

## SEMEN CHARACTERISTICS OF CROSSBRED (FRIESIAN X SAHIWAL) AND SAHIWAL YOUNG BULLS MAINTAINED UNDER SUB-TROPICAL CONDITIONS OF PUNJAB

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### ABSTRACT

Comparative studies of semen characteristics were carried out in 50% crossbred (Friesian X Sahiwal) and purebred Sahiwal young bulls maintained under sub-tropical conditions at Research Institute for Physiology of Animal Reproduction, Bhunikey and Semen Production Unit, Qadirabad, respectively. Semen was collected on weekly intervals for a period of one year. 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  $5.62 \pm 0.14$ ,  $1.25 \pm 0.04$ ,  $50.50 \pm 0.93$ ,  $25.78 \pm 0.91$  and  $27.15 \pm 0.97$ , respectively in crossbred bulls. The corresponding values for these semen characteristics in Sahiwal bulls were  $3.64 \pm 0.09$ ,  $1.36 \pm 0.04$ ,  $60.55 \pm 0.33$ ,  $27.73 \pm 0.87$  and  $15.41 \pm 0.86$ , respectively. These semen parameters differed significantly ( $P < 0.05$ ) between crossbred and Sahiwal bulls. It may be concluded from this study that the semen characteristics in crossbred (Friesian x Sahiwal) bulls were poorer than purebred Sahiwal bulls.

**Key words:** Semen characteristics, bulls, sahiwal, crossbred.

### INTRODUCTION

The breeding of indigenous cattle breeds with exotic cattle breeds (Friesian or Jersey) results in the production of 50% crossbred progeny in  $F_1$ . There are about 1.09 million heads of crossbred cattle in Punjab (Annon., 2000). Early studies have shown that under sub-tropical conditions, 50% crossbred females showed better productive and reproductive performance than crosses of other levels of exotic inheritance (Chaudhary *et al.*, 1987). To maintain 50% exotic blood inheritance in subsequent generations, it is necessary to produce and maintain crossbred bulls of the same exotic blood for breeding. Various field reports and research studies indicate that crossbred bulls (Friesian X Sahiwal) have lower fertility than purebred Friesian and Sahiwal bulls (Nazir *et al.*, 1987). This necessitated to investigate the reasons of lower fertility in crossbred dairy cattle bulls. Therefore, the present investigation was planned to study semen characteristics and morphological traits of spermatozoa in young crossbred (Friesian X Sahiwal) as well as purebred Sahiwal bulls for comparison.

### MATERIALS AND METHODS

Five sexually mature 50% crossbred (Friesian X Sahiwal) and five purebred Sahiwal young bulls (2-3.5 years old) maintained at the Research Institute for Physiology of Animal Reproduction, Bhunikey and

Semen Production Unit, Qadirabad, respectively were used in this study. The feeding and management practices at the two stations were similar. They are located in the same agro-ecological zone. The semen was collected on weekly intervals for one year, from August/1997 to July/1998, by artificial vagina method after sexual stimulation by one false mount and 5-10 minutes restraint. Immediately after collection, the semen collecting tubes were taken to the laboratory and placed in a water bath at 37°C. Semen characteristics such as volume, mass motility and individual motility of spermatozoa were recorded using standard procedures. Mass motility was graded on a 0-5 point score basis. Each ejaculate was evaluated for mass motility and individual motility of spermatozoa using phase contrast microscope. Smear of each semen sample 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 examined under 40x to count the frequency of abnormal sperm cells. The average values (mean  $\pm$  SE) for each trait in both breeds were compared by using paired t-test (Steel and Torrie, 1984).

## RESULTS AND DISCUSSION

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  $5.62 \pm 0.14$ ,  $1.25 \pm 0.04$ ,  $50.50 \pm 0.93$ ,  $25.78 \pm 0.91$  and  $27.15 \pm 0.97$  respectively, in crossbred bulls. The corresponding values for these semen characteristics in Sahiwal bulls were  $3.64 \pm 0.09$ ,  $1.36 \pm 0.04$ ,  $60.55 \pm 0.33$ ,  $27.73 \pm 0.87$  and  $15.41 \pm 0.86$ , respectively. Statistically, these semen parameters of crossbred and Sahiwal young bulls differed significantly ( $P < 0.05$ ) (Table-1).

respectively. However, these values in Sahiwal bulls were  $5.30 \pm 0.35$ ,  $3.87 \pm 0.34$  and  $6.24 \pm 0.51\%$ , respectively. These differed significantly ( $P < 0.05$ ) between crossbred and Sahiwal young bulls (Table-1).

Raju and Rao (1982) recorded abnormal sperm heads, protoplasmic droplets and tail abnormalities in Brown Swiss x Ongole crossbred bulls which averaged 8.69, 1.06 and 6.31%, respectively. Their results for sperm head abnormalities were higher while those of other two abnormalities were lower than the findings of the present study in crossbred bulls. The results of the present study are not in line with the findings of Rao *et al.* (1996). They reported abnormalities of sperm head,

**Table-1: Semen characteristics (mean  $\pm$  SE) of crossbred (FxS) and Sahiwal young bulls**

Semen characteristics	Crossbred bulls	Sahiwal bulls
No. of ejaculates	200	200
Mass motility (0-5 score)	$1.25 \pm 0.04^a$	$1.36 \pm 0.04^b$
Individual motility(%)	$50.50 \pm 0.93^a$	$60.55 \pm 0.33^b$
Dead percentage	$25.78 \pm 0.91^a$	$27.73 \pm 0.87^b$
Total abnormalities (%)	$27.15 \pm 0.97^a$	$15.41 \pm 0.86^b$
Head abnormalities (%)	$6.33 \pm 0.43^a$	$5.30 \pm 0.35^b$
Protoplasmic droplet (%)	$7.82 \pm 0.48^a$	$3.87 \pm 0.34^b$
Tail abnormalities (%)	$13.00 \pm 0.76^a$	$6.24 \pm 0.51^b$

Values with different superscripts within a row differ significantly ( $P < 0.05$ ).

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. Their findings for mass motility are similar while for sperm motility are lower than those recorded in the present study. The results of Nazir *et al.* (1987) are partially in agreement with the findings of the present study. They reported the average values for semen volume per ejaculate (ml), mass motility (0-5 grade), individual motility of spermatozoa (%) and sperm abnormalities (%) in Friesian X Sahiwal crossbred bulls as  $5.79 \pm 0.67$ ,  $1.02 \pm 0.20$ ,  $39.40 \pm 6.28$  and  $21.98 \pm 2.25$ , respectively. The corresponding values in Sahiwal bulls were  $5.17 \pm 0.36$ ,  $1.84 \pm 0.09$ ,  $57.00 \pm 1.44$  and  $12.74 \pm 2.39$ , respectively. Singh and Pangawkar (1990) reported higher semen volume (7.0  $\pm$  0.2 ml) in Holstein x Sahiwal bulls than the present study. The differences may be due to different location/environment and managerial practices.

In the present study, different abnormalities of head, protoplasmic droplets and tail were  $6.33 \pm 0.43$ ,  $7.82 \pm 0.48$  and  $13.00 \pm 0.76\%$  in crossbred bulls,

protoplasmic droplets and tail in Sahiwal X Jersey bulls as 2.47, 1.97 and 2.31%, respectively. It might be due to the type of crossbred bulls and environmental differences. However, Mathur *et al.* (2002) while studying semen quality attributes in Frieswal (Friesian X Sahiwal) bulls reported lower values for volume ( $4.06 \pm 0.05$ ), where as values for gross motility ( $2.94 \pm 0.02$ ) and per cent progressive motility ( $52.48 \pm 0.78$ ) were higher than the findings of the present study.

It may be concluded from the present investigations that young crossbred bulls (FxS) produced significantly poor quality semen than purebred young Sahiwal bulls. However, further studies in older crossbred bulls are suggested which may provide more information about their semen quality parameters.

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## REFERENCES

- Anonymous, 2000. Punjab Livestock Census. Vol.1, Livestock and Dairy Development Department Punjab (Pakistan).
- Chaudhary, M. Z., S. K. Shah, G. Rasul, I. H. Shah and M. A. Farooque, 1987. Production and reproduction performance of various genetic groups of crossbred cattle. *Pakistan Vet. J.*, 7(3): 99-108.
- Mathur, A.K., S. Tyagi, S. Mukherjee and S.P Singh, 2002. Semen quality attributes in Frieswal bulls. *Indian J. Anim. Sci.*, 72(1): 59-60.
- Nazir, M., M. Mushtaq, A. Masood, M. Munir and T. Naseer, 1987. Morphological abnormalities in the spermatozoa of crossbred cow bulls. *Pakistan Vet. J.*, 7(1-2): 57-59.
- Raju, S. and A.R. Rao, 1982. Note on semen characteristics of crossbred and purebred bulls. *Indian J. Anim. Sci.*, 52(12): 1230-1232.
- Rao, A.V. N., O. Sreemannarayana and A. N. Rao, 1996. Sperm abnormalities in Jersey and its crosses. *Indian J. Dairy Sci.*, 49(6): 362-364
- Singh, D.M. and G.R. Pangawkar, 1990. Studies on some characteristics of exotic and crossbred bull spermatozoa. *Indian J. Anim. Reprod.*, 11(2): 88-91
- Steel, R.D.G. and J.H. Torrie, 1984. Principles and Procedures of Statistics. Mc-Graw Hill Koga Kusa Ltd. Book Co.Inc. New York.
- Usmani, R.H., S.K. Shah and A.H. Zafar, 1993. Seasonal effect on semen producing ability of Holstein Friesian and crossbred bulls under subtropical environments of Punjab. *Pakistan Vet. J.*, 13(3): 133-137.