0.013b	0.59 ± 0.014b	0.58 ± 0.014b	0.57 ± 0.014b	0.67 ± 0.025a
SocialSecurity	0.57 ± 0.012c	0.57 ± 0.011bc	0.60 ± 0.014bc	0.58 ± 0.012b	0.65 ± 0.025a
Institutional Security	0.55 ± 0.012c	0.57 ± 0.012b	0.57 ± 0.014b	0.56 ± 0.014b	0.68 ± 0.025a
Infrastructural Security	0.55 ± 0.011b	0.57 ± 0.011b	0.57 ± 0.014b	0.57 ± 0.012b	0.66 ± 0.025a
Livelihood Security	0.55 ± 0.004c	0.58 ± 0.004b	0.57 ± 0.005b	0.58 ± 0.005b	0.68 ± 0.009a

Means followed by the different letters in a row significantly different at the 5 percent level of significance. The multiple comparisons are based on DMRT post hoc test.

4. CONCLUSION

It was found that based on existing livelihood activities, the majority of the respondents in each category of farmer depend on farming for their livelihood followed by livestock rearing. Dominant livestock system pursued by marginal farmers was Buffalo+ Goat+ Sheep. Dominant livestock system pursued by small farmers was Buffalo+ Goat. Dominant livestock system pursued by semi-medium, medium and large farmers was cattle+ Buffalo. For more than half of the household's income from livestock was the major contributor to gross income accounting for more than any other enterprise possessed by the dairy farmers.It can be concluded from the results that marginal, small, semi-medium and medium farmers were not significantly different, whereas, large farmers were significantly different from all other farmers based on food, educational and infrastructural security.

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