



# Study to Assess the Effect of Breed, Season and Breed X Season Interaction on Maintenance Behaviour of Stud Bulls"

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## ARTICLE INFO

Received on : 13-06-2019  
Accepted on : 26-06-2019  
Published online : 09-07-2019

## ABSTRACT

Stud bulls plays a unique role in cattle breeding due to its high genetic potential. To maintain its characteristics, better health condition is necessary which can be achieved if it exhibits its maintenance behavior normally. Hence, aim of the present study was to assess the effect of breed, season and breed x season interaction on the maintenance behavior (viz., amount of feed consumed, eating, drinking, rumination, standing, sitting, lying and sleeping time) of stud bulls. Twenty bulls (five from each four different breeds i.e. Sahiwal, Gir, Jersey cross and H. F. cross) at frozen semen bull station, Haringhata, Nadia, West Bengal, India during two seasons i.e., winter and summer were selected for the experiment. The result revealed that amount of feed consumed, eating, sitting, lying and sleeping time was significantly affected by breed at 5,5,1,1 and 1% level statistically. Season was found to have significant effect on rumination and sitting time at 5 and 1% level statistically whereas there was significant effect of breed x season interaction on lying ( $P<0.01$ ) and sleeping time ( $P<0.01$ ). All the effects were found to be non-significant on drinking and standing time. Hence, information based on the study might be helpful to adopt better management practices in the farm so that bulls maintain its behavioral activities normally and perform better in each season.

## KEYWORD

Stud bull, maintenance behavior, season

## INTRODUCTION

Stud bull plays a unique role in cattle breeding. The knowledge of maintenance behavior can markedly improve the efficiency and profitability, quality of life of producers and their animals and integrity of the environment (Irola *et al.* 2013). It includes feeding, drinking, ruminating and resting behavior (Mitlohner *et al.* 2001). Feeding behavior has direct effect on growth, fertility and income (Fraser and Broom 2002). It includes eating and drinking activity (Dumont 1996). Drinking compensates loss of liquid in the bull. This compensation is important for the natural thermoregulation of animal so that they maintain their health and survive well in the given condition. Rumination is an important natural behavior of these animals which helps them to digest feed. It provides a more sensitive and earlier indication of an animal's health and wellness. Duration of rumination is primarily determined by the composition and quality of feed (Lindstrom *et al.* 2001). Rest reflects the comfort of the animal. It comprises various postures like sitting, standing, lying and sleeping in a normal manner (Mounaix *et al.* 2013). All the components of maintenance behavior varies according to health, age, weight, breed, species of the animal and season (consisting of various environmental factors).

The aim of the experiment was to test the hypotheses that the certain aspects of maintenance behavior of stud bulls are influenced by breed, season and interaction between breed x season.

## MATERIALS AND METHODS

The study was conducted at Frozen Semen Bull Station, Haringhata Farm under Paschim Banga Go Sampad Bikash Sangsthan, ARD Department, Government of West Bengal on twenty stud bulls (Five bulls of each four genetic groups viz., Sahiwal, Gir, Jersey cross and H.F. cross) in two seasons, viz., winter and summer. All the animals were maintained as per routine management practices of farm under uniform environment and identical condition. Offered and refusals of feed have been weighed for evaluating feed consumed by the bull per day. Hourly scan sampling method (Mialon *et al.* 2008) has been used for assessing other maintenance activities. Observation was recorded for two hours each at morning (9.00 to 11.00 A.M) and at afternoon (2.30 to 4.30 A.M) starting from thirty minutes prior to offering of feed and continues for one and half an hour after offering feed.

Every two bulls were observed for two minutes and incidence of particular behavior(s) was noted on tabulation sheet suitably developed for the purpose. The bull(s) was again observed after 10 minutes after completing observation on other bulls in circular manner. With the help of these observations total feeding time, total drinking time, total ruminating time and total resting time in 2 hours were calculated. Accordingly, total time of observation per bull was 48 min per day. The data were analyzed using mixed model least squares analysis for fitting constants (Harvey 1990).

## RESULTS AND DISCUSSION

### Feed consumption

Only the effect of breed on daily feed consumption was found to be significant ( $P<0.05$ ). Effect of season and breed x season interaction was found to be non-significant. The differences between Gir and Sahiwal, H.F. cross and Gir were

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significant ( $P < 0.05$ ) (Table 1). Rest of the differences were non-significant statistically. Out of the total feed offered Sahiwal, Gir, Jersey cross and H.F cross bulls consumed about 95, 93.4, 94.6 and 94.4% of total feed (Fig. 1). Similar finding was observed by Baumant *et al.* (2006). But Rastani *et al.* (2001) and Thomson *et al.* (2001) have reported lower values than the present findings, which was 3.34 and 2.8 kg/100kg live wt. in Jersey cows whereas, 3.59 and 3.03 kg/100kg live wt. in Holstein Friesian cows respectively. The significant variation found might be due to the genetic differences of the animal and their variation in adaptability to local situation.

#### Eating time

Effect of breed on eating time was significant statistically ( $P < 0.01$ ). Rest of the effects were non-significant. Breeds influenced the time spent in eating by the stud bulls in the order i.e., Sahiwal > Jersey cross > Gir > H.F. cross. The differences in duration of eating time between Sahiwal and Gir, and Jersey cross and H.F cross were found to be significant statistically (Table 1). During 48 min. of observation the total time spent eating varied from 41.39 to 43.33% (Fig. 2). Lower values than those of the presented findings have been reported by Singh *et al.* (1985) in cattle.

This variation might be due to the genetic differences of the animal, weather and management practices.

#### Drinking time

All the effects (i.e., breed, season and their interaction) were found to be non-significant statistically. Present findings have been supported by (Baumont *et al.* 2006). But they are in contradiction with the findings of Fraser and Broom (2002) who reported significant variation in drinking time between breeds and seasons.

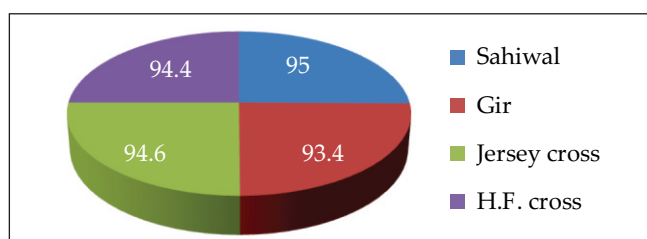
#### Rumination time

Effects of season on rumination time was significant at 5% level statistically. Present findings showed that rumination was more in summer in comparison to that during winter season. The reference is limited in the literature on the time spent ruminating by stud bulls. Similar finding was reported by Schake and Riggs (1969) in Sahiwal cattle. But deviation from the present observation was found by Singh *et al.* (1985) in lactating dairy cows and buffalo. Seasonal variation in present study might be due to variation in quality of roughage offered to the bulls in different seasons and direct effect of environmental temperature on rumen physiology.

**Table 1:** Different components of maintenance behavior of bulls during 48 min. per animal of scan sampling observation (Mean  $\pm$  S.E)

Breeds	Season	Feed consumed/ bull/day (kg/100kg body wt.)	Eating time (min.)	Drinking time (min.)	Rumination time (min.)	Resting Time			
						Sitting time (min.)	Standing time (min.)	Lying time (min.)	Sleeping time (min.)
Sahiwal	Winter	4.78 $\pm$ 0.02	21.48 $\pm$ 0.32	1.68 $\pm$ 0.14	5.24 $\pm$ 0.29	3.40 $\pm$ 0.37	12.72 $\pm$ 0.76	1.48 $\pm$ 0.20 <sup>a</sup>	2.00 $\pm$ 0.01
	Summer	4.71 $\pm$ 0.02	20.12 $\pm$ 0.35	1.24 $\pm$ 0.14	5.76 $\pm$ 0.27	4.26 $\pm$ 0.33	12.40 $\pm$ 0.44	2.52 $\pm$ 0.22 <sup>b</sup>	1.70 $\pm$ 0.03
	Overall	4.75 $\pm$ 0.01 <sup>ACD</sup>	20.80 $\pm$ 0.31 <sup>ACD</sup>	1.46 $\pm$ 0.11	5.50 $\pm$ 0.26	3.83 $\pm$ 0.23 <sup>ABD</sup>	12.56 $\pm$ 0.53	2.00 $\pm$ 0.10 <sup>ACD</sup>	1.85 $\pm$ 0.02 <sup>ACD</sup>
Gir	Winter	4.69 $\pm$ 0.02	20.88 $\pm$ 0.35	1.64 $\pm$ 0.16	5.16 $\pm$ 0.23	4.52 $\pm$ 0.31	13.00 $\pm$ 0.56	1.68 $\pm$ 0.12	1.12 $\pm$ 0.01
	Summer	4.65 $\pm$ 0.01	18.92 $\pm$ 0.34	1.16 $\pm$ 0.14	7.60 $\pm$ 0.29	5.76 $\pm$ 0.34	12.08 $\pm$ 0.45	1.48 $\pm$ 0.20	1.00 $\pm$ 0.03
	Overall	4.67 $\pm$ 0.01 <sup>BEG</sup>	19.90 $\pm$ 0.32 <sup>BEF</sup>	1.40 $\pm$ 0.12	6.38 $\pm$ 0.24	5.14 $\pm$ 0.24 <sup>AFG</sup>	12.54 $\pm$ 0.37	1.58 $\pm$ 0.12 <sup>BEG</sup>	1.06 $\pm$ 0.01 <sup>CEF</sup>
Jersey cross	Winter	4.71 $\pm$ 0.04	19.92 $\pm$ 0.30	1.72 $\pm$ 0.14	4.52 $\pm$ 0.23	4.68 $\pm$ 0.34	12.80 $\pm$ 0.59	1.60 $\pm$ 0.24	2.76 $\pm$ 0.01 <sup>a</sup>
	Summer	4.74 $\pm$ 0.03	20.12 $\pm$ 0.40	1.16 $\pm$ 0.16	5.48 $\pm$ 0.28	6.40 $\pm$ 0.41	11.24 $\pm$ 0.45	1.36 $\pm$ 0.11	2.24 $\pm$ 0.01 <sup>b</sup>
	Overall	4.73 $\pm$ 0.03 <sup>CEI</sup>	20.02 $\pm$ 0.30 <sup>CEG</sup>	1.44 $\pm$ 0.12	5.00 $\pm$ 0.24	5.54 $\pm$ 0.27 <sup>CFH</sup>	12.02 $\pm$ 0.39	1.48 $\pm$ 0.14 <sup>CFI</sup>	2.50 $\pm$ 0.01 <sup>BEG</sup>
H.F. cross	Winter	4.73 $\pm$ 0.04	20.34 $\pm$ 0.36	1.32 $\pm$ 0.12	5.48 $\pm$ 0.28	4.36 $\pm$ 0.50	13.34 $\pm$ 0.67	1.46 $\pm$ 0.05 <sup>c</sup>	1.70 $\pm$ 0.01
	Summer	4.72 $\pm$ 0.02	19.41 $\pm$ 0.39	1.06 $\pm$ 0.13	5.94 $\pm$ 0.25	5.56 $\pm$ 0.39	13.24 $\pm$ 0.62	1.05 $\pm$ 0.08 <sup>d</sup>	1.74 $\pm$ 0.04
	Overall	4.72 $\pm$ 0.03 <sup>DHI</sup>	19.87 $\pm$ 0.37 <sup>DFH</sup>	1.19 $\pm$ 0.11	5.71 $\pm$ 0.24	4.96 $\pm$ 0.32 <sup>EGH</sup>	13.29 $\pm$ 0.46	1.26 $\pm$ 0.05 <sup>DHI</sup>	1.72 $\pm$ 0.01 <sup>DEG</sup>

Mean having different superscripts within the same column differs significantly



**Fig. 1:** Feed consumed by different breeds of stud bulls (%)

### Resting time

Resting time has been classified to following four sub components.

### Sitting time

Time spent in sitting posture and not performing any activity is taken as sitting time. Effects of breed and season were found significant statistically ( $P < 0.01$ ) on the parameter. The differences between Sahiwal and H.F. cross, Jersey cross and Sahiwal were significant (Table 1). [Yadav and Gupta \(1985\)](#) reported higher values than that of the present result whereas lower values were obtained by [Thind and Gill \(1986\)](#) in buffaloes. This variation might be due to the genetic differences of the animals. Bulls showed more sitting activity in summer season than that during winter season. During 48 min. of observation the total time spent sitting varied from 7.97% to 11.54% (Fig. 2). Higher value (19.72 min out of 48 min.) was reported by [Raut \(1999\)](#) in Black pied cows during summer season. Significant variation found might be due to the variation in adaptability of the breed(s) to local weather.

### Standing time

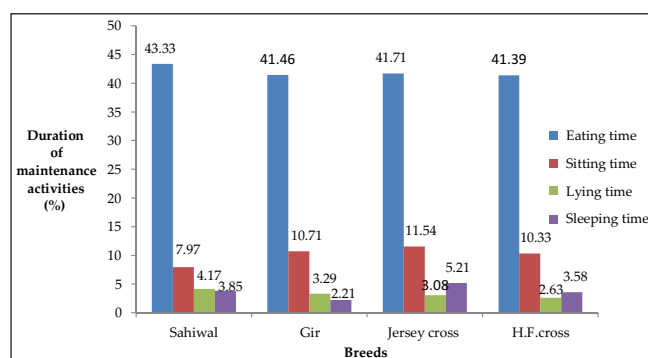
This includes time spent in idle standing posture without any activity. All the effects ( i.e., breed, season and their interaction) were found to be non-significant. Contrarily [Gonyou and Stricklin \(1984\)](#) found that seasonal changes had significant effect on standing time.

### Lying time

This refers to time spent in lying posture in idle condition. Effects of breed and breed x season interaction on this component of maintenance behavior were significant statistically ( $P < 0.01$ ). Differences in lying time between Gir and Sahiwal, H.F. cross and Gir, Jersey cross and Gir were found to be significant statistically (Table 1). During 48 min. of observation the total time spent lying varied from 2.63% to 4.17% (Fig.2). Higher values than that of the present findings were found by [Singh et al. \(1985\)](#) in cattle. But similar findings were reported by [Mialon et al. \(2008\)](#) in cattle. The variations

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**Fig. 2:** Effect of different breeds of stud bulls on duration of various maintenance activities (%)

found might be due to differences in age of the experimental animals.

### Sleeping time

It is the time spent either in sitting or lying posture with closed eyes. Effects of breed and breed x season interaction on this parameter were significant statistically at 1 and 1 % level respectively. Differences in sleeping time between Jersey cross and Sahiwal was found significant statistically ( $P < 0.05$ ). The mean sleeping time of bulls ranged from 2.21 to 5.21% (Fig.2). Breeds influenced the time spent in sleeping by the stud bulls in the order i.e., Jersey cross > Sahiwal > H.F. cross > Gir. Higher value 2.56 min. (5.34%) and 7.2 min. (5%) per 48 min were reported by [Jana et al. \(1988\)](#) in crossbred cattle. These variations might be due to the age of animals and different management conditions. Apparently sleeping activity shown by bulls of all breeds/ strains was more in winter than that during summer season. Similar findings were reported by [Das \(2001\)](#) in Sahiwal, Jersey cross and H.F cross cattle. The variation might be due to pleasant environmental condition in sunny winter.

### CONCLUSION

Different breeds responded differently in expression of various subcomponents of maintenance behavior during two seasons. Drinking and standing behavior appears to be more tolerant to different effects among all components of postural behavior.

### ACKNOWLEDGEMENT

The authors are thankful to the Director, Frozen Semen Bull Station, Haringhata, Nadia, West Bengal, India for permitting to carry out the research work. It is also acknowledged to all the official veterinarians and staff members of the station for providing necessary support during the work period.

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