A comparison of morphometric traits of sheep breeds of Karnataka in the farmers' flocks

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Sheep, reared primarily for meat and wool in India, play significant socio-economic roles in the lives of rural dwellers. Kenguri, Bellary, Hassan and Mandya sheep breeds of Karnataka are maintained by the farmers under extensive grazing system in tropical monsoon type climate. The distribution, characteristics and management of these 4 breeds were described by Jain et al. (2005, 2005a, 2006 and 2006a). The morphometric characterization of Indian sheep is limited to single breed/population. However, Yadav et al. (2012) have given a comparative analysis of morphometric traits of Muzaffarnagri sheep with Munjal sheep. The present study attempts a comparison of morphometric traits of all the four sheep breeds. The information generated would enable inter-breed comparisons of morphometric traits, thereby assisting in the development of improvement and conservation programmes.

Data on morphometric traits, viz. body weight, body length, height at withers, chest girth, ear length and tail length were recorded from 327 sheep flocks on 416, 576, 205, 446 ewes, and 82, 148, 54, 54 rams of Kenguri, Bellary, Hassan and Mandya breeds respectively. The body weights (kg) were recorded with a weighing machine and the morphometric traits were measured (cm) with a measuring tape after making the animal stand squarely on an even ground. The age of the animal was estimated from its dentition and varied from 2 to 8-tooth. The mean differences between traits of the 4 breeds were tested using one-way ANOVA procedure in SAS (2009). Means separation was done using Tukey's HSD at 5% significance level. The analysis was performed on pooled as well as age-wise grouped data.

The mean values of morphometric traits, their SE and significance of differences are presented in Table 1. The

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four breeds differed significantly (P<0.05) with respect to body weight and all other morphological traits except ear and tail lengths. The differences were found significant over the sexes. The overall mean body weight of rams was highest in Kenguri (52.63±0.86 kg) followed by Bellary (42.97±0.62 kg), Mandya (37.21±0.85 kg) and Hassan (32.84±0.86 kg), whereas the body weight in ewes was highest in Kenguri (35.87±0.24 kg) followed by Bellary (31.81±0.22 kg), Hassan (28.28±0.34 kg) and Mandya (26.78±0.21 kg). Similar results were observed in body length, height at withers and chest girth except that the height at withers was higher in Hassan than the Mandya rams. Ear length in Kenguri ewes was highest followed by Hassan, Bellary and Mandya, although the difference between Bellary and Mandya was nonsignificant. In rams, ear length was highest in Kenguri followed by Hassan, Bellary and Mandya. The mean ear length of Kenguri was significantly different from mean ear length of Bellary and Mandya whereas the differences were non-significant between Kenguri and Hassan, and between Bellary and Mandya. Tail length in ewes was longest in Bellary followed by Hassan, Kenguri and Mandya but pairwise differences were non-significant between Kenguri and Hassan, and Kenguri and Mandya. In rams the descending order was Bellary, Kenguri, Hassan and Mandya but pairwise differences were significant only between Bellary and Mandya. The tail was longest in Bellary and smallest in Mandya in both the sexes.

Age-wise analysis of morphometric traits indicated the body weight of Kenguri ewes to be significantly higher than other 3 sheep breeds in all 4 age groups. All pairwise differences were significantly different (P<0.05) except between Hassan and Mandya ewes in 2T, 4T and 6T age groups. The body weight of Kenguri rams was significantly higher (P<0.05) than Bellary rams across all the age groups whereas the differences were non-significant between Hassan and Mandya across the 4 age groups. The possible reasons could be small sample size and large variation in body biometry of rams as ascribed to their selection and managemental differences varying from farmer to farmer.

Body length in ewes was maximum in Kenguri breed

Table 1. Descriptive statistics of the morphometric traits of sheep breeds of Karnataka

Trait	Age	Ewes								Rams							
		Kenguri		Bellary		Hassan		Mandya		Kenguri		Bellary		Hassan		Mandya	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.±	Mean	S.E.
Body weight	2T	33.2[a]	0.61	29.1[b]	1.25	24.5c	0.70	25.0[c]	0.58	50.8[e]	1.98	37.6[f]	1.90	29.2[g]	1.19	33.1[fg]	1.32
	4T	34.3[a]	0.56	29.7[b]	0.51	26.1[c]	0.75	25.7[c]	0.47	49.4[e]	1.87	39.7[f]	1.27	32.4[g]	1.07	31.3[g]	1.13
	6T	36.6[a]	0.61	31.4[b]	0.55	26.5[c]	0.75	26.6[c]	0.40	53.6[e]	1.40	41.7[f]	1.28	36.3[fg]	3.06	35.0[g]	1.62
	8T	36.6[a]	0.31	32.5[b]	0.26	30.0[c]	0.41	27.7[d]	0.29	54.4[e]	1.55	46.7[f]	0.67	37.9[g]	1.59	40.8[g]	1.03
	All	35.9[a]	0.24	31.8[b]	0.22	28.3[c]	0.34	26.8[d]	0.21	52.6[e]	0.86	43.0[f]	0.62	32.8[h]	0.86	37.2[g]	0.85
Body length	2T	66.2[a]	0.39	65.0[a]	1.00	59.87[b]	0.50	60.1[b]	0.49	74.9[e]	1.32	67.4[f]	1.27	63.9[f]	1.03	67.8[f]	0.70
	4T	66.4[a]	0.42	64.9[b]	0.38	61.3[c]	0.67	59.6[c]	0.39	73.5[e]	1.00	68.2[f]	0.90	62.7[g]	1.41	66.0[fg]	1.86
	6T	68.3[a]	0.32	65.4[b]	0.35	60.8[c]	0.58	59.7[c]	0.36	75.0[e]	0.84	70.0[f]	0.79	67.5[f]	1.55	67.5[f]	1.04
	8T	67.5[a]	0.19	65.8[b]	0.17	62.9[c]	0.25	61.4[d]	0.24	75.1[e]	0.70	72.1[f]	0.42	65.7[h]	1.07	69.4[g]	0.73
	All	67.3[a]	0.15	65.6[b]	0.14	62.0[c]	0.22	60.5[d]	0.17	74.7[e]	0.45	70.2[f]	0.39	64.3[h]	0.66	68.3[g]	0.51
Height at withers	2T	72.1[a]	0.45	69.6[a]	0.95	60.0[b]	0.79	53.8[c]	0.56	81.0[e]	0.86	72.2[f]	1.15	63.6[g]	0.94	60.8[g]	1.58
	4T	72.1[a]	0.40	69.1[b]	0.35	60.3[c]	0.81	54.0[d]	0.56	79.8[e]	1.17	73.1[f]	0.50	63.2[g]	1.12	62.5[g]	1.58
	6T	72.7[a]	0.38	68.9[b]	0.33	60.1[c]	0.68	53.5[d]	0.44	82.3[e]	0.55	74.1[f]	0.74	69.5[f]	2.95	62.5[g]	1.73
	8T	72.7[a]	0.17	68.8[b]	0.15	61.2[c]	0.26	55.3[d]	0.28	82.0[e]	0.75	76.0[f]	0.38	65.6[g]	1.10	62.6[g]	0.68
	All	72.6[a]	0.14	68.9[b]	0.13	60.8[c]	0.24	54.4[d]	0.21	81.5[e]	0.43	74.5[f]	0.33	64.4[g]	0.63	62.3[h]	0.60
Chest girth	2T	76.1[a]	0.55	74.2[a]	1.04	67.0[b]	0.83	68.1[b]	0.63	86.9[e]	1.30	78.7[f]	1.30	72.0[g]	0.93	75.9[fg]	1.45
	4T	76.7[a]	0.50	74.5[a]	0.41	69.8[c]	0.91	68.0[c]	0.60	87.4[e]	1.24	81.1[f]	0.90	75.3[g]	1.02	74.0[g]	1.12
	6T	78.9[a]	0.47	75.8[b]	0.44	70.4[c]	0.72	68.6[c]	0.50	90.4[e]	0.89	82.0[f]	0.73	78.8[fg]	2.59	77.2[g]	1.50
	8T	79.1[a]	0.25	76.5[b]	0.20	73.8[c]	0.43	70.5[d]	0.31	90.6[e]	0.89	84.6[f]	0.55	79.1[f]	1.41	82.2[fg]	0.85
	All	78.4[a]	0.20	76.1[b]	0.17	71.9[c]	0.37	69.4[d]	0.23	89.4[e]	0.54	82.5[f]	0.42	75.2[h]	0.73	79.2[g]	0.74
Ear length	2T	15.4[a]	0.20	14.4[ab]	0.86	14.8[a]	0.20	13.2[b]	0.23	15.9[e]	0.34	13.4[e]	0.85	14.3[e]	0.17	13.4[e]	0.62
	4T	15.0[a]	0.20	12.9[b]	0.43	14.4[a]	0.16	12.3[b]	0.23	15.0[e]	0.38	13.7[e]	0.68	14.1[e]	0.30	12.8[e]	0.79
	6T	15.2[a]	0.21	13.3[b]	0.43	14.0[ab]	0.27	12.7[b]	0.19	15.4[e]	0.20	13.6[f]	0.60	13.3[ef]	1.25	13.7[ef]	0.51
	8T	15.3[a]	0.08	13.2[c]	0.20	14.0[b]	0.14	13.3[bc]	0.11	14.8[e]	0.22	12.9[f]	0.44	14.1[ef]	0.45	12.2[f]	0.29
	All	15.2[a]	0.07	13.2[c]	0.17	14.2[b]	0.10	13.0[c]	0.09	15.2[e]	0.14	13.3[f]	0.30	14.1[ef]	0.18	12.8[f]	0.24
Tail length	2T	10.4[a]	0.22	11.3[a]	0.38	10.2[ab]	0.24	9.6[b]	0.14	12.1[e]	0.50	12.9[e]	0.31	11.7[e]	0.65	10.8[e]	0.52
	4T	10.0[b]	0.25	11.4[a]	0.15	10.3[b]	0.40	9.8[b]	0.11	11.9[e]	0.42	12.3[e]	0.31	11.4[e]	0.48	10.5[e]	0.67
	6T	10.4[b]	0.17	11.2[a]	0.16	10.0[b]	0.18	9.9[b]	0.10	12.5[e]	0.45	12.3[e]	0.23	11.5[ef]	0.86	10.2[f]	0.29
	8T	10.0[c]	0.10	11.2[a]	0.07	10.5[b]	0.11	10.0[c]	0.08	11.7[ef]	0.35	12.6[e]	0.20	11.2[f]	0.45	11.0[f]	0.29
	All	10.1[bc]	0.08	11.2[a]	0.06	10.3[b]	0.09	9.9[c]	0.05	12.0[ef]	0.22	12.5[e]	0.13	11.5[fg]	0.31	10.7[g]	0.20

2T: 2-tooth, 4T: 4-tooth, 6T: 6-tooth, 8T: 8-tooth, All: overall pooled over age groups; abcd, different superscripts within a row indicate significant difference for the trait (ewes); efgh, different superscripts within a row indicate significant difference for the trait (rams).

and minimum in Mandya across all age groups except 2T. Differences in body length were non significant in Hassan and Mandya ewes except 8T age group. Height at withers was maximum in Kenguri sheep followed by Bellary, Hassan and Mandya across the sexes. Pair-wise differences were significant in ewes except in 2T age group between Kenguri and Bellary where the differences were non-significant. In males, nonsignificant differences in height at withers were observed between Hassan and Mandya breeds in all age groups except 6T. Similarly, chest girth was maximum in Kenguri ewes followed by Bellary, Hassan and Mandya except in 2T whereas in rams it was maximum in Kenguri followed by Bellary, Mandya and Hassan in 2T and 8T age groups. In the foregoing order Hassan was followed by Mandya in 4T and 6T age groups but the pair-wise differences between Hassan and Mandya in all age groups were nonsignificant (P<0.05). The ear and tail were longest in Kenguri and Bellary, respectively and smallest in Mandya in both sexes. No increase in ear and tail lengths was observed with the advancement of age from 2T to 8T across the sexes. The findings of this study are similar to growth pattern in Muzaffarnagri sheep (Yadav *et al.* 2012). The observed differences in morphometric traits can be used for objective differentiation of animals of these sheep breeds. The results will be helpful in selection, improvement and prioritization of breeds for conservation.

SUMMARY

The study revealed that the 4 sheep breeds of Karnataka differed significantly with respect to body weight and other

physical traits. Kenguri and Bellary breeds of sheep were larger and heavier than Hassan and Mandya sheep breeds. Amongst them Kenguri rams were heaviest followed by Bellary, Mandya and Hassan but in ewes the above order was reversed in breeds of southern Karnataka. The overall difference in body weights of Kenguri and Bellary rams was 9.66 kg whereas in Hassan and Mandya rams it was 4.37 kg. The corresponding values in ewes were 4.06 kg and 1.5 kg. In ewes, the increase in magnitude of a morphometric trait from a lower age group to next higher age group was marginal. All the sheep breeds of Karnataka attained maximum weight at 8-tooth age.

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