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Synergistic Effect of Cholesterol-Vitamin E, Solubilized in Cyclodextrins, on Frozen-Thawed Bovine Semen

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Cryopreservation of sperm has been developed considerably in the recent years. However, during the different phases of the cryopreservation process spermatozoa are affected by various stresses. The aim of this study was to minimize this damage, particularly at the membrane level by supplementing the freezing extender medium with bioactive molecules, vitamin E and cholesterol. The two molecules are supposed to act in a complementary manner, cholesterol to reinforce the cell membrane and to fight against the cold shock, and vitamin E to fight against the oxidative stress. As the two molecules are lipophilic, they were both preloaded in cyclodextrins to enhance their solubility. The two molecules were used alone or in association. Sperm mobility (using CASA), sperm viability (using HOST) and levels of lipid peroxidation (using TBARs) were used to analyze sperm quality. The post-thawed results showed a significant protection of all sperm parameters when vitamin E and cholesterol were used simultaneously with $57.69 \pm 0.82 \mu\text{m/s}$, $39.87 \pm 6.3 \%$, $0.046 \pm 0.12 \text{ nmol}/10^8$, for VCL, viability, and oxidative stress status, respectively. Associating cholesterol and vitamin E, both preloaded in cyclodextrins, seems to offer a real opportunity to improve bovine semen quality after freezing-thawing process.