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To analyze the socio-personal, socio-economic, communication and psychological characteristics of sheep farmers about improved sheep management practices in zone Ic of Rajasthan

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Abstract

The research investigation was conducted in the Hyper-Arid Partially Irrigated Western Plain Zone (IC) of Rajasthan. The study area comprised Jaisalmer and Bikaner districts, along with selected parts of Churu district. Based on the highest sheep population, Jaisalmer and Bikaner districts were purposively selected for the research study. From each selected district, three tehsils with the highest sheep population were identified and chosen, resulted in a total of six tehsils. Within each tehsil, five villages were selected purposively based on the highest concentration of sheep population. Thus, a total of thirty villages were selected from the six tehsils of Jaisalmer and Bikaner districts. For the selection of respondents, a proportional random sampling technique was employed. Ten sheep farmers were selected from each village, leading to a total sample size of 300 respondents (150 from each district). The respondents represented small, medium and large sheep farmers based on the having total number of sheep. Primary data were collected through personal interviews using a structured questionnaire. Under the objective Sheep farmers belonged to the adult age group ((44.67%), OBC caste (40.34%), illiterate (67.65%), joint family ((58.00%), lived in pucca house ((51.00%) having marginal land (42.00%), have medium level of annual income (69.34%), main occupation is agriculture+livestock farming (24.00%), have medium flock size (42.00%), have medium herd size (55.00%), purchased animals at local market/ village market ((32.24%), having no social participation (68.33%), didn't participate in any training programme (76.00%), had medium level extension contact (64.00%), had medium level of mass media utilization (66.34%), had medium experience (46.00%), had medium risk orientation ((62.35%) and had medium innovativeness.

Keywords: Sheep farmers, education, occupation, flock size, herd size, training programme, mass media utilization, experience, land holding, income generation, marketing orientation, risk orientation and innovativeness

Introduction

Sheep play a vital role in the socio-economic and cultural livelihoods of rural households in India, as they are an important category of small ruminants. Sheep rearing has been practiced since ancient times and is widely regarded as a profession with considerable commercial potential. Owing to their small body size, ease of management, high reproductive efficiency, early sexual maturity, low input requirements, minimal initial investment and relatively simple marketing channels, sheep farming is extensively practiced across the world. These characteristics make sheep rearing more advantageous for rural populations compared to large ruminants such as cattle and buffaloes. Sheep Farming has traditionally been one of the most important elements of the agro-economic system of the Rajasthan state and more than 80.00 per cent rural families keep livestock in the state. Rajasthan earns annually remarkable revenue from wool, mutton and other products from sheep. Cost effective economy and less expensive housing, feeding practices make the sheep farming economic viable proposition for the poor farmers. Sheep farming has a long-standing tradition in Rajasthan, India's largest state, which is predominantly arid

and semi-arid and includes a substantial portion of the Thar Desert. More than 80 per cent of rural households in the state are engaged in animal husbandry. Rajasthan possesses a substantial livestock population of 56.8 million, accounting for 11.27 per cent of India's total livestock population of 535.78 million, thereby ranking second in the country. The livestock sector contributes approximately 10.21 per cent to the state's Gross Domestic Product (GDP). According to the 2012 Livestock Census, the sheep population in Rajasthan increased by 14.13 per cent, constituting nearly 13.8 per cent of the state's total livestock population (Anonymous, 2021) ^[2]. Rajasthan ranks first in the country in terms of camel and goat populations, second in buffalo and total livestock population, third in horses, and fourth in sheep population. As per the 20th Livestock Cens (2019), India had 74.26 million sheep, of which Rajasthan accounted for 7.9 million, ranking among the leading states after Telangana, Andhra Pradesh, and Karnataka

Materials and Methods

Due to the wide diversity in agro-climatic conditions across Rajasthan and to address location-specific agricultural

research needs, the state has been classified into ten agro-climatic zones. Among these, the Hyper Arid Partially Irrigated Western Plain Zone (Ic) was selected for the research study. This zone comprises the districts of Bikaner, Jaisalmer and parts of Churu. Out of these, the districts of Bikaner and Jaisalmer were purposively selected because they possess the highest sheep population within this agro-climatic zone. For the study, three tehsils from each selected district were purposively chosen based on their larger sheep population. Thus, a total of six tehsils were selected from the two districts. Further, five villages from each selected tehsil were chosen on the basis of having the highest sheep population. Consequently, thirty villages were selected from the six tehsils of Bikaner and Jaisalmer districts. In consultation with concerned local authorities, a comprehensive list of sheep farmers having a minimum of five years of experience in sheep husbandry was prepared from the selected villages. These farmers constituted the sampling frame for the study. From this frame, a total of 300 sheep farmers were selected as respondents.

Preparation of interview schedule and data collection

An interview schedule was carefully developed to collect relevant and reliable information from sheep farmers, keeping the objectives of the study in view. The schedule consisted of both open-ended and closed-ended questions, all framed in a clear, simple and direct manner. Prior to final data collection, the interview schedule was pre-tested with 10 sheep farmers to assess its clarity and suitability. Based on the results of the pre-test, necessary corrections and modifications were made. Data for the study were collected through face-to-face personal interviews with the selected sheep farmers using the finalized interview schedule. After each interview, the data sheets were thoroughly checked and verified to ensure that the responses were accurately and completely recorded.

Data tabulation and analysis

After completing data collection, all the data were compiled, coded and then tabulated for the processing. Local units were converted into standard units. Different statistical methods were used like included frequency, percentage, mean, mean percent score, standard deviation, rank

correlation, formulation of null and alternative hypotheses. To analyze the data, the SPSS statistics 16.0 program and excel were used.

Results and Discussion

Socio-economic information of the sheep farmers

Data of the Table 1 indicated that the overall majority (44.67%) of sheep farmers of selected districts belonged to adult age (from 36 to 55 years) group, followed by 30.33 per cent of sheep farmers who belonged to young age (15 to 35 years) group and only 25.00 per cent of sheep farmers belonged to old age (more than 55 years) group. Table 1 further indicated that majority (42.68 per cent) of sheep farmers of Jaisalmer and Bikaner districts (46.67%) belonged to adult age group (from 36 to 55 years). The possible reason might be due to the facts that adult age group are relatively more interested, experienced, aware about new technologies, energetic and hard working. The research work was in conformity with the findings of Sudhakar Rao, D.R. (2012) [30], Kumari *et al.* (2014) [16], Shirsat *et al.* (2019) [26], Kadagi *et al.* (2020) [13] and Chopra *et al.* (2022) [7]. The sheep farmers were divided into four categories based on their caste as Scheduled Tribes (ST), Scheduled Caste (SC), Other Backward Class (OBC) and General. The data presented in Table 2 revealed that the overall majority i.e., 40.34 per cent of sheep farmers belonged to OBC caste, followed by 29.33 per cent of sheep farmers who belonged to general caste, 27.33 per cent belonged to SC caste and only 03.00 per cent of sheep farmers belonged to ST caste categories. Thus, it was concluded that majority of the sheep farmers belonged to OBC caste category. The caste data in Table 2 further showed according to district wise, majority (38.67 per cent) of sheep farmers of Jaisalmer and Bikaner districts (42.00 per cent) belonged to OBC caste. The possible reasons that OBC sheep farmers are having good education, awareness, economic incentives, big community network and local adaptation. The findings are in conformity with the findings of Rajanna *et al.* (2011) [22], Rajanna *et al.* (2012) [21], Singh *et al.* (2013) [28], Rao (2013a) [24], Sridhar (2017) [29], Ramesh (2017) [23], Guruprasad *et al.* (2019) [11] and Kadagi *et al.* (2020) [13] who reported that most of the farmers belonged to OBC (other backward class) category.

Table 1: Classification of sheep farmers according to their age and caste

Categories		Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N= 150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
Age group	Young (15 to 35 years)	06	25.00	22	36.06	27	41.53	55 (36.65)	09	18.37	20	30.77	07	19.44	36 (24.00)	91	30.33
	Adult (From 36 to 55 years)	13	54.17	25	40.99	26	40.00	64 (42.68)	23	46.93	28	43.08	19	52.78	70 (46.67)	134	44.67
	Old (Above 55 years)	05	20.83	14	22.95	12	18.47	31 (20.67)	17	34.70	17	26.15	10	27.78	44 (29.33)	75	25.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
Caste Categories	SC	06	25.00	16	26.22	15	23.08	37 (24.66)	13	26.53	20	30.77	12	33.33	45 (30.00)	82	27.33
	ST	02	08.33	04	06.58	03	04.61	09 (06.00)	00	0.00	00	0.00	00	00.00	00 (00.00)	09	03.00
	OBC	07	29.17	22	36.06	29	44.61	58 (38.67)	20	40.81	28	43.08	15	41.67	63 (42.00)	121	40.34
	General	09	37.50	19	31.14	18	27.70	46 (30.67)	16	32.66	17	26.15	09	25.00	42 (28.00)	88	29.33
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

sheep farmers at the time of investigation, they were

classified in seven categories viz. illiterate, primary, middle,

secondary, senior secondary, graduation and post-graduation and above on the basis of frequency and percentage. The results are presented in Table 2. It is clear from Table 2 that the overall majority (67.65 per cent) of the sheep respondents of selected districts were illiterate, followed by primary school level (15.00 per cent), middle school level (09.67 per cent), secondary school level (06.00 per cent), senior secondary school level (01.68 per cent) 102 and it was surprising that not a single respondent was found under graduation and post-graduation & above level of education. The data in Table 2 further shows that maximum sheep farmers who are illiterate were in Jaisalmer district (68.67 per cent) followed by Bikaner district (66.67 per cent). Primarily, sheep farming is typically practiced in rural and remote areas where access to quality education is limited. Schools and colleges in these regions may be few, far between and under-resourced, making regular attendance challenging and families engaged in subsistence farming might not afford school fees, uniforms, or educational materials. The results were in conformity with Dejen (2010) ^[9], Patil *et al.* (2012) ^[18], Rajanna *et al.* (2012) ^[21], Kumari, N. (2014) ^[16], Arpana *et al.* (2016) ^[3], Ramesh (2017) ^[23], Sridhar (2017) ^[29], Chappa *et al.* (2018) ^[6], Shirsat *et al.* (2019) ^[26] and Islam *et al.* (2021) ^[12]. The respondents were divided into two categories namely nuclear family and joint family. The data presented in Table 2 reveals that out of 300 sheep farmers most of the farmers were belonged to the joint family (58.00 per cent) followed by respondents who belonged to nuclear family (42.00 per cent). A close observation of findings in Table 2 further shows that

majority (70.00 per cent) of sheep farmers of Jaisalmer district belonged to joint family whereas, majority (54.00 per cent) of respondents of Bikaner district belonged to nuclear family. It might be due to the reason that the joint family system provides a robust economic unit capable of pooling resources, labour and skill, which was crucial in managing agricultural activities, handle the diverse and labor-intensive tasks such as grazing man, ploughing, sowing and harvesting of crops for sheep fodder. The findings are in line with the research study conducted by, Patil *et al.* (2012) ^[18], Guruprasad *et al.* (2019) ^[11] and Singh *et al.* (2020) ^[27]. On the basis of type of house sheep farmers were classified into three categories viz. kutcha house, pucca house and mixed house (kutcha+pucca). The frequencies were counted and converted into percentage. The data are presented in the Table 2. The data presented in Table 2 showed that the overall majority (51.00 per cent) of sheep farmers of selected districts lived in pucca house, whereas 25.33 per cent lived in mixed house and remaining (23.67 per cent) lived in kutcha house. A close inspection of data further indicated that majority of respondents of Jaisalmer (49.33 per cent) and Bikaner district (52.67 per cent) lived in pucca house. It might be due to the reason that the shift to pucca houses reflect an improvement in the economic condition of many rural sheep farmers. Government initiatives, subsidies, schemes, rural housing funds and rural development programme (PMAY) have facilitated to access better housing conditions. The findings are in consistent with the finding of Rajanna *et al.* (2012) ^[21], Arpana *et al.* (2016) ^[3] and Sridhar (2017) ^[29].

Table 2: Classification of sheep farmers according to their educational level, family and house categories

	Categories	Jaisalmer District (n=150)								Bikaner District (n=150)								Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)		Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)		Total (N=300)	
		F	%	F	%	F	%			F	%	F	%	F	%			F	%
Educational Categories	Illiterate	17	70.83	41	67.21	45	69.23	103 (68.67)		32	65.31	45	69.23	23	63.89	100 (66.67)		203	67.65
	Primary	04	16.67	11	18.03	08	12.31	23 (15.33)		08	16.33	09	13.85	05	13.89	22 (14.67)		45	15.00
	Middle	02	08.33	06	09.84	09	13.85	17 (11.33)		04	08.16	04	06.15	04	11.11	12 (08.00)		29	09.67
	Secondary	01	04.17	03	04.92	03	04.62	07 (04.67)		03	06.12	06	09.23	02	05.56	11 (07.33)		18	06.00
	Senior Secondary	00	00.00	00	00.00	00	00.00	00 (00.00)		02	04.08	01	01.54	02	05.56	05 (03.33)		05	01.68
	Graduation	00	00.00	00	00.00	00	00.00	00 (00.00)		00	00.00	00	00.00	00	00.00	00 (00.00)		00	00.00
	Post-graduation and above	00	00.00	00	00.00	00	00.00	00 (00.00)		00	00.00	00	00.00	00	00.00	00 (00.00)		00	00.00
	Total	24	100	61	100	65	100	150 (100)		49	100	65	100	36	100	150 (100)		300	100
Family categories	Nuclear	08	33.33	21	34.42	16	24.61	45 (30.00)		29	59.18	35	53.84	17	47.22	81 (54.00)		126	42.00
	Joint	16	66.66	40	65.57	49	75.38	105 (70.00)		20	40.81	30	46.15	19	52.77	69 (46.00)		174	58.00
	Total	24	100	61	100	65	100	150 (100)		49	100	65	100	36	100	150 (100)		300	100
House Categories	Kutcha	09	37.50	20	32.79	20	30.74	49 (32.67)		08	16.31	08	12.31	06	16.68	22 (14.68)		71	23.67
	Pucca	11	45.83	30	49.18	33	50.80	74 (49.33)		21	42.86	38	58.46	20	55.56	79 (52.67)		153	51.00
	Mixed	04	16.67	11	18.03	12	18.46	27 (18.00)		20	40.83	19	29.23	10	27.76	49 (32.65)		76	25.33
	Total	24	100	61	100	65	100	150 (100)		49	100	65	100	36	100	150 (100)		300	100

On the basis of size of land holding sheep farmers were categorised as landless, marginal farmers, small farmers,

semi-medium farmers, medium farmers and large farmers. The data presented in Table 3 shows that the overall majority (42.00 per cent) of sheep farmers selected districts had marginal land holding, followed by small (18.33 per cent), semi-medium (17.67 per cent), landless (14.33 per cent), large (05.00 per cent) and possessed medium land holding (02.67 per cent). A perusal of data shown in Table 3 reveals that in Jaisalmer district majority (40.00 per cent) of sheep farmers had marginal land holding, and in Bikaner district most of sheep farmers (44.00 per cent) had marginal land holding. It might be because of the fact that in the present time land holding is being declined trend continuously due to fragmentation of land, economic limitation of farmers often restricts their ability to purchase. Findings of Rajanna *et al.* (2012) ^[21], Patil *et al.* (2012) ^[18], Sudhakar Rao (2012) ^[30], Choudhary *et al.* (2013), Shirsat *et al.* (2019) ^[26], Gupta *et al.* (2020) ^[10], Sharma (2021) ^[25] and Islam *et al.* (2021) ^[12] are similar to observed finding of present research study.

On the basis of annual income sheep farmers were classified into three categories viz. low annual income (up to 111,681 Rs.), medium annual income (from 111,681 to 199,889 Rs.) and high annual income (above 199,889 Rs.). The results in the Table 3 visualize that out of total 300 respondents, 69.34 per cent of sheep farmers reported to have medium level of income (Rs. 111,681 to 199,889), whereas 21.33 per cent reported to have income more than Rs. 199,889 per annum and remaining 09.33 per cent reported to possess yearly income less than Rs. 111,681 per annum. A close observation of result in Table 3 further shows that only 26.00 per cent of Jaisalmer district sheep farmers and 16.67 per cent Bikaner district sheep farmers belonged to high income group (>Rs. 199,889). It might be due to the specific reasons that all sheep farmers belonged to rural background so sheep rearing is the main source of their family income and also additional income from agriculture and livestock has probably contributed to increase in their total annual income. Similar conclusions were also recorded by the Rao (2013a) ^[24], Ramesh (2017) ^[23], Shirsat, (2018) ^[26], Guruprasad *et al.* (2019) ^[11], Gupta *et al.* (2020) ^[10], Sharma (2021) ^[25] and Channappa *et al.* (2021) ^[5] who also found that respondents had medium level of income.

To conscious the occupation of sheep farmers, they were divided into eight occupation categories i.e., labour+sheep farming, caste occupation+sheep farming, sheep rearing, agriculture+sheep rearing, livestock farming, agriculture+livestock farming, sheep rearing+business/self-employment and sheep rearing+service. The results in Table 3 showed that most of the respondents of selected districts i.e. 24.00 per cent were engaged in agriculture+livestock for earing income, followed by 23.34 per cent engaged in livestock farming, 20.33 per cent in agriculture+sheep rearing, 15.00 per cent in sheep rearing, 09.00 per cent in labour+sheep rearing, 03.00 per cent in sheep rearing+business/ self-employment and remaining 01.00 per cent were engaged in sheep rearing+service. A fine look at the data in Table 3 further indicated that majority of sheep farmers 28.65 per cent were engaged in agriculture+sheep rearing in Jaisalmer district and majority in Bikaner district

(34.64 per cent) were engaged in agriculture+livestock. It might be due to the reason that the rural sheep farmers often engage in both agriculture and livestock activities to establish a more resilient and sustainable farming system. The results of the research study are in conformity with the findings of Arya and Chander (2009) ^[4], Kamal *et al.* (2012) ^[14], Sudhakar Rao, (2012) ^[30], who also found that respondents had agriculture+livestock occupation.

On the basis of number of sheep possessed by the respondents, they were divided into three categories i.e., small flock size (<50 sheep), medium flock size (51-100 sheep) and large flock size (>100 sheep). The data presented in the Table 3 shows that most of the sheep farmers of selected districts i.e. 42.00 per cent to have medium flock size (51 to 100 sheep) followed by 33.67 per cent large flock size (>100 sheep) and remaining 24.33 per cent sheep respondents have small flock size (<50 sheep). The data in Table 3 further revealed that majority (43.33 per cent) of sheep farmers in Jaisalmer district have large flock size (>100 sheep) whereas, majority of sheep farmers in Bikaner district have (43.33 per cent) medium flock size (51-100 sheep). On the basis of herd size of animals possessed by sheep farmers, they were categorized into three group viz., small herd size (less than 20 animals), medium herd size (from 20 to 50 animals) and large herd size (more than 50 animals). The results presented in the Table 3 indicate that out of total 300 respondents 55.00 per cent of sheep farmers reported to have medium herd size (20 to 50 animals) while, 25.34 per cent of the respondents reported to have large herd size (more than 50 animals) followed by 19.66 per cent respondents found to have small herd size (less than 20 animals). Further glance at the data in the Table 3 showed that 56.00 per cent of Jaisalmer district sheep farmers and 54.00 per cent of Bikaner district sheep farmers were having medium herd size. Presented finding are supported with the results of studies conducted by Patel *et al.* (2013) ^[17] and Sharma, (2021) ^[25] who also found that majority of farmer possessed medium herd size.

To classify the sheep farmers on the basis of sources of purchase of animals, they were categorised into six grouped namely local market/ village market, tehsil/district market, animal market/animal fair, government breed farm, friends and relatives and any other farmers. A perusal of data showed in Table 3 reveal that out of total 300 respondents, overall majority purchased animals at local market/ village market (32.24 per cent) followed by 27.29 per cent, 20.24 per cent, 16.47 per cent and 02.24 per cent from friends and relatives, any other farmers, tehsil/district market and animal market/animal fair. Only 01.53 per cent purchase from government breed farm. A close exploration of results in the Table 3 further indicated that 29.41 per cent of sheep farmers purchase animals from friends and relatives in Jaisalmer whereas, 36.32 per cent of sheep farmers purchase animal from local market/village market in Bikaner district. These observations are in agreement with the findings of Suresh *et al.* (2008) ^[31], Pokharkar (2013) ^[19] and Shirsat *et al.* (2019) ^[26] who concluded that sheep farmers sold sheep products mainly to village agent or middlemen who had regular contact with the sheep farmers.

Table 3: Classification of sheep farmers according economics categories

Characters	Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
Land holding Categories	Landless	02	08.33	10	16.39	12	18.46	24 (16.00)	04	08.16	14	21.53	01	02.77	19 (12.66)	43	14.33
	Marginal (less than 1 ha.)	10	41.67	29	47.54	21	32.30	60 (40.00)	25	51.02	26	40.00	15	41.66	66 (44.00)	126	42.00
	Small (1 to 2 ha.)	04	16.67	06	09.83	18	27.69	28 (18.66)	07	14.28	09	13.84	11	30.55	27 (18.00)	55	18.33
	Semi-Medium (2.01 to 4 ha.)	04	16.67	10	16.39	08	12.30	22 (14.68)	11	22.44	14	21.53	06	16.66	31 (20.68)	53	17.67
	Medium (4.01 to 10 ha.)	01	04.17	01	01.63	02	03.07	04 (02.66)	02	04.08	01	01.53	01	02.77	04 (02.66)	08	02.67
	Large (More than 10ha.)	03	12.50	05	08.19	04	06.15	12 (08.00)	00	00.00	01	01.53	02	05.55	03 (02.00)	15	05.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
Income Categories	Low (less than to Rs. 111,681)	04	16.67	07	11.48	02	03.08	13 (08.67)	04	08.16	03	04.69	02	05.71	15 (10.00)	28	09.33
	Medium (from Rs. 111,681 to 199,889)	17	70.83	43	70.49	38	58.46	98 (65.33)	37	75.51	49	76.56	18	51.43	110 (73.33)	208	69.34
	High (above Rs. 199,889)	03	12.50	11	18.03	25	38.46	39 (26.00)	08	16.33	12	18.75	15	42.86	25 (16.67)	64	21.33
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
Occupation Categories	Labour + Sheep rearing	03	12.50	06	09.83	05	07.69	14 (09.34)	05	10.20	06	09.23	02	05.56	13 (08.67)	27	09.00
	Caste occupation+ Sheep rearing	01	04.16	03	04.91	03	04.61	07 (04.66)	02	04.10	03	04.62	01	02.78	06 (04.00)	13	04.33
	Sheep rearing	02	08.33	11	18.03	15	23.07	28 (18.67)	05	10.20	09	13.85	03	08.32	17 (11.33)	45	15.00
	Agriculture + sheep rearing	10	41.66	19	31.14	14	21.53	43 (28.65)	06	12.24	08	12.31	04	11.11	18 (12.00)	61	20.33
	Livestock farming	03	12.50	12	19.67	20	30.76	35 (23.35)	11	22.45	15	23.06	09	25.00	35 (23.33)	70	23.34
	Agriculture + Livestock farming	05	20.83	07	11.47	08	12.30	20 (13.33)	15	30.61	22	33.85	15	41.67	52 (34.67)	72	24.00
	Sheep rearing + Business/ Self employment	00	00.00	02	03.27	00	00.00	02 (01.34)	04	08.16	02	03.08	01	02.78	07 (04.67)	09	03.00
	Sheep rearing + Service	00	00.00	01	01.63	00	00.00	01 (00.66)	01	02.04	00	00.00	01	02.78	02 (01.33)	03	01.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
Herd Size	Small herd size (less than 20)	04	16.67	09	14.75	08	12.30	21 (14.00)	12	24.49	20	30.77	06	16.67	38 (25.33)	59	19.66
	Medium herd size (20 to 50)	14	58.33	30	49.18	40	61.53	84 (56.00)	29	59.18	31	47.69	21	58.33	81 (54.00)	165	55.00
	Large herd size (more than 50)	06	25.00	22	36.07	17	26.17	45 (30.00)	08	16.33	14	21.54	09	25.00	31 (20.67)	76	25.34
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
Market Categories	Local market/ Village market	22	32.84	48	27.12	62	28.84	132 (28.76)	44	42.31	63	38.18	35	32.11	142 (36.32)	274	32.24
	Tehsil /District market	10	14.93	27	15.25	40	18.60	77 (16.78)	17	16.35	27	16.36	19	17.43	63 (16.11)	140	16.47
	Animal market/ Animal Fair	00	00.00	01	00.56	07	03.26	08 (01.74)	02	01.92	02	01.21	07	06.42	11 (02.81)	19	02.24
	Government breed farm	00	00.00	01	00.56	20	00.93	03 (00.65)	00	00.00	03	01.82	07	06.42	10 (02.56)	13	01.53
	Friends and relatives	15	22.39	55	31.07	65	30.23	135 (29.41)	19	18.27	42	25.45	36	33.03	97 (24.81)	232	27.29
	Any other farmers	20	29.85	45	25.42	39	18.14	104 (22.66)	22	21.15	28	16.97	05	04.59	68 (17.39)	172	20.24

Bikaner District	Local/ village market	49	57.64	49	30.24	00	00.00	49	42.60	65	34.21	62	38.27	00	00.00	65	32.50
	tehsil market	09	10.58	08	04.93	00	00.00	00	00.00	12	06.31	09	05.55	00	00.00	00	00.00
	District market	02	02.35	01	00.61	00	00.00	00	00.00	05	02.63	05	03.08	00	00.00	00	00.00
	Government farm/Firm	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00
	Middleman	35	41.17	35	21.60	00	00.00	07	06.08	63	33.15	57	35.18	00	00.00	38	19.00
	Animal fairs/ Exhibitions	01	01.17	01	00.61	00	00.00	00	00.00	00	00.00	05	03.08	00	00.00	00	00.00
	Out of state market	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00
	Relatives/friends	38	44.70	33	20.37	00	00.00	38	33.04	20	10.52	13	8.02	00	00.00	53	26.50
Jaisalmer District	Other Farmers	22	25.88	35	21.60	00	00.00	21	18.26	25	13.15	11	6.79	00	00.00	44	22.00
	Local/ village market	24	66.66	24	34.78	00	00.00	24	37.5	60	51.28	60	30.92	5	45.45	60	33.89
	Tehsil market	02	05.55	2	02.89	00	00.00	02	03.12	12	10.25	09	04.63	00	00.00	06	03.38
	District market	04	11.11	00	00.00	00	00.00	00	00.00	24	20.51	05	02.57	00	00.00	00	00.00
	Government farm/Firm	00	00.00	00	00.00	00	00.00	00	00.00	0	00.00	00	00.00	00	00.00	00	00.00
	Middleman	16	44.44	16	23.18	00	00.00	11	17.18	48	41.02	52	26.80	00	00.00	50	28.24
	Animal fairs/ Exhibitions	00	00.00	00	00.00	00	00.00	00	00.00	0	00.00	00	00.00	00	00.00	00	00.00
	Out of state market	00	00.00	00	00.00	00	00.00	00	00.00	0	00.00	00	00.00	00	00.00	00	00.00
	Relatives/friends	14	38.88	14	20.28	00	00.00	14	21.87	33	28.20	33	17.01	06	54.54	32	18.07
	Other Farmers	13	36.11	13	18.84	00	00.00	13	20.31	29	24.78	35	18.04	00	00.00	29	16.38

Social participation

Data presented in Table 3 reveal that the based on mean and standard deviation, sheep farmers were classified into four categories viz. none participation, member of one organization, member of more than one organization and office holder & wide public leader. The data given in Table 3 reveal that out of 300 respondents, majority (68.33%) of sheep farmers were having no social participation, whereas 24.67 per cent were member of one organization, 04.33 per

cent were member of more than one organization and only 02.67 per cent sheep respondents were office holder & wide public leader. A close exploration of data in the Table 3 further indicated that in Jaisalmer district majority (70.67 per cent) of sheep farmers not having social participation and Bikaner district majority (66.00 per cent) of sheep farmers not having social participation. These finding are supported by Kumari (2014) ^[16] who also found that majority of farmers not having social participation.

Table 3: Classification of sheep farmers according to their social participation

S. No	Social participation Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	None	12	50.00	45	73.77	49	75.38	106 (70.67)	31	63.27	41	63.08	27	75.00	99 (66.00)	205	68.33
2.	Member of one organization	09	37.50	12	19.67	12	18.46	33 (22.00)	16	32.65	18	27.69	07	19.44	41 (27.33)	74	24.67
3.	Member of more than one organization	02	08.33	01	01.64	03	04.62	06 (04.00)	02	04.08	04	06.15	01	02.78	07 (04.67)	13	04.33
4.	Office holder & Wide public leader	01	04.17	03	04.92	01	01.54	05 (03.33)	00	00	02	03.08	01	02.78	03 (02.00)	08	02.67
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

F= Frequency %= Percentage

Based on frequency and percentage, sheep farmers were categorised into two groups i.e., no training received and training received. The results accommodated in Table 4 reveal that 76.00 per cent out of total 300 respondents didn't participate in any training programme whereas, only 24.00 per cent of respondents received training related to sheep management practices. management practices. Only 16.65

per cent in Jaisalmer district and 31.33 per cent from Bikaner district sheep farmers received training related to improved sheep management practices. The results of the research study are in conformity with the findings of Kamal *et al.* (2012) ^[14], Venkatachalapathy *et al.* (2020) ^[32] and Islam *et al.* (2021) ^[12] who also found that majority of farmers not attended any training programme.

Table 4: Classification of sheep farmers according to their training received

S. No	Training Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	No training received	21	87.50	51	83.61	53	81.53	125 (83.35)	38	77.55	44	67.69	21	58.33	103 (68.67)	228	76.00
2.	Training received	03	12.50	10	16.39	12	18.46	25 (16.65)	11	22.45	21	32.31	15	41.67	47 (31.33)	72	24.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100
F= Frequency%= Percentage																	

Sheep farmers were classified into three groups on the basis of mean and standard deviation about their extension contact. They have three groups viz., low level (less than 11.89 score), medium level (from 11.89 to 22.61 score) and high level (more than 22.61 score) of extension contact. It is clear from the fig 1 that 64.00 per cent of total sheep farmers had medium extension contact, followed by 19.00 per cent had low level extension contact and 17.00 per cent had high extension contact. A close exploration of data in

the fig 1 further indicated that in Jaisalmer district majority (63.69 per cent) of sheep farmers had medium level extension contact and In Bikaner district majority (59.34 per cent) of respondents had medium level of extension contact. The results of the research study are in conformity with the findings of Shirsat *et al.* (2019) ^[26], Choudhary (2021), Sharma (2021) ^[25] and Channappa *et al.* (2021) ^[5] who also found that majority of farmers were reported having medium level of extension contact.

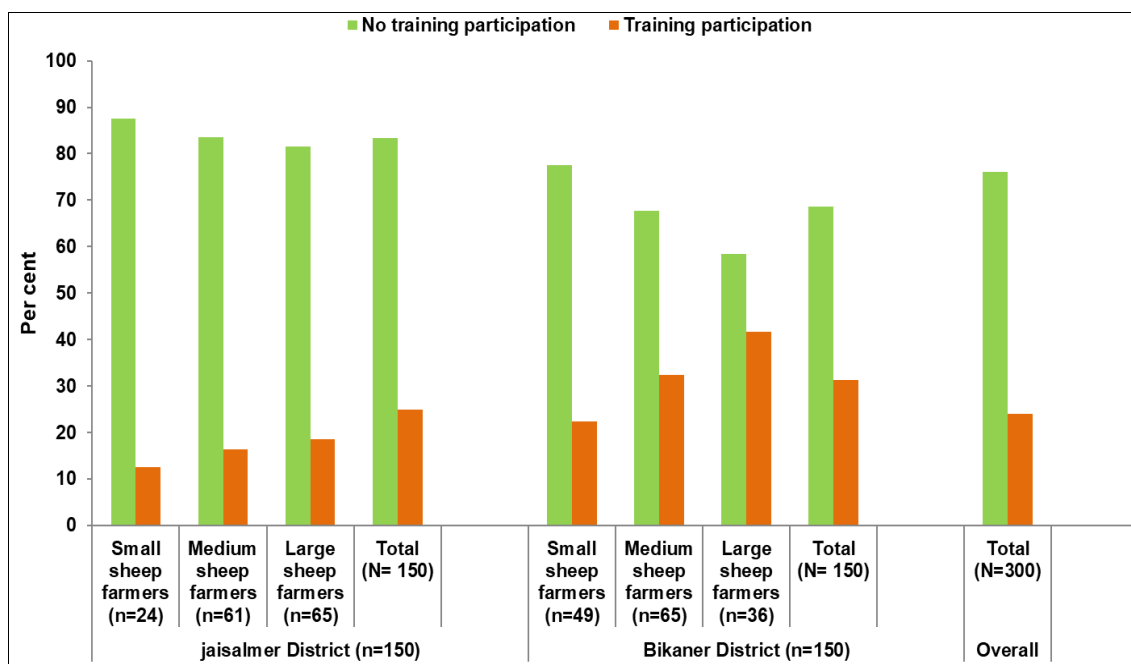


Fig 1: Classification of sheep farmers according to their training participation

Sheep farmers were classified into three groups on the basis of mean and standard deviation about their extension contact. They have three groups viz., low level (less than 11.89 score), medium level (from 11.89 to 22.61 score) and high level (more than 22.61 score) of extension contact. It is clear from the Table 5 that 64.00 per cent of total sheep farmers had medium extension contact, followed by 19.00 per cent had low level extension contact and 17.00 per cent had high extension contact. A close exploration of data in

the table 5 further indicated that in Jaisalmer district majority (63.69 per cent) of sheep farmers had medium level extension contact. In Bikaner district majority (59.34 per cent) of respondents had medium level of extension contact. The results of the research study are in conformity with the findings of Shirsat *et al.* (2019) ^[26], Choudhary (2021), Sharma (2021) ^[25] and Channappa *et al.* (2021) ^[5] who also found that majority of farmers were reported having medium level of extension contact.

Table 5: Classification of sheep farmers according to their extension contact

S. No.	Extension Contact Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	Low (Less than 11.89)	08	33.33	08	13.11	12	18.46	28 (18.65)	10	20.41	13	20.00	06	16.67	29 (19.33)	57	19.00
2.	Medium (From 11.89 to 22.61)	12	50.00	45	73.78	46	70.77	103 (63.69)	30	61.22	36	55.38	23	63.89	89 (59.34)	192	64.00
3.	High (More than 22.61)	04	16.67	08	13.11	07	10.77	19 (12.66)	09	18.37	16	24.62	07	19.44	32 (21.33)	51	17.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

Mean= 17.25, SD= 5.36, F= Frequency%= Percentage

On the basis of mean and standard deviation of sheep farmers were categorised into three groups namely low, medium and high level of mass media utilization. Perusal of data presented in Table 6 reveals that more than half (66.34%) of total selected respondents had medium level of mass media utilization followed by low level (18.66 per cent) and high level (15.00 per cent) of mass media

utilization. Table 6 further indicates that 60.00 per cent of Jaisalmer sheep farmers and 72.66 per cent of Bikaner sheep farmers had medium level of mass media utilization. The presented results of this parameter are in line with the findings of Choudhary (2021) and Sharma (2021) ^[25] who also found that majority of farmers were found medium level of mass media utilization.

Table 6: Classification of sheep farmers according to their mass media utilization

S. No.	Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (n=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (n=150)	Total (n=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	Low (Less than 04.28)	05	20.83	15	24.59	04	11.11	37 (24.66)	03	06.12	03	04.61	13	13.11	19 (12.66)	47	18.66
2.	Medium (From 04.28 to 15.43)	16	66.66	35	57.37	27	75.00	90 (60.00)	40	81.63	51	78.46	18	50.00	109 (72.66)	199	66.34
3.	High (More than 15.43)	03	12.50	11	18.03	05	13.88	23 (15.34)	06	12.24	11	16.92	05	13.88	22 (14.68)	45	15.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

Mean= 9.85, SD= 5.57, F= Frequency%= Percentage

Sheep farmers of study area were classified into three categories viz. low, medium and high experience in sheep rearing. The results in Table 7 shows that among, 300 respondents 46.00 per cent of sheep farmers of selected districts had medium level of experience (10 to 20 years) in sheep rearing, followed by 32.00 per cent with high level of experience (>20 years) and only 22.00 per cent possessed low level of experience (<10 experience). The data in Table

7 further indicated that in Jaisalmer district majority (48.67 per cent) of sheep farmers had medium level of experience in sheep rearing. In Bikaner district majority (43.33 per cent) of sheep farmers had medium level of experience in sheep rearing. These findings are supported by Rajanna *et al.* (2011) ^[22], Rao (2013b) ^[24] and Shirsat *et al.* (2019) ^[26] who also found that majority of farmers were in medium level of experience in sheep rearing.

Table 7: Classification of sheep farmers according to their experience in sheep rearing

S. No.	Experience Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	Low (Less than 10 years)	02	08.33	08	13.11	07	10.77	17 (11.33)	20	40.82	21	32.31	08	22.22	49 (32.67)	66	22.00
2.	Medium (10 to 20 years)	10	41.66	30	49.18	34	52.31	73 (48.67)	23	46.94	29	44.62	13	36.11	65 (43.33)	138	46.00
3.	High (More than 20 years)	12	50.00	23	37.70	24	36.92	60 (40.00)	06	12.24	15	23.08	15	41.67	36 (24.00)	96	32.00
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

F= Frequency%= Percentage

On the basis of the mean and standard deviation sheep farmers were classified into three categories viz. low, medium and high-risk orientation. It is clear from the Table 8 that majority (62.35 per cent) of the overall sheep farmers of selected districts had medium risk orientation (7.38 to 10.68 score), followed by 31.32 per cent with low-risk orientation (<7.38 score) and only 06.33 per cent had high risk orientation (>10.68 score). The data in Table 8 also

indicated that the majority (57.34 per cent) of sheep farmers in Jaisalmer district had a medium risk orientation whereas, in Bikaner district, 67.35 per cent had a medium risk orientation. These findings are in accordance with the finding obtained by Patel *et al.* (2014) ^[17], Rakesh *et al.* (2016), Raina *et al.* (2016) ^[20], Channappa *et al.* (2021) ^[5], Sreedhara (2021) and Kumar *et al.* (2022) ^[15].

Table 8: Classification of sheep farmers according to their risk orientation

S. No.	Risk orientation Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	Low (Less than 7.38)	08	33.33	12	19.67	36	55.38	56 (37.33)	21	42.86	11	16.9	06	16.67	38 (25.33)	94	31.32
2.	Medium (From 7.38 to 10.68)	14	58.33	45	73.77	27	41.54	86 (57.34)	27	55.10	51	78.5	23	63.89	101 (67.35)	187	62.35
3.	High (More than 10.68)	02	8.33	04	06.56	02	03.08	08 (05.33)	01	02.04	03	04.6	07	19.44	11 (07.32)	19	06.33
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

Mean= 9.03, SD= 1.65, F= Frequency%= Percentage

On the basis of score obtained by the sheep farmers regarding innovativeness they were categorised into three groups i.e., low level (Less than 02.59), medium level (02.59 to 04.47) and high level (more than 04.47). According to the statistics in Table 9 indicate that 65.67 per cent of sheep farmers were having a medium level of innovativeness out of 300 respondents. While 25.66 per cent of all respondents were having high level of innovativeness and the remaining 08.67 per cent of sheep farmers were having low level of innovativeness. A scrutiny of the data in

Table 9 revealed that the majority of sheep farmers in Jaisalmer district (64.00 per cent) and in Bikaner district (67.35 per cent) were having a medium level of innovativeness. Findings of Rakesh *et al.* (2016), Raina *et al.* (2016) ^[20], Patel *et al.* (2014) ^[17], Vishwakarma *et al.* (2017) ^[33] and Choudhary (2021) reported that majority of farmers were having medium level of innovativeness.

Classification of sheep farmers according to their Innovativeness

S. No.	Categories	Jaisalmer District (n=150)							Bikaner District (n=150)							Overall	
		Small sheep farmers (n=24)		Medium sheep farmers (n=61)		Large sheep farmers (n=65)		Total (N=150)	Small sheep farmers (n=49)		Medium Sheep farmers (n=65)		Large sheep farmers (n=36)		Total (N=150)	Total (N=300)	
		F	%	F	%	F	%		F	%	F	%	F	%		F	%
1.	Low (Less than 02.59)	03	12.50	06	09.84	06	09.23	15 (10.00)	07	14.29	02	03.08	02	05.56	11 (07.33)	26	08.67
2.	Medium (From 02.59 to 04.47)	19	79.17	39	63.93	38	58.46	96 (64.00)	33	67.35	43	66.15	25	69.44	101 (67.35)	197	65.67
3.	High (More than 04.47)	02	08.33	16	26.23	21	32.31	39 (26.00)	09	18.37	20	30.77	09	25.00	38 (25.32)	77	25.66
	Total	24	100	61	100	65	100	150 (100)	49	100	65	100	36	100	150 (100)	300	100

Mean= 3.53, SD= 0.94, F= Frequency%= Percentage

Conclusion

The study concluded that the major portion of the sheep farmers had the adult age group, OBC caste, illiterate, joint family, lived in pucca house having marginal land, have medium level of annual income, main occupation is agriculture+livestock farming, have medium flock size, have medium herd size, purchased animals at local market/ village market, having no social participation, didn't participate in any training programme, had medium level extension contact, had medium level of mass media

utilization, had medium experience, had medium risk orientation, had medium innovativeness.

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