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ABSTRACT

The North American Asian (*Elephas maximus*) and African (*Loxodonta africana*) elephant populations are not self-sustaining due to poor reproduction. If current trends continue, elephants could become geographically 'extinct' in North America within 40 years. In order to enhance fecundity rates of the North American elephant population, artificial insemination (AI) has been recognized as an important reproductive technology for genetic management of these species. However, the utilization of AI continues to be severely impeded by several factors including the inability to consistently obtain good quality ejaculates, poor sperm survival after liquid storage and transport and the inability to successfully cryopreserve elephant sperm. A series of studies focused on: i) characterizing the chemical and protein profile of seminal plasma from Asian elephants, and to determine the relationships between these components and semen quality; ii) identifying the optimal storage condition (media and temperature) for short-term liquid semen storage in Asian and African elephants; and iii) developing sperm cryopreservation techniques in Asian elephants by assessing the influence of modifying sperm membrane cholesterol content, temperature of cryoprotectant addition, and optimal composition of the post-thaw diluents on sperm cryosurvival. The knowledge gained from these studies will help enhance fecundity rates, facilitate better genetic management of elephants in captivity, and ultimately provide a "genetic insurance" of these endangered and/or protected species by developing a genome resource bank for both Asian and African elephants.