



## **Assessment of Existing Small Ruminants Rearing Practices Followed By the *Bakarwal* Tribe in Jammu District**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author FC designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SAK guided the author FC during whole research period and edited the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The present study was conducted in Jammu district to assess the existing small ruminants rearing practices followed by the Bakarwal tribe. The data was collected from 120 *Bakarwal* respondents belonging to Marh, Satwari, Bhalwal and Dansal blocks of Jammu district with the help of structured interview schedule containing selected dependent and independent variables, through personal interview technique. The findings revealed that majority of the respondents were middle aged with poor education. The respondents had medium herd size, marginal land holdings and medium source of information. They were rich in cultural attributes and had good relationship with other communities. However, they belonged to medium income group and the property is inherited to youngest son in the family. Overall existing practices level of the respondents regarding sheep and goat rearing practices was medium with the existing practice's value of 58.72% and mean existing

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practices score value of  $45.68 \pm 0.43$ . Respondents were following low existing practice in breeding (47.64%) as compared to the existing practice of feeding (68%), management (57.63%) and health care (55.67%). Majority (71.1%) of the respondents were following medium level of existing practices (57.90%), whereas, (10.0%) of the respondents had low existing practices (47.44%) and only (8.3%) of the respondents had high existing practices (67.24%). Insignificant positive association of independent variables, age ( $r=0.052$ ), herd size ( $r=0.078$ ), cultural attributes and relationship with other community (0.051), total annual income ( $r=0.178$ ) and indigenous knowledge ( $r=0.152$ ) was observed with existing practices. On the other hand source of information ( $r=-0.424^{**}$ ) was negatively and significantly associated with existing practices. Insignificant negative association of education ( $r=-0.080$ ), landholding ( $r=-0.150$ ), ownership pattern ( $r=-0.019$ ) and marketing pattern ( $r=-0.110$ ) was observed with existing practices of level sheep and goat rearing practices.

**Keywords:** Bakarwal; existing rearing practices; small ruminants.

## 1. INTRODUCTION

*Bakarwals* are primarily pastoral nomads rearing goat and sheep in high altitudes of Greater-Himalayas during summer and spend their winter in plains and foothills of Shiwaliks. *Bakarwal* is derived from the terms, *Bakri/Bakar* meaning "goat/ Sheep", and *Wal* meaning "one who takes care of". Essentially, the name *Bakarwal* implies high-altitude goatherds/shepherds. They are an important and historic tribe and practice transhumance pastoralism, that involves cyclic movements from lowlands to highlands, to take advantage of seasonally available pastures at different elevations in the Himalayas[1]. *Bakarwals* are also found in every corner of Northern provinces of the Himalayan range, namely the states of Uttarakhand, Himachal Pradesh and Punjab. The tribe is also known as Dhanger in several parts of India. In Jammu and Kashmir, *Bakarwals* are found in all the three regions of the state including Jammu, Kashmir Valley and Ladakh. In the current situation, due to increasing population pressure on land, it is difficult for *Bakarwals* to survive only on sheep and goat rearing. Sheep and goat are main source of livelihood of Bakarwals. During the summer, they move from one meadow to the other over mountains in search of better pastures for their herd. They generally travel in pairs, but sometimes they may go alone or in larger group. During their migration, their whole family accompanies with the herd of sheep and goats. During the summer season, when the nature is in its full bloom, they can easily move from one meadow to the other. Smaller body size and easy adaptation to a wide range of agro-climatic condition make sheep and goat suitable for economically weaker sections of the society. They have a cultural linked traditional knowledge about sheep and goat breeding, feeding, management and health aspects [2]. There is a

decline in the traditional way of pastoralism and it is possible to consider allowing it to die a natural death as a default option. There are several reasons that why there is an immediate need of reviving the traditional pastoral practices. In the first place, these nomadic pastoralists directly contribute significant economic value to the country in the form of wool, milk, meat and other animal products. They also contribute important manures to farmlands and common lands on which their flocks dwell. Sheep and goat manures are regarded very nutritive to the soil. Again, no precise economic value of the manures is clearly known but its value for maintaining the fertility of soil in meadows cannot be ignored. *Bakarwals* contribute significantly to the livestock economy of this state [2]. Keeping the above-mentioned factors in mind, a study was undertaken entitled "existing small ruminant rearing practices followed by *Bakarwal* tribe in Jammu district", that will generate useful information about the *Bakarwal* tribe regarding sheep and goat rearing. The generated information will help policymakers to further strengthen the pastoralism and overall livelihood development of pastoralists.

## 2. MATERIALS AND METHODS

The present study was conducted in Jammu district to assess the existing small ruminants rearing practices followed by the Bakarwal tribe. Jammu district comprises of twenty blocks. Out of these four blocks were selected purposefully having predominant *Bakarwal* population. The selected blocks were Marh, Dansal, Satwari and Bhalwal. A list of respondents involved in sheep and goat rearing were prepared from selected blocks. Thirty *Bakarwals* were selected randomly from each of the 4 selected blocks of Jammu district, making a sample size of 120

respondents. Data were collected from the study area with the help of a pre-structured interview schedule after proper pre-testing and modifications. The interview schedule was developed using the package of practices of neighbouring universities as “universe of content” after proper consultation with the members of Faculty of Veterinary Science and Animal Husbandry, SKUAST-Jammu. The final schedule was divided into four broad areas namely management, feeding, breeding and health care for evaluation of existing small ruminants rearing practices in their respective sections. The final schedule consisted of 11, 12, 7 and 9 items in the areas of management, feeding, breeding and health care, respectively. This was operationalised on a three point continuum of always, sometimes and never with 2, 1 and 0 score allotted respectively for each of the recommended practice. The scores of individual items were added to arrive at the total score of an individual respondent. The total score of all respondents was divided by the maximum possible score and multiplied by 100 to arrive at the final existing practices score. Maximum possible score for each area i.e. management, feeding, breeding and healthcare practices was as 22, 24, 14 and 18 respectively and thus the maximum possible score was 78. Data were coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean, standard deviation, mean percent score (MPS) and Pearson product moment correlation coefficient (r) were worked out for meaningful interpretation. Mean percent score (MPS) and Pearson product moment correlation coefficient (r) were calculated by using formula:

$$\text{Mean Percent Score (MPS)} = (\text{Observed score} / \text{Total score}) \times 100$$

**Pearson product moment correlation coefficient**

Pearson product moment correlation coefficient was computed by the following formula.

$$r_{xy} = \frac{[N \sum XY - (\sum X)(\sum Y)]}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}}$$

Where, X and Y = original scores in variables X and Y

Where,

- N = number of paired scores
- $\sum XY$  = each X multiplied by its corresponding Y, then summed
- $\sum X$  = sum of X scores
- $(\sum X)^2$  = each X squared and then summed
- $\sum Y$  = sum of Y scores
- $(\sum Y)^2$  = each Y squared and then summed

**3. RESULTS AND DISCUSSION**

**3.1 General Background Profile of Respondents**

Data of the table 1 revealed that the majority of the respondents were middle aged with mean age of about 50 years. The observed range of age was 34-69 years. The respondents had poor formal education with mean value of 1.51, which indicated that the majority of the *Bakarwals* were illiterate. None of the respondents had formal education, up to graduation level or higher, which is in consonance with the findings of Rathore [3], who stated that majority of *Raika* pastoralists were illiterate and nomadic. On the other hand Dabral, et al. [4] conducted a demographic study of the *Gujjars* residing in the areas surrounding Delhi and observed that the literacy level is significantly higher. Majority of the respondents were landless and with as is depicted by their mean value of 0.46±0.05. They were rich in cultural attributes and had good relationship with other communities with mean value of 9.03±0.06. Most of the respondents had medium herd size with mean of about 113 animals. Further, data revealed that the respondents had medium source of information with mean value of 13.58±0.22. however they belonged to the medium income group and in most of the cases the properties inherited to the youngest son in the family. Majority of the respondents had medium knowledge of indigenous practices of sheep and goat rearing. They fared well in terms of their marketing patterns. These results were in agreement with the findings of Khandi et al. [5] and Jeelani [6], who conducted a study on *Gujjars* of Jammu and Kashmir and reported they were middle aged, had a poor formal education, landless, having large herd size and poor mass media exposure. Similarly, Hamdani [7] and Soni [8] reported that majority of the respondents were middle aged, with poor formal education, small land holding and poor mass media exposure.

**Table 1. General background profile of the respondents**

Independent variable	Possible range	Observed range	Mean $\pm$ standard error	Standard deviation
Age	-	34-69	50.10 $\pm$ 0.81	8.82
Education	0-4	0-3	1.51 $\pm$ 0.08	0.89
Herd size	-	47-155	113.04 $\pm$ 1.85	20.31
Land holding	0-4	0-1	0.46 $\pm$ 0.05	0.50
Cultural attributes and relationship with other community	0-11	8-11	9.03 $\pm$ 0.06	0.61
Work distribution among family members	0-40	20-27	23.46 $\pm$ 0.23	2.50
Type of pastoral system	1-3	3	3.00 $\pm$ 0	0
Ownership pattern	1-4	2-4	2.83 $\pm$ 0.10	0.99
Total annual income	-	50000-200000	120708.3 $\pm$ 3071.45	33646.06
Source of information	0-22	8-18	13.58 $\pm$ 0.22	2.38
Marketing pattern	0-30	14-23	18.87 $\pm$ 0.20	2.20
Indigenous knowledge	0-26	5-13	9.67 $\pm$ 0.20	2.23

### 3.2 Existing Small Ruminants Rearing Practices Followed by the *Bakarwal* Tribe

Respondent's existing practices level in respect of small ruminants (sheep and goat) rearing practices were studied in four sectors i.e. management, feeding, breeding and healthcare practices. Table 2 reveals the scores which were obtained in the study. In the present study, overall existing practices level of the respondents regarding sheep and goat rearing practices was medium with the existing practice's value of 58.56% and mean existing practices score value of 45.68 $\pm$ 0.43. Thus, it can be suggested that more than 50% of the existing practices were followed. The variation observed in the existing practice's level was fairly small with a standard deviation of 4.67. Table 2 and Fig. 1 depict that the respondent's existing practices regarding sheep and goat rearing practices. A closer look at the table (2) reveals that the respondents were following low existing practice in breeding (47.64%) as compared to the existing practice of feeding (68%), management (57.63%) and healthcare (55.67%). Rehman [9] found that among the feeding practices, the most commonly used by *Gujjars* was grazing in pasture land in rotation, while it was feeding of concentrate mixture by *Gujjars* of Jammu. The most common management practice followed by majority of *Gujjar* and *Bakarwal* household was keeping animal loose in an enclosure.

For appropriate analysis, the respondents were classified into three categories based on existing practice scores (Table 3). As is evident from the table majority (71.1%) of the respondents were

following medium level of existing practices (57.90%), whereas, (10.0%) of the respondents had low existing practices (47.44%) and only (8.3%) of the respondents had high existing practices (67.24%).

### 3.3 Relationship of Existing Small Ruminants Practices with Socio-cultural and Economic Profile of the *Bakarwal* Tribe

Insignificant positive association of independent variables, age ( $r=0.052$ ), herd size ( $r=0.078$ ), cultural attributes and relationship with other community (0.051), total annual income ( $r=0.178$ ) and indigenous knowledge ( $r=0.152$ ) was observed with existing practices. The respondents with large herd size were following higher existing practice which can be hypothesized that improved animal husbandry practices do not fit into their existing system of rearing and thus, they do not perceive these improved animal husbandry practices as beneficial. However, this needs to be substantiated by the empirical studies. Hutchinson [10] reported that pastoral behavior is a logical consequence of social-cultural systems that have evolved from centuries of adaptation to marginal environments due to the fact that the nomadic pastoral system influences the rearing of small ruminants on traditional lines those suites their socio-cultural and economic pattern. Similarly, Arya et al. [11] reported that *Gujjars* inhabiting Shiwalik foot hill villages were mainly shepherds and dependent on animal husbandry enterprise as their main source of income and livelihood. Similar results were reported by Samajadar [12], Ara [1] and Sudan et al. [13].

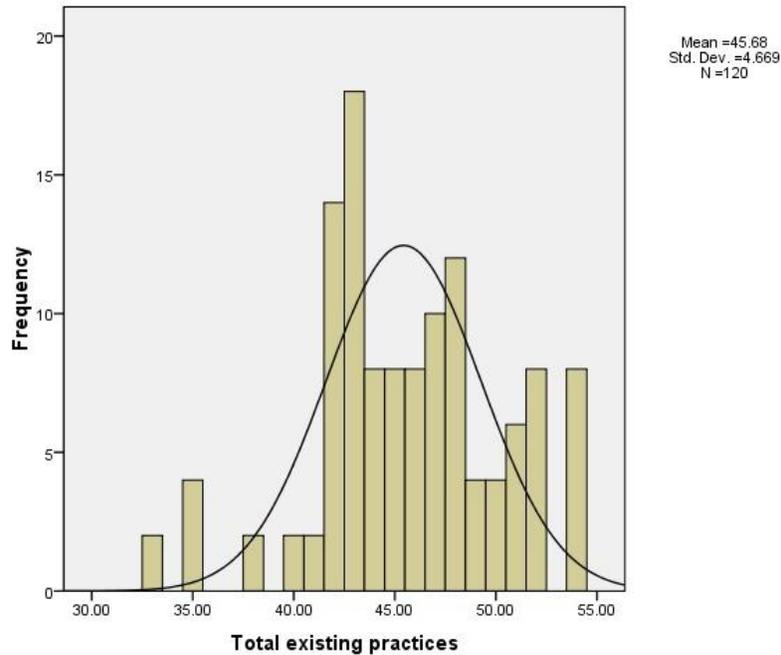


Fig.1. Histogram depicting existing practices of the respondents

Table 2. Existing practices level of respondents in different areas of sheep and goat rearing practices

Area	Possible range	Observed range	Mean ± Standard error	Standard deviation	Existing practices level (%)
Management	0-22	8-17	12.68±0.16	1.72	57.63
Feeding	0-24	11-22	16.32±0.23	2.56	68.00
Breeding	0-14	3-10	6.67±0.18	1.92	47.64
Healthcare	0-18	5-13	10.02±0.17	1.87	55.67
Total	0-78	33-54	45.68±0.43	4.67	58.56

Table 3. Classification of respondents on the basis of existing practices scores

Category	Low (<41.01)	Medium (41.01-50.37)	High (>50.37)
Frequency	12 (10.0%)	86 (71.7%)	22 (8.3%)
Item wise	(Mean score ± SE)		
Management	11.00±0.55	12.33±0.12	15.00±0.29
Feeding	12.67±.057	16.12±0.23	19.09±0.17
Breeding	6.33±0.54	6.70±0.21	6.72±0.38
Healthcare	7.00±.058	10.02±0.15	11.64±0.30
Total score of all practices	37.00±.087	45.16±0.27	52.45±0.27
Existing practices level (%)	47.44	57.90	67.24

Insignificant negative association of education ( $r=-0.080$ ), land holding ( $r=-0.150$ ), ownership pattern ( $r=-0.019$ ) and marketing pattern ( $r=-0.110$ ) was observed with existing practices of level sheep and goat rearing practices. Respondents of low education group were following higher existing practice due to the

fact that *Bakarwals* mainly remain engaged in nomadic livestock rearing which affects their formal education prospects besides other reasons. Right from the childhood they are taught to drive the flocks in pastures for grazing. Kakoty [14] studied the differential influence of incentives and disincentives in determining

**Table 4. Correlation coefficients of dependent and independent variables**

Independent variable	Correlation co-efficient 'r' value
Age	0.052
Education	-0.080
Herd size	0.078
Land holding	-0.150
Cultural attributes and relationship with other community	0.051
Work distribution among family members	0.005
Ownership pattern	-0.019
Total annual income	0.178
Source of information	-0.424**
Marketing pattern	-0.110
Indigenous knowledge	0.152

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

existing practices of small dairy farmers of Dimoria tribal development block in Assam and revealed that the existing practices were insignificantly affected by land holding. Landless respondents had high scores in existing practices and those with marginal land holding had high knowledge as compared to the landless respondents, which is probably because of the nomadic lifestyle as stated earlier by Khandi, et al. (2010). On the other hand source of information ( $r=-0.424^{**}$ ) was negatively and significantly associated with existing practices. It can be attributed to conservative nature and migratory lifestyle of the respondents. The results were in consonance with the findings of Khateeb, et al. [15] who reported that pastoralists were using indigenous knowledge for the treatment of animal diseases. Many of these indigenous practices offer viable alternatives to conventional western style medicines. It can be hypothesized that the indigenous technical knowledge should be documented, validated and employed in the treatment of various ailments in animals. It was, therefore, necessary to collect and document these practices to preserve this traditional knowledge.

#### 4. CONCLUSION

Majority of the respondents were middle aged with poor education. The respondents had medium herd size, marginal land holdings and medium source of information. They were rich in cultural attributes and had good relationship with other communities. However, they belonged to medium income group and the property is inherited to youngest son in the family. Overall existing practices level of the respondents regarding sheep and goat rearing practices was medium. Respondents were following low

existing practice in breeding and high low existing practice in feeding as compared to the existing practice of management and health care. Majority of the respondents were having medium level of existing practices followed by low and high existing practices respectively. Insignificant positive association of independent variables, age, herd size, cultural attributes and relationship with other community, total annual income and indigenous knowledge was observed with existing practices. On the other hand source of information was negatively and significantly associated with existing practices. Insignificant negative association of education, land holding, ownership pattern and marketing pattern existing practices of level sheep and goat rearing practices. Thus emphasis should be given to preserve their indigenous knowledge regarding sheep and goat rearing. Indigenous knowledge for the treatment of animal diseases should be documented. Many of these indigenous practices offer viable alternatives to conventional western style medicines. Therefore indigenous technical knowledge should be documented, validated and employed in the treatment of various ailments in animals.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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