CORRELATION BETWEEN SEMEN EVALUATION PARAMETERS AND FERTILITY OF FROZEN-THAWED SEMEN OF JERSEY X LOCAL HILL CATTLE CROSSBRED BULLS

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ABSTRACT

The present study investigated the correlation between semen evaluation parameters and their reliability in predicting the fertility of Jersey X local hill cattle crossbred bulls. Fourty ejaculates (8/bull) of five bulls were subjected to semen evaluation as well as fertility trials. The performance of bulls in terms of analyzed semen parameters was above the acceptable limits, however, none of the parameters was correlated to fertility of these bulls.

Keywords: Cattle, Crossbred, Correlation, Fertility trial, Semen evaluation

The routine semen evaluation procedures are used as tests for predicting the potential fertility of bovine semen samples used for *in vitro* fertilization or artificial insemination (Tartaglione and Ritta, 2004). Others suggested that routine semen evaluation parameters cannot be used as reliable predictors of sperm fertilizing ability (Bartoov *et al.,* 1991). The routine parameters viz. progressive motility and vigor have a limited value to predict field fertility (Morado *et al.,* 2015). This study was conducted to evaluate the relationship between sperm characteristics assessed by certain routine semen evaluation methods and fertility of Jersey X local hill cattle crossbred bulls and to establish the reliability of these tests in predicting their fertility.

The present work was conducted at Sperm Station, Palampur (32.6^{O}N, 76.3^{O}E, altitude 1290.8 m) on the semen from five Jersey X local hill cattle crossbred breeding bulls. The semen was collected twice a week by artificial vagina method. Eight ejaculates from each bull (total 40 ejaculates) were analyzed for percent livability, progressive motility, reaction to 150 mOsmol hypo-osmotic solution, acrosomal integrity and morphological abnormalities at post-thaw stage. Thawing of the frozen semen straws for post thaw evaluation was done in water bath at 37°C for 30 seconds. For fertility trials, 1,629 cows were inseminated from the semen of same bulls. Pregnancy diagnosis was done 60 days post artificial insemination by per rectal method. The data obtained were analyzed using SAS statistical package version 9.2.

Fertility of a semen sample is based on the structural intactness and functional competence of the spermatozoa which enables them to traverse through the female genitalia and reach the oviduct to penetrate the zona pellucida and lead to fertilization. In accordance with this assumption, significant correlations between various seminal attributes and fertility have been described (Januskauskas *et al.,* 2003 and Gillian *et al.,* 2008). In contrast, the present study revealed no correlation between semen evaluation parameters and fertility (Table). A significant correlation between membrane integrity and fertility was reported (Januskauskas *et al.,* 2000). The observed absence of correlation between progressive motility and fertility (Table) is in agreement with an earlier study (Tartaglione and Ritta, 2004). However, others reporetd highly significant positive correlation between post-thaw motility and fertility of bulls (Gillian *et al.,* 2008). Further, in contrast to our results of Hypo-osmotic swelling test (HOST) and fertility, a strong correlation between

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Table: Relation between semen evaluation parameters and fertility in Jersey X local hill cattle crossbred bulls

Parameters	Correlation coefficient	Regression estimate	Regression equation
Livability	0.030^{NS}	0.065±0.15	y=72.384+0.06x
Progressive motility	0.051^{NS}	0.163±0.22	y=47.400+0.16x
Hypo-osmotic swelling test	-0.019^{NS}	-0.064±0.24	y=54.120-0.06x
Acrosomal integrity	0.025^{NS}	0.049±0.14	y=76.386+0.05x
Morphological abnormalities	-0.053^{NS}	0.038±0.17	y=9.16-0.04x

^{NS}Not significant

freezability of semen and HOST was established in the crossbred bull semen (Dhanju *et al.,* 2006) and it was also found that HOST score in crossbred bovine semen was significantly higher in the group with the higher CR (Mukhopadhyay *et al.,* 2007). A high numbers of altered acrosomes are related to problems in fertilization (Thundathil *et al.,* 1999). Others revealed the absence of correlation coefficient between acrosomal integrity and fertility (Andersson *et al.,* 1990), which was also not observed in the present study (Table). This could be due to the fact that overall percentage of sperms with intact acrosomes in the samples studied were much above the limits considered acceptable for fertilization. Also, no correlation was established between the morphological abnormalities and fertility of the bulls in the present study (Table). In fact, lower fertility of semen is not associated with abnormal spermatozoa until the proportion of latter exceeds 20% and none of the head, tail or mid-piece abnormalities exceeded this limit in present investigation. In brief, none of the semen evaluation parameters had significant correlation with the conception rate.

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