

## Genetic Architecture of Deccani Sheep

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**Abstract:** Corrected data for significant non-genetic factors of five hundred twenty four lambs of body weights and greasy fleece yield of Deccani lambs born from 1995 -99 were used for estimation of heritability, genetic and phenotypic correlation maintained at Network Project on Sheep Improvement, Mahatma Phule Krishi Vidhyapeeth, Rahuri, Maharashtra. Heritability estimates of birth weight (W1), three months body weight (W3), six months body weight (W6), nine months body weight (W9), twelve months body weight (W12) and greasy fleece yield of first clip (GFY1) were  $0.249 \pm 0.118$ ,  $0.407 \pm 0.146$ ,  $0.272 \pm 0.122$ ,  $0.281 \pm 0.124$ ,  $0.277 \pm 0.123$  and  $0.158 \pm 0.101$ , respectively. Moderate heritability estimates of body weights indicate the presence of genetic variability in the flock and thus, these traits can be improved effectively by selection. The low estimates of heritability of greasy fleece yield of clip might be due to less variability between breeding rams. High genetic correlations of three months body weight with greasy fleece yield of first clip as well as six months body weight with twelve months body weight and greasy fleece yield of first clip indicated that these factors may be utilized for further genetic improvement of flock. The positive and higher phenotypic correlations among body weights and greasy fleece yield of first clip suggest that selection may be practiced at early age.

**Key words:** Body weight, Greasy fleece yield, Genetic and phenotypic correlation, Heritability

### INTRODUCTION

Deccani is promising dual purpose breed of Maharashtra mostly found in the eastern part of Maharashtra and in the neighboring areas of Andhra Pradesh. In Maharashtra, the breed is widely distributed in several districts which include Nasik, Poona, Ahmednagar, Kolhapur, Solhapur and Aurangabad. Breed is characterized by white body and tail, brownish ear, belly, head and legs and black hooves. Breed has roman shape nose, bowl shape udder and pendulous scrotum.

Profitability of dual purpose sheep depends upon growth rate and wool production. The potential genetic improvement of a trait is largely decided by its heritability and genetic correlation with others traits. Therefore, it is necessary to have information on genetic and phenotypic parameters of the flock. The present study was therefore undertaken to estimate the heritability, genetic and

phenotypic correlations among growth and wool traits of Deccani sheep.

### MATERIALS AND METHODS

The data used in the present analysis pertained to 524 lambs born from 1995-99 at Network Project on Sheep Improvement, Mahatma Phule Krishi Vidhyapeeth, Rahuri, Maharashtra. The traits measured were birth weight (W1), three months body weight (W3), six months body weight (W6), nine months body weight (W9), twelve months body weight (W12) and greasy fleece yield of first clip (GFY1).

The data were corrected for significant year, season and sex effects by fitting least squares constants. The rams having less than five progenies were not included in the analysis. The estimates of heritability, and genetic and phenotypic correlations were computed from sire components of variance

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and covariance using LSMLMW and MIXMDL computer program PC-2 (Harvey, 1990).

## RESULTS AND DISCUSSION

Heritability estimates of birth weight (W1), three months body weight (W3), six months body weight (W6), nine months body weight (W9), twelve months body weight (W12) were  $0.249 \pm 0.118$ ,  $0.407 \pm 0.146$ ,  $0.272 \pm 0.122$ ,  $0.281 \pm 0.124$  and  $0.277 \pm 0.123$ , respectively (Table 1). Moderate heritability estimates of body weights indicates the presence of genetic variability in the flock and thus, these traits can be improved effectively by selection. Moderate heritability estimates of body weights at different ages were also reported by Kulkarni and Deshpande (1986), Naikare (1986), Ghule (1992), Arora and Kushwaha (1996), Ahmad *et al.* (2004), Mishra *et al.* (2009), Gowane *et al.* (2011), Vivekanad *et al.* (2014) and Kannoja *et al.* (2016).

The heritability estimate of greasy fleece yield of first clip was  $0.158 \pm 0.101$ . The low estimates of heritability of greasy fleece yield of first clip might be due to less variability between breeding rams. The estimates being associated with large standard errors due to the sampling variation indicated that more samples of large size were needed for evaluating the quantity of wool. Similar heritability estimates of greasy fleece yield of first clip were also reported by Kumar (2000) and Nehra *et al.* (2005).

Three months body weight had (0.982) high, positive and significant genetic correlation with greasy fleece yield of first clip as well as six months

body weight had high, positive and significant genetic correlation with body weight at twelve months age (0.996) and greasy fleece yield of first clip (0.985) suggesting that selection for any above trait can bring about enormous genetic improvement of other traits. Most of the estimates of genetic correlations were little greater than unity, which might be due to the limited number of observations. Phenotypic correlations among body weights and greasy fleece yield of first clip were found positive and large in magnitude indicating that heavier lambs at birth and weaning were heavier at six, nine and twelve months of age and likely to yield more at phenotypic scale. More or less similar results with respect to genetic and phenotypic correlations, for some or all of these traits were observed by various workers (Arora and Kushwaha 1996, Ahmad *et al.* 2004 and Mishra *et al.* 2009).

## CONCLUSION

Moderate heritability estimates of body weights indicates the presence of genetic variability in the flock and thus, these traits can be improved effectively by selection. The low estimates of heritability of greasy fleece yield of first clip might be due to less variability between breeding rams. High genetic correlations of three months body weight with greasy fleece yield of first clip as well as six months body weight with twelve months body weight and greasy fleece yield of first clip indicated that these factors may be utilized for further genetic improvement of flock. The positive and higher phenotypic correlations among body weights and

**Table 1**  
Genetic and phenotypic correlations (genetic - above the diagonal, Heritability - on diagonal and phenotypic - below the diagonal) among different body weights and greasy fleece yield of first clip traits

Traits	WB	W3	W6	W9	W12	GFY1
WB	$0.249 \pm 0.118$	$0.952^{**} \pm 0.098$	$1.019 \pm 0.113$	$1.011 \pm 0.116$	$0.99^{**} \pm 0.123$	$1.112 \pm 0.209$
W3	$0.627^{**}$	$0.407 \pm 0.146$	$1.029 \pm 0.022$	$1.035 \pm 0.025$	$1.008 \pm 0.029$	$0.982^{**} \pm 0.111$
W6	$0.570^{**}$	$0.915^{**}$	$0.272 \pm 0.122$	$1.012 \pm 0.008$	$0.996^{**} \pm 0.017$	$0.985^{**} \pm 0.091$
W9	$0.555^{**}$	$0.891^{**}$	$0.965^{**}$	$0.281 \pm 0.124$	$0.992^{**} \pm 0.009$	$0.995^{**} \pm 0.081$
W12	$0.539^{**}$	$0.873^{**}$	$0.937^{**}$	$0.977^{**}$	$0.277 \pm 0.123$	$1.029 \pm 0.076$
GFY1	$0.419^{**}$	$0.717^{**}$	$0.773^{**}$	$0.799^{**}$	$0.806^{**}$	$0.158 \pm 0.101$

\*\* =  $P < 0.01$

Heritability values are on diagonal, genetic correlation are above diagonal and phenotypic correlation are below diagonal

greasy fleece yield of first clip suggest that selection may be practiced at early age.

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