

EFFECTS OF AGE AND SEASON ON THE BODY WEIGHT, SCROTAL CIRCUMFERENCE AND LIBIDO IN NILI-RAVI BUFFALO BULLS MAINTAINED AT THE SEMEN PRODUCTION UNIT, QADIRABAD

M. Younis, H.A. Samad, N. Ahmad and I. Ahmad

Department of Animal Reproduction, University of Agriculture, Faisalabad

ABSTRACT

This study was carried out to investigate effects of age and season on body weight, scrotal circumference and libido in 18 Nili-Ravi buffalo bulls kept at the Semen Production Unit, Qadirabad. Depending on age, these bulls were divided into three equal groups viz. young (3-4 years of age), adult (5-8 years of age) and old (12-15 years of age). Body weight and scrotal measurements were made at monthly intervals, while libido of each bull was assessed weekly during the low (May to July) and the peak (September to November) breeding seasons.

The results indicated that the body weight of adult and old bulls was higher ($P < 0.05$) than young bulls. Similarly, the body weight was higher during peak than low breeding season. Scrotal circumference was higher in adult and old bulls than young bulls and during peak than low breeding season ($P < 0.05$). The libido of the adult bulls was higher than young or old bulls, and during the peak than the low breeding season. It was concluded that body weight, scrotal circumference and libido of Nili-Ravi buffalo bulls were significantly affected by age of the bull and season of the year.

key words: Body weight, scrotal circumference, libido, buffalo bulls, age, season.

INTRODUCTION

The buffalo is a major dairy animal in Pakistan. Its present population in the country is approximately 20.10 million heads (Anonymous, 2000) and contributes significantly to the economy of the country by providing milk, beef, hides and draught power.

The buffalo is generally considered as a seasonal breeder. Females of this species are not as sexually active during the hot summer months as in winter (Pandey and Raizada, 1979). Buffalo bulls are comparatively sluggish and are more susceptible to heat stress due to their poor heat regulation mechanism than females (Akhtar, 1988). The testes are extremely sensitive to high ambient temperature, resulting in degenerative changes characterized by a reduction in testicular size and a change in its consistency (McEntee, 1990).

Body weight and testis size are important parameters of reproductive efficiency of a male, as they provide information about the physical and physiological maturity of the animal, its semen output and the birth weight of its off springs (Smith *et al.*, 1989; Evans *et al.*, 1995). The testicular measurements have been widely used to predict the reproductive and spermatogenic capabilities in the post pubertal period of

a bull (Ahmad *et al.*, 1989). Testicular size can be measured in terms of scrotal circumference.

The present project was designed to study changes in the body weight, scrotal circumference and libido in adult Nili-Ravi buffalo bulls maintained at the Semen Production Unit, Qadirabad, during the low (May to July) and the peak (September to November) breeding seasons.

MATERIALS AND METHODS

A total of 18 adult Nili-Ravi buffalo bulls with clinically normal reproductive tract and varying in age from 3 to 15 years were used in this study. Depending on their age, these bulls were divided into 3 groups viz. young (3-4 years of age), adult (5-8 years) and old (12-15 years), with six bulls in each group.

Feeding and management

Experimental bulls were kept at the Semen Production Unit, Qadirabad, District Sahiwal. This region is situated at an altitude of about 173m, lies between longitudes 73° and 74°E and latitudes 30° and 31.15°N. In this area, May to July is the hottest dry period of the year when green fodder is scarce and

breeding of buffalo is minimal. This period is usually termed as low breeding season for the buffalo. Most of the calvings take place in July and August. The maximum breeding takes place during September-November (Usmani *et al.*, 1987), which is the peak breeding season for animals of this species.

The experimental bulls were housed individually in North-South directionally situated pens having sufficient protection against adverse climatic conditions. Each bull was fed good quality seasonal green fodder at the rate of 35-65 kg daily according to its body weight. In addition, 2-3 Kg of concentrate (cotton seed cakes and wheat bran) was provided *ad libitum*. Each bull was showered twice daily during summer and once during other seasons. Physical exercise was given to each bull three times a week.

Scrotal circumference and body weight measurements

Body weight and scrotal measurements were made at monthly intervals. The testes were brought into the distal part of scrotum until the ventral scrotal skin folds, if any, were eliminated. The greatest scrotal circumference was then identified and measured with the help of a flexible measuring tape. Body weight of each bull was recorded using a large weighing bridge.

Estimation of libido

The libido of each bull was judged once a week in terms of reaction time and libido score. An intact bull restrained in a service crush was used as a teaser. Before introduction into the test area, each bull was given a sexual preparation for about 10 minutes. The time between introduction of a bull into the test area and the first mount was defined as reaction time. A libido score, ranging from 0 to 6, was computed for each bull depending upon its sexual interest in the teaser, as described earlier (Chenoweth, 1981).

Statistical analysis

Mean values (\pm SE) of body weight, scrotal circumference and various parameters of libido for bulls of three age groups and during the low and the peak breeding seasons were computed. In order to see the magnitude of variation in these parameters among bulls of different groups, the data were subjected to analysis of variance, using factorial experiment under completely randomized design (Snedecor and Cochran, 1989). Duncan's multiple range test (Duncan, 1955) was applied for multiple mean comparison, where necessary.

RESULTS AND DISCUSSION

Mean values (\pm SE) of body weight and scrotal circumference of buffalo bulls of three age groups during the low and the peak breeding season are given in Table-1.

Body weight

The overall mean body weight for 18 buffalo bulls was 662.03 ± 5.98 kg, the range was 495 to 775 kg. Asghar *et al.* (1985) and Heuer *et al.* (1987) recorded mean body weight of buffalo bulls as 652 and 674 kg respectively, which support our findings.

In the present study, lowest body weight (651.86 ± 4.65 kg) was noted in young bulls, while highest (674.91 ± 15.12 kg) was in adult bulls, the difference was significant ($P < 0.05$). Body weight of adult and old bulls was higher ($P < 0.05$) than that of bulls of young group, the difference among bulls of former two groups was non significant (Table 1), indicating that adult and old bulls showed the same body weight which was higher than that of young bulls. Similar findings have been reported previously (Ishaq, 1972). According to Ahmad *et al.* (1987), majority of bulls attain about 90% of their adult body weight at 4-5 years of age.

When the data were grouped according to seasons (Table-2), mean body weight during the low breeding season (654.67 ± 8.04 kg) was lower ($P < 0.05$) than 669.85 ± 8.80 kg recorded during the peak breeding season. Heuer *et al.* (1987) also observed lower body weight (659 kg) during low than 667 kg during peak breeding season. This might be due to deterioration of body condition caused by high ambient temperature and low quality of green fodder available during hot and humid period of the year. A great variation is observed in composition and digestibility of tropical forages during dry hot summer which can cause a decrease in body weight due to decreased feed intake. This indicates the importance of better feeding of breeding bulls especially during severe hot (or cold) months of the year (Heuer *et al.*, 1987; Aguiar *et al.*, 1992).

Scrotal circumference

In the present study, overall mean scrotal circumference was 33.30 ± 3.90 cm, the range was 27.00 to 37.50 cm. These values are comparable with 34.00 cm reported by Ahmad *et al.* (1987).

In the present study highest scrotal circumference (35.06 ± 0.31 cm) was observed in adult bulls, while the lowest (31.61 ± 0.38 cm) was in young bulls. Statistical analysis revealed that adult and old bulls had

Table 1. Mean values (\pm SEM) of body weight and scrotal circumference in buffalo bulls of three age groups during various months of low and peak breeding seasons

Parameters	Low breeding season					Peak breeding season					Overall mean
	May	June	July	Mean	September	October	November	Mean			
Body weight (kg)											
Young	636.00 \pm 12.89	640.17 \pm 11.56	649.67 \pm 11.74	641.95 \pm 6.69a	655.00 \pm 27.02	667.67 \pm 25.80	662.67 \pm 22.52	661.78 \pm 5.72b	651.86 \pm 4.65b		
Adult	663.17 \pm 35.09	666.83 \pm 36.83	672.83 \pm 39.22	667.44 \pm 20.13a	675.50 \pm 39.25	684.83 \pm 43.47	684.83 \pm 22.52	682.39 \pm 23.03a	674.91 \pm 15.12a		
Old	654.00 \pm 50.28	653.83 \pm 56.70	657.83 \pm 50.08	665.22 \pm 11.62a	661.00 \pm 23.06	667.50 \pm 11.54	667.50 \pm 10.54	665.39 \pm 12.13a	660.31 \pm 8.32a		
Mean	651.05 \pm 13.63	653.61 \pm 14.33	659.94 \pm 14.50	654.67 \pm 8.04	663.83 \pm 14.81	673.33 \pm 15.45	672.38 \pm 16.21	669.85 \pm 8.80	662.03 \pm 5.98		
Scrotal circumference (cm)											
Young	30.42 \pm 2.11	29.50 \pm 2.53	31.58 \pm 1.56	30.50 \pm 0.51b	32.00 \pm 2.10	32.17 \pm 1.72	34.00 \pm 1.55	32.72 \pm 0.4b	31.61 \pm 0.38b		
Adult	33.92 \pm 2.80	34.50 \pm 1.70	35.33 \pm 1.69	34.58 \pm 0.49a	34.67 \pm 0.82	35.67 \pm 1.51	36.33 \pm 1.75	35.56 \pm 0.35a	35.06 \pm 0.31a		
Old	32.75 \pm 1.13	33.33 \pm 1.37	32.33 \pm 1.29	33.14 \pm 0.29a	35.33 \pm 1.21	34.83 \pm 1.17	31.00 \pm 1.81	33.72 \pm 1.84b	34.43 \pm 0.93a		
Mean	31.46 \pm 0.65	31.74 \pm 0.75	32.08 \pm 0.54	31.41 \pm 0.38	34.00 \pm 0.47	34.22 \pm 0.48	33.71 \pm 1.86	34.00 \pm 0.65	33.30 \pm 3.90		

*Values with different letters in a column for each parameter differ significantly ($P < 0.05$)
 Young = 3-4 years. Adult = 6-8 years. Old = 12-15 years.

greater scrotal circumference than young bulls ($P < 0.05$), the difference between the former two groups was non significant. This shows that scrotal circumference of adult and old bulls was greater than young bulls. This might be due to the fact that testes of young bulls were in growing stage and had not attained their full size when the study commenced. These findings are comparable with those reported previously (Ahmad *et al.*, 1984). However, scrotal circumference has been reported to increase rapidly in young bulls, gradually in mature bulls and decline in old bulls due to senile atrophy (Jubb *et al.*, 1985; McEntee, 1990; Wildeus, 1993).

When the data on scrotal circumference were grouped according to seasons (Table-2), the mean value was higher ($P < 0.05$) during the peak (34.00 ± 0.65 cm) than during the low breeding season (31.41 ± 0.38 cm). This might be due to the effect of high ambient temperature during summer that causes thermal degeneration of testes (Ahmad *et al.*, 1984; Coulter *et al.*, 1988). Furthermore, adhesions of tunica albuginea may occur in dry hot season, causing

practices that differ from year to year and from farm to farm.

The longest reaction time (38.98 ± 4.40 sec) was observed in old bulls and the shortest (23.56 ± 2.82 sec) in adult bulls, the difference was significant ($P < 0.05$). Further analysis revealed that old bulls had longer reaction time than young and adult bulls, the difference among latter two groups was non significant (Table 3). Thus, reaction time was longer in old than young and adult bulls. Younis *et al.* (1980) reported shorter reaction time in adult and younger than in older bulls.

When the data on reaction time were grouped according to seasons (Table-2), the mean value was higher ($P < 0.05$) during the low (34.28 ± 3.34 sec) than the peak breeding season (31.24 ± 2.27 sec). Improvement of reaction time during the peak breeding season can be attributed to provision of highly nutritive green fodder during that season (Younis *et al.*, 1980). Furthermore, during the hot summer months activity of thyroid gland is depressed, resulting in low plasma testosterone level which increases reaction time (Noakes *et al.*, 2001).

Table 2. Mean values (\pm SEM) of body weight, scrotal circumference and various parameters of libido during low and peak breeding seasons

Parameters	Low breeding season	Peak breeding season
Body weight (kg)	$654.67 \pm 8.04b$	$669.85 \pm 8.80a$
Scrotal circumference (cm)	$31.41 \pm 0.38b$	$34.00 \pm 0.65a$
Reaction time (second)	$34.28 \pm 3.34a$	$31.24 \pm 2.27b$
Libido score (0-6)	$3.46 \pm 0.16b$	$4.30 \pm 0.13a$

Values with different letters in a row for each parameter differ significantly ($P < 0.05$).

testicular degeneration that can reduce scrotal circumference without any clinical signs (McEntee, 1990). Unfortunately, neither the testicular histology nor adhesions were studied in bulls under report.

Libido

In the present study, libido of Nili-Ravi buffalo bulls was assessed in terms of reaction time and libido score.

Reaction time

The overall mean reaction time for 18 buffalo bulls was 31.26 ± 2.01 sec, the range was 16 to 140 sec. This seems to be longer than 24.29 ± 1.20 and 18.05 ± 3.50 sec reported by Gill *et al.* (1974) and Anzar *et al.* (1993), respectively. Considerably higher reaction time of 70.0 sec was recorded by Bajwa *et al.* (1982). This difference might be due to variation in managerial

Libido score

The overall mean libido score in 18 buffalo bulls was 3.88 ± 0.11 ; the range was 1-6. This is in line with 3.95 reported in cow bulls (Chenoweth, 1981). Higher libido score of 4.94 was recorded in buffalo bulls by Anzar *et al.* (1988).

In the present study, highest libido score (4.39 ± 0.15) was observed in adult bulls and the lowest (3.47 ± 0.20) in old bulls ($P < 0.05$). Further analysis revealed that higher libido score was obtained by adult bulls than young and old bulls, the difference among bulls of latter two groups was non significant (Table 3). Thus, libido score was higher for adult than young or old bulls. Gupta *et al.* (1984) and Heuer *et al.* (1987) made similar observations in buffalo bulls.

In the present study, a significantly higher ($P < 0.05$) libido score (4.30 ± 0.13) was recorded during the peak than the low breeding season (3.46 ± 0.16 , Table-2).

Table 3: Mean values (\pm SEM) of different parameters of libido in bulls of three age groups during various months of low and peak breeding seasons

Parameters	Low breeding season				Peak breeding season				Overall mean
	May	June	July	Mean	September	October	November	Mean	
Reaction time (Sec.)									
Young	29.67 \pm 3.66	40.17 \pm 7.23	30.00 \pm 7.23	33.28 \pm 3.15a	28.33 \pm 6.57	33.67 \pm 9.55	25.67 \pm 4.66	29.22 \pm 3.99b	31.25 \pm 2.53a
Adult	30.50 \pm 11.33	22.27 \pm 5.91	18.33 \pm 5.19	23.66 \pm 4.58a	26.16 \pm 6.18	25.50 \pm 6.75	18.67 \pm 5.49	23.44 \pm 3.44b	23.56 \pm 2.82b
Old	31.50 \pm 12.77	47.80 \pm 3.74	31.33 \pm 12.04	36.89 \pm 8.26a	36.67 \pm 5.09	41.06 \pm 16.01	44.83 \pm 6.63	41.66 \pm 3.33a	38.98 \pm 4.40a
Mean	30.55 \pm 5.47	36.72 \pm 7.05	26.55 \pm 4.66	34.28 \pm 3.34	30.38 \pm 3.42	33.61 \pm 4.41	28.32 \pm 4.07	31.24 \pm 2.27	31.26 \pm 2.01
Libido score (0-6)									
Young	3.50 \pm 0.43	3.17 \pm 0.60	3.33 \pm 0.33	3.33 \pm 0.26b	4.17 \pm 0.31	4.17 \pm 0.40	4.33 \pm 0.42	4.22 \pm 0.21b	3.78 \pm 0.18b
Adult	4.33 \pm 0.33	3.33 \pm 0.33	4.67 \pm 0.33	4.11 \pm 0.23a	4.67 \pm 0.21	4.50 \pm 0.34	4.83 \pm 0.31	4.67 \pm 0.16a	4.39 \pm 0.15a
Old	3.00 \pm 0.45	2.83 \pm 0.54	3.00 \pm 0.54	2.94 \pm 0.76b	3.83 \pm 0.40	4.17 \pm 0.60	4.00 \pm 0.37	4.00 \pm 0.26b	3.47 \pm 0.20b
Mean	3.61 \pm 0.25	3.11 \pm 0.27	3.66 \pm 0.26	3.46 \pm 0.16	4.22 \pm 0.191	4.27 \pm 0.25	4.38 \pm 0.21	4.30 \pm 0.13	3.88 \pm 0.11

Values with different letters in a column for each parameter differ significantly ($p < 0.05$).
 Young = 3-4 years Adult = 6-8 years Old = 12-15 years.

During dry hot season, libido of buffalo bulls has been shown to be adversely affected due to heat stress, shortage of green fodder and ultimately reduced blood testosterone concentrations (Pandey and Raizada, 1979; Chenoweth, 1983). Usmani *et al.* (1987) observed a decline in libido of buffalo bulls during hot summer months. According to Heuer *et al.* (1987), no loss of libido of buffalo bulls would have occurred during the low breeding season if better feeding and management practices are adopted.

Based on the findings of the present study, it can be concluded that body weight, scrotal circumference and libido of buffalo bulls were significantly affected by the age of the animal and season of the year. The values of these parameters were higher in adult than young bulls and during the peak than the low breeding season.

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