Divergent Survival Patterns in Boar Spermatozoa Linked to Oxidative Stress during Prolonged Chilled Storage

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Artificial insemination relies on viable semen, the maintenance of which in the swine industry is a challenge due to the gradual decline in sperm quality during chilled storage. Previous studies have demonstrated the existence of Good and Poor preservation survival semen exhibiting divergent decreased sperm motility during storage. Identification of intracellular mechanisms associated with semen quality during storage is paramount for the potential prediction of Good and Poor survival of semen. This study investigates the underlying biochemical factors contributing to this variability. Extended single semen doses of fertile boars (n=25) were analyzed daily using a Computer-Assisted Sperm Analyzer for sperm motility and morphology during seven-day storage at 16–18°C. On Day 7, semen samples exhibiting extremely high and low sperm motility were identified as Good and Poor, respectively. These samples were further analyzed using commercial-grade biochemical assay kits (free radicals or ROS, total antioxidant capacity or TAC, and thiobarbituric acid or MDA) to evaluate the oxidative stress level of spermatozoa on Day 0 and Day 7. Data were statistically assessed with ANOVA, followed by the pairwise t-test. $P<0.05$ indicated significance. On Day 0 of semen collection and extension, all samples had comparable sperm motility and normal morphology parameters ($P>0.05$), but they were significantly decreased on Day 7 (vs. Day 0). However, Good samples maintained higher values than Poor counterparts ($P<0.05$). They exhibited higher TAC and lower MDA and ROS than Poor samples on both days. Findings indicate that a higher TOAC-to-MDA ratio may help identify good preservation survival boar semen.

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