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COMPARATIVE STUDY OF CLEAN WOOL CONTENT AND FIBRE QUALITY OF THREE DIFFERENT SHEEP BREEDS OF THE PUNJAB

Tahir Iqbal*, Makhdoom A. Jabbar and M. Khalil Ahmad

Three sheep breeds (Lohi, Salt Range and Kajli) were compared for their quantitative and qualitative wool characters. The clean wool contents were 60.01, 83.92 and 57.89% respectively. The difference in clean wool content and in the scoured wool was highly significant ($P<0.01$), while the ash content differed significantly ($P<0.05$) in these wools. The vegetable matter and the grease content had non-significant difference. The fibre diameter of Lohi, Salt Range and Kajli sheep was 36.04, 35.24 and 38.08 micrometers respectively. The percentage of true and heterotypical fibres differed significantly ($P<0.01$) among the breeds, while the difference in medullated fibres was non-significant. The average staple length was 5.26, 7.80 and 6.60 cm for Lohi, Salt Range and Kajli sheep and the difference for staple length and crimps/cm was highly significant.

INTRODUCTION

Pakistan hosts nearly 21 sheep breeds which mainly produce carpet wool. Pakistan wool is recognised as a superior grade wool for its carpet qualities in the international market. According to Haq (1982) the annual greasy wool production was 43.75 thousand tons yielding 26.25 thousand tons as clean wool. Rice *et al.* (1954) reported that fleece weight did not represent the weight of the wool in real sense because it contained impurities like dirt, suint, vegetable matter and grease which varied with breed, age, season, nature of soil, shearing period and method. For accurate wool production potential, estimation of clean fleece content is necessary. Greater the clean wool content, lesser the waste wool at the processing level and more the return to the breeder. Obviously, for the selection of a sheep flock for wool production, estimation of clean wool content in addition to fibre quality characteristics is of fundamental importance. The present study reports the comparative evaluation of Lohi,

*Livestock Production Research Institute, Bahadurnagar, Okara.

Salt Range and Kajli sheep breeds for clean wool content, fibre diameter, fibre types percentage and crimpiness of their wool.

MATERIALS AND METHODS

Eighty-eight wool samples of Lohi (30), Salt Range (24) and Kajli (34) sheep from whole shorn fleeces each weighing 250 gm, were collected randomly from their respective home tracts. The samples were evaluated using quantitative and qualitative analyses. The quantitative analysis was made to determine clean wool content by estimating dirt, vegetable matter, grease content and ash percentage according to A.S.T.M. (1963), while qualitative analysis was carried out for staple length, crimps/cm, fibre diameter and medullation percentage. The samples of fleece carried six months growth. The laboratory processes were carried out at a temperature of 35°C and 62% relative humidity.

The data obtained were subjected to the analysis of variance using complete randomized block design and the difference in the means was assessed using the DMR test.

RESULTS AND DISCUSSION

Clean Wool Content : The clean wool content represents the actual amount of wool after deducting all types of impurities. There was significant difference in the yield of clean wool content in these breeds (Table 1). The highest percentage of clean wool was 83.92 $\pm$ 9.54% in Salt Range, while 60.01 $\pm$ 12.84 and 57.89 $\pm$ 10.84% was found in Lohi and Kajli sheep respectively. Salt Range yielded significantly ($P<0.01$) higher clean wool content than Lohi and Kajli. Almost similar estimates of clean wool contents with an average of 91.5 $\pm$ 1.1, 59.2 $\pm$ 3.7 and 51.3 $\pm$ 4.2% from Salt Range, Lohi and Kajli breeds were reported earlier (Anonymous, 1964).

Scoured Wool : Scouring process removes the dirt and other impurities like suint and fat from greased wool resulting in different scoured wool percentages in different breeds depending upon the managemental practices. The values for scoured wool in Salt Range were significantly higher (80.37 $\pm$ 9.44%) than those obtained for Lohi and Kajli wool (i.e. 56.89 $\pm$ 11.18 and 58.31 $\pm$ 8.93%, respectively). These differences are quite natural as the acquired impurities are related to the nature of soil, pastures and managemental conditions which may vary from place to place (Rice, 1954).

Grease content : The grease is bleached in the detergent solution, leaving a smaller portion of grease in the scoured samples. The grease content from scoured wool on average was 1.28 ± 1.11, 1.73 ± 1.29 and 1.66 ± 0.88% for Lohi, Salt Range and Kajli sheep respectively (Table 1). Statistically the differences among them were non-significant. Although lower values for extractable matter 0.5-1.1%) have been reported for these breeds (Anonymous,1964), yet the trend was similar to that observed in the present study.

Vegetable Matter : The vegetable matter included the burs, cockles and straws. The quantity of this matter may vary from place to place depending upon the kind and the intensity of vegetation. Average vegetable matter was 3.07±3.61, 4.85 ±7.04 and 3.21 ± 3.07% for Lohi, Salt Range and Kajli animals. The differences were statistically non-significant ($P<0.05$). Animal to animal variation was very high as the coefficient of variation ranged from 95 to 118%. The values reported earlier for the same sheep breeds were as low as 0.70, 1.40 and 1.20% respectively (Anonymous, 1964). These differences may be due to different habitats and vegetation in grazing areas.

Ash Content : The average ash content in Lohi, Salt Range and Kajli wools was 3.58 ± 2.36, 2.53 ± 1.21 and 2.61 ± 0.48% respectively (Table 1). The values were higher for Lohi than the other two breeds which showed non-significant difference among each other. Likhacheva and Timchenko (1984) reported that the contents in upper and lower body fleece were 4.3 and 3.5% in Caucasian ewes.

Staple Length : The average staple length of Lohi, Salt Range and Kajli wools was 5.26 ± 0.58, 7.80 ± 1.59 and 6.60 ± 0.86 cm after six months growth. All these breeds yielded higher staple length than the minimum limit required, i. e. 5.0 cm for carpet industry (Shah, 1982). The values differed significantly ($P<0.05$) from each other. The present results also differed greatly from the results reported by Shah (1982) who reported 9.8, 10.0 and 5.0 cm staple length for Lohi, Salt Range and Kajli breeds respectively.

Crimpiness : The samples being that of coarse wool, the number of crimps/cm were very low as compared to that of fine wools. The average number of crimps/cm observed for Lohi, Salt Range and Kajli wools was 0.69 ± 0.17, 0.39 ± 0.10 and 0.38 ± 0.06 (Table 1).

Fibre Diameter : The average fibre diameters of Lohi, Salt Range and Kajli

Table 1. *Mean values of different parameters of Lohi, Salt Range and Kajli wools*

Breeds	Clean wool content (%)	Vegetable matter (%)	Grease content (%)	Ash content (%)	Scoured (%)	Staple length (cm)	Crimpiness (cm)	Fibre diameter (micro-	True fibre (%)	Medullation (%)
		N.S	N.S				N.S	N.S		
Lohi	60.01**	3.07	1.28	3.58*	56.89**	5.26**	0.69	36.04	50.26**	49.73**
	±12.84	±3.61	±1.11	±2.36	±11.18	±0.58	±0.17	± 5.15	±17.57	±17.56
Salt Range	83.92	4.85	1.73	2.53	80.37	7.89	0.39	35.24	61.08	38.91
	± 9.54	±7.04	±1.29	±1.21	± 9.44	±1.59	±0.10	± 4.47	±11.80	±11.78
Kajli	57.89	3.21	1.66	2.61	58.31	6.60	0 38	38.08	49.88	50.11
	±10.44	±3.07	±0.98	±0.48	± 8.93	±0.86	±0.06	± 2.71	±10.39	±10.39

N.S = Non-significant difference among three breeds.

* = Significant at $P < 0.05$.

** = Significant at $P < 0.01$.

wools were 36.04 ± 5.15, 35.24 ± 4.47 and 38.08 ± 2.71 micrometers, respectively. The differences were significant($P<0.05$) only between Kajli and Salt Range. The values for the fibre diameter were in close agreement with those of Wahid (1982) who reported 40.2, 35.3 and 37.1 micrometer for Lohi, Salt Range and Kajli wools. Rashid (1961) reported that the average fibre diameter of 12 different breeds was 40.9 micrometer with a range of 28.2 to 61.0 micrometer in different breeds.

Table 2. *Correlation coefficients among various parameters of wool*

Quantitative parameters		Qualitative parameters	
Parameter	Correlation coefficient	Parameter	Correlation coefficient
Clean wool content : scoured wool	0.60**	Fibre diameter : true fibre	-0.75
		Fibre diameter : heterotypical	0.189N.S
Clean wool content : vegetable matter	0.09N.S	Fibre diameter : medullated	0.729**
Clean wool content : grease	0.02*	True : heterotypical	0.460**
Clean wool content : ash	0.19N.S	True : medullated	0.85
Scoured wool : vegetable matter	0.30*	Heterotypical :medullated	0.075N.S
Scoured wool : grease	0.09N.S	Staple length : crimps/cm	0.065N.S
Scoured wool : ash	0.04N.S		
Vegetable matter : grease	0.14N:S		
Vegetable matter : ash	0.11N.S		
Grease : ash	0.11N.S		

N.S = Non-significant.

* = Signficant at 5%; ** = Significant at 1%.

True Fibre Percentage : The true fibre percentage was 50.26 ± 17.57, 61.08 ± 11.80 and 49.88 ± 10.39 in Lohi, Salt Range and Kajli wools. The difference was non-significant between Lohi and Kajli while the Salt Range had significantly lower ($P<0.01$) values than for the other two breeds. These values are

similar to those reported by Shah (1982) who recorded 50, 64 and 48% true fibre in Lohi, Salt Range and Kajli sheep, respectively.

Medulation Percentage : The overall percentage of medullated fibres was 49.73 ± 17.56, 38.91 ± 11.78 and 50.11 ± 10.39 in Lohi, Salt Range and Kajli wools. The difference between Lohi and Kajli was non-significant ($P<0.05$), while others differed significantly ($P<0.05$) from each other. These results conform to the findings of Shah (1982) who reported 48, 35 and 49% medullation in Lohi, Salt Range and Kajli wools.

The correlation coefficients for different parameters studied have been given in Table 2. Clean wool content was positively correlated with the scoured wool but had negative correlation with vegetable matter, grease and ash contents. The correlation of fibre diameter with true fibre percentage was negative and significant but positive with heterotypical and medullated fibres. Similar findings have been reported by Bhasin *et al.* (1968) who found that correlation coefficient was 0.907 and 0.977 for fibre diameter with true and medullated fibres respectively. The correlation between staple length and crimps/cm was non-significant in these breeds.

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