ABSTRACT

Van Leeuwen, M.M. (2020). The effect of processing on the short- and long-term viability of epididymal African buffalo (*Syncerus caffer*) spermatozoa. Master of Agricultural Sciences, Stellenbosch University.

The Africa buffalo (*Syncerus caffer*) is one of the Big 5 that features strongly in the ecotourism and trophy hunting industries, and more recently, this species is sought after in game ranching operations. Optimal management of African buffalo in production systems however is hampered by genetic selection for traits without really knowing what the impact on reproduction is, and the diseases African buffalo carry. African buffalo also differ considerably from cattle and even water buffalo when their reproduction is considered. Little information is available on the processing of African buffalo sperm to yield quality samples that can contribute to a genome resource bank of this species, which can then be used for production and conservation purposes (i.e., where entire populations need to be eradicated due to e.g., Foot and Mouth Disease). The study therefore investigated the influence of sperm harvesting method (i.e., processed directly after culling or after 24h of intact storage at 4°C) on the viability of epididymal African buffalo spermatozoa. Spermatozoa aspirated from African buffalo epididymides were evaluated directly after aspiration or subjected to prolonged (i.e., 24h) liquid storage (in Ham's F10) at 5°C to determine the effect of extended liquid storage on the motility, viability, morphology and acrosome integrity of the spermatozoa. Samples that were subjected to 24h of liquid storage post-aspiration were characterized by significantly poorer viability, midpiece abnormalities and total abnormalities. The prolonged intact cold storage of testes had a negative effect on the occurrence of tail abnormalities. Aspirated samples were subjected to cryopreservation in either Triladyl®, or Triladyl® supplemented with trehalose to determine the potential of trehalose supplementation to minimise the deleterious changes caused by cryopreservation. The addition of trehalose had a positive effect on the motility and viability of sperm samples; however, tail morphology was negatively affected. Cryopreserved sperm samples were thawed using two different thawing rates to determine the optimum thawing method to yield samples viable for use in in vitro fertilisation procedures or artificial insemination. The thawing rates included a slow thawing rate (37°C for 35 seconds), and a fast-thawing rate (80°C for 5 seconds). A fast-thawing rate is not recommended due to a significant decrease in the sperm viability. Lastly, flow cytometry was used to determine the potential of this objective analysis method to determine the post-thaw viability of aspirated epididymal African buffalo spermatozoa. Future recommendations include investigation of the influence of prolonged intact storage of testes post-mortem (i.e., up to 72 hours) and at different storage temperatures on epididymal African buffalo sperm viability. Different trehalose supplementation levels and the potential thereof to minimise the negative effect of processing and cryopreservation on spermatozoa warrant further studies. The range of Stellenbosch University https://scholar.sun.ac.za iv parameters analysed using flow cytometry should be extended to include parameters such as morphology and acrosome integrity. The influence of extended boma holding stress, as experienced during routine TB monitoring periods, and the influence thereof on sperm viability, and in particular in the presence of elevated lactic acid levels warrants investigation.