ABSTRACTS

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Customizing semen preservation protocols for individual dogs and individual species: Sperm preservation beyond the state of the art

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Sperm quality can be variable in morphometric and physiological attributes between males of different species (1), between males within species sub-types reared under different environmental conditions (2), between ejaculates of the same male, or even between sperm populations within an ejaculate (3). Clinical semen evaluation is based on evaluation of whole ejaculates. Raw ejaculates, however, are not a chemically or physiologically well-defined entity. Sperm from a given ejaculate is not one homogenous population, rather a collection of heterogeneous subpopulations giving different measurements and possessing different fertilizing potential (4). When customizing extenders to ejaculates from cryosensitive males or species, a thorough knowledge of species sperm membrane physiology and an assessment of the individual ejaculate’s sperm populations are necessary. The reduced ability to respond with a hyperactivated motility pattern after having been exposed to capacitation permissive conditions may be due to an inherent deficiency at the structural level (5). Identification of subpopulations with different motility patterns is important as well as characterizing the subtle structural changes underlying the motility differences observed. From this, that the ability to identify populations of sperm responding rapidly to specific capacitating stimuli, or failing to progress through the capacitation process, may have clinical applications as a diagnostic tool for predicting a semen population’s fertilizing potential or a male’s reproductive fitness (4). Studies of lipid phase fluidity of sperm membranes, the role of membrane modifying components and detergent resistant microdomains, are of particular interest (6).

On the basis of experimental data in canids we have found that there are structural differences in membrane fatty acids between fox species with different cryosurvival potential (1) and recently, that supplementation of detergents such as sodium lauryl sulphate (Equex STM paste), may influence membrane fluidity of the surviving spermatozoa in a species dependent manner (7). We tested the original EYT extender (with either 3 or 4 % (v/v) glycerol in the final dilution, respectively) versus a two-step EYT extender containing Equex STM paste (Uppsala Equex (UE) extender with 5 % (v/v) in the final dilution processed according to (8) for freezing of ejaculates from males of three different canid species, blue fox (Vulpes lagopus), silver fox (Vulpes vulpes) and dog (Canis familiaris). The Equex containing extender significantly improved post-thaw sperm plasma membrane fluidity of the viable sperm population in both fox species, but not of the viable sperm population of dog semen (7). Surviving spermatozoa with high membrane fluidity after thawing and subsequent incubation may indicate early signs of capacitation (9) i.e. the detergent containing extender seemed to prevent initiation of capacitation like changes of fox spermatozoa during the cryopreservation procedure. With the long maturation time of canid oocytes a delay in capacitation may be beneficial.