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FROZEN SEMEN PRODUCTION PERFORMANCE OF MURRAH BUFFALO BULLS

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ABSTRACT

A study was conducted to evaluate semen output characteristics of 3,933 ejaculates of 36 Murrah buffalo bulls maintained at the Artificial Breeding Complex, NDRI, Karnal, India. The objective of this study was to estimate expected frozen semen dose production. Age of bulls at collection during the study period (1996 to 2006) ranged from 2.31 to 7.36 years, with a mean of 4.46 ± 0.22 years. The average ejaculate volume (VOL, ml), mass activity (MA), percent motility (IM), sperm concentration per ml (SPC, millions) and total sperm output per ejaculate (SPCE, millions) were 2.58 ± 0.09 (1.79 - 3.61 ml); 2.88 ± 0.02; (2.62 - 3.19); 66.63 ± 0.44% (61.58 - 71.93%); 998 ± 10.90 (853.49 - 1125.23) and 2561.05 ± 77.80 (1783.59 - 3545.20, respectively). The average dilution rate was found to be 1: 12.49 ± 0.13, ranging from 1:10.67 to 14.07. The expected number of ejaculates that could be frozen per year per bull was 53.27 (21 - 74) and correspondingly expected frozen doses produced per year per bull were 6,879.49 (2,826.31 - 12,550.00).

Keywords: Murrah, semen quality, expected no. of ejaculate frozen, dose produced

INTRODUCTION

With globalization, the dairy industry has witnessed an increased demand for semen from superior sires. India has the largest breeding infrastructure in the world (64 frozen semen bull stations and more than 54,000 AI centers). Presently, total semen production is around 30 million frozen semen straws. It is envisaged that 60% of the breedable bovine population will be covered by A.I. (XIth five year plan; which would require around 66 million straws) and the remaining 40% through natural service with bulls of high genetic merit. In India, the result of AI is much below the desired level. As such, A.I. as a tool for livestock development is hardly applicable to 15% to 20% of bovine population. Artificial insemination using frozen semen is now the most widespread tool employed nationwide for improving the genetic potential of livestock. Attempts are being

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intensified to increase the coverage of AI so as to exploit the full potential of the technology. The use of the best bulls is often restricted by the limited number of doses of semen produced as there are several inherent and functional constraints in realizing the breeding goals through AI. Apart from the fact that buffalo bulls are known for poor libido, there are also anatomical and physical limitations to production of quality germplasm with good number of viable sperms throughout the year. The relatively smaller testicular size, lower daily sperm production rate and epididymal sperm reserve in buffalo bulls compared to cattle are some of the natural inbuilt constraints of this species (Suryaprakasam and Narsimha, 1993; Sudheer and Xavier, 2000; Singh et al., 2003). Besides these constraints, seasonal influences (Mondal et al., 2000) and prophylactic measures (Kammar and Gangadhar, 1998; Murugavel et al., 2000; Mathur et al., 2003) also adversely affect semen production performance directly or indirectly. There is much wastage of superior germplasm due to poor semen quality, poor freezability; and poor libido (Suryaprakasam and Narsimha, 1993; Sudheer and Xavier, 2000) resulting in immense economic losses as well as reduction in genetic gain. To satisfy the increasing demand for semen from superior sires, the AI industry has to optimize the number of spermatozoa per dose of semen in order to produce maximum number of straws with optimum conception rate. The objective of the present study was to gather basic information on semen characteristics and expected frozen semen production in Murrah buffalo bulls, which will facilitate in planning semen stations considering all the managerial factors affecting semen production in the tropical regions.

**MATERIALS AND METHODS**

Data on ejaculates of Murrah buffalo bulls were collected from the Artificial Breeding Complex, National Dairy Research Institute, Karnal, Haryana, India. In the AI unit, young bulls were evaluated for sperm quality and production capability. Tests for sexual performance begin at the onset of puberty. Subsequently, bulls are tested for semen donates and judged on sexual behavior, size of the testes and sperm production. Bulls were kept in individual pens under a loose housing system on a concrete floor with the orientation of its long axis in the east-west direction. The bulls were fed concentrate ration 2.5 kg per bull. Institute farm - grown seasonal green fodder such as maize, cowpea, berseam, jowar etc., depending on their availability, along with mixture of maize and oat silage during lean periods was available ad lib to the animals. The data were compiled on a total of 3,933 ejaculates of 36 Murrah buffalo bulls maintained during the period from 1996 to 2006 from the Artificial Breeding Complex, NDRI, Karnal, India. The ejaculates were collected by AV technique once a week with two ejaculates with a gap of 20 to 30 minutes. Information collected on each ejaculate included date of collection, ejaculate number for the day, volume of the ejaculate, mass activity, concentration of sperm per ml and percentage of motile sperm. Bulls not donating semen were excluded from the data set. The bulls which gave freezable quality semen for at least six month were considered in the present study. Out of 72 Murrah buffalo bulls, data on 36 MU buffalo bulls were used to calculate the expected frozen dose produced. Total sperm production (million), no. of ejaculate frozen/bull/year and frozen dose produced per bull per year were derived from the available information. In this experiment, the
expected frozen dose producing ability per bull per year was calculated by utilizing semen production data using standard statistical tools (Snedecor and Cochran, 1967).

**RESULTS AND DISCUSSION**

The AI industry aims at maximizing production of semen doses from bulls of high genetic merit. Therefore, the expected frozen dose producing ability per bull per year was calculated on the basis of semen data of MU bulls. This information will help in planning semen station establishment to meet the growing demand for AI considering all the managemental factors affecting semen production in tropical climates. The results of the performance of Murrah buffalo bulls regarding seminal attributes and expected frozen semen dose production are depicted in Table 1.

Age of the bulls at collection during the study period (1996 to 2006) ranging from 2.31 to 7.36 years, with a mean of 4.46 ± 0.22 years. The average semen volume of 36 Murrah bulls was 2.58 ± 0.09 ml (ranging from 1.79 to 3.61 ml) which can be compared to findings of other workers (Prajapati., 1995; Mondal, 1998). However, several workers reported higher (Singh et al., 1992; Misra et al., 1994; Rao and Sreemanarayana, 1996; Shukla and Mishra, 2005; Ravimurugan et al. 2008) ejaculate volume. The average mass activity i.e., 2.88 ± 0.02 (ranging from 2.62 to 3.19) was similar to earlier findings (Bhakat, 1994; Mondal, 1998); however, others have reported higher mass activity (Ram, 1988; Dhami, 1992; Shukla and Mishra, 2005). The average initial motility (66.63 ± 0.44%, ranging from 61.58 to 71.93%) in the present study was comparable to the findings of Kumar et al. (1993) and Ravimurugan et al. (2008). However, some reports showed higher percentages of initial motility (Bhosrekar et al., 1994; Misra et al., 1994; Sahu and Pandit, 1997; Pandey, 2001; Shukla and Mishra, 2005). The average sperm concentration (998.91 ± 10.90 millions/ml, ranging from 853.49 to 1125.23×10⁶/ml) observed in the present study was in agreement with the findings of Ram (1988) whereas higher (Misra et al., 1994; Pratap et al., 1999; Prajapati et al., 2000; Shukla and Mishra, 2005) values as well as lower (Ravimurugan et al., 2008) were recorded by other researchers. These higher estimates in comparison to our study may be due to the fact that their studies might have been based on selected bulls with very high semen producing ability. The average total sperm output of Murrah buffalo bulls was 2,561.05 ± 77.80×10⁶ (ranging from 1783.59 to 3545.20×10⁶). The average dilution rate was found to be 12.49 ± 0.13, with a range of 10.67 to 14.07. The expected number of ejaculates that could be frozen per year per bull was 53.27 (ranging from 21 to 74) and correspondingly, the expected frozen doses produced per year per bull could be 6,879.49 (ranged 2826.31 to 12550). Zafar et al. (1988) reported yearly production to be 8,412 semen doses per bull in Nili-Ravi buffalo bulls, which was higher than the estimate for Murrah bulls in the present study. The present values were higher than those reported by Roy (2006) in Murrah bulls (5,147.48 doses/year/bull).

From these findings, it can be concluded that the expected number of ejaculates that could be frozen per year per bull was 53.27 (ranging from 21 to 74) correspondingly, the expected frozen doses produced per year per bull could be 6,879.49 (ranging from 2826.31 to 12550.00) in Murrah bulls.

The production of semen from these bulls can be further increased by certain managemental interventions, i.e. control of housing and
environmental variation can be controlled through providing comfortable housing conditions throughout the years. Feeding management with supplementation of minerals and vitamins from calfhood as evident on our farm, and vaccination rescheduling and development of; new vaccines with less anaphylactic stress.

The variations in semen quality parameters recorded in the present investigation, which were well supported by earlier reports, may be due to individual variations (Saxena and Tripathi, 1978), ejaculate frequency (Nath, 1988), differences in age (Bhat et al., 2002), genetic make up of the bulls (Tomar et al., 1966), season of study (Tuli, 1984) and agro climatic conditions.

**REFERENCES**


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