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Non-Genetic Factors Affecting Growth and Production Traits in Dorper Crossbred Sheep

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ABSTRACT

Data on growth traits of 401 animals used in the present study were collected from history sheet of crossbred sheep maintained at Government Sheep Breeding Farm Panthal, Reasi, J&K, India. Traits included in the study were birth weight (BWT), weaning weight (WWT), 6-month body weight (6-BW), 12-month body weight (12-BW), mature body weight (MBW) and annual wool production (AWP). The statistical analysis was carried out using LSMLMW computer programme. The overall least-squares means were 2.857 ± 0.058 kg, 15.269 ± 0.296 kg, 17.034 ± 0.258 kg, 22.315 ± 0.298 kg, 29.375 ± 0.237 kg and 0.651 ± 0.012 kg, respectively for BWT, WWT, 6-BW, 12-BW, MBW and AWP. The co-efficient of variations for different traits were low to moderate. Period of lambing had significant effect on all the traits except for BWT. Moreover, there was no definite trend for different traits over different periods except for 12-BW, where increasing trend was obtained. Season of lambing had significant effect only on WWT and MBW. Genetic group had non-significant effect on all the traits under study although, 50% genetic groups were superior for most of the traits. Sex had significant effect on all the traits except for 6-BW and 12-BW. It can be concluded from the study that growth traits and production traits are influenced by different non-genetic factors like period, season and sex.

Keywords: Growth traits, Non-genetic factors, Dorper crossbred sheep, Annual wool production.

Improved production from our native sheep breeds is, therefore, need of the day and to achieve broad avenues appear to be open. Either the sheep at hand must be induced to yield more by selective breeding or to secure concentrated doses of good genes as replacement from improved exotic breed into our native sheep breeds, which can rather quickly transfer good qualities of exotic breeds in our animals. The genetic improvement can be done, either by selection or by cross-breeding the indigenous breeds with exotic fine wool breeds. Selection of genetically superior animals is influenced by non-genetic factors such as year, season and sex etc. due to which there is difficulty in estimating the differences in breeding values of individuals being selected, therefore identification and their correction factors will help in estimation of genetic parameters. The improvement on account of selection could be achieved only after several generations, but by crossbreeding the desirable goal can be achieved in short span of time.

Birth weight, weaning weight, 6-month weight and 12-month weight are the indicators of individual performance and they have direct effect on the productivity and health status of sheep. These are the important factors as they influence lamb's survival and growth. The animals weighing heavier at birth and weaning have a better survivability and may grow faster and likely to increase the overall productivity.

Early growth traits are important factors influencing profitability in any meat producing enterprise. The birth weight of an animal and its early growth rate are highly influenced by genetic potential of sheep. Therefore, genetic studies on growth and production traits will be ideal model for future on the basis of which selection can be done. Therefore, the present study was undertaken to study the effect of non-genetic factors in Dorper crossbred sheep.

MATERIALS AND METHODS

Performance data on 401 animals used in the present study were collected from history sheet of crossbred sheep maintained at Government Sheep Breeding Farm Panthal, Reasi, J & K, India. The Government Sheep Breeding Farm, Panthal, is located 52 kms on north-east of Jammu and lies between $33^0\,05''$ N latitude and $74^0\,5''$ E longitude. The farm follows semi-migratory production system. In middle of April the sheep are shifted to highland alpine pastures, at an altitude of 6000-8000 feet above sea level and allowed to graze there up to end of September. Ewes were mated in the month of August and October when ewes were flushed on nutritive highland pastures. The ewes were divided into groups, each group consisting of about 50 ewes. The crossbred population was developed for crossbreeding of different level of inheritance of Dorper with Rambouillet sheep. There were three genetic groups in the farm i.e., 50% Dorper inheritance, 75% Dorper inheritance and 100% Dorper inheritance. The performance data maintained at farm from 2001 to 2013 were classified into three different periods for present study. Growth traits included in the study were birth weight (BWT), weaning weight (WWT), 6-month body weight (6-BW), 12-month body weight (12-BW) and mature body weight (MBW). Data with any recorded abnormalities and outliers were excluded prior to the analysis. The mean, standard errors and coefficient of variations (CV) of all economic traits like growth and production traits, were computed statistically given by Snedecor and Cochran (1968).

All the traits under study were normalized. The effects of non genetic factors such as periods, seasons and sex on various normalized growth and production traits were analyzed by least squares analysis using the technique developed by Harvey (1990). The following model was used for analyzing data for Dorper crossbred sheep with assumptions that the different components being fitted into the model were linear, independent and additive.

$$Y_{ijklm} = \mu + P_i + S_j + G_k + C_l + e_{ijklm}$$

Where,

Y_{ijklm} = m^{th} record of individual lambed in i^{th} period, j^{th} season, of k^{th} genetic group and l^{th} sex

μ = Overall population mean

P_i = Fixed effect of i^{th} period of lambing

S_j = Fixed effect of j^{th} season of lambing

G_k = Fixed effect of k^{th} gentic group

C_l = Fixed effect of l^{th} sex

e_{ijklm} = Error associated with each observation and assume to be normally and independently distributed with mean zero and variance $(0, \sigma^2_e)$

For significant effects, the differences between pairs of levels of effects were tested by Duncan's multiple range test as modified by Kramer (1957).

RESULTS AND DISCUSSION

The overall average estimates along with standard error (SE) were 2.931 ± 0.034 kg, 14.490 ± 0.159 kg, 17.540 ± 0.162 kg, 22.660 ± 0.171 kg, 29.950 ± 0.142 kg and 0.669 ± 0.08 kg, respectively for BWT, WWT, 6-BW, 12-BW, MBW and AWP. Lower overall estimates for BWT & WWT and higher estimate for GFW were reported in Kashmir Merino sheep (Das *et al.*, 2014). The coefficients of variations were ranged from 8.99% to 21.65% for MBW and BWT, respectively. Das *et al.* (2014) was reported low CV for BWT and WWT in Kashmir Merino sheep. The co-efficient of variation CV (%) for different traits under study were low to moderate indicating that there are low to moderate variations among these traits and these traits can be improved with proper breeding, selection and management practices.

The least-squares means for different factors have been presented on Table 1. The overall least-squares means for BWT, WWT, 6-BW, 12-BW, MBW & AWP were 2.857 ± 0.058 kg, 15.269 ± 0.296 kg, 17.034 ± 0.258 kg, 22.315 ± 0.298 kg, 29.375 ± 0.237 kg and 0.651 ± 0.012 kg, respectively. Similar birth weight was reported by Ganesan *et al.* (2013) in Madras Red sheep and Das *et al.* (2014) in Kashmir Merino sheep. Balasubramanyam and Kumarasamy (2011) also reported similar findings of BWT and 12-BW in Madras Red sheep. However, higher estimates of BWT, WWT, 6-BW and 12-BW have been reported by earlier workers (Saghi *et al.,* 2012; Dass *et*

Table 1. Least-squares means for different growth and production traits in Dorper crossbred sheep

Particulars	No. of obs.	BWT (Kg)	WWT (Kg)	6-BW (Kg)	12-BW (Kg)	MBW (Kg)	AWP (Kg)
Overall mean	401	2.857±0.058	15.269 ± 0.296	17.034±0.285	22.315±0.298	29.375±0.237	0.651±0.012
Period		NS	*	**	**	**	**
Period-1(2001-2003)	166	2.932±0.735	15.503b ± 0.393	16.696a±0.363	21.207a±0.380	29.041a±0.302	0.691b±0.015
Period-2 (2004-2010)	61	2.748±0.945	15.718b ± 0.476	16.021a±0.468	22.484b±0.489	28.912a±0.389	0.624a±0.020
Period-3 (2011-2013)	174	2.891±0.581	14.584a ± 0.287	18.386b±0.281	23.254c±0.294	30.173b±0.234	0.639a±0.012
Season		NS	*	NS	NS	**	NS
Winter (Nov-Feb)	356	2.928±0.041	14.593 ± 0.2086	17.365±0.207	22.750±0.216	29.834±0.172	0.665±0.009
Others (Mar-October)	25	2.785±0.102	15.944 ± 0.5312	16.703±0.497	21.880±0.519	28.916±0.413	0.637±0.021
Genetic group		NS	NS	NS	NS	NS	NS
50%	151	2.904±0.656	15.658 ± 0.3449	17.380±0.323	22.621±0.337	29.418±0.268	0.648±0.014
75%	201	2.825±0.628	15.212 ± 0.3226	16.996±0.304	22.276±0.318	29.467±0.253	0.652±0.013
100%	49	2.841±0.106	14.936 ± 0.5005	16.726±0.501	22.048±0.522	29.241±0.415	0.653±0.021
Sex		**	**	NS	NS	**	**
Male	208	3.021±0.652	15.712 ± 0.2968	17.148±0.320	22.183±0.334	29.889±0.266	0.686±0.014
Female	193	2.693±0.065	14.825 ± 0.3796	16.920±0.328	22.447±0.343	28.861±0.272	0.616±0.014

*P<0.05; ** P<0.01; NS-Non-significant
Means with different superscripts differ significantly

al., 2014). On the other hand, lower estimates for WWT, 6-BW and 12-BW were reported by Singh *et al.* (2006) and Ganesan *et al.* (2013).

The period of lambing had significant effect on all the traits under study for Dorper except for BWT, where, non-significant effect was observed. Khan *et al.* (2013) in Rambouillet crossbred sheep and Das *et al.* (2014) in Kashmir Merino reported significant effect of year of lambing on BWT and WWT. Significant effect of year/period of lambing on BWT, WWT, 6-BW and 12-BW were also reported by Singh *et al.* (2006) in crossbred sheep, Ganesan *et al.* (2013) in Madras Red, Dass *et al.* (2014) in Muzaffarnagri sheep and Ekambaram *et al.* (2014) in Nellore sheep. There was no definite trend over period of lambing, except for MBW, where increasing trend over period of was obtained. The highest values for 6-BW, 12-BW and MBW at period-3 in Dorper crossbred sheep indicate that the ongoing breeding/selection strategy is fruitful and there was improvement for these traits over the year.

Season of lambing had significant effect only on WWT & MBW and non-significant effect on BWT, 6-BW, 12-BW and AWP. Lambs born during winter season are excelled for all traits barring exception for WWT. Non-significant effect of season of lambing on BWT and WWT were reported by Singh *et al.* (2006) and Dass *et al.* (2014). However, significant effect of season of lambing on BWT, WWT, 6-BW and 12-BW was reported by Ekambaram *et al.* (2014) in Nellore sheep. Balasubramanyam and Kumarasamy (2011) and Dass *et al.* (2014) also reported significant effect of season on 6-BW and 12-BW. Non-significant effect of season on wool production was also reported by Krishnamurthy *et al.* (1975) in Merino, Nilgiri and their crosses.

Genetic group of Dorper crossbred sheep had non-significant on all growth and production traits, although, 50% Dorper sheep were better for all the traits. Better performance of 50% Dorper crossbred sheep indicates there is full exploitation of non-additive gene action (NAGA), and these results are due to heterotic effect. Therefore, in F_1 generation better performances were reported for all the traits. The annual wool production in three different genetic groups was very close to each other. It indicates that genetic inheritance of Dorper had no such influence in annual wool weight as Dorper sheep is mainly mutton purpose breed.

Sex had significant effect on all the traits under study except for 6-BW and 12-BW Males were superior for body weight traits barring few exceptions. Significant effect of sex on different growth traits were also reported by Singh *et al.* (2006), Balasubramanyam and Kumarasamy (2011), Saghi *et al.* (2012), Ganesan *et al.* (2013), Ekambaram *et al.* (2014) and Dass *et al.* (2014). Significant effect of sex on different body weight traits indicating that physiological and hormonal basis have influence in growth of both the sexes. Males produced more annual wool compared to female one. It may be due to the fact that mature males are larger and heavier compared to females. Pandey *et al.* (2000) in Ramboulliet sheep also reported significant effect of sex on wool production.

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REFERENCES

Balasubramanyam, D. and Kumarasamy, P. 2011. Performance of Madras Red sheep in Kancheepuram District. *Indian J. Fundamental Appl. Sci.*, **1** (2): 133-137.

Das, A. K., Chakraborty, D., Kumar, N., Gupta, P., Khan, N. N. and Bukhari, S. 2014. Effects of non-genetic factors on performance traits of Kashmir Merino. *Indian J. Anim. Res.*, **48** (2): 106-108.

Dass, G., Mondal, A. and Rout, P. K. 2014. Genetic and phenotypic parameters of growth traits in Muzaffarnagri sheep. *Indian J. Anim. Sci.*, **84** (12): 1328-1331.

Ekambaram, B., Chakravarthi, M. K. and Rajesh, M. M. 2014. Effect of non-genetic factors on the growth performance of Nellore sheep under farm conditions. *Indian Vet. J.*, **91** (11): 48-52.

Ganesan, R., Dhanavanthan, P., Balasubramanyam, D., Kumarasamy, P. 2013. Estimation of genetic parameters of growth traits in Madras Red sheep. *IOSR J. Agri. and Vet. Sci*, **3** (5): 69-73.

Harvey, W. R. 1990. User guide for LSMLMW and MIXMDL package mixed model least squares and maximum likelihood computer programme. PC–2 version Mimeograph Colubia, Ohio, USA.

Khan, N. N., Kumar, N., Das, A.K., Chakraborty, D. and Gupta, P. 2013. Birth and Weaning weight in Rambouillet Crossbred sheep. *Indian Vet. J*., **90** (5): 36-37.

Kramer, C.R. 1957. Extension of multiple range tests to group correlated means. *Biometrics*, **13**: 13-18.

Krishnamurthy, U.S., Venkatesan, R. and Rathnasabapathy, V. 1975. Effects of genetic and non-genetic factors on body weights, wool yield and fleece characteristics in Merino, Nilgari and their crosses. *Cherion*, **4**(1):21-24.

Pandey, A K., Sharma, R., Prakash, B. and Mishra, B.P 2000. Genetic diversity study in wool traits of Rambouillet sheep. *Indian Vet. J.*, **86:**141-154.

Saghi, D A., Aslaminejad, A., Tahmoorespur, M., Farhangfar, H., Nassiri, M., Dashab, G R. 2012. Estimation of genetic parameters for growth traits in Baluchi sheep using Gompertz growth curve function. *Indian J. Anim. Sci.*, **82** (8): 889-892.

Singh, D., Kumar, Pander, B.L., Dhaka, S.S., Singh, S. 2006. Genetic parameters of growth traits in Crossbred sheep. *Asian-Aust. J. Anim. Sci.*, **19** (10): 1390-1393.

Snedecor, G.W. and Cochran, W. G. 1968. Statistical Methods. 7th Ed. Oxford and IBH Publishing Co., Bombay.