

A Study on the Follicle Traits and Their Association with Wool Traits in Patanwadi Sheep

R. R. Shah, K. N. Vyas and R. K. Shukla

Veterinary College, Gujarat Agricultural University, Anand Campus, Anand

ABSTRACT

Associations of follicle traits like follicle depth (F_d), follicle chord (F_c) and follicle curvature index (F_{ci}) with some wool traits in Patanwadi sheep have been reported. Heritability estimates of F_d and F_c at 15-16 months of age were found to be 0.14 and 0.35 respectively, while those of wool traits were found to be low to medium.

Genetic and phenotypic correlations between these traits were found to be of varying magnitude but in desirable direction, which emphasized utility of further study on follicle traits.

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INTRODUCTION

Very scanty literature is available on skin follicle traits and their relationship with wool and growth traits in sheep. Some study has been made on histological aspects in horizontal sections at Central Sheep and Wool Research Institute, Avikanagar. Study on follicle traits like follicle depth (F_d), follicle chord (F_c), and follicle curvature index (F_{ci}) in vertical sections was attempted in Patanwadi sheep, (Shah *et al.* 1978).

Genetic and Phenotypic correlations between wool traits and body traits have been studied by Shukla (1973) and Gumble (1978) in Patanwadi sheep. Here the effort has been made to study the association between some follicle traits and wool traits in Patanwadi flock.

MATERIALS AND METHODS

The animals used belonged to the Patanwadi breed, maintained at Gover-

nment sheep Breeding Farm, Patan, Gujarat. Eighty three animals of 7-8 months and one hundred and twelve animals of 15-16 months of age were biopsied for the present study. Histological techniques involved and methods of measurements etc. of these follicle traits viz. F_d , F_c and F_{ci} have been described by Nay (1973) and Shah *et al.* (1978).

Statistical analysis was carried out as per Snedecor and Cochran (1967). Estimates of heritability were obtained by paternal halfsib correlation method as suggested by Lush (1948) and standard errors were obtained as per Robertson (1959). Genetic correlations were estimated as outlined by Hazel *et al.* (1943).

RESULTS AND DISCUSSION

The means along with their standard errors of follicle and wool traits have been given in Table 1. Follicle

TABLE I

Mean, standard error and coefficient of variation percentage, for some follicle and wool quality traits in Patanwadi sheep.

Sr. No.	Characters	Mean + S.E.		C.V. %
1.	Follicle depth at 7-8 months (F_{d8})	2.08 ± 0.01 mm		4.40
2.	Follicle depth at 15-16 months (F_{d15})	2.06 ± 0.01 mm		5.21
3.	Follicle chord at 7-8 months (F_{c8})	2.12 ± 0.01 mm		4.35
4.	Follicle chord at 15-16 months (F_{c15})	2.11 ± 0.01 mm		5.35
5.	Follicle curvature index at 7-8 months (F_{ci8})	$12.55 \pm 0.39\%$		28.29
6.	Follicle curvature index at 15-16 months (F_{ci15})	$13.49 \pm 0.40\%$		31.21
7.	First year wool yield (FWY)	$1081 \pm 92 \pm 15.42$ gm		15.08
8.	Fibre length (FL)	6.30 ± 0.08 cm		13.93
9.	Staple length (SL)	5.72 ± 0.09 cm		15.89
10.	Fibre diameter (FD)	30.24 ± 0.27 μ		9.39
11.	Fibre density/sq. cm. (D)	914.85 ± 21.27 no/cm ²		24.60
12.	Medullation (Med)	$20.96 \pm 1.03\%$		51.72

TABLE 2

The estimates of heritability, genetic and phenotypic correlations between follicle traits and wool traits.

	F_{d8}	F_{d15}	F_{c8}	F_{c15}	F_{ci8}	F_{ci15}	FWY	FL	SL	FD	Den.	Med.
F_{d8}	- 0.024 $\pm$ 0.006											
F_{d15}		0.14 $\pm$ 0.203					0.50**	-0.01	-0.04	-0.06	-	-1.51**
F_{c8}			- 0.23 $\pm$ 0.017									
F_{c15}				0.35 $\pm$ 0.337			1.42**	-0.08	0.02	0.49**	-	-3.58**
F_{ci8}					- 0.23 $\pm$ 0.016							
F_{ci15}						- 0.05 $\pm$ 0.087						
FWY	0.07	0.18	0.05	0.22*	-0.11	0.10	0.10 $\pm$ 0.183					
FL	0.28**	0.12	0.28**	0.11	-0.12	-0.06		0.20 $\pm$ 0.241				
SL	0.56**	0.08	0.26**	0.08	-0.11	-0.08			0.26 $\pm$ 0.283			
FD	-0.06	0.14	-0.05	0.03	0.01	0.13				0.75 $\pm$ 0.589		
Den	0.03	0.15	0.00	0.14	0.06	0.07					- 0.14 $\pm$ 0.03	
Med.	-0.08	0.09	-0.07	0.09	0.08	0.01						0.01 $\pm$ 0.123

 h^2 - diagonal r_g - above diagonal r_p - below diagonal *P < 0.05 **P < 0.01

traits have already been discussed earlier by Shah *et al.* (1978) and so far as the wool traits are concerned, present findings for first year wool yield was slightly higher than those reported by Shukla (1973). Fibre length, staple length and medullation percentage were found to be lower than those reported by Shukla (1973) and Dave (1977). The traits like fibre diameter and fibre density per sq. cm. did not show much deviation from those reported by Shukla (*ibid*) and Dave (*ibid*) respectively. The differences between the present findings and those of Shukla (1973) and Dave (1977) might be due to the reason that the results obtained by Shukla (*ibid*) were pooled for various farms, ages and were based on records from 1954 to 1972, which included the observations on unselected populations. While the results of Dave (1977) were based on the yearly reports and were pooled over for five years i.e. 1970-74. Present findings were based on the records of the particular flock under study during 1976-77 only.

Heritability Estimates:

Heritability estimates of follicle traits measured at 7-8 and 15-16 months and that of body and wool traits have been given in Table 2.

The heritability estimates F_{d8} , F_{c8} , F_{ci8} and F_{ci15} were negative and hence can be taken as zero for all practical purposes, however the heritability estimates for F_{d15} , F_{c15} have been found to be 0.14 and 0.35 respectively. Present findings are contrary to those of Nay (1973) and Jackson *et al.* (1975). Nay (1973) reported it to be 0.34 for F_{ci} , while Jackson *et al.* (1975) reported it to be 0.37 ± 0.06

and 0.40 ± 0.05 for F_c and F_{ci} respectively in Australian Merino. The heritability estimates for F_d and F_c at 15-16 months of age was found to be higher than those at 7-8 months of age in the present study. The probable explanation for negative heritability estimates could be less number of observations and less number of sires with highly uneven number of observations per sire available for present study.

Heritability estimates of the wool traits were found to be much lower than those obtained by Shukla (1973) for Patanwadi sheep. The probable reason may be the location differences, age differences, period differences etc. as his estimates were pooled estimates for the above factors over a larger range of the period including large number of observations.

Genetic and Phenotypic Correlations:

Genetic correlation of F_{d15} and F_{c15} with wool traits were only estimated because other traits were having negative sire component of variances. These have been given in Table 3(1).

The genetic correlation between F_{d15} and F_{c15} was found to be 0.20*, which is slightly higher than 0.03 obtained by Jackson *et al.* (1975) in Australian Merino. So far as the wool traits were concerned, both F_{d15} and F_{c15} showed highly significant genetic correlation with F_{c15} but not with F_{d15} . The medullation had negative and highly significant genetic association with F_{d15} and F_{c15} . However these both estimates are far beyond the expected theoretical range. However, selection based on F_{c15} may lead to im

provement in genetic potential of wool production and quality traits.

The phenotypic correlations of F_{ds} and F_{cs} with fibre length and staple length were found to be positive and highly significant. The same between F_{ci5} and first year wool yield was also positive and significant. F_{ci8} and F_{ci15} had almost desirable association with wool production and quality traits, but these were statistically non-significant.

Study with larger number of observations covering progenies of more sire groups will throw better light on association between these skin follicle characteristics and wool traits.

REFERENCES

- Dave P.O. (1977). Monograph on Patanwadi sheep of Gujarat. Technical Bulletin, Directors of Animal Husbandry, Gujarat State, 29-58.
- Gumble S.N. (1978). "Study on haemoglobin types and their associations with some wool traits in Patanwadi sheep". M.V.Sc. thesis. Guj. Agri. University.
- Hazel, L.N., Baker, M. L. and Recumiller C.F. (1943). Genetic and environmental correlations between the growth rate of pigs at different ages. *J. Ani. Sci.* **2**: 118-28.
- Jackson, N. Nay T. and Turner, H. N. (1975). Response to selection in Australian Merino sheep VII. Phenotypic and genetic parameters for some wool follicle characteristics and correlation with wool and body traits. *Aust. J. Agri. Res.* **26**: P-937-57.
- J. Lush, (1948). Genetics of Populations, Mimeographs. Dept. of Animal Husbandry, IOWA State College, Ames, IOWA.
- Nay Y. (1973). Technique for examining wool follicles in the skin of sheep. 'Wool follicle' a manual for breeder. Prepared by division of Animal Genetics. CSIRO. Published by the Australian wool corporation.
- Robertson, A. (1954). Populationsgenetik Und quantitative vererbung, Handbuch der Tierzuchtung ed-2; 77 (C.F.) Johansson Ivar. Genetic aspects of Dairy Cattle breeding (1962) Oliver and Boyd. London. PP. 12.
- Shah, R.R., Vyas, K. N. and Shukla, R. K. (1978). A study on follicle depth, follicle chord and follicle curvature index in Patanwadi sheep. Paper presented at the "National Seminar on progress of Research in Animal Genetics and Breeding during a decade" held at NDRI, Karnal from 12th to 15th June 1978."
- Shukla R. K. (1973). Quantitative genetic studies of some economic traits of sheep breeds of Gujarat, Ph. D. thesis, Guj. Agri. Uni.
- Snedecor, G. W. and Cochran, W. G. (1967). "Statistical methods" 6th edition. The IOWA state University press, Ames, IOWA, U.S.A.