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JOURNAL ARTICLE

Sperm calcium levels and chlortetracycline fluorescence patterns are related to the in vivo fertility of cryopreserved bovine semen

S. Collin, M. A. Sirard, M. Dufour and J. L. Bailey
Centre de Recherche en Biologie de la Reproduction, Departement des Sciences Animales, Universite Laval, Quebec, Quebec, Canada.

Cryopreserved bovine semen is less fertile than fresh semen for reasons that have not been fully elucidated. Cryopreservation is known to disrupt the sperm plasma membrane and it induces premature capacitation of a sperm subpopulation, which may be a result of the increased internal calcium levels after thawing. To test the hypothesis that sperm intracellular calcium level is correlated with in vivo fertility, we used the fluorescent calcium indicator, indo-1, and flow cytometry to assess intracellular calcium levels in frozen-thawed sperm from bulls of varying degrees of fertility. We also tested a second hypothesis that the physiological status of sperm, as assessed by the chlortetracycline (CTC) fluorescent assay, is correlated with fertility. As detected by indo-1 fluorescence, the intracellular calcium level is negatively correlated with bull fertility immediately after thawing ($P = .0362$; $n = 3$ ejaculates from each of 10 animals). Moreover, there was a significant difference between the 3 most and least fertile bulls over 4 hours of incubation ($P < .05$; $n = 3$ ejaculates per bull). Finally, there was a positive correlation between sperm displaying the CTC acrosome reaction pattern and fertility ($P = .0014$; $n = 3$ ejaculates from each of 10 bulls).

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