STUDIES ON SEMINAL ATTRIBUTES IN RELATION TO SCROTAL CIRCUMFERENCE IN BUFFALO BREEDING BULLS

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ABSTRACT

Seminal attributes and scrotal circumference was conducted on twenty five Murrah buffalo breeding bulls belonging to Central Semen Station, Bhopal. Five semen samples from each buffalo bull were collected at 7 days interval. Fresh semen was evaluated for volume, mass motility, sperm concentration, progressive motility, live sperm count and morphological abnormalities. The mean volume, mass motility, progressive motility, sperm concentration, live sperm count and total abnormal sperms were 2.71±0.112, 3.34±0.073, 68.4±1.30, 978.9±34.37, 89.52±0.38, and 8.82±0.873%. Significant ($P<0.05$) variation was observed between the bulls with regard to sperm abnormalities. However, non-significant difference was observed for volume, sperm concentration, mass motility, progressive motility, and live sperm count. The overall mean sperm abnormalities found for abnormal head, middle piece and tail were 1.68±0.160, 2.0±0.238, and 5.12±0.475 percent, respectively. Tail abnormalities differed significantly between bulls.

Keyword: *Bubalus bubalis*, buffaloes, semen sample, progressive motility, morphological abnormalities, sperm concentration, total abnormal sperms

INTRODUCTION

Yearling bulls with larger scrotum at puberty had increased pregnancy rates in their heifer offspring (Moser *et al*., 1996). Selection of young bulls at an early age is crucial for commercial semen producers. Selecting AI bulls at early age decreases feeding and management costs and improves reproduction more rapidly (Hafez and Hafez, 2000). Scrotal circumference has been shown to be affected by age of the bull and season of the year (Younis *et al*., 2003). However, scanty literature is available on relation of scrotal circumference with seminal attributes in buffaloes. There is also paucity of literature regarding fertility of breeding bull semen. Evaluation of semen quality has been based on routine semen analysis Sperm motility, morphology and acrosome integrity are routinely applied to evaluate semen quality (Selvaraju *et al*., 2008).

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MATERIALS AND METHODS

Semen ejaculates were harvested from 25 Murrah buffalo breeding bulls belonging to Central Semen Station, Bhopal. From each bull five samples were collected, at an interval of 7 days. Semen evaluation was done immediately after collection. Volume of the semen was noted directly from the graduations of semen collection glass tube. Mass motility was observed as per the procedure described by Herman and Madden (1953). The individual motility of spermatozoa was expressed in terms of percentage of progressively motile spermatozoa (Zemjanis, 1970). Spermatozoa concentration (million/ml) was determined using photo colorimeter (IMV), standardized at 530 n (Willet and Buckner, 1951). Vital count of spermatozoa (percentage) was estimated using Eosin-Nigrosin staining technique (Campbell *et al*., 1956). Sperm morphological abnormalities in head, middle piece and tail were studied as per the procedure described by Rao, 1971.

For TSC measurement, the scrotal content was held in the ventral scrotum from the cranial side of the scrotum. The measurement was made correctly at the widest point of scrotum (Rosenberger, 1979) with plasticized cloth tape that followed the contour of the scrotum more closely as described by Foote, 1969. Prior to TSC measurement of scrotal circumference, clinically detectable testicular and epididymal pathological conditions were ruled out. The relationship of scrotal circumference with various seminal attributes were be studied by calculating correlation coefficient (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Scrotal circumference

Maximum scrotal circumference (40±1.09 cm) was observed in bulls of above 8 years age group the lowest (35.8±0.727) was observed in age group of 2 to 4 years. The scrotal circumference of 2 to 4 years age group differed significantly from that of 4 to 8 years and above 8 years age groups. The findings are in accordance with the observation of Nema and Kodagali, 1994, in Surti buffalo bulls and Younis *et al*., 2003 in Nili Ravi buffalo bulls. The scrotal circumference did not vary significantly between the bulls.

Seminal attributes

The means and standard errors for various seminal attributes semen abnormalities are presented in Table 1.

Volume

The overall mean semen volume recorded was 2.71±0.112 ml (Table 1) ranging from 2±0.332 to 4.4±0.87 ml. Analysis of variance revealed non-significant difference ($P<0.05$) in the volume of semen between bulls. This is in agreement with the findings of Dhami *et al*., 1998; Prajapati *et al*., 2000; Tiwari *et al*., 2009 who reported almost similar volume of semen in Tarai and Surti buffalo bulls. Patel *et al*., 2012 reported higher values in Jafarabadi, Mehsana and crossbred (HFx Kankrej, F1). These variations may be attributed to breeds.

Mass motility

Based on 0 to 5 scale, the mean mass motility (3.34±0.073) of spermatozoa in the semen of breeding bull ranged from 2.6 to 4.0 ($P>0.05$). These observations are in close resemblance to the findings of previous workers (Shukla and Misra,

Table 1. Age group wise seminal attributes and scrotal circumference (Mean ±SE).

Seminal attributes	Group I 2 to 4 years (11 bulls)	Group II 4 to 8 years (7 bulls)	Group III above 8 years (7 bulls)	Overall Mean±SE (25 bulls)
Volume (ml)	2.92±0.16	2.75±0.19	3.51±2.83	2.71±0.11
Sperm concentration (mill/ml)	942.9±56.50	954.2±73.96	1070.4±48.26	978.9±34.37
Mass activity (score)	3.26±0.0.10	3.28±0.15	3.28±0.08	3.34±0.07
Progressive motility (%)	67.48±9.79	67.68±2.81	70.9±0.96	68.4±1.30
Live sperm count (%)	89.64±0.47	90±0.97	89.58±0.75	89.52±0.38
Sperm morphology (%)	11.1±0.68	12±0.90	10.1±0.40	11.12±0.41
Scrotal circumference (cm)	35.8±0.72[a]	37.4±1.52[b]	40±1.09[b]	38.2±0.35
Head abnormalities	1.54±0.2	2.28±0.36	1.28±0.18	1.68±0.16
Mid piece abnormalities	1.8±0.29	2.57±0.65	1.71±0.285	2.0±0.23
Tail abnormalities	4.09±0.91[a]	5.28±0.52[b]	6.5±0.369[b]	5.12±0.47
Total abnormalities	7.43±1.40[a]	10.13±1.53[b]	9.56±0.80[b]	8.82±0.87

Means with different superscript within row differ significantly from each other.

Table 2. Correlation of seminal attributes with scrotal circumference.

Parameters	Age (year)	Volume (ml)	Mass activity	Progressive motility (%)	Sperm Conc. (million/ml)	Live sperm count (%)	Sperm abnormalities (%)	Scrotal circumf. (cm)
Age	1.000							
Volume	0.48*	1.000						
Mass activity	0.281	0.20	1.000					
Progressive motility	0.33	0.15	0.55*	1.000				
Concentration	0.37	0.06	0.40	0.20	1.000			
Live sperm count	- 0.09	0.07	0.21	0.16	0.22	1.000		
Sperm abnormalities	0.22	-0.25	-0.31	-0.31	0.07	0.05	1.00	
Scrotum circumference	0.42*	0.32*	0.35	0.21	0.37	0.07	-0.32*	1.000

* ($P<0.05$)

2005).

Progressive motility

The overall mean progressive motility of spermatozoa in present study was found to be 68.4±1.30%, ranging between 55 to 77%. Between bull variation in the progressive motility of spermatozoa was found to be statistically non significant. The present findings are in close agreement with the observations of Tulli, 1984; Pandey, 2001; Narayan *et al*., 1999, though, Selvaraju *et al*., 2008 reported lower progressive motility in Murrah bulls.

Sperm concentration

The mean value of sperm concentration (978.9±34.37 million/ml) in semen of buffalo breeding bulls, ranged from 632.8 to 1335.8 million/ml. The present results corroborate with the findings of Tiwari *et al*., 2009 in Tarai buffalo bulls. Selvaraju *et al*., 2008 reported a very higher concentration of sperm in Murrah buffalo bulls.

Live sperm count

The overall mean live spermatozoa count was 89.52±0.38%, with a range of 86.4 to 92.6%. Statistically it did not reveal significant difference between the bulls. The present study is in agreement with the finding of Dube *et al*., 1982, Shelke and Dhami, 2001; Shukla (2002), who also recorded similar, mean percent live spermatozoa in the neat semen of the Murrah bulls.

Sperm abnormalities

The mean percentage of abnormal spermatozoa in the semen of different bulls was 8.82±0.873%, which is fairly well comparable with the findings of previous workers (Jainudeen *et al*., 1982; Dhami, 1998; Pandey, 2001; Patel, 2011). The average head and mid piece abnormalities of spermatozoa observed were 1.68±0.160 and 1.71±0.285, respectively. Comparable finding have been reported by Gunarajsingham *et al*., 1996, Veerabramhaiah *et al*., 2010; Patel, 2011 for sperm head and by Sreemannarayana and Narasimharao, 2000, Shukla, 2002; Patel, 2011 for mid piece abnormalities. There was no significant variation between bull and between replicate.

Correlation of seminal attributes with scrotal circumference

The coefficients of correlation of age of animal with seminal attributes and among various seminal attributes in present Table 2. The correlation of age of the bull with that of volume and scrotal circumference was positive and significant. The correlation between age and other seminal attributes was non-significant and positive except with that a live sperm count significant correlation was also observed between volume and scrotal circumference, mass activity and progressive's motility. The correlation between sperm abnormalities and scrotal circumference was negative and significant. The correlations among other seminal attributes were non-significant.

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