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Clinical andrology and testosterone profile of Gir (*Bos indicus*) and Jafarabadi (*Bubalus bubalis*) bulls*

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ABSTRACT

Clinical andrological examination of Gir and Jafarabadi breeding bulls (4-7 yrs old) revealed normal external and internal genitalia with square to oblong scroti. The prepuce was much pendulous (8-12 inch) in Gir and tight in Jafarabadi bulls. Jafarabadi bulls had significantly lower scrotal circumference (33.03 ± 0.78 vs 37.39 ± 0.53 cm), scrotal volume (940.00 ± 21.10 vs 1217.50 ± 20.69 ml), libido score (2.34 ± 0.07 vs 2.90 ± 0.07) and plasma testosterone profile (0.68 ± 0.08 vs 7.56 ± 0.83 ng/ml) and longer reaction time (184.00 ± 28.79 vs 61.28 ± 16.92 sec) than the Gir bulls. Gir bulls of poor freezability group were significantly heavier and fatty with relatively lower scrotal measurements and testosterone profile, and longer reaction time. In Jafarabadi bulls, however, the scrotal length and reaction time were shorter in poor freezable than the good freezable group.

Key words : Testosterone, libido, scrotal biometry, semen, buffalo bulls, Gir bulls

INTRODUCTION

Thorough andrological investigation of breeding bulls is important to keep them reproductively sound. The Gujarat has pride privilege of having the world famous Gir breed of cattle and Jafarabadi breed of buffalo, but very little systematic research data on males of these breeds are available even in their home tract (Kodagali, 1997). Therefore, an attempt was made to study clinical andrology and testosterone profile in these breeds under their natural agro-climatic zone in Saurashtra region.

MATERIALS AND METHODS

Six Gir and 5 Jafarabadi breeding bulls (4-7 yrs old), maintained under identical nutritional and managerial conditions at Regional Semen Station, Rajkot (Gujarat), were used for this study. Semen was collected twice a week in AV. All observations were made three times at monthly intervals. The height at withers; body length (shoulder to pin bone), heart girth and live weight were measured using tailor's tap and weighbridge, respectively. Clinical examination of all the bulls was carried out as per Rosenberger (1979).

The scrotal circumference (cm), scrotal length and width (cm), and scrotal volume (ml) were measured using scrotal tape, Martin's caliper and a principle of water replacement, respectively. Libido score (graded from 0-3), reaction time (sec) and coital behaviour (graded from 0-2) of each bull were recorded during semen collection.The plasma testosterone concentration was assessed using RIA technique in 33 heparinized jugular blood samples collected at monthly intervals in the morning of previous day of semen collection. Blood smears were also screened for blood parasites, if any. The means of different traits were compared between Gir and Jafarabadi breeds, and also between good and poor freezable groups within the breed using unpaired 't' test.

RESULTS AND DISCUSSION

Out of 11 bulls, four (2 in each breed) were found problematic/poor freezable bulls based on their erratic sexual behaviour, poor semen quality and freezability (consistently < 40 % post-thaw motility) and the

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Table 1. Comparison of age, body measurements, scrotal biometry, sexual behaviour and blood testosterone profile between Gir and Jafarabadi bulls of good vs poor freezability groups

Character	Gir bulls			Jafarabadi bulls			Overall average		
	Good freezable (n = 12)	Poor freezable (n = 6)	't' test	Good freezable (n = 9)	Poor freezable (n = 6)	't' test	Gir (n = 18)	Jafarabadi (n = 15)	't' test
Age (months)	50.75 ± 4.03	55.00 ± 0.58	0.73^{NS}	76.66 ± 3.77	66.50 ± 4.26	1.76*	52.16 ± 2.69	72.60 ± 3.04	5.04**
Height at withers (inch)	56.63 ± 0.31	57.25 ± 0.63	1. 00 ^{NS}	64.50 ± 0.59	64.00 ± 0.28	0.64^{NS}	56.83 ± 0.29	64.30 ± 0.37	15.98**
Body length (inch)	61.00 ± 0.65	66.83 ± 0.65	5.62**	70.83 ± 1.32	73.25 ± 0.25	1.39^{NS}	62.94 ± 0.82	71.80 ± 0.88	7.36**
Heart girth (inch)	77.17 ± 0.73	82.00 ± 0.58	4.33**	92.33 ± 0.43	90.50 ± 1.40	1.47^{NS}	78.78 ± 0.75	91.60 ± 0.63	12.72**
Live weight (kg)	543.08±23.80	618.66±10.01	2.17*	896.11±16.01	860.00±45.46	0.87^{NS}	568.28 ± 18.13	881.66 ± 20.13	11.58**
Body score (1-5)	3.50 ± 0.15	4.50 ± 0.22	3.77**	3.61 ± 0.11	3.42 ± 0.08	1.27^{NS}	3.83 ± 0.17	3.53 ± 0.07	1.53^{NS}
Scrotal circumference(cm)	37.58 ± 0.45	37.00 ± 1.39	0.51 ^{NS}	33.89 ± 1.19	31.75 ± 0.31	1.43^{NS}	37.39 ± 0.53	33.03 ± 0.76	4.82**
Scrotal length (cm)	16.39 ± 0.19	15.42 ± 0.76	1.66^{NS}	15.20 ± 0.14	13.83 ± 0.21	5.58**	16.07 ± 0.29	14.65 ± 0.21	3.78**
Scrotal width (cm)	14.86 ± 0.23	13.50 ± 0.61	2 57**	12.39 ± 0.51	11.63 ± 0.16	1.67^{NS}	14.41 ± 0.28	12.09 ± 0.32	5.39**
Scrotal volume (cm)	1233.3 ± 21.8	1185.8 ± 44.4	1.09^{NS}	950.00± 33.07	925.0 ± 2041	0.57^{NS}	1217.5 ± 20.69	940.0 ± 21.10	9.33**
Libido score (0-3)	2.99 ± 0.01	2.80 ± 0.20	0.86^{NS}	2.28 ± 0.09	2.42 ± 0.21	1.03^{NS}	2.90 ± 0.07	2.34 ± 0.07	4.83**
Reaction time (sec)	33.17 ± 8.51	117.50±40.66	2.77*	245.56±30.37	91.67±27.35	3.53**	61.28 ± 16.92	184.00 ± 28.79	3.83**
Serving behaviour (0-2)	2.00 ± 0.00	2.00 ± 0.00	0.17^{NS}	1.93 ± 0.05	1.84 ± 0.18	0.79^{NS}	2.00 ± 0.00	1.87 ± 0.06	1.86^{NS}
Testosterone (ng/ml)	8.57 ± 1.11	5.55 ± 0.60	1.83*	0.70 ± 0.14	0.65 ± 0.03	0.26^{NS}	7.56 ± 0.83	0.68 ± 0.08	7.52**

n = number of observations made at monthly intervals thrice in each bull
* P<0.05; ** P<0.01; NS non-significant between groups/species

remaining all were normal/good freezable bulls.

Both external and internal genitalia were normal in all the bulls of both the species. The shape of scrotum was square to oblong with well discernible epididymis in all Gir bulls and oblong to elongated with relatively smaller size in Jafarabadi bulls. The preputial sheath was tight in Jafarabadi bulls but much pendulous (8-12 inch long) in Gir bulls, which is a well-known phenotypic characteristic of this breed.

The average age of Gir and Jafarabadi bulls was 52.16 ± 2.69 and 72.60 ± 3.04 months ($P<0.01$) and they were started donating semen around 3.5 and 4.5 years of age, respectively. Jafarabadi bulls were significantly tall, long and heavier (weighing 881.66 ± 21.3 vs 568.28 ± 18.30 kg) than Gir bulls (Table 1), which is a unique phenotypic characteristic of these breeds.

The scrotal biometry of breeding bulls revealed significantly higher scrotal circumference (37.39 ± 0.53 vs 33.03 ± 0.78 cm), scrotal length, scrotal width and scrotal volume (1217.50 ± 20.69 vs 940.00 ± 21.10 ml) in Gir than the Jafarabadi bulls (Table 1). These results coincided well with the reports of Singh and Pangawkar (1989), Matharoo *et al.* (1994) and Kodagali (1997). The scrotal circumference of the bull is an indirect indication of the number and size of seminiferous tubules present in the testes (Coulter and Foote, 1976). It gives an idea about the sperm output in breeding bulls.

Positive association observed for scrotal circumference with body weight and scrotal volume in both the breeds also coincided with the findings of Coulter *et al.* (1975), Patel *et al.* (1988) and Kodagali and Doshi (1996), but such relationship was not found between scrotal measurements and semen volume or sperm output in bulls under study. This was probably due to the fact that all bulls were fully mature and normal in sexual function. Significantly larger scrotal size found in Gir over Jafari bulls also suggested better sperm production potential in them.

Reaction time is a good index of libido in bulls. The arbitrary scores assigned to the sexual interest and the entire serving act through visual observation showed that libido and serving behaviour were satisfactory in all the bulls under study. The scores for both were significantly higher with lower reaction time (61.28 ± 16.92 vs 184.00 ± 28.79 sec) in Gir than the Jafarabadi bulls.

The random circulating testosterone profile varied from 4.93 to 13.67 and 0.40 to 1.23 ng/ml between bulls with an overall mean of 7.56 ± 0.83 and 0.68 ± 0.08 ng/ml in Gir and Jafarabadi bulls, respectively (Table 1). The Gir bulls expressed 10 to 15 fold higher testosterone levels than the Jafarabadi bulls. These findings compared well with the reports of Agarwal *et al.* (1983), Sharma *et al.* (1986) and Patel (1991). The relatively high level of testosterone observed in most bulls under study is attributed to the time (morning) and site (semen collection crate) of blood sampling adopted, which might have evoked conditioned response of normal sexual excitement for semen ejaculation and thereby elevating the circulating blood testosterone levels. Lunstra *et al.* (1989) and Patel (1991) also reported similar results.

As compared to good freezability group, Gir bulls of poor freezability group were significantly heavier and fatty with relatively lower scrotal measurements and testosterone profile (5.55 vs 8.51 ng/ml) and longer reaction time (117.5 vs 33.2 sec), whereas, among Jafarabadi bulls the scrotal length and reaction time were significantly shorter in poor freezable group (13.8 vs 15.2 cm and 91.7 vs 245.6 sec). This is conceivable, because heavy weight and obesity (scrotal insulation) are known to hinder sexual desire and semen quality in bulls. Similarly more aggressiveness and immediate ejaculation without proper sexual preparation also adversely affect the quality of semen. Belorkar *et al.* (1988) also observed poor libido score and longer reaction time in poor than good freezable crossbred bulls. Similarly, Patel *et al.* (1988) found the problem bulls to be more aggressive and had lesser scrotal circumference/scrotal volume and shorter reaction time than the normal bulls. Taha *et al.* (1984) also reported significant positive correlation between blood testosterone levels and libido in bulls. In the present study, the libido, reaction time, testosterone profile, scrotal circumference/volume and semen quality were positively correlated in bulls of both the species, and hence these traits could be of great value in screening the bulls for their breeding soundness.

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