

Comparison of Semen Characteristics of Reciprocal Crossbred Bulls of Friesian x Sahiwal Origin

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ABSTRACT

Semen characteristics of reciprocal crossbred bulls of Friesian and Sahiwal origin (F x S and S x F) being maintained at Livestock Experiment Station, Bhunikey were studied. These bulls were divided into two groups, each group comprising of two bulls. In group-1, semen from F x S crossbred bulls was collected while in group-2, the semen was collected from S x F crossbred bulls. The number of semen ejaculates collected from the bulls of groups 1 and 2 were 60 and 61, respectively. The semen characteristics (Mean \pm SE), i.e., volume per ejaculate (mL), mass motility (0-5 score), individual motility of spermatozoa (%), dead and abnormal spermatozoa (%) were 4.94 ± 0.24 vs. 7.15 ± 0.32 , 2.86 ± 0.15 vs. 2.51 ± 0.16 , 65.83 ± 1.04 vs. 61.39 ± 1.92 , 22.08 ± 1.35 vs. 40.52 ± 1.64 and 14.32 ± 0.73 vs. 25.87 ± 2.26 in reciprocal crossbred bulls of groups 1 and 2, respectively. The differences of these semen characteristics between groups 1 and 2 were statistically significant ($P < 0.05$). Different types of abnormalities like detached heads, middle droplet and coiled tails differed significantly ($P < 0.05$) between the two groups while other abnormalities, i.e., malformed heads, mini heads, proximal droplet, distal droplet and bent tails differed non-significantly.

Key Words: Semen; Bull; Sahiwal; Friesian

INTRODUCTION

The breeding of local non-descript cattle with exotic breeds of Friesian or Jersey results in the production of 50% crossbred progeny. Studies have proved that under our environmental conditions, 50% crossbred animals showed better performance than crosses of other exotic inheritance (Chaudhry *et al.*, 1987). In order to maintain 50% exotic inheritance level, breeding of 50% crossbred cows with 50% crossbred bulls is continuously required.

Two types of reciprocal crossbred bulls of F x S origin were being maintained at LES, Bhunikey, i.e., F x S crossbred bulls (Friesian sire x Sahiwal dam) and S x F crossbred bulls (Sahiwal sire x Friesian dam). It is assumed that F x S crossbred bulls might have more vigor and better semen quality due to effect of sire than S x F crossbred bulls. Keeping in view this idea, it was planned to study and compare the semen characteristics of reciprocal crossbred bulls of F x S origin being maintained at Livestock Experiment Station, Bhunikey.

MATERIALS AND METHODS

Four crossbred bulls (reciprocal crosses of F x S) 5-6 years old being maintained at LES Bhunikey were used in this study. These bulls were divided into two groups, each comprising of two bulls. In group-1, semen from F x S crossbred bulls was collected while in group-2, the semen was collected from S x F crossbred bulls. The project was carried out during the months of August through November, 2001. The duration of the semen collection was 16 weeks. The bulls were provided balanced ration in addition to green

fodder and were kept under similar conditions of feeding and management. They were housed in sheds having sufficient cross ventilation.

Two ejaculates of semen per collection from each bull were collected by artificial vagina (AV) method after sexual stimulation by one false mount and 5-10 min restraint. Semen from all the bulls was collected once-a-week. Immediately after collection the semen collecting tubes were taken to the laboratory and placed in water bath at 37°C. Semen characteristics such as color, volume, mass motility, individual motility of spermatozoa were recorded using standard procedures. Mass motility was graded on a 5-point scale basis ranging from 0-5. Each ejaculate was evaluated for mass motility and individual motility of spermatozoa using phase contrast microscope. Smear of each semen collection was made taking one drop of semen and 4-5 drops of Eosin-Nigrosin stain. Each smear was counted for the frequency of eosin stained dead spermatozoa by examining at least 100 sperms under 100x of phase contrast microscope. Few drops of each sample were fixed in about 2-3 mL of formalized buffer saline solution and then examined under 40x to count the frequency of abnormal sperm cells. The average values (Mean \pm SE) for each trait in the two groups were evaluated and compared by using paired t-test (Steel & Torrie, 1984).

RESULTS AND DISCUSSION

The number of semen ejaculates collected from the bulls of groups 1 and 2 were 60 and 61, respectively, out of an expected number of 64 ejaculates from each group. Collection failure was 13 and 9% for the 2nd ejaculate in

groups 1 and 2, respectively. On the other hand, El-Chahidi *et al.* (1978) recorded very higher failure rate of 25% for 2nd ejaculate in Egyptian buffalo bulls. No collection failure was seen for the 1st ejaculate in the present study but El-Chahidi *et al.* (1978) reported 14.35% collection failure for 1st ejaculate in Egyptian buffalo bulls. It might be due to the difference of breed and environment. The color of semen in both the groups was mostly milky. Comparison of semen characteristics in reciprocal crossbred bulls of F x S origin is shown in Table I.

Table I. Comparison of the semen characteristics in reciprocal crossbred bulls of F x S origin maintained at LES, Bhunikey

Semen Characteristics	F x S crossbred bulls (Group-1)	S x F crossbred bulls (Group-2)
Number of ejaculates	60	61
Volume per ejaculate (mL)	4.94 ± 0.24 ^b	7.15 ± 0.32 ^a
Mass Motility (0-5)	2.86 ± 0.15 ^a	2.51 ± 0.16 ^b
Individual motility (%)	65.83 ± 1.04 ^a	61.39 ± 1.92 ^b
Dead Spermatozoa (%)	22.08 ± 1.35 ^b	40.52 ± 1.64 ^a
Abnormal spermatozoa (%)	14.32 ± 0.73 ^b	25.87 ± 2.26 ^a
Detached head (%)	1.45 ± 0.27 ^b	3.51 ± 0.40 ^a
Malformed head (%)	0.05 ± 0.03 ^a	0.08 ± 0.04 ^b
Mini Head (%)	0.00 ± 0.00 ^a	0.02 ± 0.02 ^b
Proximal droplet (%)	2.52 ± 0.23 ^a	3.31 ± 0.30 ^a
Middle droplet (%)	2.48 ± 0.34 ^b	6.31 ± 0.96 ^a
Distal droplet (%)	0.22 ± 0.06 ^a	0.26 ± 0.07 ^a
Bent tail (%)	5.52 ± 0.53 ^a	6.79 ± 1.23 ^a
Coiled tail (%)	2.08 ± 0.26 ^b	5.59 ± 1.31 ^a

Values bearing different superscripts in a same row differed significantly (P<0.05).

It is evident from Table I that the differences of the semen characteristics between groups 1 and 2 were statistically significant (P<0.05). Kroetz *et al.* (2000) recorded semen volume (mL), gross motility (on a scale of 1-5), individual motility (%) and total abnormalities of reciprocal crossbred bulls (Charolais x Caracu and Caracu x Charolais) as 1.68, 1.71, 1.09 and 3.11 vs. 1.69, 1.66, 1.07 and 3.26, respectively. Prior to analysis of variance, the observed values on semen volume were transformed by $\ln(Y + 1.0)$, those on individual motility by $\arcsin(Y/100)$ 1/2 and those on gross motility and total abnormalities by $(Y + 0.5) 1/2$, where Y is the value of the variable in the original scale. The values of these semen parameters were almost the same in both the groups of reciprocal crossbred bulls of Charolais and Caracu while in the present study these values in both the groups were significantly different (P< 0.05). It might be due to the breed and environmental differences. Usmani *et al.* (1993) recorded mass motility (0-5 score) and sperm motility (%) as 1.2 and 1.1 and 38.0 and 39.0 (P<0.05) during July-September and October-November periods in Friesian x Sahiwal crossbred bulls, respectively which are lesser as compared to those reported in the present study. Singh and Pangawkar (1990) studied the semen volume in Holstein x Sahiwal bulls which averaged 7.0 ± 0.2 mL while lower values are reported in the present study. The results of Nazir *et al.* (1987) are not in line with those of the present study. They reported that the average semen volume semen per ejaculate (mL), mass motility (%) and individual motility of spermatozoa (%) in

FS crossbred bulls was 5.79 ± 0.67, 1.02 ± 0.20 and 39.40 ± 6.28, respectively. The overall mean values of sperm abnormalities were 21.98 ± 2.25 (%) in these crossbred bulls. The values of semen volume per ejaculate (mL) and sperm abnormalities (%) were higher while those of mass motility (%) and individual motility (%) were lower as compared to the present study.

In the present study, different types of abnormalities which differed significantly (P<0.05) between the two groups like detached heads (%), middle droplet (%) and coiled tails (%) averaged 1.45 ± 0.27 vs. 3.51 ± 0.40, 2.48 ± 0.34 vs. 6.31 ± 0.96, 2.08 ± 0.26 vs. 5.59 ± 1.31 in groups 1 and 2, respectively. Other abnormalities, i.e., malformed heads (%), mini heads (%), proximal droplet (%), distal droplet (%) and bent tails (%) averaged 0.05 ± 0.03 vs. 0.08 ± 0.04, 0.00 ± 0.00 vs. 0.02 ± 0.02, 2.52 ± 0.23 vs. 3.31 ± 0.30, 0.22 ± 0.06 vs. 0.26 ± 0.07 and 5.52 ± 0.53 vs. 6.79 ± 1.23 in groups 1 and 2, respectively and did not differ significantly. Raju and Rao (1982) recorded defective sperm heads (%), protoplasmic droplet (%) and tail abnormalities (%) in Brown Swiss x Ongole, Brown Swiss x Jersey crossbred bulls. These values averaged 8.69 and 6.75 (P<0.01), 1.06 and 0.60 (P<0.01) and 6.31 and 5.72 (P<0.01), respectively. The values of sperm head abnormalities were higher while those of other two abnormalities were lower as compared to the present study. It might be due to the nature of crossbred bulls and environmental differences. Conclusively, the semen characteristics of F x S crossbred bulls were of significantly better quality than those of S x F crossbred bulls and it might be due to the sire effect.

Acknowledgements. Assistance by Dr. Khalid Javed and Mr. Muhammad Ramzan is gratefully acknowledged.

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(Received 10 August 2002; Accepted 14 September 2002)