International Journal of Food, Agriculture and Veterinary Sciences ISSN: 2277-209X (Online)
An Online International Journal Available at http://www.cibtech.org/jfav.htm
2013 Vol. 3 (1) January-April, pp. 101-103/Jeichitra
Research Article

EFFECT OF NON-GENETIC FACTORS ON POST WEANING RELATIVE GROWTH RATES IN MECHERI SHEEP

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ABSTRACT
The growth data of 1763 Mecheri sheep maintained at Mecheri Sheep Research Station, Pottaneri, Salem over a period of sixteen years (1991 to 2006) were analysed. Least-squares means (±S.E.) of relative growth rates (RGR) for post weaning period viz. 3-6 (RGR1), 3-9 (RGR2) and 3-12 (RGR3) months were 0.41 ± 0.006, 0.34 ± 0.004 and 0.28 ± 0.003 per cent per day respectively. Relative growth rate is useful for comparing growth of individual with widely different weight or even across species. All post-weaning RGR measures were influenced by non-genetic factors viz. period of lambing, season of lambing and sex of the lamb whereas, age of dam at mating did not influence the RGR measures.

Key Words: *Mecheri, Sheep, Relative Growth Rates*

INTRODUCTION
Mecheri is one of the five breeds of hair sheep in Tamilnadu distributed in Salem, Erode, Karur, Namakkal and parts of Dharmapuri districts. The breed is medium sized, well adapted to the local conditions and there is a good demand for their meat. Therefore, efforts are needed to bring about genetic improvement of the growth potential of this breed. The present study was undertaken to estimate the least-squares means and the effect of non-genetic factors on post weaning relative growth rates of Mecheri sheep.

MATERIALS AND METHODS
Data were collected from 1763 Mecheri lambs born during 1991 to 2006 at the Mecheri Sheep Research Station, Pottaneri, Tamilnadu. This research station is situated on Salem-Mettur highway at a longitude of 77º 56' E, latitude of 11º 45' N and altitude of about 200 metres above mean sea level. The average maximum and minimum temperatures are 34.3º and 21.9ºC with an average annual rainfall of 975 mm. Rams and ewes were housed separately. The lambs were allowed for suckling twice a day, in the morning and evening until they were weaned at about 90 days of age. Sheep were grazed for about eight hours per day. In poor grazing condition (i.e., during summer), the animals were supplemented with concentrate mixture at the rate of 50 to 400 g per animal per day depending upon sex, age, pregnancy and lactation. Relative growth rate (RGR) is the growth rate relative to the current weight and was calculated as per the method described by Fitzhugh and Taylor (1971). The relative growth rate in this study is equal to per cent change in the body weight per day. RGR = $(\ln y_{t2} - \ln y_{t1}) / (t_2 - t_1)$, where, ln denotes the natural logarithm of weight y at time 1 (t_1) and time 2 (t_2).
The non-genetic factors influencing pre-weaning (0-3 months) and post-weaning RGR (3-6, 6-9 and 9-12 months) considered in the study were period of lambing (period 1: 1991 to 1994; period 2: 1995 to 1998; period 3: 1999 to 2002 and period 4: 2003 to 2006), season of lambing (1 - January to March, 2 - July to September and 3 - October to December), age of dam at mating (those born to dams of age <2 years, >2 and <3 years, >3 and <4 years, >4 and <5 years and >5 and <7 years) and sex (male and female) of the lamb. As the subclass numbers were unequal and disproportionate, least-squares procedures as outlined by Harvey (1990) were followed to study the effect of non-genetic factors on pre- and post-weaning RGR.

$$Y_{ijkl} = \mu + P_i + C_j + S_k + e_{ijkl}$$

where, Y_{ijkl} is the RGR of the l^{th} animal of the k^{th} sex born in the j^{th} season of lambing of the i^{th} period and e_{ijkl} is the random error with respect to Y_{ijkl}. The differences between the least-squares means for subclasses under a particular effect were tested by Duncan's multiple range tests.

RESULTS AND DISCUSSION

The least-squares means and analyses of variance for post-weaning RGR measures are furnished in Table 1. The overall least-squares means for post weaning period viz. 3-6 (RGR1), 3-9 (RGR2) and 3-12 (RGR3) months were 0.41 ± 0.006, 0.34 ± 0.004 and 0.28 ± 0.003 per cent per day respectively.

Table 1: Least-squares means (±S.E.) for relative growth rates (per cent/day) in Mecheri sheep

Main effect/subclass	RGR1	RGR2	RGR3
Overall mean	0.41 ± 0.006 (1356)	0.34 ± 0.004 (1047)	0.28 ± 0.003 (659)
Period of lambing	**	**	**
Period 1 (1991-1994)	0.37^{b} ± 0.015 (156)	0.32^{b} ± 0.009 (136)	0.28^{a} ± 0.008 (104)
Period 2 (1995-1998)	0.32^{a} ± 0.010 (359)	0.31^{a} ± 0.006 (294)	0.28^{a} ± 0.005 (209)
Period 3 (1999-2002)	0.46^{c} ± 0.010 (427)	0.34^{c} ± 0.006 (345)	0.26^{b} ± 0.006 (163)
Period 4 (2003-2006)	0.48^{d} ± 0.009 (414)	0.38^{d} ± 0.007 (272)	0.30^{c} ± 0.006 (183)
Season of lambing	**	**	**
Season 1 (Jan to Mar)	0.45^{c} ± 0.008 (540)	0.35^{c} ± 0.005 (421)	0.30^{b} ± 0.005 (253)
Season 2 (July to Sep)	0.35^{a} ± 0.010 (440)	0.34^{b} ± 0.007 (339)	0.27^{a} ± 0.006 (219)
Season 3 (Oct to Dec)	0.42^{b} ± 0.010 (376)	0.33^{a} ± 0.007 (287)	0.27^{a} ± 0.006 (187)
Age of dam at mating	**NS**	**NS**	**NS**
<2 years	0.39 ± 0.013 (220)	0.32 ± 0.009 (166)	0.28 ± 0.008 (88)
>2 and <3 years	0.42 ± 0.011 (318)	0.35 ± 0.007 (239)	0.29 ± 0.006 (163)
> 3 and < 4 years	0.41 ± 0.011 (299)	0.34 ± 0.007 (234)	0.29 ± 0.006 (165)
> 4 and < 5 years	0.40 ± 0.012 (240)	0.34 ± 0.008 (190)	0.28 ± 0.007 (120)
> 5 and < 7 years	0.43 ± 0.011 (279)	0.34 ± 0.008 (218)	0.29 ± 0.007 (123)
Sex of lamb	**	**	**
Male	0.42^{b} ± 0.007 (662)	0.35^{b} ± 0.005 (476)	0.29^{b} ± 0.005 (237)
Female	0.39^{a} ± 0.007 (694)	0.33^{a} ± 0.005 (571)	0.27^{a} ± 0.004 (422)

Means with at least one common superscript within classes do not differ significantly.
** (P<0.05), ** (P<0.01)*
Figures in parentheses are the number of observations

The RGR for weaning to 12 months is comparable to Nilagiri (Panneerselvam, 1993), lower than that reported for Nilagiri Synthetic (Iyue, 1993) and higher than that reported for Western range ewes (Stobart *et al.,* 1986). The earlier weaning and delayed maturity might be the factors responsible for higher RGR during weaning to 12 months than that was reported in Western range ewes. The RGR declined continuously with increasing age from weaning to post weaning period viz. 3-6 months RGR (0.41 per cent per day) to 3-12 months RGR (0.28 per cent per day) indicating the reduction in growth with advancement of maturity. The declining trend of RGR with advancement of age up to yearling age are in agreement with the findings already reported for wool sheep maintained under hill range conditions (Stobart *et al.,* 1986; Iyue, 1993 and Panneerselvam, 1993).

Period of lambing, season of lambing and sex of the lamb as non genetic factors were highly significant (P<0.01) for all measures of RGR and is in good agreement with the findings of Iyue (1993) and Panneerselvam (1993) but, significant effect were reported by Stobart *et al.*, (1986). The lambs born during period 2 (1995-1998) had the lowest means for pre-weaning and 3-6 months RGR. This could be due to variation in the availability of pasture, climatic factors and management. The effect of age of dam at mating was found to be not significant for all post weaning RGR and is in agreement with the results of

Panneerselvam (1993). In general, RGR were higher in males than females and the same agreed with the findings of Iyue (1993) and Panneerselvam (1993) for wool sheep. The difference in sex effect observed indicated that influence of sex gets reduced in the latter age. Relative growth rate indicates the per cent increase in weight in relation to the current weight and higher weight gain in males gets offset by their higher initial weight from birth onwards.

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