

Fleece production and wool quality characteristics of Coimbatore sheep

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Tamil Nadu has 8 recognized breeds of sheep of which Coimbatore, Tiruchy Black and Nilgiri are the woolly breeds. Among them, Coimbatore sheep are migratory in nature and the breeding and migration tracts are mostly in Coimbatore and Erode districts of Tamil Nadu. Coimbatore sheep produces coarse carpet wool suitable for making rough blankets (*kambilis*). Information on fleece production and wool quality characteristics of Coimbatore sheep in the native environment is limited. This paper reports the fleece production and quality characteristics of Coimbatore sheep in the farmers' flocks.

Recording of annual greasy fleece weight and collection of wool samples for analysis were done in May–June 2005 on 15 flocks with average size of 500. Fleece weights were recorded on 220 sheep by visiting places of shearing while on migration, and it was recorded to the nearest 10 g. For the estimation of clean fleece yield, composite wool samples (about 250 g) were collected from 115 yearlings and adult sheep. About 50 g of wool sample was collected from the mid-side for the analysis of wool quality attributes from each of 164 yearlings and adults. Both types of samples were collected at random, coded and stored in polythene bags and the analyses were carried out at the Southern Regional Research Centre of Central Sheep and Wool Research Institute, Avikanagar (Mannavanur, Kodaikanal, Tamil Nadu). Scouring yield and clean fleece yield were analysed as per ASTM (American Society for Testing Materials) D-584–96. Fibre diameter and medullation per cent were estimated respectively as per Standards D-2130–90 and D-2968–95 of ASTM. For estimating both, 200 to 400 fibres were measured and counted and for the majority of samples it was more than 300 fibres. Determination of staple crimp was carried out as per IS Standard 6124/1971 and the value for each sample was based on the average of 10 locks. As the data were unequal and disproportionate in different

subclasses, least-squares analysis (Harvey 1990) was performed considering location of shearing, age and sex as fixed effects. Subjective analyses of wool were made on 162 samples using five observers trained in observing colour, lustre, canary colouration, feel and appearance. Results were expressed as per cent occurrence.

Fleece was shorn normally at intervals of 11 to 13 months and the first shearing was done from 12 to 14 months or at times even later, depending upon the growth of wool. The sheep were washed one day prior to shearing.

Wool yield

The least-squares means of wool yield estimated are given in Table 1. The overall annual greasy fleece weight was 403.6 ± 12.2 g and those of males and females being 466.1 ± 19.6 and 341.1 ± 10.1 g respectively. The coefficient of variation of unadjusted data was 36.9 %. Among fixed effects considered for analysis, location had significant ($P < 0.05$) effect on wool yield, and age and sex were highly significant ($P < 0.01$) sources of variation. Sheep shorn in Coimbatore district produced more greasy fleece than those migrated to Erode district. There was no clear trend among various age groups and two-tooth animals had the highest wool production as most of them were shorn for the first time and the period of growth was likely to be more than twelve months in many animals as lambing takes place throughout the year. The higher fleece weight in rams could not be entirely due to sex effect as males were the selected lot. Ganesakale and Rathnasabapathy (1973) reported that the mean wool yield of Coimbatore rams and ewes was 0.56 and 0.34 kg respectively. The annual greasy fleece yield of Coimbatore sheep in the present study was less than that observed earlier (Littlewood 1936, Basu Thakur and Singh 1969, Anonymous 1993) for the same breed and comparable with the yield of Tiruchy Black and less than that reported for other coarse-woolled sheep in southern peninsular India, viz. Bellary and Deccani sheep (Acharya 1982, Report 2003).

The mean scouring and clean wool yields were 89.78 ± 0.74 and 81.38 ± 1.05 % respectively. Scouring yield was not influenced by any of the fixed effects considered in the

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Table 1. Least-squares means ($\pm$ S.E.) of fleece yield of Coimbatore sheep

Main effect/ Subclass	Annual greasy fleece weight (g)	Scouring yield yield (per cent)	Clean wool (per cent)
Overall mean	403.6 $\pm$ 12.2 (220)	89.78 $\pm$ 0.74 (115)	81.38 $\pm$ 1.05 (115)
Location	*		*
Coimbatore	424.7 $\pm$ 18.1 ^a (51)	90.72 $\pm$ 1.32 (10)	83.57 $\pm$ 1.88 ^a (10)
Erode	382.6 $\pm$ 11.5 ^b (169)	88.85 $\pm$ 0.48 (105)	79.19 $\pm$ 0.68 ^b (105)
Age	**		
12 months	437.9 $\pm$ 33.2 ^{ab} (12)	87.99 $\pm$ 1.69 (7)	79.45 $\pm$ 2.40 (7)
2-tooth	485.0 $\pm$ 17.5 ^a (53)	90.29 $\pm$ 1.07 (19)	80.99 $\pm$ 1.52 (19)
4-tooth	362.2 $\pm$ 17.5 ^c (50)	90.55 $\pm$ 0.97 (27)	81.83 $\pm$ 1.37 (27)
6-tooth	382.3 $\pm$ 17.0 ^{bc} (49)	90.34 $\pm$ 0.85 (30)	82.13 $\pm$ 1.21 (30)
Full mouth	350.8 $\pm$ 17.2 ^c (56)	89.74 $\pm$ 0.94 (32)	82.52 $\pm$ 1.34 (32)
Sex	**		**
Male	466.1 $\pm$ 19.6 ^a (41)	90.10 $\pm$ 0.93 (38)	82.96 $\pm$ 1.33 ^a (38)
Female	341.1 $\pm$ 10.1 ^b (179)	89.46 $\pm$ 0.74 (77)	79.81 $\pm$ 1.05 ^b (77)

Figures in the parentheses are the number of observations.

* Significant ($P < 0.05$); ** Highly significant ($P < 0.01$); means with at least one common superscript within classes do not differ significantly ($P > 0.05$).

analysis while clean wool yield was influenced by location and sex. Animals in Coimbatore district produced significantly ($P < 0.05$) higher clean wool yield and rams had highly significant ($P < 0.01$) increase in yield (Report 2006).

Wool quality

The least-squares means of wool quality characteristics are set out in Table 2. The coefficients of variation (per cent) of wool quality traits varied between 25.6 for fibre diameter and 72.2 for staple crimp. The overall mean staple length of annual fleece was 5.50 $\pm$ 0.18 cm. Location and age had highly significant ($P < 0.01$) influence on staple length. Sheep in Coimbatore district had significantly ($P < 0.01$) longer staples than those sheep shorn in Erode district. Sheep at two-tooth age had significantly ($P < 0.05$) longer staples than all other age groups except those at 12 months. The overall mean staple crimps (No./cm) were 0.20 $\pm$ 0.02 and none of the fixed effects were a source of variation. The overall mean fibre diameter was 45.8 $\pm$ 2.2 micron. Location had no significant effect while age and sex significantly ($P < 0.05$) contributed to the variation of fibre diameter. Two-tooth sheep had significantly

Table 2. Least-squares means ($\pm$ S.E.) of wool quality characteristics of Coimbatore sheep

Main effect/ Subclass	Staple length (cm)	Staple crimp (No./cm)	Fibre diameter (μ)	Medullation percentage
Overall mean	5.50 $\pm$ 0.18 (162)	0.20 $\pm$ 0.02 (162)	45.8 $\pm$ 2.2 (162)	48.76 $\pm$ 2.85 (155)
Location	**			
Coimbatore	6.26 $\pm$ 0.31 ^a (10)	0.24 $\pm$ 0.04 (10)	43.3 $\pm$ 3.9 (10)	49.08 $\pm$ 4.87 (10)
Erode	4.74 $\pm$ 0.12 ^b (152)	0.16 $\pm$ 0.02 (152)	48.2 $\pm$ 1.5 (152)	48.43 $\pm$ 1.96 (145)
Age	**		*	
12 months	5.67 $\pm$ 0.45 ^{ab} (5)	0.17 $\pm$ 0.06 (5)	42.3 $\pm$ 5.6 ^{ab} (5)	47.94 $\pm$ 7.67 (4)
2-tooth	6.27 $\pm$ 0.21 ^a (39)	0.22 $\pm$ 0.03 (39)	42.6 $\pm$ 2.6 ^b (39)	48.79 $\pm$ 3.31 (37)
4-tooth	5.27 $\pm$ 0.21 ^b (34)	0.19 $\pm$ 0.03 (34)	45.9 $\pm$ 2.7 ^{ab} (34)	48.74 $\pm$ 3.36 (32)
6-tooth	5.11 $\pm$ 0.19 ^b (35)	0.18 $\pm$ 0.03 (35)	50.8 $\pm$ 2.4 ^a (35)	50.63 $\pm$ 3.01 (35)
Full mouth	5.18 $\pm$ 0.20 ^b (49)	0.23 $\pm$ 0.03 (49)	47.3 $\pm$ 2.5 ^{ab} (49)	47.68 $\pm$ 3.15 (47)
Sex			*	
Male	5.56 $\pm$ 0.22 (37)	0.19 $\pm$ 0.03 (37)	48.6 $\pm$ 2.7 ^a (37)	51.35 $\pm$ 3.52 (34)
Female	5.44 $\pm$ 0.18 (125)	0.20 $\pm$ 0.02 (125)	43.0 $\pm$ 2.2 ^b (125)	46.16 $\pm$ 2.79 (121)

Figures in the parentheses are the number of observations.

*significant ($P < 0.05$); ** Highly significant ($P < 0.01$); means with at least one common superscript within classes do not differ significantly ($P > 0.05$).

($P < 0.05$) lower fibre diameter while six-tooth sheep had significantly ($P < 0.05$) coarser wool. Males had significantly ($P < 0.05$) higher fibre diameter. The least-squares mean of medullation per cent of Coimbatore sheep was 48.76 $\pm$ 2.85 and none of the effects were significant. The unadjusted averages for hetero fibre, hair and kemp were 13.29, 5.57 and 28.19 % respectively. Generally as age advanced, fibre diameter increased.

The fibres of Coimbatore sheep were shorter, coarser and less medullated when compared with the values reported for the same breed under the sub-temperate farm environment (Acharya 1982). Moreover, medullation was higher in the samples from the field than that indicated earlier by Basu Thakur and Singh (1969) for four- and six- tooth Coimbatore ewes. A study on quality of wool produced by sheep in erstwhile Madras Province revealed that the majority of Coimbatore fleece was coarse (fibre diameter above 25 micron), heterogeneous and medullated while in Bellary sheep, the fleece was very coarse (fibre diameter above 40 micron), highly medullated and very heterogeneous. The staple length was, in general, above 75 mm in both the breeds (Patel *et al.* 1953). The fibre diameter measured in

Coimbatore sheep was less than that reported for Bellary and Deccani sheep and the fibres were more medullated than Bellary and less medullated than Deccani (65.71 %) sheep (Acharya 1982, Report 2003).

By visually appraised subjective analysis, fleece colour was categorised into 11 types. The fleece colour was predominantly pale yellow (48.1 %), followed by brownish yellow (13.6 %). The other colours present were dull white (8.6 %), white (6.2 %), brownish white (6.2 %), brown and white (4.3 %), black and brown (4.3 %), yellow, brown, yellowish brown and white brown. Lustre was absent in 57.5 % and present in 12.3 % and slightly present in 30.2 % of wool samples. Canary colouration was present only in 18.5 % of the samples, whereas it was present slightly in 35.2 % and absent in 46.3 %. The feel of majority of wool samples was soft (99.4 %) and appearance was fine (12.3 %), slightly coarse (6.2 %), coarse (54.3%) and very coarse (27.2 %). When compared to Deccani, the fleece of Coimbatore sheep was less lustrous and had more canary colouration (Report 2003).

SUMMARY

Coimbatore sheep, a woolly breed of Tamil Nadu, produces coarse carpet wool suitable for making rough blankets (*kamblis*). A study conducted in the native environment revealed that the least-squares mean of annual greasy fleece weight was 403.6 ± 12.2 g and values for males and females were 466.1 ± 19.6 and 341.1 ± 10.1 g respectively. The mean scouring and clean wool yields were 89.78 ± 0.74 and 81.38 ± 1.05 % respectively. The average staple length of annual fleece was 5.50 ± 0.18 cm and staple crimp (No./cm) was 0.2 ± 0.02 . The least-squares means of fibre diameter and medullation percentage were 45.8 ± 2.2 micron and 48.76 ± 2.85 . Influence of non-genetic factors on fleece yield and wool quality was also observed. Subjective analyses revealed that fleece colour was predominantly pale yellow (48.1 %) and less lustrous. Canary colouration was present

only in 18.5 % of wool samples. The feel was mostly soft and the appearance was coarse.

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