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Production and quality of wool in Magra breed of sheep

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Indian hand knotted carpet industry is one among the world's most leading carpet industry. This industry has shown tremendous growth due to the use of superior wool produced by some of the best carpet wool producing breeds of sheep. Magra breed of sheep inhabits Bikaner district and nearby area in Rajasthan and produces extremely white and lustrous wool (Acharya 1982). Evaluation of production performance and analysis of the quality of wool produced by this breed was carried out to assess the scope for its improvement and use for upgradation of inferior wool producing breeds. The repeatability of greasy fleece weight, fibre diameter and per cent pure fibres between first and second clip was also estimated to predict future performance.

The data were collected from the Magra flock maintained at the Central Sheep and Wool Research Institute, Arid Region Campus, Bikaner, from the year 1997 to 2000. The average fibre diameter and percentage of different types of fibres were measured by using standard protocol described by Pant *et al.* (1980). Least-squares maximum likelihood programme (Harvey 1987) was used to study the effect of sex, season and year on quality and quantity of wool produced. All effects were taken as fixed. The repeatability of greasy fleece weight, fibre diameter and per cent pure fibres was estimated by variance-covariance method (Warwick and Legates 1979).

The greasy fleece weight of Magra adults and lambs is presented in Table 1. The spring clip was heavier (918.32±15.84 g) than the autumn clip (668.87±14.81g). The average adult annual clip was 1627.86±24.01g. The effect of year was highly significant (P<0.01). After the initiation of the project by the purchase of animals from field in the year 1996 and 1997, the wool production increased from 1178.20±86.01g to 1816.33±28.08 and 1854.98±27.54 g in the year 1998 and 1999 respectively. Climate plays a major role on the livestock production system. In the year 2000, Rajasthan had third consecutive drought. The annual rainfall was only 196.7 mm with consequent reduction in the relative humidity (Meteorological Department, Government of Rajasthan). The impact of this drought is reflected in wool production for the year 2000, which was 1661.95 g only. The effect of sex was found significant (P<0.01) with superiority of males over females. The highest annual wool production in males was 3.3 kg and 56 males produced more than 2 kg greasy fleece weight suggesting the scope for improvement of wool production in the flock producing 1627.86±24.01 g of wool per head.

The average first and second clip greasy fleece weight was 584.11±12.77 and 536.93±20.33 g, respectively. The spring born animals produced higher first and second clip yield (636.26±17.70 and 575.75 ±30.28 g) as compared to autumn born animals (531.95±21.27 and 498.11±22.10g). The regression of 6 and 12 months body weight was highly significant (P<0.01) on first and second clip greasy fleece weights. Taneja *et al.* (1991b) reported 596±23.2 g greasy fleece weight of spring, 1991 clip for milk teeth animals of Magra breed from farmers' flock, which is similar to the present wool production of the lambs. The repeatability of greasy fleece weight for the first and second clip was estimated to be 0.28, which can be ranked as medium to low. Taneja *et al.* (1991a) reported very low heritability (0.096±0.249) of the greasy fleece weight in Magra animals. The present results can be said consistent with the reported heritability because the repeatability defines the upper limit of heritability (Falconer 1986).

A total of 226 wool samples were collected from first and second clip of Magra animals belonging to both sexes and analysed (Table 2). The average fibre diameter was 32.41±0.28 μ and the percentage of pure and medullated fibres were 63.31±1.58 and 36.68±1.59% respectively. The effect of sex on per cent composition of different types of fibres was significant (P<0.05). Males had higher percentage of medullated fibres as compared to females. The effect of season and year on quality of wool was nonsignificant but when the data were analysed for only those 45 male animals, which were analysed in first and second clip, both, the effect of clip was found significant (P<0.01) on diameter of wool fibres and hence the repeatability was estimated to be 0.173. The effect of clip on per cent composition of fibres was

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Table 1. Greasy fleece weight (g) of Magra adults and lambs

Effect	Adult clip			Lamb clip	
Year 1998-99	Spring	Autumn	Annual	I Clip	II clip
μ	918.32±15.84 (701)	668.87±14.81 (808)	1627.86±24.01 (668)	584.11±12.77 (246)	536.93±20.33 (132)
Year	**	**	**	**	NS
1997	651.65±55.70 (19)	607.38±54.72 (15)	1178.20±86.01 (15)	-	-
1998	828.70±20.10 (207)	856.40±14.35 (264)	1816.33±28.08 (205)	720.48±37.69 (21)	527.00±42.38 (21)
1999	1207.42±19.37 (234)	584.12±16.24 (223)	1854.98±27.54 (223)	518.69±15.68 (137)	546.86±16.83 (111)
2000	985.53±18.66 (241)	627.59±13.44 (306)	1661.95±26.59 (225)	513.14±26.10 (88)	-
Sex	**	**	**	NS	*
Male	1187.73±24.71 (91)	721.49±19.44 (142)	2013.00±36.09 (83)	600.35±16.36 (123)	98.44±28.28 (59)
Female	648.92±17.84 (610)	616.25±16.35 (666)	1242.73±26.66 (585)	567.86±15.73 (123)	575.42±21.59 (73)
Season of birth				**	*
Spring				636.26±17.70 (193)	575.75±30.28 (82)
Autumn				531.95±21.27 (53)	498.11±22.10 (50)
Regression coefficient				VI wt**	XII wt**
				28.59±3.25	25.39±4.39
Average				17.29±4.29	22.88±3.69

NS–Nonsignificant. * (P<0.05), ** (P<0.01).

Table 2. Wool quality attributes of Magra breed of sheep

Effect	Observations	Diameter (μ)	Pure (%)	Medullation (%)
μ	226	32.41±0.28	63.31±1.58	36.68±1.59
Sex	226	NS	*	*
Male	129	32.01±0.31	60.30±1.75	39.70±1.75
Female	97	32.81±0.44	66.32±2.44	33.66±2.44
Season	226	NS	NS	NS
Spring	92	32.39±0.43	66.08±2.40	33.91±2.40
Autumn	134	32.43±0.36	60.55±1.99	39.45±1.99
Clip	226	NS	NS	NS
First	167	32.21±0.29	60.21±1.60	39.77±1.60
Second	59	32.61±0.53	66.42±2.94	33.58±2.94
Year	226	NS	NS	NS
1999	118	32.74±0.46	61.67±2.55	38.32±2.55
2000	108	32.08±0.35	64.95±1.94	35.03±1.94
1998	59	33.54±0.70	51.95±3.13	47.59±3.09

NS – Nonsignificant, * (P<0.05).

nonsignificant and hence the repeatability of per cent pure fibres for first and second clip was estimated to be 0.42.

In the year 1998, 59 samples were collected from adult animals and the diameter was observed to be 33.54±0.70 μ and percentage of pure and hetro type fibres were observed to be 51.95±3.13 and 47.59±3.09%, respectively, showing slightly higher diameter and lesser percentage of pure fibres as compared to that of first and second clip pooled together. 30.84±0.67 μ fibre diameter and 57.75 ±2.67% pure fibres were reported earlier for the 48 male lambs of the same flock (Mehta *et al.* 1998). Taneja *et al.* (1991b) reported 33.60±0.52 μ fibre diameter and 42.5±1.95% medullation for milk teeth animals belonging to farmers' flock, which is quite consistent with the present observations. For field samples of two teeth animals Taneja *et al.* (1991b) reported 35.9±0.53μ fibre diameter and 42.0±1.95% medullation as against 33.54±0.70μ fibre diameter and 47.59±3.09% medullation observed in the present study. Various non-genetic factors and little biological variation (genetic variation) can be the possible reason for the observed differences. The progress report of Network project on sheep improvement (1995-96) indicted 37.5±0.65μ fibre diameter for farmers' flock. The wool samples belonged to all age groups and hence increase in fibre diameter was expected. Taneja *et al.* (1991b) also reported 36.5±0.28μ fibre diameter for Magra animals of all age group from farmers' flock.

Magra males producing about 3 kg of greasy fleece weight per annum can be selected to increase the production of nucleus flock at the Institute. The quality of wool produced

by this breed is well with in the range (30-35μ fibre diameter and 35-40% medullation) desired by the carpet industry. Despite of severe drought and significant reduction in vegetation in the field, the mortality was observed to be less than 4%. Therefore this breed can be used for large-scale upgradation of coarse wool producing breeds.

SUMMARY

Production and quality of wool of Magra sheep were evaluated. Grease fleece weight, fibre diameter and per cent pure fibres between first and second clip was also estimated to predict future performance. Effect of sex, season and year of birth on wool quality and quantity was estimated. The spring clip was heavier than autumn clip. Males produced more wool than females. Males had higher percentage of medullated fibre as compared to females. The effect of year and season on wool quality was nonsignificant. The mortality even in stressful conditions was lower hence this breed can be used for large scale upgradation of coarse wool producing breeds.

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