

Biometry of testes in Frieswal bulls

A K MATHUR¹, D K MANDAL², M KUMAR³ and S TYAGI⁴

Project Directorate on Cattle, P.O. Box 17, Grass Farm Road, Meerut, Uttar Pradesh 250 001 India

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Maintenance of superior quality, genetically potent breeding bulls is essential to meet the requirement of good semen for AI programme. The semen production mainly depends on optimal testicular development and functioning of seminiferous tubules, Leydig cells and some other factors. Perusal of literature reveals plenty of information on biometry of scrotum and testis in buffalo bulls and exotic breeds of cattle. However, this is lacking in Frieswal bulls reared in tropics. Hence, the present study was undertaken to observe these aspect of testicular biometry in adult Frieswal bulls reared under our conditions.

The study was conducted on 30 adult Frieswal bulls maintained under standard feeding and management practices at Bull Rearing Unit of Frieswal Project. These animals were culled from breeding programme of the project on various reasons. Based on the age, animals were classified into group

1—below 36 months (4), group 2—37–48 months (8), group 3—49–60 months (11) and group 4—above 60 months (7). Intact testes were measured using scrotal tape. Orchidectomy was performed in all the animals by open surgical method. The testicular measurements were recorded before surgical operation with the help of Vernier caliper and also after removal from the body. Weight of testes were recorded. The testicular volume was calculated as per Bailey *et al.* (1998) (prolate spheroid formula where, volume = $0.5236 \times \text{length} \times \text{width}^2$).

The data were subjected to the analysis of variance (Snedecor and Cochran 1994).

Scrotal circumference (Table 1) was significantly higher ($P < 0.05$) in the bulls having age more than 60 months as compared to other 3 age groups, however, no significant difference was observed between animals below 36 months

Table 1. Biometric measurement of intact testes of Frieswal bulls (mean $\pm$ SE)

Particulars	Age groups				
	Below 36 months (n=4)	37–48 months (n=8)	49–60 months (n=11)	above 60 months (n=7)	Pooled (n=30)
Scrotal circumference (SC) (cm)	34.80 ^a $\pm$ 0.86	34.72 ^a $\pm$ 0.76	37.41 ^b $\pm$ 0.78	38.57 ^c $\pm$ 0.81	36.62 $\pm$ 0.49
Right testicle (cm)					
Length	15.80 $\pm$ 0.93	14.69 $\pm$ 0.68	16.65 $\pm$ 0.60	17.13 $\pm$ 0.77	16.13 $\pm$ 0.38
Width	7.25 $\pm$ 0.08	7.10 $\pm$ 0.20	7.57 $\pm$ 0.20	8.08 $\pm$ 0.33	7.52 $\pm$ 0.13
Depth/thickness	6.92 $\pm$ 0.13	6.54 $\pm$ 0.43	7.13 $\pm$ 0.41	7.51 $\pm$ 0.49	7.03 $\pm$ 0.22
Left testicle (cm)					
Length	15.87 $\pm$ 0.90	14.50 $\pm$ 0.70	16.62 $\pm$ 0.59	16.83 $\pm$ 0.59	16.00 $\pm$ 0.37
Width	7.45 $\pm$ 0.20	6.86 $\pm$ 0.31	7.56 $\pm$ 0.21	7.81 $\pm$ 0.31	7.42 $\pm$ 0.15
Depth/thickness	6.80 $\pm$ 0.31	6.17 $\pm$ 0.44	7.04 $\pm$ 0.49	7.21 $\pm$ 0.43	6.82 $\pm$ 0.24
Average testicular length	15.83 $\pm$ 0.89	14.59 $\pm$ 0.69	16.64 $\pm$ 0.59	16.98 $\pm$ 0.66	16.06 $\pm$ 0.37
Average testicular width	6.76 $\pm$ 0.25	6.27 $\pm$ 0.24	6.90 $\pm$ 0.17	6.91 $\pm$ 0.44	6.72 $\pm$ 0.14
Average testicular depth	6.86 $\pm$ 0.20	6.36 $\pm$ 0.43	7.08 $\pm$ 0.44	7.36 $\pm$ 0.45	6.92 $\pm$ 0.23

Figures with different superscript show significant difference at $P < 0.05$.

Present address: ¹Principal Scientist, ³Scientist, ⁴Senior Scientist (Animal Physiology); ²Scientist Senior scale (LPM).

and bulls having age of 48 months. It was observed that SC was higher ($P < 0.05$) in the bulls of 49 to 60 months age group

Table 2. Biometric measurements of testes of Frieswal bulls after surgical removal from scrotal sac (mean±SE)

Particulars	Age groups				
	Below 36 months (n=4)	37-48 months (n=8)	49-60 months (n=11)	above 60 months (n=7)	Pooled (n=30)
<i>Right testicle (cm)</i>					
Length	13.20±0.78	13.15±0.62	13.33±0.45	14.76±0.56	13.60±0.29
Width	6.47±0.15	6.42±0.21	6.91±0.18	7.03±0.52	6.75±0.15
Depth/thickness (cm)	6.00±0.42	5.90±0.42	6.04±0.40	5.78±0.49	5.94±0.21
<i>Left testicle (cm)</i>					
Length	14.02±0.71	13.17±0.57	13.40±0.48	14.48±0.39	13.68±0.27
Width	6.40±0.14	6.12±0.27	6.89±0.18	6.80±0.37	6.60±0.14
Depth/thickness	6.17±0.47	5.70±0.38	6.12±0.39	5.58±0.56	5.88±0.22
<i>Testicular weight (g)</i>					
Right	346.72±19.89	304.99±20.27	352.86±16.66	379.07±20.27	345.39±10.57
Left	339.06±15.31	314.56±21.94	357.12±22.27	376.86±17.35	347.97±11.40
Paired	685.78±34.45	619.54±41.41	709.98±38.17	755.93±37.45	693.36±21.54
<i>Testicular volume (cm³)</i>					
Right	291.54±28.18	288.46±25.50	338.61±25.40	390.62±53.01	330.83±18.17
Left	299.736±10.21	264.71±27.35	336.17±27.18	356.91±39.07	316.44±16.14

than bulls of less than 49 months of age group.

Scrotal biometry varies and depends on genetic components. The SC of pure exotic Holstein Friesian (HF), Jersey (J) and crossbred were 39.30, 35.65 and 38.60 (Verma and Sahni 1997), 36.90, 34.92 and 33.92 and 33.88 cm (Dhami *et al.* 2001) respectively. Our observations with respect to Frieswal bulls were similar to the reports of these workers. However, lower values (31.2 cm) in crossbreds bulls were also reported by Brito *et al.* (2004).

The mean length (L), width (W) and thickness (T) in groups 1,2,3 and 4 Frieswal bulls, were 15.83, 6.76 and 6.86; 14.59 6.27 and 6.36; 16.64, 6.90 and 7.08; and 16.98, 6.91 and 7.36 cm respectively. The overall mean dimensions for L, W and T were 16.06, 6.72 and 6.92 cm. The mean testicular volume irrespective of age in the left and right testis were

not significantly ($P<0.05$) different (Table 2). These values are similar to that of 341.1 cm³ in *Bos taurus* and higher to that of crossbred bulls (242.5) as reported by Brito *et al.* (2004). Lower testicular volumes (118.3, 144.4 cm³) in crossbred have also been reported by Verma and Sahni (1997). The testicular volume is important as it has been reported that increased sperm production is associated with increase in testicular volume (Bruto *et al.* 2004).

Testicular biometry varies according to genetic constituents. The testicular biometries in terms of length, width and thickness in adult HF and Jersey bulls were 12.98, 7.55, 5.08 and 12.93, 7.45, 5.30 cm, respectively. However, these measurements in HF×Sahiwal, HF×Brown Swiss×Tharparkar and HF×Brown Swiss×Tharparkar and HF×Red Sindhi×Sahiwal crossbreds were 13.25×7.25×6.15;

Table 3. Biometry of various parts of epididymis of the testes of Frieswal bulls (mean±SE)

Particulars	Age groups				
	Below 36 months (n=4)	37-48 months (n=8)	49-60 months (n=11)	above 60 months (n=7)	Pooled (n=30)
<i>Right epididymis (cm)</i>					
Caput length	5.22±0.27	5.54±0.45	5.74±0.36	5.56±0.47	5.58±0.20
Caput width	4.52±0.57	3.62±0.27	4.08±0.18	3.98±0.27	4.00±0.14
Corpus length	11.10±0.17	12.29±0.57	12.45±0.83	12.50±0.54	12.24±0.36
Corpus width	1.17±0.19	0.80±0.09	0.89±0.08	0.94±0.16	0.92±0.06
Caudal length	3.87±0.41	3.19±0.33	3.65±0.36	2.68±0.17	3.33±0.18
Caudal width	3.90±0.52	2.80±0.15	3.20±0.17	3.60±0.26	3.28±0.13
<i>Left epididymis (cm)</i>					
Caput length	5.10±0.17	5.79±0.38	5.64±0.46	5.10±0.35	5.48±0.21
Caput width	4.35±0.58	3.44±0.26	4.24±0.31	3.80±0.22	3.94±0.17
Corpus length	10.85±0.27	11.85±0.63	12.10±0.95	12.17±0.58	11.88±0.40
Corpus width	0.97±0.19	0.82±0.12	0.73±0.06	0.98±0.16	0.85±0.06
Caudal length	3.72±0.36	3.05±0.30	3.24±0.29	2.91±0.19	3.18±0.15
Caudal width	3.60±0.53	2.60±0.13	3.11±0.15	3.11±0.15	3.04±0.12

13.37×7.81×6.0 and 12.66×7.16×5.25 cm respectively (Verma and Sahni 1997). Similar observations for testicular measurement were also reported by Singh and Pangaonkar (1989) in crossbred bulls having HF ×Brown Swiss blood with Sahiwal ×Tharparkar bulls. Brito *et al.* (2004) also compared, the testicular dimensions in adult *Bos indicus*, crossbred and *Bos taurus* bulls. The dimensions were smallest in *Bos indicus* and greatest in *Bos taurus*, whereas crossbred had dimensions intermediate between the two. The testicular length and width reported were 9.4, 5.4; 10.5, 6.6 and 12.2, 7.3 cm, respectively. These values were lower as compared to our crossbred animals; one reason may be that most of our animals were more than 36 months age as compared to them (27.8 months). Further in our animals no significant difference ($P<0.05$) was visible between testicular measurement of Rt and Lt testes. Similarly, there was no significant difference ($P<0.05$) in the mean Rt and Lt testicular weight and the values were 345.39 and 347.97 g, respectively.

Epididymal measurement revealed that the mean values in terms of Lt and Rt caput epididymus were 5.58×4.0 and 5.48×3.94 cm, respectively. These values for Lt and Rt caudal epididymis were 3.3×3.28 and 3.18×3.04 cm. The mean values at different age are presented in Table 3.

These observations on testicular biometry revealed that the dimensions of testes and epididymis in Frieswal bulls lie in between pure exotic i.e. (HF) and Indigenous breeds reared under our conditions.

SUMMARY

Testicular biometry was studied in 30 adult Frieswal bulls. The scrotal circumference was significantly higher in bull at 49 to 60 months as compared to bull having age less than 36 months and 37 to 48 months. The measurement of intact testes

revealed no significant difference between right (RT) and left (LT) testes with respect to length (L), width (W) and thickness (T). After orchidectomy these measurements were taken again along with testicular weight. No significant difference was observed between the dimensions of Rt and Lt testis. The testicular weight and volume of Rt versus Lt testes were 330.8 g and 345.39 cm³ versus 316.44 g and 347.97 cm³, respectively.

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