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EFFECTS OF NON-GENETIC FACTORS ON PERFORMANCE TRAITS OF KASHMIR MERINO SHEEP

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ABSTRACT

Data on 462 ewe lambs pertaining to newly developed Kashmir Merino by crossing Gaddi, Bhakarwal, Poonchi, Rambouillet and Merino over the six years (2005-2010) at Hardushiva, Sopore, Kashmir, J&K state were studied. The averages were 2.56 kg, 13.06 kg, 14.60 months, 19.60 months, 1.37 kg, 4.78 cm and 21.01 µ for birth weight (BW), weaning weight (WW), age at first fertile service (AFFS), age at first lambing (AFL), greasy fleece weight (GFW), staple length (SL) and fiber diameter (FD), respectively. The least squares means were 2.82 kg, 13.31 kg, 14.74 months, 19.74 months, 1.4 kg, 5.22 cm and 20.95µ for BW, WW, AFFS, AFL, GF, SL and FD, respectively. The highest CV (%) was obtained for SL (26.65%). The effect of season of lambing was found significant on weaning weight and staple length. However, no definite trend was observed over the year and season of lambing for all the traits with the exception of birth weight and fiber diameter where decreasing and increasing trends were obtained respectionly over the season of lambing.

Key words: Kashmir Merino, Growth, Production, Reproduction, Sheep.

INTRODUCTION

Kashmir Merino is a crossbred strain developed by crossing Gaddi, Bhakarwal and Poonchi with 50 to 75% exotic inheritance of Rambouillet and Merino sheep (Tomar, 2004). Growth traits of lambs reflect the economic viability of animals and hence it is used as a selection criterion along with production and reproduction traits. One of the most important reproductive traits, age at first fertile service has significant impact on economics of sheep flock as early age at first fertile service increases the lifetime production of the animal (Jain *et al.* 2001). There are many non-genetic factors, which influence the phenotypic expression of the growth, reproduction and production of sheep (Dixit *et al.*, 2011). Therefore, the present study was undertaken with the objective to investigate the effect of various non-genetic factors on growth, reproduction and production traits in Kashmir Merino sheep under organized farm in J&K state.

MATERIALS AND METHODS

The records of 462 ewe lambs of Kashmir Merino maintained at Hardushiva, Sopore, Kashmir, J&K state over six (6) years from 2005 to 2010 were collected for the present study. The season of lambing was divided into three seasons Winter (November-February), Spring (March–June) and Autumn (July-October). The traits under study were birth weight (BW), weaning weight (WW), age at first fertile service (AFFS), age at first lambing (AFL), greasy fleece weight (GFW), staple length (SL) and fiber diameter (FD). The means, standard errors and coefficient of variation of all production and reproduction traits were estimated by using standard statistical procedures (Snedecor and Cochran, 1994). The effect of non-genetic factors was studied by least-squares analysis for non-orthogonal data using the technique developed by Harvey (1990). The following model was used with assumptions that different components being fitted into the model were linear, independent and additive. The model is described as under:

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$$Y_{ijk} = \mu + S_i + P_j + e_{ijk}$$

Where, Yijk = Observation on k^{th} individual in j^{th} year and in i^{th} season of lambing

μ = Overall mean

S_i = Fixed effect of i^{th} season of lambing (i= 1- 3)

Pj= Fixed effect of j^{th} year of lambing (j= 1-6) and

e_{ijk}= error associated with each observation and assumed to be normally and independently distributed with mean zero and variance $ó^2_e(0, ó^2_e)$.

The difference of means between subclasses of periods and seasons were tested for significance using Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957).

RESULTS AND DISCUSSION

The averages were 2.56 kg, 13.06 kg, 14.60 months, 19.60 months, 1.37 Kg, 4.78 cm and 21.01 µ for BW, WW, AFFS, AFL, GFW, SL and FD, respectively (Table 1). The coefficient of variations (CV %) of all these traits under study were low to medium indicating that the traits had low to medium variability. The highest CV (%) for staple length (26.65%) showed that staple length had the maximum variability among all the traits under study. On the other hand the lowest CV (%) was observed for AFL (2.06%). Moderate CV (%) for BW, GFW and SL indicated that there are scope for improvement of these traits through proper selection procedures and managemental practices. Dixit *et al*. (2011) reported the highest CV (%) for staple length in Bharat Merino sheep.

The least squares means were 2.82 kg, 13.31 kg, 14.74 months, 19.74 months, 1.4 kg, 5.22 cm and 20.95µ for BW, WW, AFFS, AFL, GF, SL and FD, respectively (Table 2). Higher estimate of BW was reported by Singh *et al*. (1987) and Tomar *et al*. (2000) in Nali its crossbred and Bharat Merino sheep, respectively. Lower estimate for the present study may be due to the reason that for the present study only ewe lambs were included. Jain *et al*. (2001) observed higher estimate for AFFS in Rambouillet sheep. Lower estimate for AFFS in the present study was obtained which is a desirable one as it increases the lifetime production of the individuals. Tomar *et al*. (2000) reported lower estimates of greasy fleece yield in Bharat Merino sheep. Lower estimates of SL and FD were reported by Dixit *et al*. (2011) in Bharat Merino sheep. Different estimates might be due to differences in breeds and genetic merit of sires or might be due to differences in managemental practices.

TABLE 1: Average performance for different growth, production and reproduction traits in Kashmir Merino ewes

	Mean ± SE	Standard Deviation	CV (%)
BW	2.56 ± 0.02	0.48	18.75
WW	13.06 ± 0.04	0.79	6.07
AFFS	14.60 ± 0.02	0.40	2.77
AFL	19.60 ± 0.02	0.40	2.06
GFW	1.37 ± 0.02	0.32	23.61
SL	4.78 ± 0.06	1.27	26.65
FD	21.01 ± 0.03	0.73	3.45

Effect of year of lambing: The effect of year of lambing was non significant for all the traits under present study. There was also no definite trend of year of lambing on all the traits under study. The variability in different traits due to years may be due to variation in physical environmental conditions, feeding, forage availability prevailing in different years for grazing resources and selection of rams.

The highest values for birth weight (2.90 kg) and weaning weight (13.94 kg) were obtained for 2010 and 2009 respectively. Sharma *et al*. (1999) reported significant effect of year of lambing on birth weight of Malpura and Avikalin lambs. Poonia and Dangi (2006) reported significant effect of year of birth on weaning weight in crossbred sheep.

The lowest value for AFFS (14.68 months) and AFL (19.68 months) was obtained on 2005 which is desirable one.

The highest values for greasy fleece weight (1.51 kg) and staple length (5.60 cm) were obtained in 2010 and 2008, respectively. On the other hand, the lowest value for fibre diameter (20.86µ) was obtained in 2006. Mir *et al*. (2000) reported significant effect of year of birth on greasy fleece weight in Corriedale sheep.

Effect of season of lambing: The effect of season of lambing was significant (P< 0.01) for weaning weight. Ewes that lambed in autumn and winter were of same body weight and had more weight than the ewes that lambed at spring season. Decreasing BW over the season of lambing may be due to the reason that in spring lambing there was scarcity of green fodder due to adverse climatic conditions. On the other hand in autumn and winter lambing, the values for growth traits were high due to available of plenty of green fodders after the rainy

TABLE 2: Least-squares means (± SE) and analysis of variance for different growth, reproduction and production traits in Kashmir Merino ewes

Effect	No. of obs.	BW (Kg)	WW (Kg)	AFFS (months)	AFL (months)	GFW (kg)	SL (cm)	FD (µ)
Overall mean	462	2.82 ± 0.05	13.31 ± 0.07	14.74 ± 0.04	19.74 ± 0.04	1.40 ± 0.04	5.22 ± 0.11	20.95± 0.07
Year		NS	NS	NS	NS	NS	NS	NS
2005	59	2.85 ± 0.10	13.00 ± 0.13	14.68 ± 0.07	19.68 ± 0.07	1.33 ± 0.08	4.78 ± 0.20	21.13 ± 0.04
2006	75	2.85 ± 0.09	13.25 ± 0.12	14.83 ± 0.06	19.83 ± 0.06	1.35 ± 0.07	5.11 ± 0.18	20.86 ± 0.12
2007	84	2.80 ± 0.07	13.20 ± 0.09	14.82 ± 0.05	19.82 ± 0.05	1.30 ± 0.05	4.96 ± 0.14	20.93 ± 0.09
2008	106	2.69 ± 0.08	13.06 ± 0.11	14.71 ± 0.05	19.71 ± 0.06	1.46 ± 0.06	5.60± 0.16	20.87 ± 0.11
2009	78	2.86 ± 0.09	13.94 ± 0.13	14.70 ± 0.07	19.70 ± 0.07	1.44 ± 0.07	5.27 ± 0.19	20.95 ± 0.13
2010	60	2.90 ± 0.10	13.44 ± 0.13	14.71 ± 0.07	19.71 ± 0.07	1.51 ± 0.07	5.57 ± 0.19	20.95 ± 0.13
Season		NS	**	NS	NS	NS	*	NS
Autumn (July-Oct)	22	2.85 ± 0.15	13.34 ± 0.20^{ab}	14.74 ± 0.10	19.74 ± 0.10	1.50 ± 0.12	5.08^{a} ± 0.30	20.83 ± 0.21
Winter (Nov-Feb)	196	2.84 ± 0.05	13.41 ± 0.07^{b}	14.67 ± 0.03	19.67 ± 0.03	1.31 ± 0.04	5.55^{b} ± 0.10	20.92 ± 0.07
Spring (Mar-June)	244	2.79 ± 0.05	13.18 ± 0.06^{a}	14.82 ± 0.03	19.82 ± 0.03	1.38 ± 0.04	5.02^{a} ± 0.09	21.10 ± 0.06

*significant (P< 0.05), **highly significant (P< 0.01), NS= Non-significant and means with same superscript do not differ significantly

season. Decreasing trend over the season of lambing was observed for body weight.

Season of lambing had non-significant effect for reproductive traits of the present study. Ewes that lambed at winter season had the lowest AFFS (14.67 months) and AFL (19.67 months). Significant effects of year and season of birth for AFFS were reported by Jain *et al.* (2001) in Rambouillet sheep.

The effect of season of lambing was significant (P< 0.05) for staple length. Increasing trend over the season of lambing was obtained for FD, although, season of lambing had no significant effect on FD. Tomar *et al.* (2000) reported significant effect of year of birth and season of birth on greasy fleece weight in Bharat Merino sheep.

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