Can exogenous insulin improve sperm motility in cooled-stored stallion semen?

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 Unlike many of the domesticated large animal species, stallions are selected based on athletic and phenotypic characteristics rather than fertility. Stallion semen is often extended, cooled, and shipped to the location of the mare prior to breeding, and sperm motility inevitably decreases as semen ages despite the addition of semen extender. There is active interest in identifying additives to extend the life and improve motility of sperm, to increase the likelihood of successfully impregnating mares. Recent studies in human males showed that insulin may play a role in sperm metabolism and motility. We hypothesized that addition of insulin to stallion semen would have a positive effect on sperm viability and motility, compared to an insulin-negative control. To test this idea, semen was collected from eight light breed stallions using the Missouri artificial vagina for a total of 24 separate ejaculates, three from each stallion. Semen extender (EquiPro Cool Gard, MOFA Global, Verona, WI) was used to dilute each ejaculate to a final volume of 50 ml and a concentration of 25 million sperm/ml. The extended ejaculate was divided into three separate 15 ml aliquots (control, 0.25 and 1.0 IU insulin/ml). Aliquots were further divided into three smaller 5-ml aliquots and stored in a passive cooling device (EQUITAINER, Hamilton Research Inc., Ipswich, MA), to simulate real-life shipping conditions, for subsequent examination of motility. A computer-aided sperm analysis machine (SpermVision II, MOFA Global, Verona, WI) was used for the testing. Total and progressive motilities were analyzed at 0, 24, 48, and 72 hours after collection, and then statistical analyses performed. The motility parameters were log-transformed and analyzed by mixed models. The data were expressed as means +/- SEM, with significance set at p<0.05. There were significant effects of time on the total and progressive motilities (p<0.05), but no time-group interaction (p>0.05). There was no significant difference in motility for each of the three treatment groups at the time points recorded, with total and progressive motilities having the same average whether insulin was in the sample or not. Sperm viability was not directly measured. Therefore, in the present study, the addition of insulin to the semen extender does not improve sperm progressive motility during cooling over a 72 hour time period. Differences in endogenous insulin levels between equine and human semen could possibly account for the different results in similar experiments in the two species.

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