GENETIC ASPECTS OF SOME FOLLICLE CHARACTERISTICS, HAEMOGLOBIN TYPES AND POTASSIUM ION TYPES IN PATANWADI SHEEP

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SUMMARY

The present investigation has been carried out on 1847 Patanwadi lambs born during 1978-1990 covering five generations. The least squares means for follicle depth (Fd), follicle chord (Fc) and follicle curvature index (Fci), birth weight (BW) and weaning weight (WW) were 1.79±0.02 mm, 1.94±0.03 mm, 15.81±0.35 (%), 2.84±0.05 (kg) and 12.57±0.21 kg respectively. The follicle traits were significantly affected by sex and sex x K ion types while BW and WW were significantly affected by generations, sex and sex x K ion effects. The overall gene frequencies for Hb^A and K^L were 0.3563 and 0.2096 respectively. The gene frequency of K^L allele significantly increased from 0.1786 to 0.2409 from 1st generation to 5th generation. All traits were highly heritable and genetic correlations between them were of moderate to high magnitude except between BW x WW, Fd x BW, Fd x WW, Fc x BW and Fc x WW.

INTRODUCTION

The Patanwadi sheep is an important medium sized carpet wool breed of Gujarat. The present investigation was undertaken to study follicle traits of the breed and genetic architechture of breed with regards to haemoglobin types (Hb types) and K ion conc. types (K types) with objective to get clear picture about inheritance and distribution of these important marker traits in Patanwadi population.

MATERIALS AND METHODS

The blood samples and skin samples were collected from 1847 Patanwadi lambs (at 4 months age) during 1978-1990 at Govt. Sheep Farm, Patan. The samples were studied for Hb types (Smithies, 1955), K ion conc. types (Oser 1965) and various follicle traits i.e.follicle depth (Fd), follicle chord (Fc) and follicle curvature index (Fci) (Nay 1973). The least squares analysis (Harvey 1990) was carried out using a statistical model which comprised of sires (86) as random effect and generations (5), sex (2), Hb types (3), K ion types (2) as fixed effects. The interaction components Hb type x K ion types (6), Sex x K ion types (4) and Sex x Hb types (6) were also considered while interaction between random and fixed effects were assumed to be zero.

RESULTS AND DISCUSSIONS

The least squares means (LSMs) for various follicle traits, birth weight (BW) and weaning weight (WW) are presented in Table 1. Sex of lambs and Sex x K ion types significantly affected follicle

traits. Female lambs had longer Fd, Fc values with lower Fci values. Shukla et al (1985) and Solanki (1987) have also reported significant effect of sex and K ion types on follicle traits in Patanwadi and its crosses with Merino and Rambouillet. The BW and WW have shown significant generation effect. They have shown declining trend from 1 to 5 generations. The BW and WW were also significantly affected by sex. The sex x K ion type also significantly affected WW. The male lambs with HK types were heaviest. Shukla et al (1985) and Solanki (1987) have also reported significant effect of sex and Hb type and K ion types on follicle traits in Patanwadi and its crosses. The BW and WW differed significantly in both sexes as well as different generations. While WW was significantly affected by sex x K ion types of lambs. Krishnamurthy and Rathanasabapathy (1980) and Kishore et al (1982) have reported non significant effect of Hb type and K ion type on BW and WW. The distribution of frequencies of Hb^A and K^L alleles in different generations is presented in Table 2. The gene frequency of K^L allele significantly increased over generations which may be a correlated change on account of selection in flock on basis of wool traits during years under study. Kalla et al (1971) and Singh et al (1976) have also studied gene frequencies of Hb and K ion alleles in Indian sheep. Their findings are in close range of gene frequencies reported in this paper.

The heritability estimates obtained from half sib progenies groups (K_1 = 12.37) for BW, WW, Fd, Fc and Fci were 0.969±0.146, 0.719±0.128, 0.850±0.138, 1.137±0.156 and 0.595±0.118 respectively. The high estimates for h^2 indicate greater role of additive genetic effects in expression of these traits. Jackson et al (1975) in Pepin Merino and Shukla and Solanki (1990) in Patanwadi and its crosses have reported lower magnitude of h^2 than present findings. The Fd and Fc had strong and positive (0.955±0.015) genetic correlations while Fci showed moderately negative genetic correlations with Fd (-0.114±0.150) and Fc (-0.202±0.144). The BW and WW had shown low and positive genetic correlation with Fd and Fc while Fci expressed strong and positive genetic correlation with BW (0.546±0.116) and negative (-0.485±0.136) with WW. Shukla et al (1985) and Solanki (1987) have reported similar trend of genetic relationship between follicle traits in Patanwadi and its crosses. The present findings clearly indicate that frequency of K^L has increased over generations. The follicle traits are highly heritable and have strong relationship with BW and WW. the follicle traits are also free of effect of Hb type and K ion types.

Table 1 : Least squares means ± S.E. for body weights and follicle characteristics in Patanwadi lambs.

factors	n	Birth weight (kg)	Weaning weight (kg)	Follicle depth (mm)	Follicle chord (mm)	Follicle curvature index (%)
U±SE	1088	2.84±0.05	12.57±0.21	1.79±0.02	1.94±0.03	15.81±0.35
Generations						
1	132	2.96±0.08 a	13.48±0.36 a	1.81±0.04 a	1.93±0.04 a	15.96±0.64 a
2	304	2.97±0.06 a	13.41±0.26 a	1.76±0.03 a	1.91±0.03 a	15.64±0.45 a
3	366	2.85±0.06 b	12.43±0.25 b	1.79±0.03 a	1.94±0.03 a	16.08±0.42 a
4	239	2.68±0.06 c	11.65±0.27 c	1.78±0.03 a	1.93±0.03 a	16.02±0.46 a
5	47	2.73±0.09 bc	11.89±0.42 bc	1.80±0.04 a	1.97±0.05 a	15.36±0.74 a
Sex						
M	478	2.94±0.05 a	12.84±0.23 a	1.75±0.02 a	1.90±0.03 a	16.21±0.38 a
F	610	2.73±0.05 b	12.31±0.23 b	1.82±0.02 b	1.97±0.03 b	15.42±0.38 b
Haemoglobin types (Hb)						
AA	149	2.87±0.06 a	12.51±0.27 a	1.77±0.03 a	1.92±0.03 a	15.67±0.47 a
AB	511	2.84±0.05 a	12.53±0.22 a	1.79±0.02 a	1.94±0.03 a	15.80±0.37 a
BB	428	2.80±0.05 a	12.69±0.23 a	1.80±0.02 a	1.95±0.03 a	15.97±0.38 a
K ion type (K)						
LK	397	2.86±0.05 a	12.49±0.24 a	1.80±0.02 a	1.95±0.03 a	15.76±0.40 a
HK	691	2.82±0.05 a	12.66±0.22 a	1.78±0.03 a	1.93±0.03 a	15.87±0.37 a
Sex x K ion type						
M LK	165	2.95±0.06 a	12.63±0.27 b	1.77±0.03 b	1.93±0.03 b	15.99±0.47 a
HK	313	2.92±0.06 a	13.05±0.24 a	1.73±0.02 c	1.88±0.03 c	16.42±0.41 a
F LK	232	2.76±0.06 a	12.35±0.26 b	1.82±0.03 a	1.97±0.03 ab	15.52±0.44 a
HK	278	2.71±0.06 a	12.27±0.24 b	1.83±0.02 a	1.97±0.03 a	15.32±0.41 a

LSMs with different superscripts are differing significantly
(P<0.001 for generation, sex, haemoglobin and K ion types,
P<0.05 for sex x K types)
HK = High K ion conce., LK = Low K ion concen.

Table 2 : Generation wise gene frequencies of alleles of Haemoglobin type and K ion types in Patanwadi sheep.

Generations	Haemoglobin type (Hb)			K ion type		
	No.	Hb-A	Hb-B	No.	K^{L*}	K^{H*}
1	312	0.3510	0.6490	249	0.1786	0.8214
2	564	0.3652	0.6348	541	0.2166	0.7834
3	565	0.3726	0.6274	529	0.2066	0.7934
4	344	0.3227	0.6773	314	0.2221	0.7779
5	62	0.3387	0.6613	59	0.2409	0.7591
Total	1847	0.3563	0.6437	1692	0.2096	0.7904

* Significant difference between generations ($P<0.05$)

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