SEASONAL VARIATION IN THE CHARACTERISTICS OF THE SWAMP BUFFALO SEMEN OF NORTHEAST INDIA

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ABSTRACT

Different workers have reported better semen quality in buffaloes during hot and humid summer than in colder months, whereas contrary observations were also reported by many workers. Therefore, an initial study was attempted to find out the seasonal effect on semen characteristics of the swamp buffaloes of north eastern India. Data of semen characteristics pertaining to four bulls of four years were used for the study. The semen was collected by artificial vagina and the fresh semen was evaluated as per standard methods. The season was divided into Pre-monsoon (March to May), Monsoon (June to September), Post-monsoon (October to November), and winter (December to January) on the basis of meteorological data of the area. The volume of the semen was significantly ($P<0.05$) higher during Monsoon in comparison to other seasons. Mass activity, initial motility, per cent livability and sperm concentration did not differ significantly among the seasons. In conclusion, there is no significant effect of season on mass activity, initial motility, percent live sperm and concentration in swamp buffalo semen of north east India except the semen volume.

Keywords: semen, season, swamp buffalo, India

INTRODUCTION

India has a rich genetic resource of buffalo comprising of 13 registered riverine buffalo breeds along with many lesser known populations of significant regional importance. The riverine buffalo (*Bubalusbubalis*) is found throughout the length and breadth of the country, while the swamp buffalo (*Bubalus bubalis carabanesis*) is restricted to Assam and other Northeastern states of the country (Kalita *et al*., 2010). These animals are particularly suitable for ploughing paddy fields and providing draught power for varied agricultural activities. They are hardy animals and capable of readily using low-quality feedstuff and well suited to swampy, hot and humid tropical climate of the region. These buffaloes play important role in the socio-economic conditions of the rural population of the region. They are unique germplasm and need considerable attention for conservation. An initial study was made on the seminal attributes of these animals for using in artificial insemination programmes (Das *et al*., 2007). Buffalo bulls breed round the year but conflicting reports have been published about the semen quality and volume during various seasons. Different workers had studied the influence of season on semen quality in different species of animals (Javed *et al*., 2000;

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Koonjaenak *et al.*, 2007; Safaa *et al*., 2008; Tiwari *et al*., 2012). However, to the best of our knowledge, there is no literature available regarding seasonal effect on the fresh semen quality of these buffaloes. Therefore, an initial study was attempted to find out the seasonal effect on fresh semen characteristics of the swamp buffaloes of north-eastern region of India.

MATERIALS AND METHOD

Semen was collected from four swamp buffalo bulls (aged 3 to 4 years) maintained in the buffalo farm of the Network Project on Swamp Buffalo, College of Veterinary Science, Khanapara, Guwahati, Assam, India, using artificial vagina following twice a week schedule. They were managed uniformly under intensive system of management, fed concentrate mixture as per the body weight and green fodders *ad libitum*. Immediately after collection semen samples were taken into the laboratory and kept at 37ºC in a water bath. Ejaculates were evaluated for volume (ml), mass activity (0 to 5 scale), initial motility (%), livability (%) and the sperm concentration.

Semen volume (ml) was determined by reading the volume in the pre-warmed graduated glass collection tube. The mass activity of fresh semen was evaluated (100 × magnification) on the basis of a scale from 0 to 5 (0 = all spermatozoa are motionless, 5 = 90% or more of the spermatozoa are rapidly moving waves). Initial sperm motility was evaluated as a percentage, using a drop of semen diluted in Tris buffer at 37°C, and observed on a pre-warmed slide at a 100x magnification under microscope. Per cent livability was estimated by staining with eosin and nigrosin stain and counting 200 cells under microscope at 400x magnification. The sperm concentration (million/ml) was calculated by diluting the semen (1:400) using a Sahli pipette in a formol citrate solution and measured by counting in an Improved Neubauer chamber at a 400x magnification under a microscope.

Semen characteristics data of four year involving four seasons were taken into account for the study. The season was classified into pre-monsoon (March to May), monsoon (June to September), post-monsoon (October to November), and winter (December to January) on the basis of meteorological data of the area.

The data obtained were subjected to compute analysis of variance (ANOVA). Duncan's Multiple Range Test was performed to identify significant difference among the seasons as per Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

The mean values (±S.E.) for various characteristics of fresh semen of swamp buffaloes of northeast India viz., semen volume, mass activity, initial motility, present livability and sperm concentration are presented in Table 1.

The ejaculate volume in the present study varied from 1.08±0.06 to 1.78±0.21 ml among different seasons with an overall average of 1.28±0.17 ml. Das *et al*. (2006) recorded a similar value of 1.90±0.16 ml ejaculate volume in swamp buffaloes of Assam. However, in contrast to the present finding Koonjaenak *et al*. (2007) reported a higher volume of 3.2 to 3.8 ml in swamp buffaloes of Thailand. This difference may be due to variation in genetics, reproductive health status of bulls, age of bulls, frequency of collection, nutrition and management. The reported ejaculate volume in the

swamp buffaloes of India is much lower than the values of other riverine buffalo breeds (Javed *et al*., 2000; Maurya *et al*., 2003; Bhakat *et al*., 2011). In the present investigation the semen volume was significantly higher (P<0.05) during monsoon than in other seasons. Javed *et al.* (2000) also recorded significant effect of season on the ejaculate volume of Nili-Ravi buffalo bull. However, Alavi-Shoushtari and Babazedeh-Habashi, (2006) found semen volume had no significant variation in different seasons in Azarbaijani buffalo.

The mass activity in the present investigation varied from 3.51±0.12 to 3.78±0.06 with an overall mean of 3.63±0.08 in a 0 to 5 scale. Similar to present findings Das *et al*. (2006) reported mass activity of 3.12±0.13 in swamp buffaloes of Assam. Javed *et al.* (2000) recorded overall mass activity score of 2.65±1.03 in Nili-Ravi buffalo semen. They further reported mass activity score was higher (P<0.05) in dry summer and spring. However, in our study the mass activity varied during different seasons but it was statistically not significant. The initial sperm motility ranged from 77.50±0.92 to 79.66±0.74% with an overall average of 78.94±0.49%. Koonjaenak *et al.* (2007) reported initial sperm motility ranged from 72.8 to 75.2% in Thai swamp buffaloes, which is almost consistent with the present findings. They further concluded that the season has no influence on the initial sperm motility. In the present investigation also the initial motility in swamp buffalo semen did not differ significantly between the seasons. Javed *et al.* (2000) recorded much lower values of overall sperm motility (56.89±0.65%) in Nili- Ravi buffaloes with significantly (P<0.05) lower values in winter than humid summer and autumn.

Percentage of live sperm varied from 89.36±0.85 to 90.21±0.80 with an overall mean of 89.91±0.19 in the present study. The present values are higher than the findings of Das *et al*. (2006) for swamp buffaloes and Alavi-Shoushtari and Babazedeh-Habashi (2006) for Azarbaijani buffaloes. Although, the live sperm percentage varied between the seasons but statistically not significant. Non- significantly highest value was recorded during post-monsoon and lowest during monsoon season. In contrast to our findings, Pant and Mukherjee (1972) reported that the percentage

Table 1. Semen characteristics (Mean±S.E.) of swamp buffalo of north east India during different seasons.

Semen characteristics	Seasons				Overall
	Pre-monsoon	Monsoon	Post-monsoon	Winter	
Volume (ml)	1.15^{a}±0.05	1.78^{b}±0.21	1.12^{a}±0.04	1.08^{a}±0.06	1.28±0.17
Mass activity (0-5 scale)	3.47±0.07	3.51±0.12	3.75±0.07	3.78±0.06	3.63±0.08
Initial motility (%)	79.35±0.72	77.50±0.92	79.26±0.67	79.66±0.74	78.94±0.49
Livability (%)	89.97±0.77	89.36±0.85	90.21±0.80	90.10±0.71	89.91±0.19
Concentration (million/ml)	1016.13±28.25	1113.33±53.97	998.53±53.53	1100.34±56.49	1057.08±29.07

Means with different superscript in a row differ significantly (P<0.05).

of live spermatozoa decreased with increase in air temperature and humidity in Murrah buffaloes.

The sperm concentration (million/ml) varied from 998.53±53.53 to 1113.33±53.97 with an overall average of 1057.08±29.07. Present value is in consistent with the values of Koonjaenak *et al.* (2007) for Thai swamp buffaloes (1.1 to 1.2 billion/ml). Das *et al.* (2006) reported a lower concentration of 968.88±104.87 million/ml in swamp buffaloes of Assam in comparison to the present study. Although, highest value was recorded in monsoon and the lowest in post-monsoon season, however, the results are not significant. Koonjaenak *et al.* (2007) also found that season has no influence on the sperm concentration in the semen of Thai swamp buffaloes. In contrast to our study, Javed *et al.* (2000) reported influence of season in the sperm concentration of Nili- Ravi bulls during autumn and spring.

In conclusion, present study revealed that there is no significant effect of season on mass activity, initial motility, percent livability and sperm concentration of swamp buffalo semen reared in the north eastern India except the semen volume. The semen volume found to be significantly higher ($P<0.05$) during monsoon season.

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