

SEASONAL VARIATIONS IN SEMEN PRODUCTION OF MURRAH BUFFALO BULLS

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ABSTRACT

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Total of 4834 ejaculates collected from seven Murrah buffalo bulls were studied to observe the effect of seasons on semen quality, freezability and loss of male gametes during frozen semen production. Mean values for seminal parameters viz. number of ejaculates per month, seminal volume (ml), initial motility (%), sperm concentration ($10^6/ml$), sperm output per ejaculate (million) and post-thaw motility (%) were 14.38 , 3.12 ± 0.02 , 67.42 ± 0.07 , 1139.71 ± 5.89 , 3487.59 ± 28.58 and 53.68 ± 0.08 respectively. Sperm concentration, initial and post-thaw sperm motility differed significantly ($P < 0.05$) between seasons, however volume and sperm output per ejaculate did not differ significantly between seasons. Bull to bull variations was significant ($P < 0.05$) for all seminal parameters. Discard rate of frozen semen doses was highest during monsoon season followed by summer and winter.

Key words: Murrah, Seminal characteristics, Seasons

INTRODUCTION

Buffaloes contribute about 56.9% (50.74 million ton) of the country's total milk production and India produces 66.2% of the world's total buffalo milk production (Anon, 2004). Use of frozen semen plays major role in scientific breeding of cattle and buffaloes. For production of good quality buffalo semen for use in artificial insemination, it is essential to study the effect of non-genetic factors on semen production and implement corrective measures accordingly. The present study was designed to investigate the effect of seasons on the quality of buffalo bull semen being produced at Animal Breeding Centre, Salon in Rae Bareilly district of Uttar Pradesh.

MATERIALS AND METHODS

Seasonal variations in semen production, freezability and reproductive losses of male gametes of seven Murrah buffalo bulls maintained at Animal Breeding Center, Salon were studied from January 2002 to December 2005. Seasons were classified as winter, summer and monsoon as per climatic data collected at the center. Age of the bulls included in the study ranged between 64 and 70 months. The bulls were found to be negative for Brucellosis, Tuberculosis, Paratuberculosis and Infectious Bovine Rhinotracheitis (IBR). All the bulls were kept under uniform conditions of care and management. Semen was collected from all the bulls twice a week using artificial vagina. Two false mounts were given to each bull before collection. On each collection normally two ejaculates and rarely one ejaculate were obtained from each bull. The total number of ejaculates collected from these bulls were 4834, of which 4042 ejaculates were frozen. The remaining 792 ejaculates were discarded due to poor quality semen. Ejaculate volume was recorded immediately after collection and sperm concentration was estimated by Accucell photometer (IMV). Semen was diluted in tris diluent (Rasbech, 1975) and freezing

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was carried out after equilibration under standard conditions (Graham *et al.*, 1985). Post-thaw progressive motility was assessed 24 hrs after freezing. If the progressive motility was more than 50 % only then the frozen semen was preserved. The data was analysed using two way ANOVA as described by Snedecor and Cochran (1989).

RESULTS AND DISCUSSIONS

Ejaculates per Month (EPM): In this study the average EPM per bull was 14.38 (Table) which was higher during summer followed by monsoon and winter seasons. However, Tomar *et al.* (1964) obtained lower values (4.37 ± 0.37) in Murrah bulls, whereas Singh *et al.* (1994) obtained 5.85 ± 0.18 ejaculates per month in Mehsana bulls. This might be due to increased collection frequency of semen at Animal Breeding Centre in comparison with other research centers.

Ejaculate Volume (EVOL): The overall mean EVOL was found to be 3.12 ± 0.02 ml (Table). It was observed that EVOL did not differ significantly between seasons, but differed significantly ($P < 0.05$) between the bulls. Significant variation in EVOL between bulls was also reported by Bhoeraker *et al.* (1988) in Murrah bulls. In the present study the semen volume during monsoon was higher and it was lower during summer. Lower EVOL recorded during summer season corroborates with the findings of Tomar *et al.* (1964) and Bhoerakar *et al.* (1988, 1992). Estimation of reproductive wastage in the present study revealed that variation in discard of neat semen volume was significant ($P < 0.05$) between bulls and between years. The overall mean for EVOL of rejected neat semen was 2.83 ± 0.06 ml and the rejection rate of semen volume was similar during summer and monsoon, however it was lower during winter season.

Sperm Concentration (SCON): The mean SCON was 1139.71 ± 5.89 million/ml (Table). SCON was found

significant ($P < 0.05$) between bulls as well as between seasons. Difference in SCON during the summer and monsoon season was not significant, but it was significantly lower during winter season. Significant seasonal influence on SCON corroborates with findings of Gill *et al.* (1974), Rao *et al.* (1991), Bhoeraker *et al.* (1992), Singh *et al.* (1992), Mandal *et al.* (2000) and Ravimurugan *et al.* (2006) in Murrah bulls. However, Tomar *et al.* (1966) did not observe significant seasonal variation in SCON in this breed. The overall mean of reproductive wastage for SCON was 878.85 ± 16.30 million/ml and differed significantly ($P < 0.05$) between seasons, bulls and year.

Sperm output per ejaculate (SOUT): Mean SOUT in Murrah buffalo bull semen was found to be 3478.59 ± 28.58 million (Table). Bull to bull variation in SOUT was significant ($P < 0.05$). Though the seasonal variation was not observed in sperm output but higher values were observed during summer, compared to winter and monsoon seasons. On the contrary Gill *et al.* (1974) and Dhama *et al.* (1998) reported seasonal variation in SOUT in Murrah Bulls. The overall mean for loss of SOUT was 2712.41 ± 85.29 million/ml. The loss of SOUT was found to be significant ($P < 0.05$) between bulls and the year, but it was non-significant between seasons.

Post-Thaw Motility (PTM): Mean PTM was 53.68 ± 0.08 % (Table). Results revealed that PTM differs significantly ($P < 0.05$) between seasons as well between bulls. Higher values in winter, followed by summer and monsoon seasons have also been reported by Sagdeo *et al.* (1991) in Surti buffalo bulls.

Based on higher ejaculate volume, percent initial motility, post-thaw motility and lower discard rate of neat and frozen semen during winter season, it is concluded that winter is the best season for production of frozen semen of Murrah buffalo bulls.

TABLE : MEAN \pm SE OF SEMINAL ATTRIBUTES OF MURRAH BULLS

Season	No. of ejaculate per month/ bull	Ejaculate volume (ml)	Sperm concentration (10^6 /ml)	Sperm out put/ejaculate (million)	Initial motility (%)	Post-thaw motility (%)
Winter	13.38 (1544)	3.12 \pm 0.03 (1314)	1111.86 ^b \pm 10.24 (1314)	3408.17 \pm 49.78 (1314)	68.00 ^a \pm 0.12 (1314)	54.43 ^a \pm 0.15 (1271)
Summer	14.88 (1667)	3.10 \pm 0.04 (1371)	1159.01 ^a \pm 10.14 (1371)	3527.76 \pm 51.90 (1371)	66.47 ^b \pm 0.12 (1371)	53.56 ^a \pm 0.15 (1261)
Monsoon	14.49 (1623)	3.15 \pm 0.03 (1357)	1147.19 ^a \pm 10.17 (1357)	3497.11 \pm 46.65 (1357)	67.83 ^a \pm 0.11 (1357)	53.14 ^b \pm 0.14 (1230)
Overall	14.38 (4834)	3.12 \pm 0.02 (4042)	1139.71 \pm 5.89 (4042)	3487.59 \pm 28.58 (4042)	67.42 \pm 0.07 (4042)	53.68 \pm 0.08 (3762)

Note: Means bearing a common superscript in columns do not differ significantly with each other ($P > 0.05$)
 Figures in parentheses are no. of observations

REFERENCES

- Anon. (2004) FAO, Data Bank, Italy, 2004.
- Bhosrekar, M.R., Purohit, J.R., Pande, A.B. and Mangurkar, B.R. (1988). Effect of season on frozen semen production in Murrah buffalo bulls. *Indian J. Anim. Sci.*, **58**(9):1073-1074.
- Bhosrekar, M.R., Purohit, J.R., Gokhale, S.B. and Mangurkar, B.R. (1992). Semen characteristics and behavioral patterns of buffalo bulls in relation to age and season. *Indian J. Anim. Sci.*, **62**(3):251-255.
- Dhami, A.J., Mohan, Greesh and Sahni, K.L. (1998). Seasonal influence on the quality and freezability of semen of Friesian and Murrah buffalo bulls. *Indian J. Anim. Reprod.*, **19**(1):55-58.
- Gill, R.S., Gangwar, P.C. and Takkar, O.P. (1974). Seminal attributes in buffalo bull as affected by different seasons. *Indian J. Anim. Sci.*, **44**(7): 415-418.
- Graham, E. F, Crabo, B. and GandBrown, K.L. (1985). Effect of some zwitter ion buffers on freezing and storage of spermatozoa of bull. *Indian J. Dairy Sci.*, **55**:372-378.
- Mandal, D.K., Nagpaul, P.K. and Gupta, A.K. (2000). Seasonal variation in seminal attributes and sexual behaviour of Murrah buffalo bulls. *Indian J. Dairy Sci.*, **53**(4):278-283.
- Rao, A.V.N., Rao, C.V. and Harnath, G.B. (1991). Effect of collection frequency, age and season on quantitative seminal characteristics in Murrah bulls. *Indian Vet. J.*, **68**(11):1084-1085.
- Rasbech, N.C. (1975). Tris egg yolk citric acid glycerol as extender for bovine semen. Manual for Indo-Danish Training course, DANIDA. Institute for Animal Reproduction, Copenhagen.
- Ravimurugan, T., Kanakaraj, P. and Thangaraju (2006). Effect of season on semen production traits in Murrah buffalo bulls. *Tamilnadu J. Vet. & Anim. Sci.*, **2**(3): 109-111.
- Sagdeo, L.R., Chitnis, A.B. and Kaikini, A.S. (1991). Effect of seasonal variations on freezability of Surti buffalo bull semen. *Indian J. Anim. Reprod.*, **12**(1):1-3.
- Singh, D.V., Tripathi, V.N. and Dave, A.S. (1994). Factors affecting seminal attributes of Mehsana bulls. *Indian Vet. J.*, **71**:1185-1189.
- Singh, Madhumeet, Singh G.D. and Panth, H.C. (1992). A study on semen quality of Murrah buffalo bulls under temperate climate. *Indian Vet. med. J.*, **16**: 194-197.
- Snedecor, G.W. and Cochran W.G. (1989). Statistical methods, 8th edn. The Iowa state university press, Iowa, USA
- Tomar, N.S. Mishra, B.J. and Johari, C.B. (1966). Seasonal variation in reaction time and semen production and prediction of some semen attributes on initial motility of spermatozoa in Hariyana and Murrah bulls. *Indian J. Dairy Sci.*, **19**:87-93.
- Tomar, N.S., Sharma, S.C., Pandey, R. and Desai, R.N. (1964). Sexual behavior of bulls in relation to oestrous frequency in females. *Indian J. Vet. Sci. & Anim. Husb.*, **34**:108.