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Gross anatomy and biometry of foetal testis and epididymis of *Gaddi* Sheep

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Abstract

The present study was conducted on sixty eight male *Gaddi* sheep foetii ranging from 36th day to 140th day (2 cm to 40 cm CRL) of gestation to record biometrical parameters (length, breadth, thickness and weight) of testes, epididymis and scrotum. The foetii were divided into four stages depending on age. The biometry of epididymis could not be done in foetii less than 63 days (CRL 11.8 cm) of gestation due to very small size of epididymis. The gradual increase was observed in the size of testes, epididymis and scrotum with the progression of gestation. However, there was no significant difference among different biometrical parameters with respect to right and left testis, epididymis and scrotum.

Key words: Biometry, testis, epididymis, scrotum, *Gaddi*, sheep.

Gaddi sheep is one of the important livestock breed of northern temperate region of India. Dehkordi *et al.* (2008) studied the different gross biometric parameters of the testis of Lori Bakhtiyari breed in Iran at different phases of development. Proper development of testis is critical to establish the male phenotype and attain maximal reproductive capacity (Dufour *et al.*, 2002 and Dehkordi *et al.*, 2008). Any disturbance in prenatal development of the testis and epididymis can lead to low reproductive efficiency or even infertility in animals. The scientific literature available on prenatal development of testis and epididymis of *Gaddi* sheep is scanty. The target of this study was to record the biometric values of sheep embryonic testis, epididymis and scrotum of *Gaddi* breed.

Materials and Methods

The present study was conducted on the testes, epididymis and scrotum of 68 male *Gaddi* sheep male foetii. The foetii collected were measured for their crown-rump length (CRL) in cm with the help of a graduated nylon tape (Harvey, 1959) and weighed in grams on digital electronic balance. The approximate age of the foetii was calculated by using the formula given by Gall *et al.* (1994) i.e. $Y = 2.74 X + 30.15$, where Y is the age of embryos in days and X is the CRL in cm. Thereafter the foetii were divided into four stages on the basis of their age viz. stage I (31-60 days), stage II (61-90 days), stage III (91-120 days) and stage IV (121- till term).

Biometrical parameters of testis, epididymal regions (caput, corpus and cauda) and scrotum such as length, breadth and thickness were recorded using vernier callipers. The testis with epididymis was weighed using digital electronic balance. The mean values of all the parameters were subjected to statistical analysis for comparison between the different regions of testis and epididymis using one way analysis of variance and independent samples – T test (SPSS Statistics -17.0). A probability of $p<0.05$ was considered as statistically significant.

Results and Discussion

The dimensions of both right and left testes of *Gaddi* sheep foetii during different stages of gestation have been summarized in table 1.

The right testis was slightly shorter than the left testis in stage I of gestation. The thickness and breadth remained consistent in both right and left foetal testis. In contrast, Dehkordi *et al.* (2008) observed that the left foetal testis was shorter and wider than the right foetal testis in stage I of gestation in sheep.

The right testis was slightly longer, broader and

thinner than the left one in stage II of gestation. Dehkordi *et al.* (2008) also reported that the right testis was broader but thicker than the left one at stage II of gestation in sheep foetii.

The right testis was slightly shorter, narrower and thinner than the left testis, but the difference did not vary significantly in stage III of gestation. The right testis was slightly shorter, thinner and narrower than the left one although the differences were statistically non significant in stage IV of gestation. The length and width of the testis of Gaddi sheep foetii were less than that reported by Dhande *et al.* (2006) in sheep in the last stage of gestation.

The size of testes did not vary significantly between left and right sides among different stages of gestation which corroborates well with the findings of Kaur (2006) and Mathur *et al.* (2005) in buffaloes and frieswal bulls, respectively.

Table 1. Mean biometrical parameters of right and left testis of male *Gaddi* sheep foetii during different stages of gestation

Gross parameters	Right testis	Left testis
Length of testis (mm)		
Stage I (n= 21)	$2.36^{a} \pm 0.15$	$2.44^{a} \pm 0.18$
Stage II (n= 25)	$4.25^{b} \pm 0.18$	$4.22^{b} \pm 0.17$
Stage III (n= 12)	$5.40^{c} \pm 0.18$	$5.64^{c} \pm 0.17$
Stage IV (n= 10)	$7.57^{d} \pm 0.55$	$7.90^{d} \pm 0.48$
Breadth of testis (mm)		
Stage I (n= 21)	$1.51^{a} \pm 0.15$	$1.51^{a} \pm 0.14$
Stage II (n= 25)	$2.68^{b} \pm 0.11$	$2.59^{b} \pm 0.11$
Stage III (n= 12)	$3.39^{c} \pm 0.22$	$3.51^{c} \pm 0.16$
Stage IV (n= 10)	$4.83^{d} \pm 0.32$	$4.88^{d} \pm 0.34$
Thickness of testis (mm)		
Stage I (n= 21)	$1.00^{a} \pm 0.20$	$0.99^{a} \pm 0.19$
Stage II (n= 25)	$2.19^{b} \pm 0.14$	$2.31^{b} \pm 0.14$
Stage III (n= 12)	$2.98^{c} \pm 0.12$	$3.02^{c} \pm 0.12$
Stage IV (n= 10)	$3.81^{d} \pm 0.21$	$4.09^{d} \pm 0.16$
Weight of testis + epididymis (g)		
Stage I (n= 21)	$0.02^{a} \pm 0.00$	$0.02^{a} \pm 0.00$
Stage II (n= 25)	$0.06^{b} \pm 0.01$	$0.06^{b} \pm 0.01$
Stage III (n= 12)	$0.19^{c} \pm 0.02$	$0.19^{c} \pm 0.03$
Stage IV (n= 10)	$0.52^{d} \pm 0.09$	$0.50^{d} \pm 0.08$

Values of same parameter with different superscripts vary significantly ($P<0.05$)

Table 2. Mean biometrical parameters of right and left epididymis of male *Gaddi* sheep foetii during different stages of gestation

Parameter		Stage II (n= 25)	Stage III (n= 12)	Stage IV (n= 10)
Caput				
Length	Right epididymis	$1.56^{a} \pm 0.13$	$2.75^{b} \pm 0.16$	$4.23^{c} \pm 0.17$
(mm)	Left epididymis	$1.73^{a} \pm 0.15$	$2.87^{b} \pm 0.11$	$4.43^{c} \pm 0.18$
Breadth	Right epididymis	$0.56^{a} \pm 0.08$	$0.88^{a} \pm 0.16$	$0.62^{a} \pm 0.05$
(mm)	Left epididymis	$0.58^{a} \pm 0.09$	$0.93^{b} \pm 0.14$	$0.63^{ab} \pm 0.05$
Thickness	Right epididymis	$0.54^{a} \pm 0.06$	$0.87^{b} \pm 0.14$	$2.40^{c} \pm 0.24$
(mm)	Left epididymis	$0.52^{a} \pm 0.13$	$0.85^{b} \pm 0.14$	$2.37^{c} \pm 0.15$
Corpus				
Length	Right epididymis	$3.29^{a} \pm 0.19$	$5.39^{b} \pm 0.37$	$7.24^{c} \pm 0.48$
(mm)	Left epididymis	$3.92^{a} \pm 0.25$	$5.53^{b} \pm 0.29$	$8.14^{c} \pm 0.82$
Breadth	Right epididymis	$0.51^{a} \pm 0.07$	$0.83^{b} \pm 0.14$	$0.59^{ab} \pm 0.05$
(mm)	Left epididymis	$0.49^{a} \pm 0.06$	$0.82^{b} \pm 0.14$	$0.60^{ab} \pm 0.05$
Thickness	Right epididymis	$0.54^{a} \pm 0.05$	$0.68^{a} \pm 0.08$	$1.78^{b} \pm 0.12$
(mm)	Left epididymis	$0.51^{a} \pm 0.05$	$0.69^{a} \pm 0.09$	$1.77^{b} \pm 0.16$
Cauda				
Length	Right epididymis	$1.70^{a} \pm 0.14$	$2.81^{b} \pm 0.16$	$3.82^{c} \pm 0.20$
(mm)	Left epididymis	$1.81^{a} \pm 0.16$	$2.99^{b} \pm 0.20$	$3.88^{c} \pm 0.25$
Breadth	Right epididymis	$0.66^{a} \pm 0.09$	$1.45^{b} \pm 0.22$	$0.95^{a} \pm 0.08$
(mm)	Left epididymis	$0.72^{a} \pm 0.16$	$1.57^{b} \pm 0.26$	$0.96^{a} \pm 0.08$
Thickness	Right epididymis	$0.78^{a} \pm 0.08$	$1.09^{a} \pm 0.25$	$3.22^{b} \pm 0.18$
(mm)	Left epididymis	$0.75^{a} \pm 0.09$	$1.08^{a} \pm 0.24$	$3.25^{b} \pm 0.22$

Values with same superscripts within rows did not vary significantly ($P < 0.05$)

Table 3. Mean biometrical parameters of scrotum of male *Gaddi* sheep foetii during different stages of gestation

Gross parameters	Right side	Left side
	Length of scrotum (mm)	
Stage I (n= 21)	$2.18^{a} \pm 0.34$	$2.09^{a} \pm 0.35$
Stage II (n= 25)	$11.26^{b} \pm 1.47$	$11.33^{b} \pm 1.41$
Stage III (n= 12)	$22.58^{c} \pm 1.47$	$22.59^{c} \pm 1.58$
Stage IV (n= 10)	$26.59^{d} \pm 1.24$	$26.78^{d} \pm 1.17$
Breadth of scrotum (mm)		
Stage I (n= 21)	$1.09^{a} \pm 0.10$	$1.05^{a} \pm 0.10$
Stage II (n= 25)	$4.66^{b} \pm 0.58$	$4.50^{b} \pm 0.46$
Stage III (n= 12)	$9.38^{c} \pm 0.47$	$9.61^{c} \pm 0.37$
Stage IV (n= 10)	$9.78^{c} \pm 0.55$	$9.90^{c} \pm 0.46$

Values with same superscripts of same parameter within columns did not vary significantly ($P<0.05$)

Comparison of the biometrical parameters between different age groups revealed that there was significant increase in the size of the testis with the progression of foetal age from stage I to stage IV (Table 1).

Epididymis

The biometrical observations of the epididymis of Gaddi sheep foetii has been summarized in table - 2.The caput of the right epididymis was shorter, narrower and thicker than the caput of the left epididymis in stage II, III and IV of gestation in Gaddi sheep foetii.

The corpus of the right epididymis was shorter, broader and thicker than the corpus of the left one in stage II, thinner in stage III and narrower in stage IV of gestation.

The cauda of the right epididymis was shorter, narrower and thicker than the cauda of the left epididymis in stage II and III of gestation where as thinner in stage IV of gestation.

The measurements of different parts – caput, corpus and cauda of the epididymis did not vary significantly with respect to right and left sides. The length and thickness of caput, corpus and cauda increased significantly with progression of gestation whereas the breadth increased from stage II to III and then decreased at stage IV of gestation in both right and left epididymis (Table 2). These findings were similar to that observed by Sharma (2010) in Indian buffalo foetus.

Scrotum

The dimensions of scrotum of *Gaddi* sheep foetii during different stages of gestation have been summarized in table 3.

The length and breadth of the foetal scrotum was more on the right side than on the left side in stage I of gestation. In stage II the scrotum was shorter and broader in the right side in comparison to that on the left side. At stage III and IV of gestation the scrotum was longer and broader in the left side than in the right one.

The biometrical parameters of scrotum of male Gaddi sheep foetii when compared between different stages of gestation revealed that the length of the scrotum increased significantly from stage I to IV of gestation on both right as well as left sides. The breadth of the scrotum increased significantly from stage I to III and then remained consistent at stage IV of gestation on both right and left sides (Table 3). These findings were in agreement to that of Amin and Alwan (2010) who demonstrated that in sheep the length of the foetal scrotum steadily increased from initial stages of gestation till term.

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