FAREEDA SUWOR : SPERM CRYOPRESERVATION OF BOER GOAT. THESIS ADVISOR : ASST. PROF. SAMORN PONCHUNCHOOVONG, Ph.D., 82 PP.

Keyword: SPERM CRYOPRESERVATION/CRYOPROTECTANT/EGG YOLK/SOYBEAN LECITHIN/ ANTIOXIDANT/LIPID PEROXIDATION

The objective of this study was to examine the effects of cryoprotectants and antioxidants on sperm cryopreservation of the Boer goat. Two experiments were carried out. The first experiment was to evaluate the effects of cryoprotectant (glycerol) with the combinations of soybean lecithin and egg yolk on frozen semen quality and biomolecular changed in sperm cells of Boer goat using Synchrotron-Fourier Transform Infrared Spectroscopy (SR-FTIR). The second experiment was to investigate the effects of different concentrations of antioxidants glutathione (GSH), cysteine, and vitamin E on the sperm cryopreservation of Boer goat. Experiment one found that a tris-base extender with an osmolality similar to Boer goat semen and the combination of glycerol (5%) + Egg yolk (18%) yielded a higher total motility, progressive motility, and viability compared to the other treatments ($P<0.05$), but lower than that of the control group (Andromed). In addition, this study found that the combinations of glycerol (5%) and egg yolk (18%) yielded a higher lipid, ester lipid, and secondary protein (α-helix) compared to the other treatments ($P<0.05$). An increase in α-helix content was correlated to sperm capacitation. Experiment two was conducted to investigate the effects of different concentrations of three antioxidants (GSH, cysteine, and vitamin E) on the sperm cryopreservation of Boer goat. The sperm was diluted with a tris-based extender and different concentrations of each antioxidant with respective concentrations (1, 3, and 5 mM for GSH), (6, 9, and 12 mM for cysteine) and (1, 2, and 3 mM for vitamin E) were supplemented, and mixed with combinations of glycerol (5%) and egg yolk (18%). The extender with no antioxidant supplementation was also tested, and Andromed was used as a control. The results showed that the addition of 1 mM GSH yielded a higher membrane integrity and acrosome integrity compared to the other treatments ($P<0.05$). Furthermore, adding 1 mM of GSH or 1 mM of vitamin E decreased the lipid peroxidation of the frozen semen (3.01 and 2.96 nmol/mL,

respectively). These showed significantly better results than those of the other treatments $P<0.05$, but did not show a significant difference to Andromed ($P>0.05$). Nevertheless, supplementation with 1 mM of GSH did not show a significant difference in DNA methylation compared to those of Andromed and fresh sperm ($P>0.05$). Artificial insemination was also tested and it was found that 1 mM of GSH yielded a fertilization rate of 66.67% compared to Andromed which was 37.50%. Thus, this study suggests that 1 mM of GSH can be considered as an alternative antioxidant for semen cryopreservation of Boer goat, which can lead to increased goat production in the future.

School of Animal Technology and Innovation Student's Signature Fareeda
Academic Year 2024 Advisor's Signature Samorn P.