

Comparative anatomy of the thyroid gland of small ruminants

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Gross anatomical description of the thyroid gland has been reported in horses (Venzke 1975, Nickel *et al.* 1979), Spiti pony and mule (Rajput *et al.* 2001, 2004), and in ruminants (Jain *et al.* 1984). Keeping in view the importance of thyroid gland the present study was planned to record the topographic anatomy and biometry of thyroid gland in Gaddi sheep and Gaddi goat.

Gaddi sheep (6) and Gaddi goats (6) were utilized for this study. The thyroid gland was exposed *in situ* after careful dissection. The topographic location and relations of the thyroid were noted carefully. The thyroid gland along with laryngeal and tracheal cartilages was collected in 10% neutral buffered formalin.

Thyroid gland was measured with the help of Vernier calipers for length, width and thickness of each lobe up to nearest of 1/10th division of a cm. The weight was recorded using digital analytical balance after proper drying of the gland on the filter paper pads. The volume was measured by water displacement method.

The thyroid gland was located on the dorso-lateral aspect of the trachea in Gaddi sheep and Gaddi goat. The thyroid gland was bilobed, both lobes joined together with a narrow isthmus (Figs 1, 2) as reported by Jain *et al.* (1984) in sheep

and goat. The thyroid extended from posterior extremity of larynx to fifth to seventh tracheal ring except in 1 Gaddi sheep where it extended up to ninth tracheal ring, whereas in Gaddi goats thyroid extended from the posterior extremity of larynx to the fifth tracheal ring. Similar observations were reported by Sisson (1975) in sheep and Jain *et al.* (1984) in sheep and goat.

In Gaddi sheep the thyroid gland was dark brown. Jain *et al.* (1984) had reported pale brown thyroid gland in sheep and goat. The lobes were almond shaped but more pointed at the posterior end than that in Gaddi goat. Jain *et al.* (1984) reported the shape as elongated oval whereas Sisson (1953) reported thyroid as long elliptical in sheep.

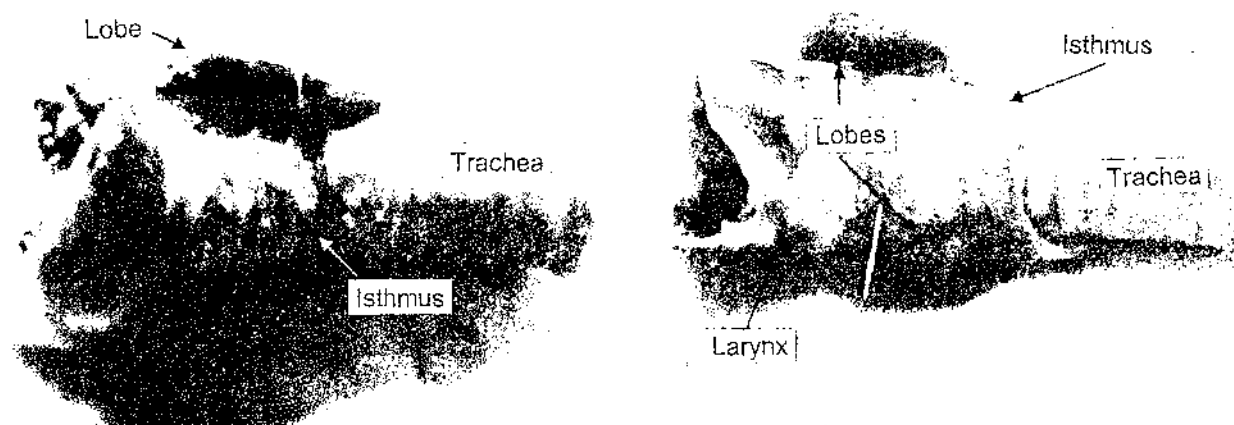
In Gaddi sheep the average mean length of the left lobe was 3.68 ± 0.28 cm and the right lobe measured 3.20 ± 0.15 cm (Table 1). The mean width of the left lobe was 1.28 ± 0.09 cm and the right lobe was 1.28 ± 0.10 cm. The mean thickness of the left lobe was 0.57 ± 0.04 cm and that of right lobe was 0.52 ± 0.04 cm. Jain *et al.* (1984) measured average length, width and thickness 5.0 cm, 1.4 cm, 0.7 cm, respectively, in sheep. The weight of the left lobe was 1.50 ± 0.17 g and that of the right lobe was 1.43 ± 0.20 g in Gaddi sheep whereas Jain *et al.* (1984) reported 4.9 g in sheep of the plain region.

Table 1. Morphometry of the thyroid gland of Gaddi sheep and Gaddi goat

	Length (Max) (cm)		Width (Max) (cm)		Thickness (Max) (cm)		Volume (cc)		Weight (g)	
	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
Gaddi sheep										
Mean $\pm$ SE	3.68 ± 0.28	3.2 ± 0.15	1.28 ± 0.09	1.28 ± 0.10	0.57 ± 0.04	0.52 ± 0.04	1.57 ± 0.15	1.3 ± 0.20	1.5 ± 0.17	1.43 ± 0.20
Range	2.9–4.5	2.7–3.7	1.1–1.7	1.0–1.7	0.4–0.7	0.4–0.7	1.2–2.0	1.0–2.0	0.89–2.03	0.83–2.06
Gaddi goat										
Mean $\pm$ SE	3.2 ± 0.21	2.97 ± 0.21	1.3 ± 0.05	1.33 ± 0.08	0.8 ± 0.03	0.8 ± 0.05	2.08 ± 0.08	2.12 ± 0.42	2.21 ± 0.22	2.14 ± 0.33
Range	2.6–3.9	2.5–3.7	1.2–1.5	1.1–1.6	0.7–0.9	0.7–0.9	2.0–2.5	1.2–4.0	1.8–2.94	1.43–3.46

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In Gaddi goat the average mean length of the left lobe was 3.20 ± 0.21 cm and the right lobe measured 2.97 ± 0.21 cm. The mean width of the left lobe was 1.30 ± 0.05 cm and



Figs 1-2. Thyroid gland of: 1. Gaddi sheep, 2. Gaddi goat.

the right lobe was 1.33 ± 0.08 cm. The mean thickness of the left lobe was 0.80 ± 0.03 cm and that of right lobe was 0.80 ± 0.05 cm whereas Jain *et al.* (1984) measured the length, width and thickness as 2.3 cm, 0.4 cm and 0.27 cm respectively in the goats of the plain region.

The medial surface of the gland was moulded on the trachea and was thus concave as reported by Jain *et al.* (1984).

The volume of left and right lobes was 1.57 ± 0.15 cc and 1.30 ± 0.20 cc in Gaddi sheep and 2.08 ± 0.08 cc and 2.12 ± 0.42 cc in Gaddi goats respectively. The weight of left and right lobes was 1.50 ± 0.17 g and 1.43 ± 0.20 g in Gaddi sheep and 2.21 ± 0.22 g and 2.14 ± 0.33 g in Gaddi goats which was less as compared to the goats in plain region (2.9 g) by Jain *et al.* (1984).

The isthmus was observed in all the animals as Kent (1965) has also stated that isthmus was present in all the amniotes. In Gaddi goats it connected the caudal poles of the two lobes of the thyroid gland and around the ventral aspect of trachea over the fifth or sixth tracheal ring (Fig. 2) as reported by Jain *et al.* (1984) in sheep and goat. Whereas in Gaddi sheep the isthmus connected the two lobes about half cm above the posterior ends (Fig. 1).

SUMMARY

The topography and morphometry of the thyroid gland of Gaddi sheep and Gaddi goat was studied. The thyroid gland of Gaddi goat was larger and heavier than the Gaddi sheep, except length of the gland which was more in Gaddi sheep.

The color was darker in Gaddi sheep. The gland was located on the dorsolateral aspect of the trachea posterior to the larynx. Posterior margin of the gland varied in Gaddi sheep and Gaddi goat. The gland was almond shaped in both the species except the posterior margin of the gland in Gaddi sheep was more pointed and longer than that in Gaddi goats. In Gaddi goat isthmus connected the caudal poles of the two lobes of the thyroid gland, whereas in Gaddi sheep the isthmus connected the 2 lobes about half cm above their posterior ends.

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