Haryana Vet. (June, 2020) **59(1),** 106-108

Research Article

ESTIMATION OF BREEDING VALUES FOR PERFORMANCE TRAITS IN RAMBOUILLET RAMS

AAKRITI SUDAN, R.K. TAGGAR and D. CHAKRABORTY*
Division of Animal Genetics & Breeding
FVSc&AH, SKUAST-Jammu, R.S. Pura, Jammu-181102, India

Received: 10.10.2019; Accepted: 09.03.2020

ABSTRACT

The present investigation was undertaken on Rambouillet sheep maintained at Government Sheep Breeding and Research Farm, Reasi, Jammu, Jammu and Kashmir, India. Performance records of progenies of ninety Rambouillet sheep distributed over 20 years (1996 to 2015) were analyzed. The ram effects and ranks of 90 rams were estimated on the basis of their progenies' performance. The progeny group size of the sires ranged from 5 to 83. The performance traits included in the present study were birth weight (BW), weaning weight (WW), nine-month body weight (9BW), twelve-month body weight (YW) and annual wool production (AWP). Ram's breeding values were estimated by best linear unbiased procedure (BLUP). The estimated breeding values (EBV) for BW, WW, 9BW, YW and AWP ranged from 2.65 to 3.64 kg; 19.61 to 23.99 kg; 23.52 to 30.68 kg; 27.07 to 35.54 kg and 1.03 to 1.52 kg, respectively. The product moment correlations among various traits were low barring few exceptions. The highest product-moment and rank correlations were obtained between 9BW and YWto the tune of 0.97. The results indicated that ram coding195, 193, 192 and 198 were the best and alive rams can be used for future breeding purpose.

Keywords: Annual wool production, BLUP, Estimated breeding values, Performance traits, Rambouillet sheep

The sheep population in India is 65.06 million and India ranks 3rd in world behind China and Australia (FAOSTAT, 2016). Better growth and wool yield are the traits having direct economic relevance to sheep farmers because heavier lambs with higher growth will result in more economic returns. Rambouillet sheep breed was intensively used for crossbreeding programme in India especially J&K state for improving the productivity of native sheep (Sudan *et al.*, 2018). Evaluation of genetic progress for economic traits is an essential part of successful planning of future breeding schemes, and allows documentation of progress from past selection (Eteqadi *et al.*, 2016). To maximize the response to selection programs, an accurate predicted breeding value of candidate animals is one of the best tools. There are many factors that determine the success of a breeding program. In such case, the actual change in breeding value expressed as a proportion of expected theoretical change of the mean breeding value for the trait under selection can be used to assesses the success of a breeding program (Jurado *et al.*, 1994).Therefore, the present investigation was planned to evaluate the Rambouillet rams based on performance traits by BLUP method.

MATERIALS AND METHODS

The data pertaining to different performance traits for present study were collected from history sheets of Rambouillet sheep maintained at Government Sheep Breeding and Research Farm, Reasi, Jammu, Jammu and Kashmir, India over a period of twenty years from 1996 to 2015. The performance traits included in the present study were Birth weight (BW), weaning weight (WW), nine-month body weight (9BW), twelve-month body weight (YW) and annual wool production (AWP). A total of 90 rams were used for the present study. The ranks of 90 rams were estimated on the basis of their progenies' performance. Rams with five and more than five progenies only were considered for the present study. Abnormal records like incomplete body weight records and out layers were also excluded from the present study. The number of progenies ranged from 5 to 83.

Best Linear Unbiased Prediction (BLUP) (Henderson, 1973) was used for the estimation of breeding value of rams for different performance traits by using LSMLMW and MIXMDL package of Harvey (1990).

In matrix notation, the model of BLUP was as follows:

$Y = Xb + Zu + e$

Where, Y = vector of observations on progeny of ram in u, X = known design matrices that relate records (Y) to fixed effects, b = vector of fixed effect, Z = known design matrices that relate records (Y) to random rams, u = vector of random ram effects and e = vector of residual effects.

To check the ranking and correction of BVs of different sires, product moment correlations and Spearman rank correlations (Spearman, 1904) were used

RESULTS AND DISCUSSION

The breeding values of rams for performance traits BW, WW, 9BW, YW and AWP were estimated by Best Linear Unbiased Prediction (BLUP) procedure. The average estimated breeding values (EBV) for BW, WW, 9BW, YW and AWP were 3.10 kg, 21.48 kg, 26.42 kg, 30.65 kg and 1.24 kg, respectively (Table 1). It was found that out of 90 rams, 40 (44.44%), 43 (47.78%), 42

*Corresponding author:v.dr.dibyendu@gmail.com

Table 1

Average breeding value (B.V) of Rambouillet Ram's for different performance traits

Traits	No. of rams	Average B.V. (% below avg.)	Minimum B.V. (% Above avg.)	Maximum B.V. above	No. of rams average B.V. (% of rams)	No. of rams below average B.V. (% of rams)
BW	90	3.10	2.65 (14.52)	3.64 (17.42)	40 (44.44)	50 (55.56)
WW	90	21.48	19.61 (8.71)	23.99 (11.69)	43 (47.78)	47 (52.22)
9BW	90	26.42	23.52 (10.98)	30.68 (16.12)	42 (46.67)	48 (53.33)
YW	90	30.65	27.07 (11.68)	35.54 (15.95)	41 (45.56)	49 (54.44)
AWP	90	1.24	1.03 (16.94)	1.52 (22.58)	38 (42.22)	52 (57.78)

Table 2

Top 10 rams on the basis of breeding value for performance traits in Rambouillet sheep

S.No.	Rank	BW	WW	9BW	YW	AWP
1	1	195	179	195	195	123
2	2	198	10	194	194	150
3	3	193	184	193	193	97
4	4	143	52	192	192	117
5	5	170	150	198	198	166
6	6	192	176	176	181	142
7	7	181	178	185	187	60
8	8	91	142	181	183	151
9	9	129	125	187	177	178
10	10	151	132	183	185	167

Table 3

Product moment (upper diagonal) and Rank correlations (below diagonal) between breeding values among performance traits of Rambouillet rams

	BW	WW	9BW	YW	AWP
BW	-	0.019	0.630**	0.663**	-0.084
WW	-0.010	-	0.025	0.056	0.146
9BW	0.607**	0.075	-	0.970**	-0.001
YW	0.673**	0.123	0.965**	-	-0.039
AWP	-0.032	0.164	0.076	0.030	-

**P<0.01

(46.67%), 41 (45.56%) and 38 (42.22%) rams were above the average breeding value for BW, WW, 9BW, YW and AWP, respectively. The top ranking rams were 17.42%, 11.69%, 16.12%, 15.95% and 22.58% genetic superior than average of the flock for BW, WW, 9BW, YW and AWP, respectively. The top ranking alive rams should be used for further breeding for genetic improvement. Higher percentages of rams were reported to have above average B.V. for BW, WW, YW and AWP in Munjal sheep (Yadav *et al.*, 2018). The estimated mean predicted breeding value (kg) of Bharat Merino sheep in BWT and GFY were 0.067 and -0.003, respectively (Mallick *et al.*, 2016).

Higher average breeding values for BW & greasy fleece weight (GFW) and lower average breeding value for WW and YW were reported in Munjal sires (Yadav *et al.*, 2018).

The breeding values of rams for BW, WW, 9BW, YW and AWP ranged from 2.65 to 3.64 kg; 19.61 to 23.99 kg; 23.52 to 30.68 kg; 27.07 to 35.54 kg and 1.03 to 1.52 kg, respectively. A wide range of variation in 9BW was observed. Lower ranges of breeding values were estimated for BW, 9BW and YW were reported in Mechari sheep (Jeichitra *et al.*, 2015).

The breeding value estimation is generally aimed to select first few top ranking rams. The top 10 ranked rams were enlisted in Table 2. It was observed that ram coding 195, 193, 192 and 198 are the best as they were in the top 10 for BW, 9BW and YW. So, 195, 193, 192 and 198 coded rams were the best and alive rams can be used for future breeding purpose.

Product moment correlations

The product moment correlations among rams' estimated breeding values for the performance traits are

presented in Table 3. The product moment correlations among various traits were low barring exception for BW & 9BW; BW & YW and 9BW& YW where highly significant correlations were obtained. The highest product moment correlation was obtained between 9BW and YW (Table 3). On the other hand, all the product moment correlations between AWP and other traits were negative except with WW, where the value was positive and low. The lowest product moment correlation was obtained between 9BW and AWP (Table 3).

On contrary to the present findings, no negative product moment correlations were obtained in Munjal sheep except for BW & YW (Yadav *et al.*, 2018).

Rank correlations

Rams were ranked on the basis of their breeding values estimated by BLUP procedure. The value of rank correlations among these traits ranged from -0.0098 to 0.965. The highest rank correlation was obtained between 9BW and YW, whereas, the lowest rank correlation was obtained between BW and WW (Table 3). The rank correlations for BW & 9BW; BW & YW and 9BW & YW traits were highly significant ($P<0.01$). BW had highly significant rank correlations with 9BW and YW indicate that the ram that was good for BW was also good for 9BW and YW traits. Similarly, negative rank correlation between BW and AWP was reported in Munjal Sheep (Yadav *et al.*, 2018).

CONCLUSION

Results of the present study indicate that selection should be conducted using rams with high estimated breeding values. The top ranking alive rams should be used for further breeding for genetic improvement. Selection of rams on the basis of estimated BV of 9BW would be a better choice as it has high and highly significant product moment as well as rank correlations in with BW and YW breeding values in the present study. After WW, there is less maternal effect and selection on the basis of 9BW will reduce the generation interval and hence will increase the genetic gain.

ACKNOWLEDGEMENT

Authors are thankful to Director, Sheep Husbandry, Jammu, and the In-charge and staff of Government Sheep Breeding and Research Farm, Reasi, Jammu for providing facilities and help for the present study.

REFERENCES

Eteqadi, B., Ghavi Hossein-Zadeh, N. and Shadparvar, A.A. (2016). Estimation of genetic and phenotypic trends for body weight traits of sheep in Guilan province of Iran. *J. Livest. Sci. Technol.* **4**(2): 57-62.

FAOSTAT. (2016). Food and Agriculture Organizations of the United Nation, Rome. http://www.fao.org/faostat/en/#data/QA.

Harvey, W.R., (1990). Mixed Model Least-squares and Maximum Likelihood Computer Programme. PC-2 version. OhioState University, Columbus.

Henderson, C.R., (1973). Sire evaluation and genetic trends. Proceedings of Animal Breeding and Genetics symposium in Honour of Dr. Jay L. Lush. American Society of Animal Sciences and American Dairy Science Association. Champaign, Illinois, U.S.A. pp. 10-14.

Jeichitra, V., Rajendran, R., Karunanithi, K. and Rahumathulla, P.S. (2015). Comparison of three methods for estimating breeding values of Mecherirams for body weights. *Indian J. Anim. Res.*, **49**(2): 161-164.

Jurado, J.J., Alonso, A. and Alenda, R. (1994). Selection response for growth in Spanish Merino flock. *J. Anim. Sci.*, **72**: 1433-1440.

Mallick, P.K., Thirumaran, S.M.K., Pourouchottamane, R., Rajapandi, S., Venkataramanan, R., Nagarajan, G., Murali, G. and Rajendiran, A.S. (2016). Genetic trend for growth and wool performance in a closed flock of Bharat Merino sheep at sub temperate region of Kodai hills, Tamil Nadu. *Vet. World*, **9**(3): 276-280.

Spearman, C. (1904). The proof and measurement of association between two things. *Am. J. Psychol.* **15**: 72-101.

Sudan, A., Taggar, R.K., Chakraborty, D., Kumar, D. and Kumar, N. (2018). Factors affecting performance traits in Rambouillet sheep. *Indian J. Anim. Sci.* **88**(12): 1406–1408.

Yadav, U., Malik, Z., Dalal, D., Dahiya, S. and Patil, C. (2018). Estimation of breeding values and genetic trend of production traits in munjal sheep. *Int. J. Livest. Res.* **8**(8):135-141. doi: 10.5455/ijlr.20171222122124.