PERFORMANCE OF PURE DANISH HOLSTEIN FRIESIAN BULLS UNDER INDIAN MANAGEMENT AND TROPICAL CLIMATIC CONDITIONS

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ABSTRACT

Data on 1798 ejaculates obtained from three high pedigree pure Danish Holstein Friesian bulls were analyzed to observe the influence of Indian management and tropical climatic conditions on various seminal characteristics. The effect of seasons was significant ($P<0.05$) for ejaculate volume, sperm output per ejaculate, initial motility and post thaw motility, bull to bull variation was observed in all parameters except initial motility and post thaw motility. Sperm concentration was non significant between seasons. Ejaculate wise data analysis revealed that volume and initial motility for the first ejaculate did not differ significantly between bulls however rest of the parameters differed significantly between bulls, the effect of season was significant in all parameters except sperm concentration in both the ejaculates and post thaw motility for the first ejaculate.

KEY WORDS: Danish Holstein Friesian bulls, Indian management, semen ejaculates

INTRODUCTION

In order to get the advantage of genetic improvement happening in dairy advanced countries, the exotic bulls were imported in India. The semen produced by these bulls is used to upgrade our indigenous cattle resulting in higher milk production and productivity. Under national cross-breeding program, much emphasis is given on breeding our non-descript indigenous cows with quality semen of high pedigree exotic bulls. This is aimed at improving the genetic make-up of low milk producing non-descript indigenous cows. The use of exotic Holstein Friesian (H.F.) semen in the artificial insemination (A.I.) programme in the country is on the rise, however the semen production potential of exotic bulls under Indian management and tropical climatic conditions has to be assessed for maximum exploitation of the superior germ plasm. The information on the seminal characteristics of such bulls is lacking in Indian conditions. Thus, the present study is designed to investigate the characteristics of semen ejaculates of pure Danish Holstein Friesian bulls under Indian management and tropical climatic conditions.

MATERIALS AND METHODS

The performance data of three high pedigree pure HF bulls for a four year period from 2001 to 2004 has been utilized in this study. These bulls were imported from Denmark as young bulls and reared, trained for semen collection and maintained at the semen station of this centre. The seasons were classified as winter (November to February), summer (March to June) and rainy or monsoon (July to October), age of the bulls included in the study ranged between 41 and 42 months. As per standard disease protocol of the semen station, all animals were periodically vaccinated against Theileriosis, Foot and Mouth Disease (FMD), Haemorrhagic Septicemia (HS) and Black Quarter (BQ). They were tested to detect the incidences of Brucellosis, John's Disease (JD) and Tuberculosis (TB) and the positive reactors were suitably disposed off as per the mandate of the herd health management. The faecal samples and blood smears were also screened periodically for the detection of parasitic infestations and protozoan parasites, respectively. As a routine, all animals were dewormed once in a year before monsoon.

All the bulls were kept under identical conditions of care and management. Semen was collected from all the bulls twice a week. On the day of semen collection, two false mounts were provided to each bull, normally two ejaculates and rarely one ejaculate were obtained from each bull. The total number of ejaculates collected from these bulls was 1798. Ejaculate volume was recorded immediately after collection, initial motility was evaluated under Phase Contrast microscope and sperm concentration was estimated by Accucell photometer (IMV, France). Semen was diluted in Tris diluent (Rasbech, 1975) and freezing was carried out after equilibration under standard conditions (Graham et al., 1985). Post thaw progressive motility was assessed 24 hrs after freezing. If the progressive motility was more than 50 % only then the frozen semen was preserved. The data was analyzed using two way ANOVA as described by Snedecor and Cochran (1989).

RESULTS AND DISCUSSIONS

The overall mean values of seminal parameters such as ejaculates per month, volume of ejaculate, sperm concentration, number of sperms per ejaculate, initial sperm motility and post thaw motility are presented in Table 1 whereas seminal parameters for first and second ejaculates have been summarized in Table 2.

Ejaculates per Month (EPM): The overall mean EPM per bull was 12.49 (Table 1) which was recorded higher during summer followed by winter and monsoon seasons, respectively. Singh et al. (1994) obtained 5.85 ± 0.18 ejaculates per month in Mehsana bulls and Tomar et al. (1964) obtained 4.37 ± 0.37 ejaculates per month in Murrah bulls, however, Tiwari et al. (2010) observed 14.38 EPM in Murrah bulls at this centre. This may be due to reduced frequency of semen collection at some semen stations once a week instead of twice a week.

Ejaculate Volume (EVOL): It was observed that season had significant ($P<0.05$) effect on EVOL, this was in conformity with the findings of Fiaz et al. (2010), Nagaraj et al. (2001), Dhami et al. (1998), Singh and Pangawkar (1990) and Bhosrekar et al. (1980) in HF bulls.Bull to bull variation was also significant except for first ejaculate. The overall mean EVOL was 4.55 ± 0.04 ml (Table 1) which is in agreement with the findings of Sharma et al. (1991) and Bonia (1978). Higher values were observed in winter season, which is in conformity with the findings of Bhosrekar et al. (1980) followed by summer and monsoon seasons, respectively, the outcome is similar to the findings of Dhami et al. (1998), however Nagaraj et al. (2001) and Stalhammer et al. (1989) observed higher values during summer followed by winter and monsoon seasons, respectively. This may be due to the different geographical locations / agro-climatic conditions where the different groups of animals were kept. The highest mean value of EVOL was recorded at 4.97 ± 0.11 ml in first ejaculate during winter season and the lowest at 3.99 ± 0.11 ml (Table 2) in second ejaculate in monsoon season.

Sperm Concentration (SCON): It was observed that SCON had no significant effect between seasons but it differs significantly ($P<0.05$) between bulls. This correlates with the findings of Bhosrekar et al. (1980) however contradicts to the reports of Nagaraj et al. (2001) and Singh and Pangawkar (1990). The results of first and second ejaculates follow the same pattern. The mean SCON was 1145.01 ± 10.09 million/ml (Table 1). These values are higher to the findings of Nagaraj et al. (2001), Dhami et al. (1998), Shukla et al. (1995) and Bhosrekar et al. (1980) but lower to the findings of Suryaprakasam et al. (1993) and Singh and Pangawkar (1990). In the present study, the higher values were observed in summer followed by winter and monsoon seasons, respectively. Whereas, Dhami et al. (1998) and Bhosrekar et al. (1980) found higher values during winter. Lower values during monsoon are in line with the findings of Nagaraj et al. (2001) and Dhami et al. (1998).

Sperm output per ejaculate (SOUT) : SOUT was varied significantly ($P<0.05$) between seasons as well as between bulls. Higher values were observed during winter followed by summer and monsoon seasons, respectively. This statement is in agreement with the findings of Dhami et al.

Table 1: Mean values and their SE of seminal parameters in different seasons

Season	Total No. of ejaculates	No. of ejaculates per month/bull EPM	Ejaculate Volume (ml) EVOL	Sperm Concentration (10^6/ml) SCON	Sperm out put/ejaculate (million) SOUT	Initial Motility (%)	Post Thaw Motility (%) PTM
Winter	565	11.77	4.83 [a] ± 0.07	1140.67 ± 17.27	5703.52 [a] ± 136.27	59.93 [a] ± 0.70	56.50 [a] ± 0.24
Summer	692	14.42	4.64 [a] ± 0.06	1168.65 ± 16.62	5636.68 [a] ± 120.77	57.75 [ab] ± 0.64	55.77 [b] ± 0.19
Monsoon	541	11.27	4.17 [b] ± 0.07	1119.31 ± 18.58	4850.96 [b] ± 121.55	55.27 [b] ± 0.94	55.05 [c] ± 0.28
Overall	1798	12.49	4.55 ± 0.04	1145.01 ± 10.09	5421.27 ± 73.51	57.82 ± 0.43	55.86 ± 0.14

Note: Means bearing a common superscript in columns do not differ significantly with each other (P≤ 0.05)

Table 2: Mean values and their SE of seminal parameters on successive ejaculates in different seasons

Season	1st Ejaculate							2nd Ejaculate						
	Total No. of ejaculates	No. of ejaculates per month/bull	Ejaculate Volume (ml)	Sperm Conc. (10^6/ml)	Sperm out put/ejaculate (million)	Initial Motility (%)	Post Thaw Motility (%)	Total No. of ejaculates	No. of ejaculates per month/ bull	Ejaculate Volume (ml)	Sperm Conc. (10^6/ml)	Sperm out put/ejaculate (million)	Initial Motility (%)	Post Thaw Motility (%)
Winter	316	6.58	4.97 [a] ±0.11	1274.16 ±23.49	6542.91 [a] ±202.33	59.38 [a] ±0.95	56.22 ±0.32	249	5.19	4.64 [a] ±0.10	971.25 ±21.03	4638.26 [a] ±147.16	60.46 [a] ±1.02	56.85 [a] ±0.37
Summer	368	7.67	4.82 [a] ±0.10	1317.09 ±22.43	6523.29 [a] ±177.62	57.22 [ab] ±0.88	55.59 ±0.25	324	6.75	4.43 [b] ±0.08	1000.05 ±21.14	4629.66 [a] ±141.50	58.36 [ab] ±0.94	55.98 [b] ±0.29
Monsoon	318	6.63	4.29 [b] ±0.09	1250.82 ±23.39	5524.87 [b] ±163.80	54.93 [b] ±1.22	55.23 ±0.37	223	4.65	3.99 [c] ±0.11	931.78 ±25.57	3889.95 [b] ±159.60	55.79 [b] ±1.45	54.78 [c] ±0.45
Overall	1002	6.96	4.70 ±0.06	1282.52 ±13.35	6212.61 ±105.96	57.28 ±0.58	55.72 ±0.18	796	5.53	4.37 ±0.06	971.91 ±13.01	4425.12 ±86.93	58.52 ±0.63	56.04 ±0.21

Note: Means bearing a common superscript in columns do not differ significantly with each other (P≤ 0.05)

(1998). The overall mean SOUT was 5421.27 ± 73.51 million (Table 1). This value is higher to the findings of Dhami et al. (1998) and lower to the findings of Suryaprkasam et al. (1993). Highest SOUT was 6542.91 ± 202.33 million (Table 2) obtained during the winter season in first ejaculates.

Initial Motility: The mean percentage initial motility differed significantly (P<0.05) between seasons, however, bull to bull variation was observed only in second ejaculates. The highest mean percentage initial motility was found in winter and the lowest in rainy season. On the contrary, Nagaraj et al. (2001) and Bhosrekar et al. (1989) reported highest percentage initial motility during rainy season.

Post Thaw Motility (PTM): PTM was significant (P<0.05) between seasons except for first ejaculates, whereas bull to bull variation was non significant. Overall mean PTM was 55.86 ± 0.14 % (Table 1). Higher values were observed in winter, followed by summer and monsoon seasons, respectively.

The outcome of this study has revealed that higher ejaculate volume, higher sperm output per ejaculate, higher per cent initial motility and best post thaw motility were obtained during the winter season. Therefore it may be concluded that maximum utilization of exotic bulls in India, in term of quality and quantity of semen doses can be practiced during the winter season.

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