

## Semen characteristics, semen discard rate and fertility in Murrah buffalo bulls

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### ABSTRACT

A total of 2747 collections from 24 buffalo bulls were evaluated to find the per cent semen discard at the time of semen collection and also during freezing process. Bulls were categorized into three semen discard groups; low (30-50%), medium (50-70%) and high (70-90%). The various parameters viz. age at first collection, body weight at first collection, average semen volume, pre and post-freezing discard, initial motility, post-thaw motility and conception rate were studied among these groups to find the effect of discard rate on fertility of Murrah buffalo bulls. The mean values of various parameters viz. age at first collection (months), body weight at first collection (kg), average semen volume (ml), pre-freezing discard (%) and post-freezing discard (%), initial motility (%), post-thaw motility (%) and conception rate (%) were  $27.2 \pm 1.37$ ,  $386.50 \pm 21.06$ ,  $3.47 \pm 0.14$ ,  $32.41 \pm 2.87$ ,  $29.30 \pm 2.26$ ,  $57.37 \pm 1.06$ ,  $42.71 \pm 0.81$  and  $29.36 \pm 2.15$ , respectively. The results have shown that the age and weight of bulls at sexual maturity were lowest in high semen discard group ( $22.9 \pm 2.88$  months and  $347.5 \pm 45.17$  kg). The mean value of age and body weight at first collection, average semen volume, pre-freezing semen discard and conception rate did not vary significantly among three discard groups. The results indicate that conception rate of bulls is not effected by discard rate of semen. Post-freezing discard was significantly higher ( $P \leq 0.01$ ) in high discard group as compared to other discard groups. Initial motility and post-thaw motility of semen was significantly higher ( $P \leq 0.01$ ;  $P \leq 0.05$ ) in low discard group as compared to medium and high discard groups. The results indicated that the studies on semen discard rate would help to identify bulls with minimum discard rate with best semen characteristics for selection in breeding programme to meet the semen production targets for genetic improvement of this species.

**Key words:** Semen characteristics, discard rate, fertility, Murrah buffalo bull

Among various factors contributing the enhanced semen production and breeding efficiency, identifying the right bulls for favourable characters is of prime importance. The selection of bulls should be wide enough to accommodate all characters of semen production ability and fertilizing ability along with other traits essentially needed by breeding bulls. Identifying the bulls with lower discard rate is of prime importance to meet the targets of frozen semen production in a stipulated period for effective utilization in breeding programme for genetic improvement of buffaloes. Although extensive information is available on the seminal characteristics in relation to age and season (McCool and Entwistle, 1989; Saeed *et al.*, 1990; Javed *et al.*, 1997; Kolev and Dimov, 1998; Younis *et al.*, 1998), semen cryopreservation (Misra *et al.*, 1994; Kolev, 1996; Satish *et al.*, 1997; Pawan *et al.*, 2000; Subash *et al.*, 2001; Rao *et al.*, 2002); relationship among various seminal attributes (Tomar

and Singh, 1996; Madhumeet *et al.*, 1999; Pant *et al.*, 2002) and physical, morphological and biochemical aspects of semen (Aquiar *et al.*, 1976; Narayan Pratap *et al.*, 1999) but few reports are available on the semen discard rate in buffalo bulls (Sagdeo *et al.*, 1991; Jindal *et al.*, 1996). Therefore, the present investigation has been carried out to study the semen discard rate, semen characteristics and fertility in Murrah buffalo bulls.

### MATERIALS AND METHODS

Twenty-four young breeding buffalo bulls (2.0 - 2.5 years old) at PAU Dairy Farm, Ludhiana were undertaken in the present studies. Semen was collected twice a week by using an artificial vagina and a total of 2747 semen ejaculates were evaluated to find out the total per cent semen discard at the time of semen collection and also during freezing process. These bulls were categorized into three semen discard groups; low (30-50%), medium (50-70%) and high (70-90%). The age (months) and body weight (kg) at first semen collection were recorded for each bull. Routine

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semen evaluation was carried out for semen cryopreservation and the semen discard at the time of semen collection and during microscopic evaluation was recorded as pre-freezing discard whereas, post-freezing discard referred to number of collections discarded during freezing process and after checking post thaw motility of semen. The various parameters viz. semen volume (ml), initial motility (%), pre-freezing discard (%), post freezing discard (%), post thaw motility (%) and conception rate (%) obtained after using frozen semen of 24 bulls were studied in detail among three discard groups. The data was statistically analysed using standard statistical methods (Snedecor and Cochran, 1968).

### RESULTS AND DISCUSSION

The mean values of various parameters viz. age at first collection (months), body weight at first collection (kg), semen volume (ml), pre-freezing discard (%), post-freezing discard (%), initial motility (%), post-thaw motility (%) and conception rate (%) were  $27.20 \pm 1.37$ ,  $386.50 \pm 21.06$ ,  $3.47 \pm 0.14$ ,  $32.41 \pm 2.87$ ,  $29.30 \pm 2.26$ ,  $57.37 \pm 1.06$ ,  $42.71 \pm 0.81$  and  $29.36 \pm 2.15$ , respectively (Table 1). The average semen volume in the present studies commensurate with earlier reports (Misra *et al.*, 1994; Tomar and Singh, 1996). However, mean values of initial motility are relatively different as compared to earlier studies made by Misra *et al.* (1994); Tomar and Singh (1996) and Narayan Pratap *et al.* (1999). The differences in results may be due to variation in age, season and quality of raw ejaculate and the freezability of semen. The results of present studies revealed that only 38.63 per cent collections were utilized for effective semen freezing and rest were discarded, whereas Sagdeo *et al.* (1991) found that percentage of freezable ejaculates was only 46.8 in Surti buffalo bulls. The high discard rate in buffalo bulls due to poor initial quality and freezability of semen is a major constraint in completion of semen production targets. The results suggested that bulls with excellent semen quality and minimum discard rate should be selected under breeding programme for genetic improvement of this species.

The results have shown that the age and body weight of bulls at sexual maturity were lowest in high discard group ( $22.90 \pm 2.88$  months and  $347.50 \pm 45.17$  kg). Saeed *et al.* (1990) reported that best quality semen was given by 3-4 years old bulls. Similarly, Kanchan Sapra (2003) also suggested that bulls should be selected at appropriate age of sexual maturity (2.50 to 2.75 years) for inclusion in a breeding programme for effective frozen semen production to meet the targets. The results showed that conception

Table 1. Semen characteristics, semen discard rate and conception rate in Murrah buffalo bull

Semen discard group(%)	No. of animals (n=24)	Age at first collection (months)	Body wt. at first collection(kg)	Average semen volume(ml)	Pre-freezing semen discard (%)	Post-freezing semen discard (%)	Initial motility (%)	Post-thaw motility (%)	Conception rate (%)
30-50	9	$29.60 \pm 1.69$	$373.50 \pm 31.24$	$3.31 \pm 0.21$	$22.50 \pm 4.25$	$18.71 \pm 3.36$	$64.34 \pm 1.15^a$	$45.73 \pm 1.21^b$	$31.08 \pm 3.19$
50-70	10	$29.10 \pm 1.88$	$438.50 \pm 28.25$	$3.60 \pm 0.19$	$34.43 \pm 3.85$	$26.63 \pm 3.04$	$58.20 \pm 1.42$	$42.79 \pm 1.09$	$29.30 \pm 2.89$
70-90	5	$22.90 \pm 2.88$	$347.50 \pm 45.17$	$3.50 \pm 0.30$	$40.30 \pm 6.15$	$42.56 \pm 4.86^a$	$49.93 \pm 2.28$	$39.61 \pm 1.75$	$27.65 \pm 4.62$
Average		$27.20 \pm 1.37$	$386.50 \pm 21.06$	$3.47 \pm 0.14$	$32.41 \pm 2.87$	$29.30 \pm 2.26$	$57.37 \pm 1.06$	$42.71 \pm 0.81$	$29.36 \pm 2.15$

Values within the same column with superscript a differ significantly ( $P < 0.01$ )

Values within the same column with superscript b differ significantly ( $P < 0.05$ )

rate did not vary significantly among three discard groups. Therefore, it becomes clear from the results that conception rate of bulls is not effected by the pre and post freezing discard percentage of semen but it is governed by several other factors. The post-freezing discard was significantly higher ( $P < 0.01$ ) in high discard group bulls as compared to low and medium discard groups (Table 1) whereas initial motility and post-thaw motility was significantly higher ( $P < 0.01$ ;  $P < 0.05$ ) in low discard group as compared to medium and high discard groups thereby confirms the fact that freezability of semen is entirely dependent upon the quality of raw ejaculates. Similar studies by Anchieta *et al.* (2001) suggested that selection of donor bulls should be based on ejaculate quality, sperm motility and vigour recovery at post-freezing.

In conclusion, the results of the present study indicate that assessment of semen discard rate, semen characteristics and fertility would help to identify the bulls with minimum discard rate for selection in breeding programme to meet the production targets in stipulated period. It will be of economical and technical interest in well managed semen production units for genetic improvement of this species.

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