

## RESEARCH ARTICLE

# Seasonal Influence on Sexual Behaviour of Jaffrabadi Buffalo Bulls

KH Parmar<sup>1\*</sup>, AJ Dhama<sup>2</sup>, FS Kavani<sup>2</sup>, GB Solanki<sup>3</sup>, KS Murthy<sup>3</sup>

### ABSTRACT

The study was carried out on four mature Jaffrabadi breeding bulls (4–6 years old) maintained at Cattle Breeding Farm, JAU, Junagadh for a period of 8 months during winter and summer. The seasonal and bull variations in sexual behavior traits were studied. A total of 64 observations (32 per season, 8 per bull) were availed at the fortnightly interval. The mean values/ scores for temperament (0–5 scale), libido (0–9 scale), penile erection (0–4 scale), protrusion (0–4 scale), intensity of thrust (0–4 scale), reaction time (sec) and Flehmen reaction (0, 1) during winter season were  $1.28 \pm 0.08$ ,  $6.75 \pm 0.19$ ,  $3.22 \pm 0.74$ ,  $2.88 \pm 0.59$ ,  $3.15 \pm 0.65$ ,  $125.00 \pm 6.92$  and  $0.91 \pm 0.43$ , respectively, while the respective values in summer season were  $2.22 \pm 0.07$ ,  $5.93 \pm 0.43$ ,  $2.84 \pm 0.65$ ,  $2.75 \pm 0.59$ ,  $2.93 \pm 0.13$ ,  $143.5 \pm 7.07$  and  $0.88 \pm 0.06$ . There were significant differences among seasons for temperament, libido and penile erection score of Jaffrabadi bulls. Significant differences among bulls were also found for libido score, the intensity of thrust and reaction time in the winter season, and for ejaculatory thrust in the summer season. All these traits were highly significantly and positively interrelated ( $r = 0.353$  to  $0.512$ ), except Flehmen reaction and reaction time which were negatively correlated with all other behavioral traits ( $r = -0.340$  to  $-0.499$ ). Summer in general significantly exerted an adverse effect on the sexual behavior of Jaffrabadi bulls, and winter was the favored season. It could be concluded from the study that the Jaffrabadi bulls had good sexual behavior scores throughout both the seasons, however, bulls showed better sexual behavior during winter as compared to summer.

**Keywords:** Flehmen reaction, Jaffrabadi bulls, Penile erection, Protrusion, Reaction time, Seasonal influence, Temperament, Thrust.

*Ind J of Vet Sci and Biotech* (2019): 10.21887/ijvsbt.15.1.8

### INTRODUCTION

The sexual behavior traits reflect the reproductive efficiency of breeding bulls and have paramount importance in a breeding program. Libido in bulls is a heritable trait. Aggressive and efficient breeders tend to have offspring that are also good breeders. Sexual behavior is a very complex phenomenon, controlled by the endocrine constitution of an animal, influenced by the social environment, sensory capacities and sexual stimuli (Naskar and Nagpaul, 2005). The intensity of sexual expression not only reflects the sex drive (libido) but also the seminal attributes of bull (Joshi and Kharche, 1992). Sexual behavior stimulation could increase sperm production (Sholikah *et al.*, 2018). The specific consideration to the surrounding environmental conditions particularly temperature and humidity should be paid to minimize their negative influence directly or indirectly on semen production and other related physiological functions of the breeding bulls (Ahirwar *et al.*, 2018). The information on the evaluation of adaptability of Jaffrabadi breed in tropical conditions with specific reference to the different gradient of ambient temperature is meager. Though the seminal characteristics of several Indian breeds were extensively studied, there is no systemic study about the sexual behavior of Jaffrabadi bulls. These indices could be used in selection and culling of Jaffrabadi bulls in the breeding program. Hence this study was aimed to acquire information on the sexual behavior

<sup>1</sup>Department of Gynaecology & Obstetrics, College of Veterinary Science and AH, JAU, Junagadh, Gujarat, India

<sup>2</sup>Department of ARGO, Veterinary College, Anand Agricultural University, Anand, Gujarat, India

<sup>3</sup>Cattle Breeding Farm, Junagadh Agricultural University, Junagadh, Gujarat, India India

**Corresponding Author:** KH Parmar, Department of Gynaecology & Obstetrics, College of Veterinary Science and AH, Junagadh, Gujarat, India, e-mail: parmankiran16@yahoo.co.in

**How to cite this article:** Parmar, K.H., Dhama, A.J., Kavani, F.S., Solanki, G.B., & Murthy, K.S. (2019). Seasonal Influence on Sexual Behaviour of Jaffrabadi Buffalo Bulls. *Ind J Vet Sci and Biotech*, 15(1):36-39.

**Source of support:** Nil

**Conflict of interest:** None

**Submitted:** 03/7/2019 **Accepted:** 12/7/2019 **Published:** 27/7/2019

of Jaffrabadi bulls during different seasons of the year to predict their reproductive efficiency in native climate.

### MATERIALS AND METHODS

A total of four mature Jaffrabadi (*Bubalus bubalis*) breeding bulls, aged 4–6 years, maintained at a semen station of Cattle Breeding Farm, JAU, Junagadh was used in the study during summer and winter season. All the bulls were in good health under uniform veterinary care and identical sanitary conditions. Before the inclusion of bulls in the experiment,

they were examined and screened for their normal external and internal reproductive organs. These bulls were in regular twice a week semen collection schedule using artificial vagina. A total of 8 observations were taken at fortnight interval from each bull in each season while collecting semen for this study.

The temperament score (0–5 scale; Hearnshaw and Morris, 1984), libido score (10 points; Chenoweth, 1981) and penile erection, protrusion and intensity of thrust (all 0–5 score; Joshi and Kharche, 1992) were recorded. Reaction time was recorded in seconds. Flehmen reaction score of "1" was given if the bull exhibited Flehmen response, while a score of "0" was given if no response was obtained when the bull was brought for semen collection shed in morning hours. The data were analyzed statistically using ANOVA and 't' test.

## RESULTS AND DISCUSSION

The mean temperament score (0–5 scale) of Jaffrabadi bulls ranged from 1.59 to 1.91 with an overall mean of  $1.75 \pm 0.08$  (Table 1). The score was significantly ( $p < 0.01$ ) higher during summer as compared to winter season ( $2.22 \pm 0.07$  vs  $1.28 \pm 0.08$ ). There was non-significant variation in temperament score among individual Jaffrabadi bulls during both the seasons. Similar mean temperament scores were also reported by Kumar (1993) and Kumar and Nagpaul (1995), while Singh *et al.* (2013) recorded lower temperament score in Murrah bulls. Buffalo bulls remaining calm and docile during handling are considered to have a good temperament. Bulls with better temperament produce good quality semen and are manageable at the time of semen collection. The season had a significant effect on temperament score of Jaffrabadi bulls investigated. However, earlier workers did not find a significant seasonal effect on temperament score in Murrah bulls (Prajapati *et al.*, 1999). It was observed that Jaffrabadi bulls show slightly excited movement, staining, paddling and rarely kicking in summer season due to a slightly higher temperature, while in winter bulls remain quiet and steady due to mild cold condition.

The average libido score in Jaffrabadi bulls was  $6.34 \pm 0.11$  with a range of 6.12 to 6.56 (Table 1). Libido score was significantly ( $p < 0.01$ ) higher during the winter season as compared to summer ( $6.75 \pm 0.19$  and  $5.93 \pm 0.43$ ). The bulls also varied significantly for libido score in the winter season, but not in the summer season. Similar trend of mean libido score has been reported in Mehsana bulls (Prajapati *et al.*, 1999), Murrah bulls (Mandal *et al.*, 2000), Egyptian buffalo bulls (Ramadan *et al.*, 2009) and Cholistani bulls (Mahmoud *et al.*, 2013), while lower libido score than present one has been reported in Surti buffalo bulls (Gupta *et al.*, 1978). Like present finding, significantly higher libido score was recorded in Murrah bulls by Singh *et al.* (2013) during cooler months, while Mandal *et al.* (2000) observed the non-significant difference between winter and rainy seasons in Murrah bulls. The variations in libido score might be attributed to the different managemental conditions, experimental location, breed, and species.

The Jaffrabadi bulls included in the present study showed good penile erection. The mean penile erection score was  $3.03 \pm 0.05$  with a range of 2.92 to 3.13 (Table 1). It was significantly ( $p < 0.01$ ) higher during the winter season as compared to summer ( $3.22 \pm 0.74$  and  $2.84 \pm 0.65$ ). There was non-significant variation among bulls for this trait in both the seasons. Similar mean penile erection score was reported by Singh *et al.* (2013), while lower values were reported by Kumar (1993) and Kumar and Nagpaul (1995) in Murrah bulls. In contrast to significant variation in the present study, a non-significant seasonal variation in erection score in Murrah and Surti bulls (Bhosrekar *et al.*, 1992<sup>b</sup>) has also been reported, while Prajapati *et al.* (1999) observed significantly different erection score during different seasons in Mehsana bulls. Jaffrabadi bulls showed good erection score throughout the study indicating better sexual behavior, which is one of the desirable criteria for selection of breeding bulls.

The Jaffrabadi bulls showed normal penile protrusion throughout the study period. The mean protrusion score was

**Table 1:** Overall mean ( $\pm$ SE) and seasonal variation (summer vs. winter season) in scores of sexual behavior traits of Jaffrabadi buffalo bulls

Sexual behavioral traits	Overall mean score (n = 64)	Seasonal variation		Significance	
		Winter (n = 32)	Summer (n = 32)	't' value	p value
Temperament (0–5 scale)	$1.75 \pm 0.08$	$1.28 \pm 0.08^a$	$2.22 \pm 0.07^b$	8.55	0.00
Libido (0–9 scale)	$6.34 \pm 0.11$	$6.75 \pm 0.19^a$	$5.93 \pm 0.43^b$	4.05	0.00
Penile erection (0–4 scale)	$3.03 \pm 0.05$	$3.22 \pm 0.74^a$	$2.84 \pm 0.65^b$	3.79	0.00
Penile protrusion (0–4 scale)	$2.87 \pm 0.04$	$2.88 \pm 0.59$	$2.75 \pm 0.59$	0.00	1.00
Ejaculatory thrust (0–4 scale)	$3.10 \pm 0.07$	$3.15 \pm 0.65$	$2.93 \pm 0.13$	0.00	1.00
Reaction time (sec)	$133.75 \pm 5.0$	$125.0 \pm 6.92$	$143.5 \pm 7.07$	1.79	0.08
Flehmen reaction (0, 1)	$0.90 \pm 0.03$	$0.94 \pm 0.43$	$0.88 \pm 0.06$	80.85	0.39

Means bearing uncommon superscript within the row differ significantly between seasons

2.87 ± 0.04 with a range of 2.79 to 2.95 (Table 1). It was non-significantly higher during winter than summer season (2.88 ± 0.59 and 2.75 ± 0.59). The bull variation for penile protrusion score was also non-significant. These findings corroborated well with the observations in Murrah bulls (Singh *et al.*, 2013), whereas lower protrusion score was reported by Kumar and Nagpaul (1995) in Murrah bulls and by Prajapati *et al.* (1999) in Mehsana bulls. Like present observation, non-significant seasonal variation in protrusion scores have also been reported earlier in Murrah and Surti bulls (Bhosrekar *et al.*, 1992<sup>a,b</sup>). The variation in protrusion score might be due to different factors like breed, environment surrounding collection area, nutritional status of bull, etc.

The mean intensity of thrust in Jaffrabadi bulls was 3.10 ± 0.07, which ranged from 3.01 to 3.29 (Table 1). It was non-significantly higher during winter than summer season (3.15 ± 0.65 and 2.93 ± 0.12). It varied significantly among bulls during both the seasons. The mean intensity of thrust was similar to the findings in Kankrej bulls (Rathod, 2018), while the lower score was reported earlier in Mehsana (Prajapati *et al.*, 1999) and Murrah bulls (Kumar and Nagpaul, 1995; Singh *et al.*, 2013). Like Jaffrabadi bulls, a non-significantly higher mean intensity of thrust during winter compared to summer was also found in Kankrej bulls by Rathod (2018). Contrary to the present finding, Bhosrekar *et al.* (1992<sup>b</sup>) reported the significant seasonal effect on this trait in Murrah and Surti buffalo bulls, where the maximum thrust was observed in the months from June to September. The intensity of thrust depends on the size of the dummy, exercise, and locomotory system of bull.

The mean reaction time in Jaffrabadi bulls was 133.75 ± 5.03 seconds, with a range from 123.69 to 143.80 seconds (Table 1). It was non-significantly longer during summer than winter season (143.5 ± 7.07 vs 125.0 ± 6.92 sec). It also varied significantly among bulls during the winter season, but not during the summer season. The mean reaction time observed in Jaffrabadi bulls was similar to the earlier findings in Murrah (Mandal *et al.*, 2000) bulls, whereas higher reaction time was recorded in Murrah bulls (Sahu and Pandit, 1997) and Jaffrabadi bulls (Dhami and Shelke, 2005) by others. However, Tomar and Singh (1996) reported a mean reaction time of 66.1 sec in Murrah bulls. The insignificant seasonal variation observed in the present study was also in accordance with the earlier

reports in Surti (Gupta *et al.*, 1978), Murrah (Bhosrekar *et al.*, 1992<sup>a</sup>; Mandal *et al.*, 2000), Mehsana (Prajapati *et al.*, 1999), Egyptian buffalo bulls (Ramadan *et al.*, 2009), and Cholistani bulls (Mahmoud *et al.*, 2013). During hot season thyroid activity is depressed, resulting in low plasma testosterone level, which prolongs the reaction time (Arthur *et al.*, 2001). However, the reaction time in Jaffrabadi bulls observed in the present study was optimum for the buffalo breeds.

The overall mean frequency of Flehmen reaction in Jaffrabadi bulls was 0.90 ± 0.03 (Table 1). Flehmen reflex exhibited by Jaffrabadi bulls was non-significantly higher in frequency during winter (0.94 ± 0.43) than summer season (0.88 ± 0.05). There was no significant variation among bulls for Flehmen reaction in any of the seasons. However, higher frequency of Flehmen response was recorded by earlier workers in Kankrej bulls (Rathod, 2018), and lower in Murrah buffalo bulls (Kumar and Nagpaul, 1995). In the present study, the tendency to exhibit Flehmen reflex by Jaffrabadi bulls during different seasons was nearly identical. The similar non-significant difference with higher frequency during the winter season in Mehsana bulls (Prajapati *et al.*, 1999) and lower in Kankrej bulls (Rathod, 2018) have been reported. These variations might be attributed to the difference in species, location, climate, and individuality.

Pearson's correlations studied among the sexual behavior traits of Jaffrabadi bulls (Table 2) revealed that the temperament score was significantly ( $p < 0.05$ ) and positively correlated with penile erection ( $r = 0.383$ ), penile protrusion score ( $r = 0.352$ ), intensity of thrust ( $r = 0.378$ ), and reaction time ( $r = 0.358$ ). Libido score had similar significant ( $p < 0.05$ ) positive correlations with penile erection, penile protrusion score, and intensity of thrust and a negative correlation with reaction time ( $r = -0.499$ ). Penile erection score had a highly significant ( $p < 0.01$ ) and positive correlations with penile protrusion ( $r = 0.512$ ) and thrust ( $r = 0.378$ ), and negative correlations with reaction time ( $r = -0.380$ ) and Flehmen reaction ( $r = -0.362$ ). Protrusion score showed a highly significant ( $p < 0.01$ ) positive correlation with thrust ( $r = 0.419$ ), and reaction time had negative correlations with libido ( $r = -0.499$ ), penile erection ( $r = -0.380$ ), penile protrusion ( $r = -0.372$ ) and intensity of thrust ( $r = -0.398$ ), while Flehmen reaction showed non-significant positive correlations with

**Table 2:** Correlation coefficients among sexual behavioral traits in Jaffrabadi bulls

Traits	TEMP	LB	PE	PP	THR	RT
Libido (LB)	0.277	–				
Penile erection (PE)	0.383*	0.368*	–			
Penile protrusion (PP)	0.352*	0.361*	0.512**	–		
Ejaculatory thrust (THR)	0.383*	0.353*	0.378**	0.419*	–	
Reaction time (RT)	0.358*	-0.499**	-0.380*	-0.372*	-0.398**	–
Flehmen reaction (FL)	-0.047	-0.098	-0.362*	-0.060	-0.103	0.097

N = 64, TEMP = temperament, \*significant at  $p < 0.05$ , \*\*significant at  $p < 0.01$  level (2-tailed)



reaction time, intensity of thrust and non-significant negative correlation with protrusion score. Results indicated that bull having better temperament tend to show better penile protrusion, the intensity of thrust, penile erection as well as had less reaction time. These were better signs for semen collection and bull having better temperament can be selected for semen collection. The current results suggest that the bull having better libido tends to show better penile erection, penile protrusion, the intensity of thrust, as well as taking less time to react dummy and donate semen.

The literature reviewed did not reveal comparable correlation findings among sexual behavior traits in buffalo bull. In the present study, more intense libido of Jaffrabadi bulls led to decreased reaction time. Similarly, Anzar *et al.* (1993) and Pal *et al.* (2012) reported a negative correlation between libido score and reaction time in buffalo bulls and crossbred bulls, respectively. In contrast to present correlation of temperament score, Kumar (1993) did not find a correlation of temperament with penile erection, protrusion, and intensity of thrust in Sahiwal bull, though the protrusion score was correlated with the intensity of thrust, which in turn was significantly associated with total time taken in successful mounts. The present non-significant positive correlation of reaction time with Flehmen reaction was however in line with Kumar (1993) in Sahiwal bulls.

From the study it was concluded that summer season significantly exerted an adverse effect on the sexual behavior of Jaffrabadi bulls, winter was the favored season. Jaffrabadi bulls studied had good sexual behavior scores throughout both the seasons; however, bulls showed better sexual behavior during winter as compared to summer. All the sexual behavior traits, except reaction time, were significantly and positively interrelated and Flehmen reaction showed significant negative correlation only with penile erection score.

## ACKNOWLEDGMENT

Authors are thankful to the authorities of Junagadh Agricultural University, Junagadh for granting permission and providing necessary facilities for this work.

## REFERENCES

- Ahirwar, M.K., Katakaware, M.A., Prasad, K., Pal, R.K., Barman, D., Thul, M. and Rawa, N. (2018). Effect of non-genetic factors on semen quality in bulls: A review. *J. Ento. and Zool. Studies*, 6(4): 38-45.
- Anzar, M., Ahmad, M., Nazir, M. and Ahmad, N. (1993). Selection of buffalo bulls: sexual behavior and its relationship to semen production and fertility. *Theriogenology*, 40(6): 1187-1198.
- Arthur, G.H., Noakes, D.E. and Pearson, H. (2001). *Veterinary Reproduction and Obstetrics (Theriogenology)*. 5th ed., Bailliere Tindall, London, UK.
- Bhosrekar, M.R., Purohit, J.R., Gokhale, S.B. and Mangurkar, B.R. (1992a). Semen characteristics and behavioural pattern on buffalo bulls in relation to age and season. *Indian J. Anim. Sci.*, 62(3): 251-255.
- Bhosrekar, M.R., Purohit, J.R., Gokhale, S.B. and Mangurkar, B. R. (1992b). Effect of season on production performance of Surti buffalo bulls. *Indian J. Anim. Sci.*, 62(5):443-447.
- Chenoweth, P.J. (1981). Libido and mating behaviour in bulls, boars and rams: A review. *Theriogenology*, 16:155-170.
- Dhami, A.J. and Shelke, V.B. (2005). Investigations into the causes of poor semen quality and freezability in Jaffrabadi buffalo bulls. *Indian J. Anim. Sci.*, 75(8):925-929.
- Gupta, H.C., Nasir, M.C.S., Naik, S.G. and Srivastava, R.K. (1978). Effect of age and season on certain seminal characteristics of Surti buffalo bulls. *Indian J. Dairy Sci.*, 31:245-252.
- Hearnshaw, H. and Morris, C.A. (1984). Genetic and environmental effects on temperament score in beef cattle. *Australian J. Agril. Res.*, 35(5):723-733.
- Joshi, V.K. and Kharche, K.G. (1992). Assessment of sexual behavior of crossbred bulls. *Livestock Advisor*, 17(2): 38-38.
- Kumar, M. (1993). Sexual behavior pattern in Sahiwal and Murrah bulls M.V.Sc. thesis, National Dairy Research Institute, Karnal, Haryana, India.
- Kumar, M. and Nagpaul, P.K. (1995). Assessment of sexual behaviour in Sahiwal and Murrah bulls. *Indian J. Anim. Prod. Mgmt.*, 11(4):217-221.
- Mahmoud, S.A., Ijaz, A., Ahmad, N., Rehman, H.U., Zaneb, H. and Farooq, U. (2013). Studies on libido and serum testosterone concentration of Cholistani AI bulls under stress free and stressful seasons. *Journal Anim. Plant Sci.*, 23(6):1491-1495.
- Mandal, D.K., Nagpaul, P.K. and Gupta, A.K. (2000). Seasonal variation in seminal attributes and sexual behavior of Murrah buffalo bulls. *Indian J. Dairy Sci.*, 53(4):278-283.
- Naskar, S. and Nagpaul, P.K. (2005). Effect of social facilitation on seminal attributes and sexual behavior in crossbred male goats. *Indian J. Anim. Prod. Mgmt.*, 19(4):103-108.
- Pal, A., Chatterjee, P.N. and Chakravarty, A.K. (2012). Genetic study of dairy cattle and buffalo bulls based on growth, milk production and reproductive traits. *Iran J. Appl. Anim. Sci.*, 2(3):239-245.
- Prajapati, K.B., Nagpaul, P. K., Singh, D.V., Raina, V.S. and Kale, M.M. (1999). Effect of exercise on sexual behaviour of Mehsana buffalo bulls indifferent seasons. *Indian J. Dairy Sci.*, 52(2):100-103.
- Ramadan, T.A., Taha, T. A., Samak, M.A. and Hassan, A. (2009). Seasonal and motility variations in semen characteristics of Egyptian buffalo bull. *Alexandria J. Agril. Res.*, 54(2):13-23.
- Rathod, B.S. (2018). Study on sexual behavior, seminal characteristics and major HSP gene in relation to fertility in Kankrej bulls. Ph.D. Thesis. Sardarkrushinagar Dantiwada Agricultural University, Dantiwada, Gujarat, India.
- Sahu, S.B. and Pandit, R.K. (1997). Grading of breeding Murrah bulls on sexual behavior and seminal characteristics including cryopreservation. *Indian Vet. J.*, 74:557-569.
- Sholikah, N., Supriyanto, S., Yekti, A., Kuswati, S. and Susilawati, T. (2018). Sexual behaviour and semen production of Madura bulls. *Intl. Res. J. Adva. Engg. and Sci.*, 4(1):48-50.
- Singh, A.P., Singh, R., Singh, A.K., Gupta, A.K. and Raina, V.S. (2013). Influence of microclimate modification on sexual behavior and semen characteristics of Murrah buffalo bull during hot humid period in India. *Indian J. Anim. Sci.*, 83(4):431-434.
- Tomar, S.S. and Singh, S.P. (1996). Studies on reaction time and score of the seminal attributes and their interrelationship in Murrah buffaloes. *Indian J. Anim. Res.*, 30(1):49-54.