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# EFFECT OF SEMEN COLLECTION FLOOR ON SEXUAL BEHAVIOUR AND SEMEN QUALITY OF SAHIWAL BULLS

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A study was conducted on Sahiwal cattle bulls maintained at the artificial breeding complex, NDRI, Karnal, Haryana, India, to evaluate the influence of type of semen collection floor on sexual behaviour and semen quality. Semen was collected from six bulls once a week (2 ejaculates), on three types of collection floors viz, concrete, brick clay and rubber mattress for a total of two weeks for each type of collection floor. Sexual behaviour and semen quality traits considered were: Reaction time (RT), Dismounting time (DMT), Total time taken in mounts (TTTM), Flehmen's response (FR), Erection Score (ES), Protrusion Score (PS), Intensity of thrust (ITS), Temperament Score (TS), Libido Score (LS), Semen volume, Physical appearance, Mass activity, Initial progressive motility, Non-eosiniphilic spermatozoa count (NESC) and post thaw motility percent. Data were analysed by least squares technique. Libido score, temperament score and semen volume (ml) were significantly ($p<0.01$) higher in rubber mattress group bulls than others, whereas concrete floor showed significantly ($p<0.01$) higher values of erection score, protrusion score, intensity of thrust than brick clay and rubber mattress floors. The results suggested that collection of semen on rubber mattress would result in better libido and higher ejaculate volume in Sahiwal bulls.

**Keywords:** Sahiwal bulls, sexual behaviour, semen quality, semen collection floor

## INTRODUCTION

Sahiwal, a milch breed of zebu cattle, is known for its remarkable power of endurance for hot climate of tropics, resistance to tropical diseases, low cost of maintenance as compared to the crossbreds. Due to these attributes there has been a thrust on improving this breed of cattle through selective breeding and also in upgrading of non-descript cattle using Sahiwal breed as an improver breed. If high genetic merit bulls are to be used extensively in breed improvement programs, it becomes necessary to ensure that the bull is kept in optimum breeding condition. It has been observed that some of the male calves especially in zebu cattle breeds reserved for breeding are disposed due to poor libido and other associated problems; this may be partly overcome by various managemental practices. Type of semen collection floor has crucial effect on sexual behaviour and ejaculate thrust of the breeding bulls, which could be due to certain factors related to comfortability and risk of slipping on the floor during mounting. There is more smooth movement on a soft rubber surface than conventional concrete type of floor. There are the imbalances of the pressure distribution under hooves when animals are confined to hard concrete flooring (Klatt *et al.*, 1973). Reports are scanty on sexual behaviour and semen production performance of Sahiwal bulls on different types of floor. Keeping this in view the project was planned to study the effect of semen collection floor on sexual behaviour and semen quality attributes of Sahiwal bulls.

## MATERIALS AND METHODS

The study was carried out on six Sahiwal bulls maintained at the animal breeding complex, National Dairy Research Institute, Karnal. All the bulls were fed concentrate in addition to ad lib green fodder. The bulls were regularly vaccinated and managed under standard breeding, feeding and management practices. The sexual behaviour studies were carried out at the time of semen collection/training and various sexual behavioural expressions were recorded with the help of different score cards. Sexual behaviour traits were recorded by using time stopwatch and cards. All the important sexual behaviour parameters of all the animals were recorded. Temperament score as suggested by Hearnshaw and Morris (1979) (0-5 scale) was used to record the observation. Libido score card (1-9) developed by Chenoweth *et al.* (1977) was used for the study. Erection score during seeking was observed and recorded as described by Joshi and Kharche (1992) (0-4 scale). Protrusion score was recorded as used by Joshi and Kharche (1992) (0-4 scale). Intensity of Thrust score was recorded as described by Joshi and Kharche (1992) (0-4 scale). Reaction time, Dismounting time and total time taken in mounts were also recorded. Reaction time is the time lapse between the appearance of bull to the dummy bull and its first mount or mounting attempt. The mount may or may not be successful. Dismounting time is the time lapse between immediately after releases of thrust (ejaculated) and stepping down of the front legs in the ground, i.e. activity followed after intensity of thrust and ejaculation. Total time taken in

mounts is the duration of time taken by a non-stimulus male from the appearance to a mount with successful ejaculation when it was brought to a stimulus bull. All these times were recorded by using stop watch. The frequency of Flehman's response was also, recorded.
Semen was collected by AV technique once a week (2 ejaculates) for a period of two weeks on each type of collection floor.. Semen samples were evaluated for volume (ml), color density/ physical appearance visually viz., watery (1), lemon (2), milky (3), and creamy (4)), mass activity (0to +5), initial progressive motility (observed under phase contrast microscope), Non eosinophilic spermatozoa count (live sperm %) (by eosin- negrosin staining) and post thaw motility percent. Data were analysed by least squares technique (Harvey, 1975).

## RESULTS AND DISCUSSION

The results of the influence of type of semen collection floor on sexual behaviour, initial semen quality and post-thaw motility characteristics are presented in Tables 1-6.

### Sexual behaviour

The results of influence of collection floor type on sexual behavioural characteristics are presented in Tables 1-4.

***Reaction time (RT) (seconds):*** The overall mean was 51.24±2.24s. The results indicated that bulls were very active and had higher sexual stimulation before semen collection on rubber mattress followed by brick clay floor and concrete collection floor. However, the differences were not statistically significant between different types of floor though the variation between bulls was highly significant ($p<0.01$). Similar values were reported by Tomar and Singh (1998) in Murrah bulls. Lower reaction time was found by Kumar and Nagpaul (1995), and Mandal and Tyagi (2004). Whereas higher values were also reported in summer (2.78±0.41 min) as well as in winter (2.75±0.52 min) in Sahiwal bulls (Ahmad *et al.*, 2005).

***Dismounting time (DMT) (seconds):*** The results revealed that there was no effect of type of semen collection floor on DMT as well as no variation could be noticed in DMT between bulls. The overall mean of DMT for different types of semen collection floor was 7.07±0.19s, which indicated that bulls quickly dismounted after ejaculation. Estimates lower than the present values were reported in Sahiwal bulls (Kumar, 1993; Rao *et al.*, 1996; Mandal and Tyagi, 2004). Slightly lower values were also found in Ongole, Jersey x Ongole bulls and Jersey as reported by Rao *et al.* (1996) and in Surti buffalo bulls as observed by Purohit *et al.* (2000).

***Total time taken in mounts (TTTM) (seconds):*** The overall mean for TTTM was 55.68±2.23s, which indicated that all the bulls took less time in ejaculation. TTTM was higher for Concrete followed by brick clay and rubber mattress type of floors, which meant that TTTM in rubber mattress was lower compared to other floor types, so it could be preferable than others. However, analysis of variance revealed that the differences were not significant between different types of collection floors. Similar values for TTMM were reported in Murrah and Sahiwal bulls by Kumar and Nagpaul (1995) and in Sahiwal bulls by Mandal and Tyagi (2004). Higher values were recorded in Tharparkar bulls by Mishra *et al.* (1972) and in crossbred bulls by Pathkar *et al.* (1990).

***Flehmen's response (FR):***: It was observed that most of the bulls didn't show FR at the time of semen collection and no variation was observed between different types of floor. The overall mean of FR for different types of collection floors was 0.056±0.026. Whereas significant variation between bulls was recorded ($P< 0.05$), which might be due to the individual variation in FR. Similar finding was reported by Salvador *et al.* (2003). Higher values were also reported in Sahiwal and Murrah bulls (Panwar, 1989; Kumar, 1993; Panwar and Nagpaul, 1994; Kumar and Nagpaul, 1995).

***Erection score (ES):*** Erection score varied from fair to good with an overall mean as 2.69±0.047. ES was found significantly ($p<0.01$) influenced by the type of collection floor. Concrete floor (2.92) showed significantly higher values of ES than rubber mattresses (2.63) and brick clay (2.54), which might be due to adaptation of animals to the concrete floor. The present findings were similar to the observations in Sahiwal and Murrah bulls (Kumar, 1993). However, slightly higher score for erection in Sahiwal bulls was reported by Joshi and Kharche (1992) and lower value by Mandal and Tyagi (2004).

***Protrusion score (PS):*** The PS was found significantly ($p<0.01$) influenced by the type of collection floor. The PS score ranged from fair to good with an overall mean as 2.69±0.05. Concrete floor showed significantly higher values of PS than rubber mattresses and brick clay, which might be due to adaptation of animals to the concrete floor and preference of animals to mount on rubber mattresses than brick clay floor. The findings obtained in the present study were similar to those reported by Mandal and Tyagi (2004) in Sahiwal bulls. Lower values in Sahiwal and Murrah bulls were reported by Kumar (1993). Higher erection score (3.950 ± 0.28) was reported by Joshi and Kharche (1992) in crossbreds.

**Table 1. Least square means of sexual behaviour characters of bulls for different types of semen collection floors**

| Type of collection floor | Reaction time (sec) | Dismounting time (sec) | Total time taken in mounting (sec) | Flehmen's response |
|---|---|---|---|---|
| Concrete | 55.46±4.77 | 7.33±0.44 | 60.54±4.75 | 0.04±0.04 |
| Brick clay | 51.46±4.50 | 7.08±0.34 | 55.63±4.49 | 0.04±0.04 |
| Rubber mattresses | 46.75±3.80 | 6.79±0.18 | 50.88±3.83 | 0.04±0.06 |
| Overall mean | 51.24±2.25 | 7.07±0.19 | 55.68±2.23 | 0.056±0.026 |

**Table 2. Analysis of variance (MS) of sexual behaviour characters of bulls exposed to different types of semen collection floors**

| Source of variation | Reaction time | Dismounting time | Total time taken in mounting | Flehmen's response |
|---|---|---|---|---|
| | Mean sum of squares (MS) | | | |
| Between bulls | 1676.78** | 3.68 | 1755.38** | 0.12* |
| Between floors | 456.26 | 1.76 | 560.72 | 0.01 |
| Error | 364.79 | 2.64 | 357.27 | 0.05 |

* Significant (p<0.05) ** Significant (p<0.01)

**Table 3. Least square means for sexual behaviour characters of bulls for different types of semen collection floors**

| Collection floor types | Erection score scale (0-4) | Protrusion score scale (0-4) | Intensity of thrust scale (0-4) | Temperament score scale (0-5) | Libido score scale (0-9) |
|---|---|---|---|---|---|
| Concrete | 2.92 ±0.06[a] | 2.92 ±0.06[a] | 2.92 ±0.06[a] | 0.29±0.10[b] | 6.71±0.16[b] |
| Brick clay | 2.54±0.10[b] | 2.54±0.10[b] | 2.54±0.10[b] | 0.25±0.09[b] | 7.00±0.17[b] |
| Rubber mattress | 2.63±0.10[b] | 2.63±0.10[b] | 2.63±0.10[b] | 0.67±0.10[a] | 7.50±0.10[a] |
| Overall mean | 2.69±0.05 | 2.69±0.05 | 2.69±0.05 | 0.40±0.06 | 7.07±0.08 |

**Table 4. Analysis of variance (MS) for sexual behaviour characters of bulls for different types of semen collection floor**

| Source of variation | Erection score | Protrusion Score | Intensity of thrust | Temperament Score | Libido score |
|---|---|---|---|---|---|
| | Mean sum of squares (MS) | | | | |
| Between bulls | 0.62 ** | 0.62 ** | 0.62* * | 0.18 | 1.15* |
| Between floors | 0.93** | 0.93** | 0.93** | 1.26** | 3.85** |
| Error | 0.16 | 0.16 | 0.16 | 0.22 | 0.49 |

*Significant (p<0.05) **Significant (p<0.01)

**Table 5. Least square means for semen quality parameters of bulls for different semen collection floors**

| Types of collection floor | Ejaculate volume(ml) | Semen colour | Mass activity (0-4) grade | Initial progressive motility | Non eosinophilic sperm (%) | Post thaw motility (%) |
|---|---|---|---|---|---|---|
| Concrete | 3.40±0.16[b] | 2.92±0.17 | 3.00±0.07 | 66.67±7.02 | 82.08±8.59 | 47.18±4.92 |
| Brick clay | 3.79±0.22[b] | 2.92±0.10 | 3.02±0.09 | 64.16±6.74 | 78.75±8.22 | 49.16±5.17 |
| Rubber mattress | 4.25±0.31[a] | 2.92±0.12 | 2.18±0.09 | 59.16±6.23 | 78.75±8.32 | 47.18±4.92 |
| Overall mean | 3.81±0.11 | 2.92±0.08 | 2.94±0.048 | 63.33±4.00 | 80.14±5.02 | 47.78±3.00 |

**Table 6. Analysis of variance (MS) of sexual behaviour characteristics of bulls for different types of semen collection floor**

| Source of variation | Ejaculate volume | Semen colour | Mass activity | Initial progressive motility | Non eosinophilic sperm (%) | Post thaw motility |
|---|---|---|---|---|---|---|
| | Mean sum of squares (MS) | | | | | |
| Between bulls | 7.66** | 0.60 | 0.21 | 35.00 | 9.51 | 3.06 |
| Between floors | 4.39** | 0.00 | 0.34 | 87.50 | 18.06 | 8.68 |
| Error | 0.89 | 0.41 | 0.17 | 1149.22 | 1813.92 | 648.10 |

*Significant (p<0.05) **Significant (p<0.01)

***Intensity of thrust (ITS):*** The Intensity of thrust was found significantly ($p<0.01$) influenced by the type of collection floor. The overall mean of erection score was 2.69±0.05, which was in range of fair to good in bulls on different types of collection floor. Concrete floor showed significantly higher values of intensity of thrust than rubber mattresses and brick clay, which might be due to adaptation of animal to the concrete floor and preference of animals to mount on rubber mattresses than brick clay floor. The present estimates were higher than the values reported in Sahiwal by earlier workers (Kumar, 1993; Mandal and Tyagi, 2004). However, higher scores were reported by Mathur and Vyas (1969) in Nagauri bulls and by Joshi and Kharche (1992) in crossbreds.

***Temperament score (TS):*** The overall mean TS was 0.40±0.06, which ranged from docile to very aggressive during semen collection. The effect of semen collection floor type on TS was highly significant ($p<0.01$). Rubber mattress (0.67) showed significantly higher value of TS than concrete floor (0.29) and brick clay floor (0.25). The results indicated that bulls preferred rubber mattress than other floor types, which might be due to more comfort during semen collection. Different values of behavioural temperament were observed in Sahiwal bulls by Panwar (1989) and in Sahiwal and Murrah bulls by Kumar (1993).

***Libido score (LS):*** Libido score was found to be significantly ($p<0.01$) influenced by the effect of type of collection floor. Rubber mattress revealed significantly higher values than brick clay and concrete floor respectively, indicating that rubber mattress was the choice of floor followed by brick clay. The variation between bulls was found significant ($p<0.05$). The overall means of LS (0-9scale) of bulls in different types of collection floors was 7.07, which indicated that all bulls in different types of collection floors were active to very active at collection time and exhibited pronounced libido as revealed from their libido ratings. The present results were in agreement with the values reported in literature for Sahiwal and Murrah bulls (Panwar, 1989; Kumar, 1993). Kumar (1993) also found significant ($p<0.05$) variation between the bulls.

**Seminal attributes**

Least squares means and analysis of variance of seminal characteristics in relation to different types of collection floors are shown in Tables 5-6.

***Ejaculate Volume (ml):*** The overall mean of ejaculate volume (ml) for different types of floor was 3.81±0.11. Ejaculate volume showed highly significant ($p<0.01$) variation between bulls exposed to different types of collection floor. Rubber mattress showed significantly highest value as 4.25 of semen volume which confirmed its superiority in semen collection than other types of semen collection floor. The present estimates were within the range of average values reported in literature (Shukla and Bhattacharya, 1949; Tomar, 1964; Gupta *et al.*, 1990; Kumar, 1993; Panwar and Nagpaul, 1994; Keshava, 1996; Ramachandran, 2000 and Ulfina *et al.*, 2003).

***Physical appearance:*** The overall color and consistency of semen ranged from milky to creamy. The present findings were similar to the earlier reports (Panwar, 1989; Kumar, 1993 and Ulfina *et al.*, 2003).

***Mass activity:*** No significant effect was found on mass activity due to semen collection floor. The overall mean was 2.94, which was in close agreement with the values reported by Singh and Pangawkar (1990), and Keshava (1996). Slightly higher value (3.12 ± 0.20) was reported by Bhosrekar and Nagpaul (1972), and Gupta *et al.* (1990). Lower value as 1.6–2.8 was reported by Panwar (1989) and 2.18 ± 0.266 was reported by Kumar (1993) in Sahiwal bulls.

***Initial progressive motility (IPM) (%):*** The overall mean of IPM was 63.33±4.00, which was similar to the observations of Mostari *et al.* (2004) and Mandal *et al.* (2005) in Sahiwal bulls. However, analysis of variance could not indicate any effect of type of collection floor and bull to bull variation on IPM.

***Non eosinophilic spermatozoa count (NESC) (%):*** Perusal of the results given in the table could not reveal significant effect on NESC due to collection floor types and also no significant variation was observed between bulls exposed to different collection floor types. The overall mean of NESC was 80.14±5.02, which assured good quality of semen that might be due to breed inheritance, nutrition and management factors. The estiamtes of the present study were similar to estimates reported by Rao *et al.* (1996) in Ongole bulls and slightly higher than the value reported by Ulfina *et al.* (2003) in Sahiwal bulls.

***Post thaw motility (PTM) %:*** The overall mean of motility of thawed frozen semen (PTM) was 47.78, which indicated acceptable quality of semen for artificial insemination. From the results, no significant effect was found on PTM due to collection floor type and also no significant variation was observed between bulls exposed to different collection floor types. The estimates of PTM in the present study were in close agreement with the values reported in literature (Chauhan *et al.*, 1992; Ulfina *et al.*, 2003 and Mandal *et al.*, 2005) in Sahiwal bulls.

An overview of results indicated that there was improvement in sexual behaviour specifically libido score of Sahiwal breeding bulls when semen was collected on rubber mattress flooring.

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