The Indian Journal of Small Ruminants 2014, 20(1): 20-23

Indian Journal of Small Ruminants

GROWTH PROFILE OF MADRAS RED SHEEP IN FARMER'S FLOCKS

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Manuscript received on 31.03.2013, accepted on 20.07.2013

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ABSTRACT

Madras Red is a medium-sized hair sheep, reared mostly by landless farmers for meat, skin and manure in northern parts of Tamil Nadu. Body weights were recorded (n=403) up to one year of age during 2000-2002 in the farmers' flocks in its native breeding tract. The relative growth rates were computed for birth-3, 3-6, 6-9 and 9-12 months and were analyzed by the method of least-squares. The mean body weights at birth, 3, 6, 9 and 12 months were 2.70±0.02, 9.40±0.01, 14.80±0.02, 18.60±0.02 and 20.80±0.02 kg, respectively. The growth rate decreased as the age advanced and was the lowest during 9-12 months. Year of birth (P<0.05) and sex (P<0.01) had significant influence on growth rate during birth-3 and 3-6 months. The growth rate was influenced significantly (P<0.05) by the sex of the lambs during birth-3, 3-6 and 9-12 months only. Growth rate was higher in males during 3-6 months while it was higher in females during birth3 and 9-12 months. Lambs born in off-season (April - July) had significantly (P<0.05) less growth rate during 6-9 months than those born in main season (October - January). The regression of dam's weight at lambing had significant (P<0.05) influence on growth rate of their offspring during birth-3 months, indicating that lambs of heavier dams had better growth rate. The heritability estimates, obtained by paternal half-sib correlation were low during birth-3 months and moderate to high during 3-6, 6-9 and 9-12 months, which showed the presence of effective variation for selective breeding of these traits for further improvement.

Key words: Heritability, Madras Red, Relative growth rate, Sheep

Madras Red is a medium-sized hair sheep reared mostly by landless farmers in northern parts of Tamil Nadu (Devendran et al., 2009; Balasubramanyam and Kumarasamy, 2011). The animals are raised chiefly for meat and also for good quality skin and manure. Relative growth rate (RGR) is a measure of actual growth of animals and is a proportional growth as strategy for changing the shape of the growth curve (Fitzhugh and Taylor, 1971) and is useful for comparing weight gain of individuals with widely different body weights (Sharma and Pathodiya, 2006), consequently helps in deciding the animals to be retained for next generation. Information on relative growth rate of Madras Red sheep was not analyzed and reported so far. This paper presents the relative growth rate of Madras Red sheep reared in farmers' flock in its native breeding tract.

MATERALS AND METHODS

Body weights of 403 Madras Red lambs raised under field conditions were recorded at birth, 3, 6, 9 and 12 months in Kancheepuram district during 2000-2002. The animals were raised solely on grazing without concentrate supplementation and were penned in open enclosure (*patti*) near farmer's dwelling during nights. The relative growth rate is an expression of proportionate / per cent gain per day and

has been used as a selection criterion to increase growth rate up to market age but not mature size to maintain adult ewes with minimum maintenance cost. The relative growth rates were computed by dividing the instantaneous weight gain by time between birth-3 months, 3-6 months, 6-9 months and 9-12 months using following formula.

Relative growth rate = ($\log_n$[Weight2] $\log_n$ [Weight1]) / Period

The influence of non-genetic factors and regression of dam weight on relative growth rate was assessed by method of least-squares using mixed model (Harvey, 1990). The model used for analysis was $Y_{ijklm} = \mu + a_i + B_j + C_k + D_l + _{b\ (Xijklm - X)} + e_{ijklm}$ where Y_{ijklm} is the 'm' th record; a_i is the random-effect of 'i' th sire; B_j is the fixed-effect of 'j' th year of lambing; C_k is the fixed-effect of 'k' th season of lambing; D_l is the fixed effect of 'l' th sex of lamb; b is the regression coefficient for dam weight at lambing and e_{ijklm} is the residual error, normal and independently distributed, NID (0,^{2}e).

RESULTS AND DISCUSSION

The overall mean body weight of Madras Red lambs at birth, 3, 6, 9 and 12 months were 2.70±0.01, 9.40±0.01, 14.80±0.02, 18.60±0.02 and 20.80±0.02 kg, respectively. The body weights recorded in the present study were less than that observed earlier for the same breed in organized flocks (Raman et al., 2003) and were comparable to that reported in the farmers' flocks (Devendran et al., 2007; Balasubramanyam and Kumarasamy, 2011).

The least-squares means of relative growth rate at different stages of growth from birth to 12 months are presented in Table 1. The overall relative growth rates for birth- 3, 3-6, 6-9 and 9-12 months were 1.368±0.006, 0.498±0.003, 0.257±0.002 and 0.119±0.002, respectively. The growth rate during birth to 3 months was high and reduced drastically after 3 months. The lowest growth rate was observed during 9-12 months which suggests that the optimum market age was between 6 and 9 months. The mean pre-weaning relative growth rates reported ranged between 1.38 in Nilagiri Synthetic (Iyue, 1993) and 1.66 in western range sheep (Stobart et al., 1986) and the mean post-weaning growth rates ranged between 0.10 in western range sheep (Stobart et al., 1986) and 0.89 for 3-6 months in Nilagiri Synthetic (Iyue, 1993). Growth rate in Marwari sheep was relatively higher from birth-3 months and less during 3-6 and 6-9 months and comparable at 9-12 months (Joshi et al., 2003). The pre-weaning growth rate observed in present study was comparable to those reported in Nilagiri, Nilagiri Synthetic and Mecheri sheep. However, the post-weaning relative growth rates reported were higher compared to present study (Panneerselvam, 1993; Jeichitra, 2009). The instantaneous relative growth rate observed in Magra sheep from birth to 6 months was comparable to the present study (Murdia and Nagpal, 2007).

Table 1. Least-squares means (±SE) of relative growth rate of Madras Red sheep from birth to 12 months

Effect	Relative growth rate			
	Birth-3 months	3-6 months	6-9 months	9-12 months
Overall mean	1.368±0.006 (403)	0.498±0.003 (397)	0.257±0.002 (386)	0.119±0.001 (366)
Year of birth	*	*	NS	NS
2000-2001	1.352±0.007 (201)	0.504±0.004 (198)	0.254±0.002 (194)	0.121±0.001 (187)
2001-2002	1.384±0.009 (202)	0.491±0.006 (199)	0.260±0.004 (192)	0.117±0.003 (179)
Season of lambing	NS	NS	*	NS
Oct-Jan	1.369±0.007 (323)	0.495±0.003 (320)	0.260±0.003 (313)	0.119±0.002 (298)
Apr-Jul	1.367±0.009 (80)	0.500±0.004 (77)	0.254±0.003 (73)	0.119±0.002 (68)
Sex of lamb	**	**	NS	*
Male	1.357±0.007 (197)	0.501±0.004 (195)	0.257±0.002 (189)	0.117±0.002 (178)
Female	1.379±0.009 (206)	0.494±0.003 (202)	0.257±0.003 (197)	0.120±0.002 (188)
Regression (dam weight at lambing)	*	NS	NS	NS

*Figures in parentheses are the number of observations, **- Significant (P<0.01); * - Significant (P<0.05); NS- Non-significant*

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The significant (P<0.05) influence of year of birth on relative growth rate was observed for birth-3 and 3-6 months. The lambs born during 2000-2001 had less relative growth rate during birth- 3 months than those born in 2001-2002 while the trend was reverse during 3-6 months growth rate. Significant variation found over the years might be due to different management conditions and maternal environment experienced by the lambs during growth. The effect of season was significant (P<0.05) on relative growth rate only during 6-9 months. The relative growth rate was high for the lambs born during main season (October-January) from birth to 6 months. The lambs born in off-season had less relative body growth rate during 6-9 months since they had exposed to hot, humid and hardy environment during summer.

Though the male lambs were heavier than females, the latter had significantly (P<0.01) higher relative growth rate than males at birth-3 months, whereas in 3-6 months, sex effect was reversed significantly (P<0.01) as males had higher relative growth rate than females. The female hoggets had significantly (P<0.05) higher relative growth rate than males in 9-12 months. Significant effect of sex was reported during 3-6, 3-9, 3-12 and 3-18 months age intervals in Niligari sheep (Panneerselvam, 1993) while growth rate of 12-18 months in Nilagiri Synthetic was also significantly influenced by sex effect in addition to the above listed relative growth rates with similar effects (Iyue, 1993).

The regression of dam's weight at lambing had significant (P<0.05) influence on relative growth rate of their offspring only during birth-3 months and showed that lambs of heavier dams had better growth rate. Stobart et al. (1986) observed that the effect of age of dam was evident for relative growth rate over the periods from birth to weaning, 12 and 12-18 months age intervals. The heritability estimates of growth rates traits at birth-3, 3-6, 6-9 and 9-12 months were 0.08±0.02, 0.17±0.04, 0.27±0.03 and 0.33±0.02, respectively. Comparable values were reported by Stobart et al. (1986) in western range ewes. The influences of non-genetic factors like maternal effect, nutrition etc could be the possible cause for low heritability of growth rate during birth-3 months. The study revealed higher relative growth rate in birth-3 months and decreased thereafter, significantly after nine months in Madras Red sheep which suggested the optimum market age for the sale of Madras Red sheep would be around nine months. The moderate to high heritability estimates indicated that the growth rates could be improved by selective breeding in Madras Red sheep.

ACKNOWLEDGEMENT

The authors are highly grateful to Vice-Chancellor, Tamil Nadu Veterinary and Animal Sciences University, Chennai, for providing valuable suggestions and encouragement during the study.

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