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Knowledge level of Bakarwal tribe regarding sheep and goat rearing practices in Jammu district of Jammu and Kashmir, India

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Abstract
The study was conducted in Jammu district of Jammu and Kashmir state to assess the knowledge level of *Bakarwal* tribe regarding sheep and goat rearing practices. Multistage random sampling plan was followed for the selection of ultimate respondents. The data was collected from 120 *Bakarwal* respondents belonging to Marh, Satwari, Bhalwal and Dansal blocks of Jammu district through well structured interview schedule, from the respondents either at their farm or home after proper testing of schedule and using appropriate scales. The findings of the study revealed that 63.33 percent of the respondents had medium knowledge level whereas only 25 percent of the respondents had low knowledge level regarding sheep and goat rearing practices. Extent of knowledge of sheep and goat rearing practices, viz, management, feeding, breeding and health care practices were found to be 51.82 percent, 69.28 percent, 65. 75 percent and 52.35 percent respectively. Knowledge of the respondents regarding feeding practices was high; whereas it was low in management practice. Further correlation analysis reveals that land holding (r =0.188*), cultural attributes and relationship with other community (r =0.244**) and ownership (r =0.253**) had a significant and positive correlation with the knowledge level. On the other hand age (r =0.015), education (r =0.159), herd size (r =0.157), total annual income (r =0.078) and marketing pattern (r =0.131) were positively but insignificantly associated with the knowledge level regarding sheep and goat rearing practices.

Keywords: knowledge level, *Bakarwal* tribe, small ruminants, rearing practices

1. Introduction
Sheep and goat are considered as an important livestock species in India with their multifacet utility such as meat, wool, skin and manure, contributing to the agrarian economy especially in areas where crop and dairy farming are not economical (Arora *et. al*.1998) [1]. Sheep and Goat farming has been recommended as the best choice for the rural people in developing countries because of the low investment, wide adaptability, high fertility and fecundity, low feed and management needs, high feed conversion efficiency, quick pay-off and low risk involved. Sheep and Goats play an important role in income generation, capital storage, employment generation and improving household nutrition. They have an important role in agricultural production, as they provide manure for land (Anonymous, 2010) [2]. They are main source of livelihood of *Bakarwal*s. *Bakarwal* is a nomadic tribe based in the Pir Panjal and Himalayan mountains of South Asia. They are mainly goatherds and shepherds and are called as *Dhangar* in rest of India. 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 Himalayas (Ara, 2005) [3]. *Bakarwal* are highly disorganized community which is socially, educationally, economically and politically backward.

In the current situation, due to increasing population pressure on land, it is difficult for Bakarwals to survive only on sheep and goat rearing. They have a cultural linked traditional knowledge about sheep and goat breeding, feeding, management and health aspects. There are several reasons that why there is an immediate need of reviving the traditional pastoral practices. Knowledge and adoption of the recommended management practices in any enterprise will help in increasing the present income level. The sheep and goat farming is an important avocation in generating reasonable level of income to the goat farmers. A number of technologies are available for productivity improvement of sheep and goats, technological and

Management options are the only alternatives to accelerate growth in the productivity of goats, which is low in the traditional system of production. The *bakarwal* tribes rear sheep and goat mainly in extensive management system using traditional management practices relying on community land for grazing and are yet ignorant of scientific management practices. Keeping the above-mentioned factors in mind, a study was undertaken entitled " to assess the knowledge level of *Bakarwal* tribe regarding sheep and goat rearing practices in Jammu district", that will generate useful information about the Bakarwal tribe regarding sheep and goat rearing practices. Knowledge of improved management practices specially improved feeding, breeding and other management practices not only help to achieve the desired level of sheep and goat production but also increase income of farmers (Dudi and Meena, 2013) [4].

2. Materials and Methods
2.1 Research Design
Ex-post-facto research design was followed in the present study for assessment of knowledge level of *Bakarwal* tribe regarding sheep and goat rearing practices of Jammu District in Jammu and Kashmir State. Kerlinger (1983) [5]. defined Ex-post-facto research design as any systematic empirical inquiry in which the dependent variables have not been directly manipulated, because they have already occurred or they are inherently manipulated.

2.2 Locale of Study
Jammu and Kashmir State consists of three divisions' viz. Jammu, Kashmir and Ladakh. The state comprises of 22 districts of which Jammu is an important one and most populated with a population of 15, 29,958. The total population living in rural areas of Jammu district is 7, 64,945 (50%) and majority of this population depends on agriculture and animal husbandry for their livelihood. Population of tribals in Jammu district is 69,193 (Census, 2011). It is located at 32.73 °N and 74.87°E. District Jammu falls in sub-mountainous region, at the foothills of the Himalayas and is approximately 600 kilometres away from the national capital, New Delhi.
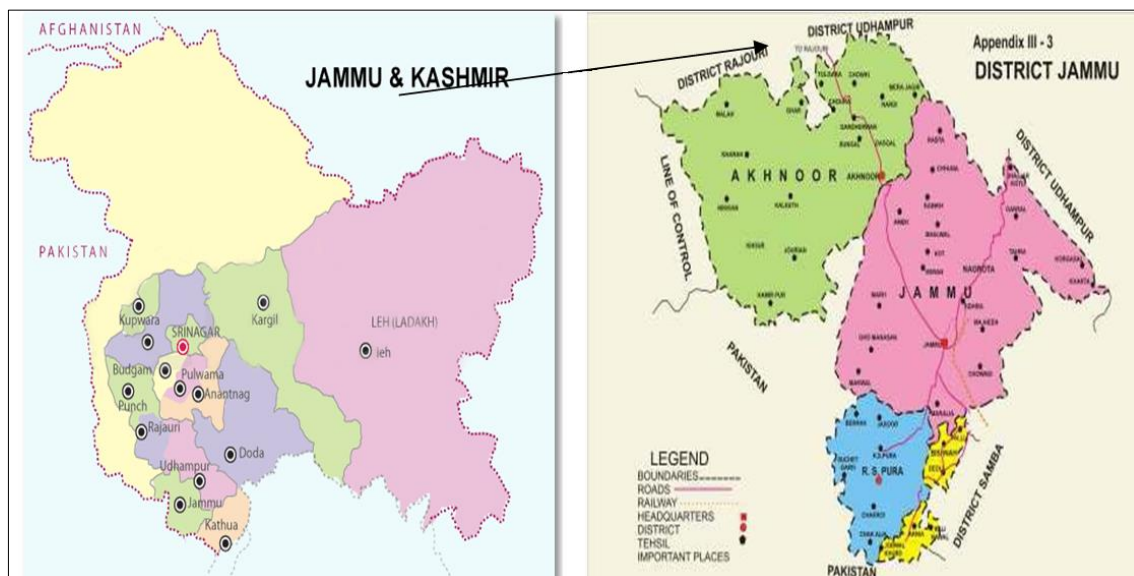

Fig 1: Map showing locale of study

2.3 Sampling Method
Multistage random sampling plan was followed for the selection of ultimate respondents. 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.

2.4 Data collection
Data were collected through well-structured interview schedule, personal interview from the respondents either at their farm or home after proper testing of schedule and using appropriate scales. The interview schedule was developed using the package of practices of neighboring universities as "universe of content" after proper consultation with the members of Faculty of Veterinary Science and Animal

Husbandry, SKUAST-Jammu. The schedule was developed using different type of questions i.e. true/ false and multiple choice. The items were based on factual information recommended in the latest package of practices. The schedule consisted of four areas i.e. management, feeding, breeding and healthcare. Opinion from faculty members of Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu were obtained in their respective areas of expertise. Based on their opinion and discussion with them certain items were deleted or modified. The final schedule consisted of 13, 14, 11 and 10 items in the areas of management, feeding, breeding and health care, respectively. Each correct answer was awarded one mark and incorrect answer was awarded zero marks in true/ false type of items. For multiple choice items the scoring ranged from 0 to 4 depending upon the accuracy of the response. Maximum possible score for each area was as under:

Knowledge area	No. of items	Maximum possible Score
Management	13	28
Feeding	14	19
Breeding	11	15
Healthcare	10	17
Total	48	79

2.5 Statistical analysis
Data were coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentations of data were done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean, standard deviation, mean percent score (MPS) and coefficients of correlation (r) were worked out for meaningful interpretation.

3. Results and Discussion
3.1 General background profile of respondents
The general background profile of respondents is presented in the table 1. The variables studied include age, education, herd size, land holding, cultural attributes and relationship with other community, work distribution among family members, type of pastoral system, ownership pattern, total annual income, source of information, marketing pattern and indigenous knowledge practices of sheep and goat rearing. The results reflected that 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 (1986) [6], who stated that majority of *Raika* pastoralists were illiterate and nomadic. On the other hand Dabral *et al.* (2004) [7] 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.* (2010) [8]. And Jeelani (2015) [9]. 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 (2008) [10]. 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 ± standard error	Standard deviation
Age	-	34-69	50.10 ± 0.81	8.82
Education	0-4	0-3	1.51 ± 0.08	0.89
Herd size	-	47-155	113.04 ± 1.85	20.31
Land holding	0-4	0-1	0.46 ± 0.05	0.50
Cultural attributes and relationship with other community	0-11	8-11	9.03 ± 0.06	0.61
Work distribution among family members	0-40	20-27	23.46 ± 0.23	2.50
Type of pastoral system	1-3	3	3.00± 0	0
Ownership pattern	1-4	2-4	2.83 ± 0.10	0.99
Total annual income	-	50000-200000	120708.30 ±3071.45	33646.06
Source of information	0-22	8-18	13.58 ± 0.22	2.38
Marketing pattern	0-30	14-23	18.87 ± 0.20	2.20
Indigenous knowledge	0-26	5-13	9.67 ± 0.20	2.23

3.2 Knowledge level *Bakarwal* tribe regarding sheep and goat rearing practices
Respondent's knowledge level regarding sheep and goat rearing practices was studied in four sectors i.e. management, feeding, breeding and healthcare. Table 2 reveals the scores which were obtained in the study. The mean knowledge score was 46.39±0.37, which means that they had 58.72% knowledge about sheep and goat rearing practices with a standard deviation of 4.05. A closer look at the table 2 reveals that the respondents had a high knowledge in feeding (69.28%) and low in management practice (51.82%) when compared with knowledge score of health care practices (52.35%) and breeding practices (65.75%). Respondents were classified into three categories based on knowledge scores (table 3). As is evident from the table 3 majority of the respondents (63.33%) were having medium knowledge level (59.85%) whereas, (25%) of the respondents had low knowledge level (51.64 %) and only (11.7%) of the respondents had high knowledge (67.81%) regarding sheep

and goat rearing practices. The results were in consonance with the findings of Khandi *et al.* (2010) [8]. Who reported that the majority of the respondents (54%) were having medium level of knowledge about improved animal husbandry practices. Similarly, Sankhala and Chand (1999) [11] Have earlier reported that the majority of trained tribal farmers of all the categories were having medium level of knowledge in management, fodder production and overall rearing practices while studying the knowledge status of tribal's regarding improved dairy farming practices in Rajasthan. Salzman (1988) [12]. Revealed that the *Bharwad* pastoralists are often involved in milk selling, especially in peri-urban settings. They are the most urbanized groups among the *Gujarati* pastoralists and have monopolized many urban milk markets. Bhasin (1988) [13]. Reported that pastoralism in Himalayas is based on transhumant practices and involves cyclical movements from lowlands to highlands to take advantage of the seasonally available pastures at different elevation.

Table 2: Knowledge level of *Bakarwal* tribe in different areas sheep and goat rearing practices

Area of sheep and goat rearing practices	Possible Range	Observed Range	Mean ± Standard Error	Standard Deviation	Knowledge Level (%)
Management	0-28	13-16	14.51±0.08	0.92	51.82
Feeding	0-18	10-18	12.47±0.16	1.79	69.28
Breeding	0-16	8-14	10.52±0.16	1.79	65.75
Health care	0-17	7-12	8.90±0.11	1.16	52.35
Total of all Practices	0-79	39-58	46.39±0.37	4.05	58.72

Table 3: Classification of respondents on the basis of knowledge scores

Category	Low (<42.34)	Medium(42.34-50.44)	High (>50.44)
Percent of Respondents	30 (25%)	76 (63.33%)	14 (11.7%)
Item wise	(Mean score ± SE)		
Management	13.90±0.88	14.63±0.11	15.14±0.23
Feeding	10.93±0.05	12.50±0.15	15.57±0.51
Breeding	8.27±0.13	11.08±.015	12.29±0.32
Health care	7.70±0.09	9.07±0.10	10.57±0.20
Total score of all Practices	40.80±0.09	47.28±0.14	53.57±0.77
Knowledge level (%)	51.64	59.85	67.81

3.3 Relationship of knowledge level with socio-cultural and economic profile of the *bakarwal* tribe

The correlation coefficients between the dependent and independent variables are depicted in table 4. The data of the table 4 revealed that insignificant positive association of age was observed with knowledge level, with correlation coefficient of 0.015. In the present study it was found that the average age of the respondents was 50 (table 1), indicating that in general the respondents were middle aged. Thus with increase in age of respondents there is inclining in their knowledge levels regarding sheep and goat practices without significantly altering their adoption level. Mahipal (1983) [14]. Reported that the age was having positive but insignificant relationship with the knowledge and overall adoption of dairy innovations by medium category farmers. This can probably be attributed to the fact the respondents of old age group differ in knowledge acquisition behaviour in comparison to the young respondents. Further the young age group respondents in general have higher curiosity levels, better formal education and higher mass media exposure as compared to old ones. Anyhow, it is suggested that the emphasis should be given to the middle age group, to increase their knowledge level as they are likely to play a dominant role in decision making regarding animal husbandry by simplifying the information of complex animal husbandry practices and by conducting training programmes periodically to impart knowledge about improved techniques.

It is a well-known fact that education results in overall development of an individual. Insignificant association of education with knowledge level was observed with a correlation co-efficient value of 0.159 (table 4). Similar findings were reported by Khandi *et al*. (2010) [8]. Who found the poor formal education of *Gujjar* respondents in Jammu and Kashmir. Similar results were reported by Bhakar *et al*. (2006) [15]. It could be attributed 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. Other reasons for poor education like cultural stereotyping and poverty cannot be ruled out. Anyhow, it is suggested that the extension programmes for *Bakarwals* should lay emphasis on demonstrations and a limited use of extension literature should be made given the

level of literacy prevalent among such nomads.
Insignificant positive association of herd size was observed with knowledge, with correlation co-efficient being 0.157 (table 4). Thus the respondents with large herd size were having high scores in knowledge. The results were in consonance with the findings of Jeelani (2015) [9]. And Khandi *et al*. (2010) [8]. Who reported that *Gujjars* were keeping large number of animals for their livelihood and sustenance. Non-significant association between herd size and knowledge level has earlier been reported by Rao, (1975) [16]. and Kherde, (1978) [17]. Nataraju *et al*. (1986) [18]. opined that large sized possession of livestock by farmers necessitated them to participate more in extension activities to seek information about improved animal husbandry practices. Khatra and Sharma (1992) [19]. have reported that range of herd size among nomadic *Gujjar*s was 11.60 to 13.73, and that they utilized their saving from buffalo keeping, increasing the herd size at the cost of their standard of living. Similar findings were also observed by Minhaj et al. (2017) [20]. And Choudhary et al. (2017) [21]. This is in consonance with the findings of Chugh (1986) [22]. Who reported that the herd size did not influence existing practices as well as awareness knowledge of dairy farmers. It 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.

Positive significant association of land holding with knowledge level was observed with a correlation coefficient value of 0.188** (table 4). The study revealed that 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) [8]. The results were in agreement with the findings of number of workers. Kakoty (1980) [23]. studied the differential influence of incentives and disincentives in determining 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. It can be hypothesized that respondents having land are engaged in diversified agricultural activities which also influences the knowledge of the respondents regarding improved sheep and goat rearing practices.

Significant positive association of cultural attributes and their relationship with other communities was observed with knowledge with correlation coefficient being 0.244** (table 4). Saberwal (1999) [24]. stated that in social evolutionary thinking, the nomadic lifestyle has traditionally been treated as less civilized, less productive and more degrading than a settled lifestyle. It can be hypothesized that the nomadic pastoral system influences the rearing of small ruminants on traditional lines that suites their socio-cultural and economic pattern.

Insignificant association of wok distribution among family members knowledge level was observed with a correlation

coefficient value -0.153 (table 4). Thus those respondents having low work distribution had high knowledge. The results were in consonance with the findings of Shahri (1987) [25]. who reported that there is clear division of labour between men and women in the daily work among *Gujjars* Bakarwal families in Jammu and Kashmir. Men care for herd, take them to pastures and protect them from wild animals. They also direct plans for the family and keep trade going. Women on the other hand besides daily household chores, milk the buffaloes, goats and cows and help their men in trade. *Gujjar Bakarwal* train their children from an early age to lead their herds and flocks to pastures. The only difference between the two tribes is that *Gujjars* rear cattle while *Bakarwal* breed sheep and goats but existence is centered towards animals, in both the groups. It can thus be hypothesized that the awareness may be increased among the *Bakarwals* towards scientific animal husbandry practices. So that they can rear livestock on scientific lines that results in increased productivity and production which will directly improve their socio- economic status.

Significant positive association of ownership pattern was observed with correlation coefficient being 0.253 (table 4). The result shows that knowledge was high for the respondents inheriting property to the youngest son. Hogg (1992) [26]. observed that many African pastoralists make decisions between livelihood patterns and resource allocation on a yearly basis, depending on the nature of the resources they possess.

Insignificant association of total annual income with knowledge was observed with a correlation coefficient value of 0.078 (table 4). Respondents were classified into three groups i.e.; low, medium and high income groups. Thus the respondents having high annual income had medium annual income had high knowledge as compared to other categories. Similarly, Arya *et al*. (1992) [27]. 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.

Negative insignificant association of source of information was observed with knowledge, having correlation coefficient of -0.034 (table 4). Thus the Respondents with low source of information had high scores in knowledge as compared to other categories. The results were in consonance with the findings of Khandi *et al. (*2010) [8]. who reported that majority of the respondents (46%) were having low mass media exposure and extension contact (89%). It can be attributed to conservative nature and migratory lifestyle of the respondents. They further reveal that the respondents with high mass media exposure and extension contacts have significantly high knowledge. Here it can be hypothesized that appropriate steps should be taken to enhance the overall mass media exposure and extension contacts that will increase the source of required information to the respondents.

Insignificant association of marketing pattern was observed with knowledge, with correlation coefficient being 0.131 (Table 4.). For appropriate analysis respondents were divided into three categories i.e., limited, fair and diverse. Respondents with diverse marketing pattern have high knowledge. Similarly Arya *et al*. (1992) [27]. reported that *Gujjars* were dependent on animal husbandry enterprise and 54% of their income comes from the sales of milk and livestock.

Negative insignificant association of indigenous knowledge with knowledge was observed with correlation coefficient of -

0.070. Thus the Respondents with high indigenous knowledge had low scores in knowledge as compared to those with low indigenous knowledge. The results were in consonance with the findings of Khateeb *et al*. (2015) [28]. 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.

Table 4: Correlation estimate for dependent and independent variables

Independent Variable	Correlation co-efficient 'r' value
Age	0.015
Education	0.159
Herd size	0.157
Land holding	0.188*
Cultural attributes and relationship with other community	0.244**
Work distribution among family members	-0.153
Ownership pattern	0.253**
Total annual income	0.078
Source of information	-0.034
Marketing pattern	0.131
Indigenous knowledge	-0.070

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

4. Conclusion
The findings revealed majority of the respondents were having medium knowledge level followed by low knowledge and high knowledge. Therefore, the sheep husbandry department and other cooperative societies should try to promote the knowledge level towards improved / scientific sheep husbandry practices by organizing extension educational activities. Efforts should be made to increase the knowledge level towards improved / scientific sheep husbandry practices through intensive training programmes, group discussions, demonstrations, tours, field visits, awareness programme etc., for socio economic up liftmen of the dairy farmers. Respondents had a high knowledge in feeding and low in management practice when compared with knowledge score of health care practices and breeding practices. Therefore Stress on scientific management and health care should be given. The independent variables viz. age, education, herd size, total annual income and marketing pattern were positively but insignificantly associated with the knowledge. The education status of majority of respondents was poor so the emphasis should be given on providing maximum educational facilities. On the other hand land holding, cultural attributes and relationship with other community and ownership were significantly positively associated with the knowledge. Insignificant negative association of work distribution among family members, source of information and indigenous knowledge was observed with knowledge level. Therefore awareness should be created among the *Bakarwal* tribe regarding the improved small ruminant rearing through demonstrations (result and method demonstration) which will help them to maximize the productivity and consequently the income of pastoralists. Mass media and extension contact should be effectively used as a source of information dissemination about scientific rearing practices. Emphasis should be given to preserve their

indigenous knowledge regarding sheep and goat rearing.

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