International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

IJFBS
International Journal of Fauna And Biological Studies

E-ISSN 2347-2677
P-ISSN 2394-0522
www.faunajournal.com
IJFBS 2021; 8(5): 06-08
Received: 05-07-2021
Accepted: 12-08-2021

Mubashir Ali Rather
Sheep Husbandry Officer at Government Sheep Breeding Farm Balnoi, Poonch, Jammu and Kashmir, India

Corresponding Author:
Mubashir Ali Rather
Sheep Husbandry Officer at Government Sheep Breeding Farm Balnoi, Poonch, Jammu and Kashmir, India

Factors affecting greasy fleece yield in Rambouillet sheep

Mubashir Ali Rather

DOI: https://doi.org/10.22271/23940522.2021.v8.i5a.847

Abstract
Greasy wool yield in sheep is an important trait governed by genetic and environmental factors during pre- and postnatal life. A study was, therefore, undertaken to study the wool yield and some environmental factors affecting it in Rambouillet sheep. The data spread over three years (2018 to 2020) pertaining to Rambouillet sheep maintained at Government Sheep Breeding Farm Balnoi was analyzed by least squares and maximum likelihood computer program, PC-2 version (Harvey, 1990). The least square mean of 1.77±0.01 kg for greasy fleece yield (GFY) in Rambouillet sheep was observed. All the factors non-genetic (age, sex and year) included in the model influenced GFY significantly (P<0.01) in the present study. Highest wool yield was observed in the animal in 5 years of age with variable decline thereafter. Therefore, it is concluded that environmental in particular age and sex are a significant source of variation in wool yield in Rambouillet sheep.

Keywords: Rambouillet sheep, greasy fleece, environmental factors, wool

Introduction
Sheep rearing is a major source of livelihood earning of poor and marginal Indian farmers. Sheep are reared for wool and mutton. Wool is a natural fibre in demand. Wool yield is governed by the interaction of genetic and environmental factors during pre- and postnatal life. The environmental factors which influence wool yield includes age and sex of the animal and reproduction in the ewe [15]. Inadequate supply of nutrients during prenatal period damages wool follicles in sheep [20] thus affect wool yield. The number and ratio of primary and secondary follicles change with age, thus affect wool yield. Maximum fleece weights are obtained from sheep of 3 to 5 years of age with variable rates of decline thereafter [1]. Therefore, a study was undertaken to investigate the effects of age and sex of the animal and year of shearing on greasy fleece yield (GFY) in Rambouillet sheep in an organized farm.

Materials and Methods
Data (n=1635) on greasy fleece yield (GFY) of Rambouillet sheep maintained at the Sheep Breeding Farm Balnoi from 2018 to 2021 were used for this study. The farm is located in Poonch district about 2000 km from Srinagar. Ewes were mated from August to the end of September. The ewes were divided into groups based on body weight and GFY. Lambing commenced in January. The animals were machine-shorn once a year in the month of October after downward migration from highland pastures Seri-Magayana. The data were classified to study the major effect of non-genetic factors like age, sex (male and female) and year of the shearing (3 periods). Data were analyzed by least squares and maximum likelihood computer program, PC-2 version (Harvey, 1990) [6] using following model:

$$Y_{ijkl} = \mu + A_i + G_j + P_k + e_{ijkl}$$

Where, Y_{ijkl} is observation of l^{th} sheep, recorded in k^{th} year having j^{th} sex and i^{th} age in years
μ is overall mean, A_i, G_j and P_k are fixed effect age of animal, sex of animal and year of shearing, respectively, whereas $e_{ijkl\ is}$ random error associated with all these fixed factors with, N (0, e). ^{2}. The statistical significance of various fixed effects in the least squares model was determined by 'F' test using SPSS software. For significant effects, the differences between pairs of levels of effects of the period were tested by Duncan's multiple range test (DMRT) as modified by Kramer (1957) [9].

Results and Discussion

The least square mean of 1.77±0.01 kg for greasy fleece yield (GFY) in Rambouillet sheep was observed in the present study. However, Rather *et al*. (2021) [18] in Kashmir Merino sheep observed six months greasy wool yield of 1.36±0.01kg. Therefore, Kashmir Merino sheep produce more GFY as compared to Rambouillet sheep. However, the number of clips and environment may also be a contributing factor for increased wool yield in Kashmir Merino. Qureshi *et al*. (2013) [22] reported overall greasy fleece yield (kg), staple length (cm), fiber diameter (µ), medullation (%), clean yield percent, clean wool yield and wool bulk (cm3/gm) of 2.19±0.082, 8.88±0.054, 26.36±0.825, 3.08± 1.485, 68.14± 2.553 and 25.87± 0.594 crossbred, 1.92±0.116, 7.89±0.673, 27.93±0.584, 8.89± 1.052, 71.08± 2.117 and 26.46± 0.493 in Poonchi sheep and 2.36±0.091,0.477, 20.02±0.650, 6.09± 1.171, 69.78± 2.578 and 25.92± 0.600 in Rambouillet sheep, respectively. As presented in Table 1, all the non-genetic factors included in the model influenced GFY significantly ($p<0.01$). Highest wool yield was observed in the animal in 5 years (at around 4.5) of age with variable decline thereafter. Rather *et al*. (2021) [18] in Kashmir Merino sheep also reported highest wool yield in animals in 5th year of age with variable decline thereafter. Maximum fleece weights were obtained from sheep of 3.5 to 6.5 years of age. However, Corbett, (2001) [1] reported maximum fleece weights from 3 to 5 years aged sheep with variable rates of decline thereafter. Less wool yield was observed in young and old sheep. The less wool yield in young sheep may be attributed to small surface area of skin for wool growth as compared to adults. Further, the active competition for nutrients between follicles and other tissues in young growing sheep results in less wool production in them than animals which have completed growth (Khan *et al*., 2012; Rather *et al*., 2021) [7, 19]. However, the decrease in wool yield with age after 5 years could be attributed to decrease in number of active follicles and their synthetic ability [1], change in feeding pattern and diet selection (Khan *et al*., 2012; Rather *et al*., 2021) [7, 18]. Dixit *et al*., (2009) [3] in 3/4th bred Bharat Merino sheep reported that the younger sheep between 2-5 years of age produced the heaviest clip of 1.307 kg to 1.342 kg, whereas older animals of age more than 6 years produced the lowest clip of 1.201 kg.

Rather *et al*., (2021) [18] in Kashmir Merino sheep reported a significant effect of age on wool yield. Dixit *et al*., (2009) [3] reported that age of lamb influenced first and subsequent six-monthly clips in 3/4th bred Bharat Merino sheep. The effect of sex was highly significant ($p<0.01$) on the greasy fleece yield with sexual dimorphism in favour of males in Rambouillet sheep in the present study.

The higher wool yield in males than females could be attributed to the fact that males are always heavier than females [24] under influence of male sex hormones and differences in sexual chromosomes and position of genes [17], thereby providing more surface area of their skin for wool growth [4]. Further, ewes have to compensate for physiological stresses of pregnancy, parturition and lactation. Higher wool yield in males than females was also reported by Gupta, (2000) [5] and Sarkar (2008) [21] in different sheep strains/ Breeds, Dixit *et al*. (2009) [3] in Bharat Merino Sheep, Lalit *et al*. (2016) [10] in Harnali sheep, Khan *et al*. (2015) [8] in Rambouillet crossbred sheep, Das *et al*. (2014)[2] and Rather *et al*. (2019) [19] in Kashmir Merino sheep. The sexual dimorphism in favour of males was also reported in earlier studies [2, 10, 11, 12, 13, 19, 18]. The year of shearing was also a significant ($p<0.01$) source of variation for GFY for Rambouillet sheep in the current study. Dixit *et al*. (2009) [3] in Bharat Merino Sheep, Qureshi *et al*. (2013) [16] in Poonchi, Rambuillet and crossbred sheep and Rather *et al*., (2021) [18] in Kashmir Merino sheep also reported significant differences due to year/ period of shearing in GFY. The variation in GFY due to year of shearing may be caused by differences in rainfall, availability of grazing in pastures and management differences.

Conclusion

It is concluded that environmental in particular age and sex are a significant source of variation in wool yield in sheep. The wool yield increases with age up to the 5th year of age with variable decrease thereafter. Therefore, it is not economical to sheep in farm after 7.5 years age. Further, management and climatic variation play significant role in wool production.

Table 1: Least squares means for greasy fleece yield in Rambouillet sheep

Effect	N	GFY (kg)
Overall	1635	1.77±0.01
Year		0.000**
2018	500	1.74±0.02^{a}
2019	538	1.88±0.02^{b}
2020	597	1.68±0.02^{c}
Sex		0.008**
Female	1211	1.74±0.01
Male	424	1.80±0.02
Age		0.000**
0.5 years	541	0.88±0.02^{a}
1.5 years	330	1.48±0.02^{b}
2.5 years	253	1.83±0.02^{c}
3.5 years	142	1.95±0.03^{d}
4.5 years	109	2.12±0.03^{e}
5.5 years	68	2.01±0.04^{de}
6.5 years	106	2.01±0.03^{d}
7.5 years	67	1.96±0.04^{d}
8.5 years	19	1.68±0.08^{b}

Means with different superscripts in the columns differ significantly; ** - Significant ($p<0.001$); N is number of observations

References

1. Corbett JL. Variation in wool growth with physiological state. University New England Publishing Unit, Armidale 2001, 79-98.
2. Das AK, Chakraborty D, Kumar N, Gupta P, Khan NN, Bukhari S. Effects of non-genetic factors on performance traits of Kashmir Merino sheep. Indian J. Anim. Res 2014;48(2):106-108
3. Dixit SP, Singh G, Kant N, Dhillon JS. Contribution of genetic and phenotypic parameters affecting fleece traits in 3/4th bred Bharat Merino Sheep. Indian J. Anim. Res 2009;43(1):1-6.
4. Gupta JP, Pandey DP, Panchasara HH, Shah RR. Non-genetic factors affecting greasy fleece weight in Patanwadi sheep. The Indian Journal of Small Ruminants 2015;21(1):100-102.
5. Gupta N. Genetic evaluations of exotic fine wool breeds (Rambouiliet and Merino) and their crosses with indigenous sheep breeds of Northwestern Himalayan

region. M.V.Sc. thesis, Department of Animal Breeding, Genetics and Biostatistics. Himachal Pradesh Krishi Vishvavidyalaya Palampur (H.P.) India 2000.
6. Harvey WR. User's Guide for LSMLMW and MIXMDL PC-2 Version. Mixed Model Least-squares and Maximum Likelihood Computer Program. Ohio State University 1990.
7. Khan MJ, Abbas A, Ayaz M, Naeem M, Akhter MS, Soomro MS. Factors affecting wool quality and quantity in sheep. African Journal of Biotechnology 2012;11:13761-13766.
8. Khan NN, Kumar N, Das AK, Chakraborty D, Taggar RK, Gupta P. Genetic studies on wool production traits in Rambouillet crossbred sheep in J & K State, India. Indian J. Anim. Res 2015;49(1):40-43.
9. Kramer CR. Extension of multiple range tests to group correlated means. Biometrics 1957;13:13-18.
10. Lalit ZS, Malik ZS, Dalal DS, Patil CS, Dahiya SP. Genetic studies on growth, reproduction and wool production traits in Harnali sheep. Indian J. Anim. Res 2016;51(5):813-816.
11. Mandal A, Rout PK, Pant KP, Roy R. Genetic studies on fleece weights of Muzaffarnagri sheep. Indian J. Small Rumin 2002;8(2):92-96.
12. Mehta SC, Choprn SK, Singh VK, Yub M, Mahrotrn V. Production and quality of wool in Magra breed of sheep. ICAR Publ 2004;74(7):792–794.
13. Mir MY, Risam KS, Kirmani MA, Ganai TAS. Genetic and environmental factors influencing greasy fleece yield in a closed flock of Corriedale sheep. Indian J. Anim. Sci 2000;70(5):540–542.
14. Sa'ayinzat FE, Bawa EK, Ogwu D, Ayo JO. Oxidative stress and its effects on reproductive performance in thermally-stressed ewes. Int J Vet Sci Anim Husbandry 2021;6(4):09-17.
DOI: https://doi.org/10.22271/veterinary.2021.v6.i4a.361
15. Purvis IW, Franklin IR. Major genes and QTL influencing wool production and quality: a review. Genetics Selection Evolution 2005;37:S97-S107.
16. Qureshi MA, Khan SA, Shafique M, Sabir N, Ahmed G. Influence of genetic and non-genetic factors on quantity and quality of wool from sheep reared at Rawalakot Azad Jammu and Kashmir. JAPS 2013;23(1):20-25.
17. Rashidi A, Mokhtari MS, Safi Jahanshahi A, Mohammad Abadi MR. Genetic parameter estimates of pre-weaning growth traits in Kermani sheep. Small Rumin. Res 2008;74:165-171.
18. Rather MA, Bashir I, Kuthu BA, Baba JA, Hamadani A. Factors affecting greasy fleece yield in Kashmir Merino sheep. Indian Journal of Small Ruminants 2021;27(1):126-128.
19. Rather MA, Shanaz S, Ganai NA, Bukhari S, Hamadani A, Khan NN, *et al*. Genetic evaluation of wool traits of Kashmir Merino sheep in organized farms. Small Ruminant Research 2019;177:14-17.
20. Reis PJ. The influence of absorbed nutrients on wool growth. In: G.E. Rogers,P.J. Reis, K.A. Ward and R.C. Marshall (eds.), The Biology of Wool and Hair. Springer, Dordrecht 1988. https://doi.org/10.1007/978-94-011-9702-1- 13, accessed on 29.09.2020.
21. Sarkar TK, Singh PK, Bank S, Ganai TAS. Comparative performance of different breeds of sheep on wool production & quality traits in Kashmir Valley. Indian J. Anim. Sci 2008;42(1):63-65.
22. Qureshi MA, Khan SA, Shafique M, Sabir N, Ahmed G. Influence of genetic and non-genetic factors on quantity and quality of wool from sheep reared at Rawalakot Azad Jammu and Kashmir, Journal of Animal and Plant Sciences 2013;23:20-25.
23. Ramesh Prasad Sah, Mohan P Yadav, Surendra P Kanu, Tirtha Raj Rijal. Study on ovine fascioliasis: Case study, associated risk factors and economic significance at sheep and goat research program, Guthichaur, Jumla, Nepal. Int J Vet Sci Anim Husbandry 2020;5(4):164-168.
24. Mousa E, Shaat I, Melak SHA. Phenotypic and genetic variation in lambs' growth using linear models. Egyptian Sheepand Goat Science 2010;6:22-33.