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Short Communication

EVALUATION OF CAUDA EPIDIDYMAL SEMEN QUALITY OF CROSSBRED BULLS IN THE TROPICS

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Abstract

The objective of the study was to evaluate the quality of semen retrieved from cauda epididymis of crossbred bulls in the tropics. Testes from one hundred and twenty six recently slaughtered cross bred bulls in the tropics were used for the analysis. The total and progressive motility percentage obtained for epididymal semen were 49.17 ± 9.26 per cent and 27.5 ± 9.11 per cent respectively. The mean concentration obtained for epididymal semen was $37,175 \times 10^6 \pm 7612 \times 10^6$ per ml. The mean percentage of live and dead sperms was 84.5 ± 8.02 per cent and 15.5 ± 8.02 per cent respectively. The mean percentage of normal spermatozoa, spermatozoa with abnormal heads, abnormal tails, spermatozoa with a proximal protoplasmic droplet and distal protoplasmic droplet were 35.67 ± 2.30 , 3.17 ± 1.58 , 2.33 ± 0.61 , 11.67 ± 4.01 and 47.17 ± 3.17 per cent respectively.

Keywords: Cross bred cattle; Epididymal semen; Morphology

Introduction

Epididymal semen is being more often considered as a potential and valuable resource of genes. Literature review showed that there were no studies about evaluation of epididymal semen in crossbred cattle in the tropics. To utilize this resource as efficiently as possible, the seminal characteristics of cauda epididymal semen have to be studied. Morphological Studies on epididymal semen was conducted in agouti (*Dasiprocta aguti*) by Silva *et al.* (2011) and in camels by El-Badry *et al.* (2015).

Materials and Methods

Testis from one hundred and twenty six recently slaughtered bulls at the Department of Livestock Product Technology, College of Veterinary and Animal Sciences, Mannuthy and breeding bull station of Kerala Livestock Development Board were collected and transported to the laboratory in sperm-TALP medium (Parrish *et al.*, 1988) maintained at 35°C . Epididymids was separated gently by blunt dissection after thorough washing of the testis. Sperms from cauda epididymis were collected by gentle slicing and squeezing of the cauda epididymis. Total, and progressive, motility was assessed subjectively (nearest 5%) by phase contrast microscopy (magnification 200X). Concentration of sperm was assessed with haemocytometer. Eosin/ nigrosin stained smears were

used for the evaluation of the percentages of live and dead spermatozoa, and for assessment of sperm morphology. At least 200 spermatozoa were counted in each sample, and classified as either: normal spermatozoa, spermatozoa with abnormal heads or tails, or spermatozoa with a proximal or distal protoplasmic droplet (values expressed as a percentage).

Results

The mean total and progressive motility percentage obtained for epididymal semen from crossbred bulls were 49.17 ± 9.26 per cent and 27.5 ± 9.11 per cent respectively. The mean concentration obtained for epididymal semen from crossbred bulls was $37,175 \times 10^6 \pm 7612 \times 10^6$ per ml. The mean percentages of live and dead sperms in cauda epididymal semen of crossbred bulls were 84.5 ± 8.02 per cent and 15.5 ± 8.02 per cent respectively. The mean percentage of normal spermatozoa, spermatozoa with abnormal heads, abnormal tails, spermatozoa with a proximal protoplasmic droplet and distal protoplasmic droplet in epididymal semen of crossbred bulls were 35.67 ± 2.30 per cent, 3.17 ± 1.58 per cent, 2.33 ± 0.61 per cent, 11.67 ± 4.01 per cent and 47.17 ± 3.17 per cent respectively (Table 1).

Table 1: Morphological evaluation report of epididymal semen from cross bred bulls in the tropics

Particulars	Result
Mean Total Motility (%)	49.17±9.26
Mean Progressive Motility (%)	27.5±9.11
Mean Concentration(per ml)	37,175x10 ⁶ ±7612x10 ⁶
Mean Live Sperms (%)	84.5±8.02
Dead Sperms (Mean) (%)	15.5±8.02
Normal Spermatozoa (Mean) (%)	35.67±2.30
Spermatozoa with Abnormal Heads (Mean) (%)	3.17±1.58
Spermatozoa with Abnormal Tails (Mean) (%)	2.33±0.61
Spermatozoa with a Proximal Protoplasmic Droplet (Mean) (%)	11.67±4.01
Spermatozoa with a Distal Protoplasmic Droplet (Mean) (%)	47.17±3.17

Discussion

Epididymal semen was examined under phase contrast microscope at 200 X magnification and assessed the total and progressive motility subjectively (nearest 5%). Deutscher *et al.* (1974) reported a higher percentage of motility in epididymal semen collected by cannulation technique from angus bulls when compared to the motility observed in the present study. The mean total and progressive motility percentage obtained for epididymal semen in the present study is in agreement with the results of Goovaerts *et al.* (2006). Singh *et al.* (2007) and Hiron (2007) also reported a higher motility of epididymal spermatozoa in buffaloes and Filliers *et al.* (2008) in cats, when compared to the results of the present study.

Deutscher *et al.* (1974) reported that, the percentage of motile sperm in the epididymal samples showed a trend for being lower than in the ejaculate. They opined that, the dilution of the epididymal sperm with seminal plasma during ejaculation stimulated more vigorous movement and a combination of dilution, oxygenation and increased temperature was observed to increase the rate of motility. Deutscher *et al.* (1974) reported a much lower concentration of spermatozoa in epididymal semen collected by cannulation technique from angus bulls when compared to the concentration obtained in the present study. The mean concentration obtained for epididymal semen in the present study is in agreement with the results of Goovaerts *et al.* (2006).

The morphology of epididymal spermatozoa was assessed by examining slides prepared by Eosin-nigrosin staining technique. The mean percentage of live and dead sperms obtained in the study is in agreement with the results of Deutscher *et al.* (1974) and Goovaerts *et al.* (1996) in

bulls; Singh *et al.* (2007) and Hiron (2007) in buffaloes and Filliers *et al.* (2008) in cats.

Deutscher *et al.* (1974) reported a higher percentage of head and tail abnormalities in bull epididymal semen when compared to the results of the present study. Deutscher *et al.* (1974) reported that, the types of abnormal sperm and their percentages were very comparable between the epididymal and ejaculate samples. The mean percentage of normal spermatozoa, spermatozoa with abnormal heads, abnormal tails, spermatozoa with a proximal protoplasmic droplet and distal protoplasmic droplet are in agreement with the results of Goovaerts *et al.* (2006) in bulls. Filliers *et al.* (2008) reported a higher percentage of normal epididymal spermatozoa in cats.

The results from the assessment of cauda epididymal semen, such as the high sperm concentration, and the presence of distal protoplasmic droplets were expected, because the epididymis is known for maturation and storage of spermatozoa.

Goovaerts *et al.* (2006) reported that the percentages of total and progressive motility of ejaculated semen were significantly higher than the percentages of these parameters in epididymal semen, which has a higher percentage of static spermatozoa. The presence of a high percentage of non-moving spermatozoa in the epididymal semen can be attributed to metabolic inactivity of the spermatozoa while in the cauda epididymis. In some cases, epididymal sperm is the only available source of male gametes for use in assisted reproduction programs. This can be the only source when spermatozoa have to be urgently retrieved from a severely injured or suddenly deceased donor, and can be vitally significant with a donor belonging to an endangered species. In some situations,

superior males have to be handled, or captured under anesthesia, and this might impair normal ejaculation. Moreover, theoretically, an ejaculate can be devoid of spermatozoa, which makes aspiration of epididymal sperm, or a testicular biopsy to recover sperm, necessary. Collection of epididymal sperm further offers the possibility to acquire and use genetic material from elite males even after their death.

Epididymal semen can either be used fresh, or be frozen and stored in genetic resource bank projects (Gilmore *et al.*, 1998). The use of fresh or cryopreserved epididymal semen in assisted reproduction programs has already led to offspring in domestic and wild species including: cattle, goat, eland and mouflon (Blash *et al.*, 2000; Bartels *et al.*, 2001).

Competing interests: Declare that there is no competing interest.

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