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Research Article

INFLUENCE OF GENETIC AND NON-GENETIC FACTORS ON NUMBER OF CRIMPS IN INDIGENOUS AND CROSSBRED SHEEP

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ABSTRACT
A study was conducted to determine the effect of breed group, age, period of birth, season of shearing and sex on number of crimps. Wool samples were collected from Bannur (n=68) and UAS-improved strain (n=120) maintained at UAS campus, Bangalore. Wool samples(n =608) were also collected from Bannur(n=69), Rambouillet X Deccani (n=56), Corriedale X Bannur(n=76), Corriedale X Deccani (n= 122) and Deccani(n=97) before shearing at the left side region at Large Scale Sheep Breeding and Training Centre, Kudapura, Chellakere of Chithradurga district of Karnataka. The Least squares analysis of variance technique was adapted to detect the significant sources of non-genetic variation. The overall least square mean of number of crimps was 3.30 ± 0.04. The comparison of means among genetic groups revealed that the highest number of crimps was observed in UAS- improved strain (4.36 ± 0.04), followed by Rambouillet X Deccani (4.20 ± 0.06), Corriedale X Deccani (4.12 ±0.06), Corriedale X Bannur (3.12 ±0.05), Deccani (2.25 ±0.06) and Bannur (2.12 ±0.04). The factors like breed, age, season of shearing and sex significantly influences the number of crimps. The period of birth did not show any significant effect on number of crimps.

Key Words: *Number of crimps, Genetic and non genetic factors, Least Square, Analysis, Deccani, Bannur, Corriedale and Rambouillet*

INTRODUCTION
The wool production potential of native breeds of sheep is not sufficient to meet ever increasing demand of wool of the state as well as India. Several exotic breeds of sheep have been introduced in the region for crossbreeding of the local sheep for improving production and quality of wool.
The indigenous breeds of Karnataka viz., Deccani, Bannur are known for quality mutton production but are lacking in production of superior quality wool. Therefore, crossbreeding with superior exotic wool breeds of sheep like Corriedale and Rambouillet was taken up as breeding policy to improve wool traits as well as other economic traits.
Number of crimps is an important trait determining wool quality in sheep. This trait is affected, both by genetic and non- genetic factors with varying degree. Hence, an attempt was made to determine the effect of breed group, age, period of birth, season of shearing and sex on staple length.

MATERIALS AND METHODS
Wool samples were collected from Bannur (n=68) and UAS-improved strain (n=120) maintained at UAS campus, Bangalore. Wool samples(n =608) were also collected from Bannur(n=69), Rambouillet X Deccani (n=56), Corriedale X Bannur(n=76), Corriedale X Deccani (n= 122) and Deccani(n=97) before shearing at the left side region at Large Scale Sheep Breeding and Training Centre, Kudapura, Chellakere of Chithradurga district of Karnataka.
Samples were collected from one square inch area in left mid side region using curved scissors . The samples collected were packed in labeled plastic bags.

A suitable sub-sample was taken from the unscoured samples for measuring the number of crimps per inch. One hundred fibres from each sample were measured for estimating the mean number of crimps per inch. The mean figures of 100 fibres represented the mean number of crimps in a sample.

The Least squares analysis of variance technique was adapted to detect the significant sources of non-genetic variation if any(Harvey, 1987). The following mathematical model was adapted:

$Y_{ijklmn} = \mu + G_i + A_j + Y_k + S_l + X_m + e_{ijklmn}$

Where, Y_{ijklmn} is the record of the n^{th} individual belonging to i^{th} genetic group, j^{th} age group, k^{th} period of birth, shorn at l^{th} season belonging to m^{th} sex.

μ is the population mean

G_i is the fixed effect of i^{th} genetic group (i=1,2,3 … 6)

A_j is the fixed effect of j^{th} age group (j=1,2,3 … 7)

Y_k is the fixed effect of k^{th} period of birth (k=1,2)

S_l is the fixed effect of l^{th} season of shearing (l=1,2)

X_m is the fixed effect of m^{th} sex group (m=1,2)

e_{ijklmn} is the random error associated with Y_{ijklmn} and assumed to be identically, independently and normally distributed with mean zero and unit variance and interaction between various effects was assumed to be zero.

The Least Square means of different groups within each of the factors were compared by computing the Least Significant Difference (LSD) (Snedecor and Cochran, 1968).

RESULTS

The least square mean and standard error computed for number of crimps per c.m are presented in Table 1

Table 1: The Least Square Mean and Standard Error computed for Number of Crimps per c.m.

Genetic and Non-genetic factors	Number of samples	Mean	Standard Error	Coefficient of Variation
Overall	608	3.30	0.04	33.03
Genetic Groups				
Bannur	137	2.12[a]	0.04	20.75
R X D	56	4.20[de]	0.06	10.00
C X B	76	3.12[c]	0.05	14.10
C X D	122	4.12[d]	0.06	15.53
Deccani	97	2.25[b]	0.06	25.78
UAS	120	4.36[e]	0.04	10.78
Age (Years)				
½ to 1 ½	52	4.41[f]	0.07	11.11
1 ½ to 2 ½	65	4.14[e]	0.08	15.22
2 ½ to 3 ½	64	3.54[d]	0.12	27.97
3 ½ to 4 ½	106	3.02[b]	0.10	32.45
4 ½ to 5 ½	114	2.81[a]	0.09	33.10
5 ½ to 6 ½	83	2.93[b]	0.11	33.78
6 ½ to 7 ½	124	3.21[c]	0.11	37.69
Period of birth				
1987 -90	384	2.99	0.05	34.78
1991 - 94	224	3.83	0.06	24.80
Season of shearing				
Dec - Jan	292	3.54[a]	0.06	26.55
Jul - Aug	316	3.08[b]	0.07	37.99
Sex				
Male	85	3.52[a]	0.10	27.27
Female	523	3.26[b]	0.05	34.05

R X D: *Rambouillet X Deccani;* ***C X B:*** *Corriedale X Bannur;* ***C X D:*** *Corriedale X Daeccani;*
UAS: *UAS improved strain; Column-wise means with at least one common superscript do not differ significantly.*

DISCUSSIONS

The overall least square mean of number of crimps was 3.30 ± 0.04. The comparison of means among genetic groups revealed that the highest number of crimps was observed in UAS- improved strain (4.36 ± 0.04), followed by Rambouillet X Deccani (4.20 ± 0.06), Corriedale X Deccani (4.12 ±0.06), Corriedale X Bannur (3.12 ±0.05), Deccani (2.25 ±0.06) and Bannur (2.12 ±0.04). The factors like breed, age, season of shearing and sex significantly influences the number of crimps. The period of birth did not show any significant effect on number of crimps.

Differences due to genetic groups were found to be significant ($P \leq 0.01$). The number of crimps in Rambouillet X Deccani and UAS improved strain were the highest and no significant difference in number of crimps was found between their crosses. Crosses of Deccani with Corriedale and Rambouillet had significantly higher number than the crosses of Bannur with Corriedale. Both indigenous breeds, Bannur and Deccani had significantly lower values as compared to other indigenous breeds like Nali, Bikaneri, Chokla and their crosses with Merino, Corriedale and Rambouillet (Krishnamurthy et al., 1975; Gupta et al. , 1976; Krishnappa, 1979 ;Singh et al.,2008).

Deccani breed can thus be improved further through rigid intra-population selection combined with selective cross breeding. Besides, crossbreeding of Deccani with Corriedale or Rambouillet will certainly improve the number of crimps per inch. Such a result has already been obtained in UAS-improved strain.

The least square mean of number of crimps was highest in the sheep aged half to one-and –a –half years (4.41 ± 0.07) and lowest in the sheep aged four-and- a -half to five-and – a – half years (2.81 ± 0.09).The mean values recorded among age groups differed significantly from one another, except for the age groups of three- and – a-half to four –and-a-half and five-and-a-half to six-and-a-half years. The higher number of crimps observed in the younger age groups might be due to physiological status and its interaction with the environment. Significant difference in number of crimps due to age was reported by Krishnappa (1979) in Corriedale X Deccani and by Garcia and Alverez (1992) in German Mutton Merinos. In contrast to this report, Singh et al.(2008) reported that age did not show any significant effect on crimpiness of wool in Corriedale and South Down sheep

The sheep shorn in period II were having more number of crimps (3.83 ± 0.06) than those lambs born in period I, but the difference was not significant statistically.

The sheep shorn in the months of December and January had more number of crimps (3.54 ± 0.06) than those sheep shorn in the months of July and August (3.08 ± 0.07) and the difference was significant ($P \leq 0.01$).Similar reports were also reported by Chaudhary and Malik (1972) in Chokla breed.

The number of crimps were more in males (3.52 ± 0.10) in comparison to females (3.26 ± 0.05) and difference was significant. Differences in hormonal levels in the two sexes might have been responsible for the variation. In contrast to this observation Krishnamurthy et al. (1975) in Nilgiri and its crosses and Krishnappa (1979) in Corriedale X Deccani reported non- significant effect of sex on number of crimps.

Period of birth did not influence number of crimps significantly in this study.

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