

The influence of net negative surface charge on the ability of ram spermatozoa to penetrate mucus

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Abstract

Studies suggest that seminal plasma improves the ability of ram spermatozoa to penetrate cervical mucus, possibly due to a net negative charge it imparts onto the sperm's surface. To investigate this interaction, the effect of seminal plasma on the electronegativity and mucus penetrative ability of ram epididymal spermatozoa was examined. While seminal plasma was observed to increase mucus penetration in fresh spermatozoa ($p < 0.01$) this was not attributed to surface charge as spermatozoa that had not been exposed to seminal plasma possessed a greater overall net negative surface charge following electrophoretic separation ($p < 0.001$). Nor was it attributed to differences in motility or viability of fresh spermatozoa. Seminal plasma was detrimental to the viability and acrosome integrity of frozen-thawed spermatozoa ($p < 0.001$). The post-thaw motility of seminal plasma treated spermatozoa in mucus also appeared to be hindered as a result ($p < 0.001$). The electronegativity of frozen-thawed spermatozoa did not differ between treatments. As hypothesised, this study demonstrates that the addition of seminal plasma to fresh epididymal spermatozoa significantly improves mucus penetration. However, it is evident that increased net negative surface charge is not the mechanism of action by which seminal plasma facilitates mucus penetration.

Keywords

cervical mucus, cryopreservation, electrophoresis, ovine, sialic acid