RESEARCH ARTICLE

Sexual Behavior and its Relationship with Semen Quality Parameters in Jaffrabadi Breeding Bulls

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Abstract

The present study was carried out on 80 ejaculates, 20 each from four healthy Jaffrabadi breeding bulls to see the relationship between sexual behavior and semen quality parameters. The results depicted that the overall mean values of libido score, mating ability score and sexual behavior score of four bulls were 45.83 ± 1.04, 78.79 ± 0.82 and 63.81± 0.77, respectively, with significant (p <0.05) difference in libido score between bulls. The overall color of semen ranged from thin white to very thick creamy. The overall values for semen volume (ml), pH, sperm concentration (million/mL), mass activity, individual sperm motility (%) and live spermatozoa (%) were 2.99 ± 0.12, 6.80 ± 0.01, 1439.68 ± 48.46, 3.94 ± 0.03, 89.51 ± 0.21 and 95.00 ± 0.19, respectively. The values for semen volume, sperm concentration, mass activity (%) and live sperm (%) differed significantly (p <0.05) between bulls. There were significant positive correlations (p <0.01) of libido with mating ability, sexual behavior score and ejaculate volume of semen (r = 0.37 to 0.87), while a negative correlation was found with sperm concentration (-0.30). Mating ability was significantly (p <0.01) correlated with sexual behavior score and ejaculate volume (0.78, 0.67), and sexual behavior was correlated with semen volume (0.84). Sperm concentration was significantly (p <0.05) correlated with mass activity (0.29), while individual sperm motility was positively (p <0.05) correlated with live sperm percentage (0.25). Correlations of libido, mating ability and sexual behavior with other semen quality parameters were negligible and negative. The study reflected the importance of sexual behavior of Jaffrabadi bulls in predicting their future utility as a proficient breeder under AI program.

Keywords: Correlation, Jaffrabadi bulls, Semen quality, Sexual behavior.

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Introduction

Buffalo, a triple purpose animal, provides milk, meat and drought power to the mankind. It is ranked on the fourth position with regards to other livestock species from several decades, however, it's a contribution to Asian livestock production is more than double (11%) in comparison to 5 % inputs in the world (Pasha and Hayat, 2012). Good libido and proper mating ability of a breeding bull are desirable traits for a successful artificial insemination (AI) program. These traits are predominantly influenced by the genetic makeup of an animal (Chenoweth, 1983). Deficiencies in these traits represent the primary cause of bull wastage and some specific forms of mating disability are caused by genetic factors. The onset of sexual desire is one of the parameters for judging puberty in bulls, and its early initiation is important in the selection of young bulls for their future usefulness in an AI program. A full understanding of sexual behavior, differentiated into libido and mating ability is critical, as it reflects for breeding bulls to harvest the maximum number of spermatozoa in a minimum of time. Currently, there are no rigid selection criteria for AI buffalo bulls in terms of growth rate, scrotal development, sexual behavior, and semen quality. The objective of this study was to develop a weighted scoring system for libido, mating ability and sexual behavior indices, which can be used in future for selection in breeding programs and culling of Jaffrabadi bulls to eliminate the problem of infertility.

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Materials and Methods

The present work was carried out on 4 healthy Jaffrabadi breeding bulls at Cattle Breeding Farm, JAU, Junagadh, Gujarat. A total of 80 ejaculates (20 ejaculates per bull) were collected from them with simultaneous scoring for sexual behavior to study the relationship between sexual behavior and semen quality.

Sexual Behavior Scoring

Weekly two teasing to each bull with a dummy in travis was done and sexual behavior of bull was observed and recorded as per the performa. The sexual aggressiveness (SA) behavior of the bull when approach towards the dummy was assessed visually and classified (Amann and Almquist, 1986) as follows:

Aggressive: Extremely eager to mount and approach the dummy bull with full vigor.
Active: Approached the dummy bull with less vigor and aggression.
Dull: Proceeded with a dull expression and took a long time to mount.
Shy: Exhibited mild sexual interest and was reluctant to mount.
Reaction time: The time taken by Jaffrabadi bull from exposure to the dummy until the successful ejaculation. Reaction time (RT) and Sexual aggressiveness (SA) of the bull were scored as per Amann and Almquist (1986):

RT (sec)	*Score*	*SA*	*Score*
<5	6	Aggressive	4
6–15	5	Active	3
16–30	4	Dull	2
31–60	3	Shy	1
61–120	2	–	–
121–300	1	–	–
>300	0	(Refusal to mount)	–

Tactile stimulation: Tactile stimulation exhibited by Jaffrabadi bull was recorded as per little modification by Anzar *et al*. (1993), which consisted sniffing, Flehmen's reaction, licking perinea, licking urine, and licking of the penis, throwing sand on the penis by forelegs, urinating, nudging, and chin rest. For each characteristic 0.2 was deducted from the total score obtained for reaction time and sexual aggressiveness.
Libido: Libido scoring (%) = [(RT score + SA score) - 0.2 per TS) ÷10] ×100.
Mating ability score: 1 to 10 score based on various behaviors Mating ability score = {[(MO+PE+ET+EJ+BL+GT+PM+PR) -futile attempt] ÷ 10} ×100.
Sexual behavior score = (Libido score + Mating ability score) ÷ 2 (Anzar *et al*., 1993).

Sexual event	Score out of
Mounting (MO)	1
Penile erection (PE): Complete 2, Partial 1, Absent 0	2
Ejaculatory thrust (ET): Strong and rapid 3, intermediate 2, weak and slow 1	3
Ejaculation (EJ)	2
Concavity of back line (BL)	0.5
Grasping the teaser firmly at pelvic level (GT)	0.5
Penile movement to locate AV (PM)	0.5
Bull's perineum at the level of teaser's perineum 0.5 (PR)	0.5
Total	10

Seminal Attributes

Semen was collected in a graduated collection cup and immediately after collection, the volume and color of semen were noted. The colour of semen was graded as creamy, milky, watery and abnormal. Seminal pH was measured by putting a drop of semen on pH indicator paper (Merck Specialties Pvt. Ltd., India) having pH scale of 2.0 to 10.5. The mass motility of semen was observed by placing a small drop of freshly collected neat semen on clean, grease free warm glass slide without cover slip under low magnification. The mass motility of semen was graded on '0 to 5' scale as per Salisbury *et al*. (1978). The individual progressive motility and percent motile spermatozoa were estimated by putting a small drop of diluted semen on a glass slide under a cover slip on high power objective (40%). For this purpose, a minimum of 4 to 5 microscopic fields was observed and recorded.

The sperm concentration was estimated by using Photometer (IMV India Pvt. Ltd., Gurgaon). Differential eosin –nigrosin staining technique was used for counting live spermatozoa in the semen sample.

Correlation Coefficients and Statistical Analysis

Pearson's correlations were investigated between sexual behavior score and the semen physical attributes of Jaffrabadi bull semen. The data generated were analyzed statistically using ANOVA and Duncan multiple range tests (Snedecor and Cochran, 1994).

Results and Discussion

Sexual Behaviour

The overall mean scores of libido, mating ability and sexual behavior of four Jaffrabadi breeding bulls studied were 45.83 ± 1.04, 78.79 ± 0.82 and 63.81 ± 0.77, respectively, with significant (p <0.05) difference in libido score between bulls (Table 1). Similar results of mean libido score have been reported in different breeds of buffalo bulls (Prajapati *et al*., 1999; Ramadan *et al.,* 2009; Marai and Habeeb, 2010), while relatively higher libido score in Murrah bulls have also been reported by Singh *et al.* (2013). The mean reaction time observed in Jaffarabadi bulls (125.00±3.27 sec) was similar to the earlier findings in Murrah (Mandal *et al.,* 2000) bulls, whereas longer reaction time than present one was also recorded in Murrah (Shukla and Mishra, 2005) and Jaffrabadi bulls (Dhami and Shelke, 2005). Bulls with higher libido usually have shorter reaction time as these traits are positively interrelated.

Seminal Attributes

The color of semen among four bulls varied from thin white to very thick creamy. The overall values for semen volume

Table 1: Libido, mating ability and sexual behavior score of Jaffrabadi breeding bulls (mean ± SE)

Sr. no.	*Name of bull*	*Libido*	*Mating ability*	*Sexual behavior*	*Reaction time (sec)*
1	Abhijeet (N = 20)	51.50 ± 2.20[b]	80.00 ± 1.88	65.75 ± 1.83	98.75 ± 3.98[a]
2	Ronak (N = 20)	45.00 ± 1.56[a]	79.30 ± 1.24	62.15 ± 1.24	187.50 ± 4.53[b]
3	Girish (N = 20)	52.20 ± 1.75[b]	78.10 ± 1.51	65.15 ± 1.38	93.75 ± 1.82[a]
4	Raghu (N = 20)	46.60 ± 2.40[ab]	77.75 ± 1.94	62.18 ± 1.61	187.50 ± 4.53[b]
Overall (N = 80)		45.83 ± 1.04	78.79 ± 0.82	63.81 ± 0.77	125.00 ± 3.27

Means with different superscripts ([a, b]) within the column differ significantly ($p < 0.05$)

(mL), seminal pH, sperm concentration (million/mL), mass activity, individual sperm motility (%) and live spermatozoa (%) were 2.99 ± 0.12, 6.80 ± 0.01, 1439.68 ± 48.46, 3.94 ± 0.03, 89.51 ± 0.21 and 95.00 ± 0.19, respectively. The semen ejaculate volume, sperm concentration, mass activity, and live spermatozoa differed significantly (p <0.05) between bulls (Table 2). The present findings of mean ejaculate volume corroborated well with the earlier report on Jaffrabadi bulls (Rana and Dhami, 2004), while lower semen volume has been reported by others in Murrah (Shukla and Mishra, 2005; Saini *et al*., 2017) and Nili-Ravi bulls (Javed *et al*., 2000). The present sperm concentration was in accordance with the previous observations in Jaffrabadi (Dhami *et al*., 2001) and Murrah bulls (Dhami and Sahni, 1994), whereas lower sperm concentration in Tarai buffalo bulls has been reported by Tiwari *et al*. (2009). The average mass activity score of 3.94 ± 0.03 in Jaffrabadi bull semen indicated very good quality. However, earlier workers have reported lower mass activity in Jaffrabadi (Dhami *et al*., 2001) and Murrah bulls (Dhami and Sahni, 1994).

The mean percentage of individual sperm motility (89.51 ± 0.21) observed Jaffrabadi bulls were in agreement with the values reported in Jaffrabadi (Dhami and Shelke, 2005) and Tarai buffalo bulls (Tiwari *et al.,* 2009). Whereas, others reported higher individual sperm motility in Murrah (Saini *et al.,* 2017) and Jaffrabadi bulls (Dhami *et al.,* 2001).

The mean live sperm percent of 95.00±0.19 found in Jaffrabadi bulls corroborated with earlier observation of Dhami and Shelke (2005) in same breed, while lower values in Murrah (Saini *et al*., 2017), Jaffrabadi (Dhami *et al*., 2001) and Nilli-Ravi (Javed *et al*., 2000) bulls were also reported by a few researchers. However, comparatively much higher live sperm percent in Murrah (Dhami and Sahni, 1994) and Tarai bulls (Tiwari *et al*., 2009) were reported by others.

Correlation between Semen Attributes and Sexual Behaviour Scores

There were significant positive correlations (p <0.01) of libido score with the mating ability (0.37), sexual behavior score (0.87) and semen volume (0.71), and negative correlation with sperm

Table 2: Seminal attributes of Jaffrabadi breeding bulls (20 ejaculates each)

Name of bull	*Volume (mL)*	*Seminal pH*	*Sperm count (million/mL)*	*Mass activity*	*Individual motility (%)*	*Live sperm (%)*
Abhijeet	3.11 ± 0.24[b]	6.80 ± 0.01	1405.35 ± 117.81[a]	4.00 ± 0.00[b]	88.95 ± 0.58	96.22 ± 0.40[b]
Ronak	3.14 ± 0.13[b]	6.80 ± 0.01	1684.05 ± 84.23[b]	4.00 ± 0.00[b]	89.80 ± 0.34	95.85 ± 0.23[ab]
Girish	3.45 ± 0.32[b]	6.80 ± 0.01	1223.30 ± 84.45[a]	3.75 ± 0.10[a]	89.55 ± 0.32	95.55 ± 0.29[ab]
Raghu	2.26 ± 0.17[a]	6.80 ± 0.01	1446.00 ± 106.73[ab]	4.00 ± 0.00[b]	89.75 ± 0.38	94.70 ± 0.42[a]
Over all	2.99 ± 0.12	6.80 ± 0.01	1439.68 ± 48.46	3.94 ± 0.03	89.51 ± 0.21	95.00 ± 0.19

Means with different superscripts ([a,b]) within the column differ significantly (p <0.01)

Table 3: Correlations between sexual behavior and seminal characteristics of Jaffrabadi breeding bulls (n = 80)

Traits	*Libido*	*Mating ability*	*Sexual behaviour*	*Volume*	*Sperm count*	*Mass activity*	*Individual motility*
Libido	1						
Mating ability	0.37**	1					
Sexual behavior	0.87**	0.78**	1				
Volume	0.71**	0.67**	0.84**	1			
Concentration	–0.30*	–0.02	–0.02	–0.13	1		
Mass activity	–0.10	–0.00	–0.08	–0.10	0.29*	1	
Individual motility	0.02	–0.04	–0.01	–0.03	–0.02	0.07	1
Live sperm %	–0.00	–0.04	–0.02	0.09	–0.18	–0.09	0.25*

*Significant at p <0.05; **Significant at p <0.01

concentration (-0.30, p <0.05). Mating ability was significantly (p <0.05) correlated with sexual behavior score and volume of semen (0.78, 0.67), and sexual behavior score was positively correlated with semen volume (0.84). Moreover, sperm concentration was positively (p <0.05) correlated with mass activity (0.29), and individual sperm motility was correlated with live sperm percentage (0.25). Further, libido, mating ability, and sexual behavior scores were not correlated with any of the other sperm quality traits studied. The literature reviewed, however, did not reveal exactly comparable findings with the present correlation studies among sexual behavior traits in buffalo bulls. Yet these results to some extent were in agreement with the findings of Pal *et al.* (2012) and Singh *et al.* (2015), who observed positive correlations of libido score with volume, motility and sperm concentration in Sahiwal, crossbred bulls and Nellore bulls. Islam *et al.* (2018) found positive correlations of libido with volume, as well as progressive motility, sperm concentration, and live/normal sperm percent in crossbred bulls, which was in contradiction to the present findings in Jaffrabadi bulls.

Conclusion

Correlations of various sexual behavior and semen quality parameters of Jaffrabadi bulls reflected the importance of sexual behavior in predicting their future utility. Libido, mating ability, and sexual behavior score, as well as semen parameters of Jaffrabadi bulls, were quite similar to other buffalo breeds. Hence it can be concluded that Jaffrabadi bulls can be used proficiently as breeding bulls under AI program.

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