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## Micrometry of renal corpuscles and renal tubules in *Marwari Sheep (Ovis aries)*

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**Abstract**

The microscopic studies of Renal tubules of 6 *Marwari* sheep showed that there was no significant difference between juxtamedullary renal corpuscles and cortical corpuscles. The glomeruli in the cortical region had an average transverse diameter of  $109.35 \pm 2.85$  microns and average vertical diameter of  $84.41 \pm 2.18$  microns. The average transverse diameter of juxtamedullary glomeruli was  $128.55 \pm 2.18$  microns and average vertical diameter was  $94.7 \pm 1.72$  microns. The average diameter of PCT, DCT, collecting duct, thick and thin segment of loop of Henle was  $49.91 \pm 2.02$ ,  $39.14 \pm 1.82$ ,  $42.80 \pm 0.99$ ,  $32.85 \pm 1.11$ , and  $19.50 \pm 0.76$  micron respectively.

**Keywords:** *Marwari* sheep, Micrometry, Renal corpuscles, loop of Henle

**Introduction**

*Marwari* sheep constitutes a major portion of the sheep population in western part of Rajasthan which has 14.31 million sheep (about 40%) and plays an important role in the economy of arid and semi-arid tract. Low rainfall and scanty vegetation are common in the western part of Rajasthan and the conditions become oppressive when extreme environmental conditions bring about the adaptive changes in organs necessary for physiological adjustments in these extreme ambient conditions. In mammals the kidneys are compound tubular glands and the chief excretory organs of the body. They have a major role in the maintenance of fluid and electrolyte balance and in control of the blood pressure.

**Materials and Methods**

The diameter of various parts of uriniferous tubule was measured from random samples seen under light microscope in high power (400X). The Micrometry of Renal tubules across various areas were recorded by using ocular micrometer after calculating calibration with stage micrometer to record the observations on mean diameters of various parts of nephron and collecting duct.

**Results and discussion****The Renal Corpuscles**

Renal corpuscles in the cortical region (Fig.1) had an average transverse diameter of  $134.79 \pm 5.47$  microns and average vertical diameter was  $98.99 \pm 3.83$  microns. The average transverse diameter of juxtamedullary renal corpuscles was  $158.63 \pm 2.94$  microns and average vertical diameter  $109.42 \pm 3.44$  microns. The glomeruli in the cortical region had an average transverse diameter of  $109.35 \pm 2.85$  microns and average vertical diameter of  $84.41 \pm 2.18$  microns. The average transverse diameter of juxtamedullary glomeruli was  $128.55 \pm 2.18$  microns and average vertical diameter was  $94.7 \pm 1.72$  microns (Table 1).

**The Proximal Convoluted Tubule**

The diameter of the proximal convoluted tubule varied from 39.4 to 67.9 microns, with an average of  $49.91 \pm 2.02$  microns (Table 2). It was similar to the findings of Trautmann and Fiebiger (1957)<sup>[4]</sup> who stated that the diameter of proximal convoluted tubule ranged from 45 to 60 microns in domestic animals. Yadava and Calhoun (1958)<sup>[5]</sup> recorded an average diameter of proximal convoluted tubule to be 56, 50, 45 and 45 microns for horse, ox, sheep, and goat respectively. Whereas Ommer and Mariappa (1970)<sup>[3]</sup> reported in Indian buffalo that an average diameter was 47.4 microns with a range of 40.7 to 64.7 microns and Beniwal (1995)<sup>[1]</sup> reported in camel that an average diameter was 76.63 microns with a range of 43.98 to 117.28 micron.

### The Thin Segment of Henle's Loop

These tubules had a diameter varying from 12.7 to 27.58 microns, with an average of  $19.50 \pm 0.76$  microns in the present study (Table 2). Yadava and Calhoun (1958) [5] recorded an average diameter of thin segment of Henle's loop to be 30, 26, 22 and 24 microns for horse, ox, sheep, and goat respectively. Trautmann and Fiebiger (1957) [4] described that the diameter of thin segment of Henle's loop ranged between 10 to 17 micron in domestic animals.

### The Thick Segment of Henle's Loop

The thick Segment of Henle's Loop had a diameter varying from 23.64 to 48.28 micron, with an average of  $32.85 \pm 1.11$  microns (Table 2). Langham *et al* (1942) [2] stated that the average diameter had a variation of 17 micron at one month to 36 micron at 6 years of age in bovine. Trautmann and Fiebiger (1957) [4] described that the diameter of thick segment of Henle's loop ranged between 25 to 40 microns in domestic animals.

### The Distal Convolted Tubule

The diameter of the distal convoluted tubule varied from 21.0

to 48.28 microns, with an average of  $39.14 \pm 1.82$  microns in the present study (Table 2). Yadava and Calhoun (1958) [5] recorded an average diameter of distal convoluted tubule as 36 microns in sheep, 38, 50 and 45 microns in goat, ox and horse respectively. Langham *et al* (1942) [2] mentioned that the average diameter ranged from 36 microns at one month to 46 microns at 6 years of age in bovine. Trautmann and Fiebiger (1957) [4] described that the average diameter of distal convoluted tubule ranged between 35 to 53 microns.

### The Straight collecting Tubule

The diameter of these tubules varied from 37.0 to 48.5 micron, with an average of  $42.80 \pm 0.99$  microns (Table 2). Yadava and Calhoun (1958) [5] recorded an average diameter of 39 microns in sheep, 42, 53, and 66 microns in goat, ox and horse respectively. While describing the bovine kidney Langham *et al* (1942) [2] mentioned that the average diameter varied from 27 microns at one month to 37 microns at 6 years age. Trautmann and Fiebiger (1957) [4] described that diameter of straight collecting tubule ranged between 35 to 53 microns in domestic animals.

**Table 1:** Statistical details of different variable for Sub capsular Renal corpuscles, Gomeruli and Juxtamedullary renal corpuscles, Glomeruli (microns).

	Cortical Renal Corpuscles		JM Renal Corpuscles		Cortical Glomeruli		JM Glomeruli	
	TD	VD	TD	VD	TD	VD	TD	VD
Mean± S.E	134.79±5.47	98.99±3.83	158.63±2.94	109.42±3.44	109.35±2.85	84.41±2.18	128.55±2.18	94.71±1.72
S.D	28.96	20.27	15.55	18.25	22.11	16.91	16.21	12.76
C.V.	21.48	20.47	9.80	16.67	20.21	20.03	12.60	13.47

**Table 2:** Statistical details of different variable for PCT, DCT, Collecting duct Thick and Thin segment of loop of Henle (microns).

	PCT	DCT	Collecting duct	Thick segment	Thin segment
Mean±SE	49.91±2.02	39.14±1.82	42.80±0.99	32.85±1.11	19.50±0.76
S.D.	8.61	7.29	3.98	5.29	14.59
C.V.	17.25	18.62	9.29	16.10	74.82

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