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Short Communication

In-vitro sperm mucus penetration test for fertility assessment in cows

P. C. BENNUR[1], S. S. HONNAPPAGOL[2†] AND M.K. TANDLE[3]

Department of Animal Reproduction, Gynecology & Obstetrics
Veterinary College, Nandinagar, Bidar 585401 (Karnataka)

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ABSTRACT

The estrual cervico-vaginal mucus (CVM) samples were collected from 44 regularly cycling pleuriparous cows prior to artificial insemination and the same were subjected for *in-vitro* sperm mucus penetration tests like slide, polyethylene and capillary tube tests. Following the collection of CVM the animals were inseminated and screened for pregnancy after 60 days. Among the *in-vitro* sperm cervical mucus penetration tests, the slide and capillary tube tests were found to be of diagnostic value in assessing the fertility of cows.

Key words: Cervico-vaginal mucus, *in-vitro* tests

There have been several attempts to relate certain physico-chemical properties of cervical mucus with fertility (Sharma and Tripathi, 1989; Salphale *et al.*, 1993). However, the information on *in-vitro* sperm mucus penetration tests in predicting the fertility is scare (Akhtar *et al.*, 1980). In this study, an attempt has been made to find out the efficacy of sperm mucus penetration tests in predicting the fertility in cows.

Forty-four regularly cycling pleuriparous cows maintained by the farmers were selected for the present study. The cervico-vaginal mucus (CVM) was collected aseptically prior to artificial insemination as per the technique of Dabas and Maurya (1988). The cows were bred artificially using frozen thawed semen. The collected mucus samples were immediately transferred to the laboratory to study the sperm mucus penetration tests like slide test (Hafez, 1977), capillary (Pangaonkar, 1990), Sperm Penetration Speed (SPS) and polyethylene tube tests (Kremer, 1965). The cryopreserved semen straws pertaining to JR 72 (Jersey) and RJY47 (Red Dane x Jersey) bulls from the same batch were employed for conducting both sperm mucus penetration tests (SMPT) and artificial insemination. Out of 44 CVM samples, 20 samples were assessed using JR 72 while, the remaining were assessed for RJY47 Bull's semen. Sixty days following breeding the fertility of the cows was assessed based on per rectal pregnancy diagnosis.

The mean percentage of progressively motile spermatozoa in the first three consecutive microscopic fields from the line of interface of mucus sperm penetration slide test revealed a gradual decline in both pregnant and non-pregnant cows. However, this decline of progressively motile spermatozoa of JRY72 bull was steady in the CVM of pregnant cows with the respective values from the three consecutive fields being 26.92±2.62, 21.15±0.29 and 17.69±3.56 % whereas, the decline was rapid in the CVM of non-pregnant cows and the values were 25.71±6.11, 12.85±3.59 and 7.85±2.64 % respectively. A similar trend was noticed with RJY47 bull's semen wherein the decline of progressively motile spermatozoa in the CVM of pregnant cows was 26.36±2.70, 22.27±2.37 and 16.81±2.63 % respectively. While in case of non-pregnant cows, the decline was from 21.92±1.83, 16.15±1.97 to 13.46±2.29 %. The variation between the fields among the pregnant and non-pregnant cows was not significant. The available literature did not reveal any documentation regarding similar studies in veterinary field.

The decline in the progressive movement of spermatozoa in the CVM of cows that became pregnant following the insemination with JR72 bull's semen was 21.15±3.40, 7.69 V2.80 and 2.30±1.66 % respectively. Similarly, the decline in the CVM of cows that became pregnant following insemination with RJY47 semen was 18.84 ±1.80, 6.53±1.53 and 3.07±1.33 % respectively.

[1]Veterinary Officer, P.O. Mugulkod, Dist. Bagalkot, Karnataka
[2]Director of Instruction, Veterinary College, Bidar-585401 (Karnataka)
[3]I/c Associate Professor, Dept of Animal Reproduction, Gynecology & Obstetrics

[†]Corresponding author

Thus, this test was not confirmative and hence no definite inference can be drawn. However, the rapid decline in the progressively motile spermatozoa may be ascribed to the poor penetrability and survivability of spermatozoa in many plastic tubings as concluded by Hafez (1977).

The mean Sperm Penetration Distance (SPD) in the CVM of cows that became pregnant was higher as compared to cows that did not conceive with the semen of both the bulls and the difference was insignificant. In the CVM of cows where JR72 bull's semen was used the SPD in the cows that became pregnant and those that did not were 24.00±4.67 and 18.76±3.10 mm/10 min. respectively. The respective values for semen of RJY47 bull were 26.00±4.00 and 16.92±1.85 mm/ 10 min. The mean Sperm Penetration Speed (SPS) in the CVM of cows that became pregnant was non-significantly higher in the cows inseminated with RJY47 semen (43.30±6.67 µ/sec.) and those inseminated with RJY47 semen (43.30±6.67 µ/sec.) while the SPS was lower in the CVM of cows that did not become pregnant following insemination with JR72 semen (31.25±5.16µ/sec.) and RJY47 semen (28.18±3.09 µ/sec.) Several studies have demonstrated about the strong biophysical interaction between spermatozoa and the mucus with a major role being played by the mucus in mediating the movements of the individual spermatozoa with in it (Katz and Berger, 1980). Further, it was indicated that there might be qualitative and quantitative differences between sperm-mucus interactions (Katz and Overstreet, 1980). The differences in the SPD and SPS in the CVM of the cows that became pregnant as compared to cows that did not may be attributed to the possible variations on accounting individual, manage mental and sperm migration assessment (Akthar *et al.*, 1980).

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