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Assessment of Indigenous and Crossbred Cattle Bull's Seminal Characteristics

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ABSTRACT

The present investigation was undertaken on cattle bull semen reared at Frozen Semen Bull Station, Karimnagar, Telangana. The study was carried out on four cattle breeds (3 to 5 years of age) viz., Gir, Ongole, Jersey and Crossbred Jersey (CBJY). Semen was collected twice weekly from each bull using artificial vagina technique with a total of 32 ejaculates evaluated under study. The semen was diluted with Egg Yolk Tris Citrate (EYTC) extender and was evaluated for physical characteristics of neat semen, motility parameters and sperm viability percentage. The investigation revealed that Gir bull semen had significantly higher ($p<0.05$) ejaculate volume, mass motility, individual motility, sperm concentration compared to other breeds in present study. Whereas, Jersey bull semen had significantly higher ($p<0.05$) sperm viability percentage.

Key words: Cattle, Bull semen, Physical parameters, Motility.
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INTRODUCTION

Artificial insemination contributes in genetic improvement, in which a single ejaculate from an elite male is used to impregnate many females. The fertility outcome of AI is affected by several factors, including age of the bull and the sperm quality of frozen-thawed semen (Oliveira *et al.,* 2012; Kumaresan *et al.,* 2017). Some of the semen characteristics like sperm motility, viability, concentration, etc. have been found to be significantly correlated with freezability and/or fertility of bovine semen and hence are currently being used as routine tests for the assessment of semen quality

(Bhoite *et al.,* 2005). Therefore, the aim of the present study was to assess sperm quality in bulls using standardized methods.

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MATERIALS AND METHODS

Eight apparently healthy elite bulls of four different cattle breeds viz., Gir, Ongole, Jersey and CBJY (Cross bred Jersey) aging between 3 to 5 years reared at Frozen semen Bull station, Karimnagar, Telangana were selected for the study. All the experimental animals were maintained under uniform feeding, lighting, housing and other managemental conditions as per the farm schedule.

Semen collection and processing: Semen was collected twice weekly from these animals using standardized Danish model artificial vagina technique. Immediately after collection, the ejaculates were kept in a water bath at 35°C and evaluated for the preliminary semen quality parameters. Later, the semen sample was subjected to initial dilution with EYTC extender and evaluated for motility parameters and sperm viability percentage.

Ejaculate colour: The collected semen sample in graduating tube was evaluated for the colour with the help of naked eye.

Ejaculate volume: The semen samples were collected in the glass collection tube which was fixed in the Artificial vagina (AV). After the ejaculation the collected semen samples were measured using graduations on collecting tube. All the recordings were noted separately.

Sperm concentration: The concentrations of the semen samples were determined using a Bovine photometer (IMV® Technologies, France). For calibrating the instrument, 4 milliliters of 0.9 per cent sodium chloride (NaCl) solution was used and the test solution comprised of 40 µl of the fresh semen sample diluted with 3960 µl of 0.9 per cent sodium chloride solution. The concentration was expressed in millions/ml.

Mass motility: Place a drop of neat/raw/undiluted semen on warm slide. Presence of waves and eddies throughout the whole drop under low power of microscope (10X) is observed and on the basis of intensity of waves and eddies, the ejaculate was graded. (Tomar, 1984).

Individual motility (%): The individual motility was subjectively evaluated using the standard method described by Serpil et al. (2009). The Individual motility of freshly diluted semen was assessed after covering one drop of semen with cover glass, under phase contrast microscope (magnification 10x20 of "Nikon") with a warm stage maintained at 37°C. The semen was extended at 37°C with Tris-Egg-Yolk-Citrate diluent to the obtained volume of ejaculates. The individual motility estimations were performed in 3 different fields and their means was recorded as per cent progressive motility.

Sperm viability (%): The sperm viability was calculated using Eosin-Nigrosine stain as per the method described by (Evans and Maxwell, 1987).

Statistical analysis: The data were statistically analyzed using Statistical Package for Social Studies (IBM SPSS Statistics 21®, USA) software. Treatment means were compared using one way ANOVA.

RESULTS AND DISCUSSION

Ejaculate colour: In the present study, the colour of the ejaculates obtained from Gir, Ongole, Jersey and CBJY cattle bulls varied between milky white to creamy, which was comparable to the previous observations made on Gir and Jaffarbadi bulls (Shelke and Dhami, 2001), Jersey and Cross bred Jersey (Kumar *et al.,* 2015) and Ongole (Affandhy *et al.,* 2018).

Ejaculate volume: The overall mean ejaculate volume of Gir (6.175 ± 0.15 ml) bull was significantly ($p<0.05$) higher compared to other cattle breeds under study (table No.1). Our findings were higher than earlier observations ((4.84 ± 0.16 ml; Shelke and Dhami, 2001), lower (7.03 ± 0.44 ml;,Rana and Dhami, 2004) in Gir bulls and in consonance with {(5.94 ± 0.11 ml; Salah *et al.,* 1992(Holstein), Singh *et al.,* 2000(Sahiwal), Chikhaliya *et al.,* 2018 (Gir)} bulls, respectively.

Sperm concentration: The overall mean sperm concentration of Gir (1789 ± 238.35 million/ml) bull semen was significantly ($p<0.05$) higher than that of other breeds under study (Table 1). Present findings were in agreement with Rana *et al.,* (2003) in Gir bull and were higher than the previous findings of (Shelke and Dhami, 2001; Chikhaliya *et al.,* 2018) in Gir bulls. Variations in sperm concentration among the different studies might be the result of variable techniques used, season of the study, age and feeding regimen for the bulls (Ijaz *et al.,* 2009).

Mass motility: The overall mean mass motility of Gir (4.0 ± 0.25) bull was significantly ($p<0.05$) higher compared to other bulls under this study (table No.1). These findings were comparable to the observations reported by Cevik *et al.,* (2007) in Holstein Friesian (4.70 ± 0.12), Patel (2014) in Kankrej (4.26 ± 0.10) bulls. These findings were higher than the findings reported by Rana and Dhami (2004) in Gir (2.96 ± 0.14) bulls, Swain and Singh (2004) in Sahiwal (3.29 ± 0.14) bulls, Desai (2013) in Kankrej (3.35 ± 0.07) bulls. The variation in the mass motility of the spermatozoa has been attributed to the factors like season, age of the bull, frequency of collection, degree of stimulus provided and type of thrust (Tomar, 1984). Since, mass motility is assessed through naked eye under the microscope,

Table No.1: Seminal characteristics among different breeds of cattle.

Bull	Seminal Characteristics of Neat semen				
	Ejaculate Volume (ml)	Concentration (million/ml)	Mass Motility (0-5 scale)	Individual Motility (%)	Sperm Viability (%)
Gir (n=8)	6.175 ± 0.15c	1789 ± 238.35d	4.0 ± 0.25^{c}	83.33 ± 1.05^{b}	74.66 ± 1.66^{a}
Ongole (n=8)	3.35 ± 0.40a	1250 ± 126.22b	3.83 ± 0.3^{b}	79.16 ± 0.83^{a}	81 ± 1.03^{b}
Jersey (n=8)	5.25 ± 0.25b	1629.33 ± 86.81c	3.16 ± 0.30^{a}	79.16 ± 1.53^{a}	82 ± 0.77^{b}
CBJY (n=8)	3.525 ± 0.10a	1229.66 ± 66.02^{a}	3.66 ± 0.21^{b}	76.66 ± 1.66^{a}	80.83 ± 0.74^{b}

Values with different superscripts within a column differ significantly ($p < 0.05$)

the experience of the worker can also affect the results (Farooq *et al.,* 2013).

Sperm viability (%): The overall mean sperm viability percentage of Jersey bulls was (82 ± 0.77) which was significantly ($p<0.05$) higher than that of other breeds under present study (table No.1).

These results were in agreement with the observations of Singh et al. (2000) in (82.50 ± 0.04) Jersey, Dhami et al. (2003) in (78.17 ± 3.66) in Jersey, Ray and Ghosh (2013) in Sahiwal bulls (83.37 ± 0.34) respectively. In the present study, higher sperm viability observed in Jersey bull might be due to various factors like frequency of collection (Tomar, 1984), age of bull and season (Dhami, 1986).

CONCLUSION

The present investigation revealed that the Gir bull had significantly ($p<0.05$) higher ejaculate volume, sperm concentration, mass motility and individual motility. Whereas, Jersey bull had significantly ($p<0.05$) higher sperm viability percentage compared to other cattle breeds.

CONFLICT OF INTEREST

Authors do not have any conflict of interest.

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