



KEY WORDS

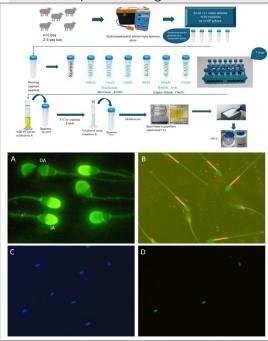
- ✓ Ram semen
- ✓ Cryopreservation
- ✓ Mitoquinone
- ✓ Caffeic Acid
- ✓ OGG1/ROMO1 gene expression and methylation

CONTACT

E-MAIL: m.melihyilmaz@outlook.com

THESIS SUPERVISOR

TELEPHONE: (+90 224) 294 12 45 E-MAIL: bbaspinar@uludag.edu.tr



EFFECTS OF MITOQUINONE AND CAFFEIC ACID SUPPLEMENTED EXTENDER ON THE FREEZABILITY OF RAM SEMEN AND SPERM OGG1/ROMO1 GENE EXPRESSION AND METHYLATION

Mehmet Melih YILMAZ

0000-0001-6050-791X

BURSA ULUDAG UNIVERSITY
GRADUATE SCHOOL OF HEALTH SCEINCES
REPRODUCTION AND ARTIFICIAL INSEMINATION DEPARTMENT
PhD PROGRAM

GRADUATION DATE:24.06.2025

SUPERVISOR

Prof. Dr. Burcu ÜSTÜNER
0000-0001-5999-4685
BURSA ULUDAG UNIVERSITY
GRADUATE SCHOOL OF HEALTH SCIENCES
REPRODUCTION AND ARTIFICIAL INSEMINATION
DEPARTMENT
BURSA – TÜRKİYE



THESIS ABSTRACT

In this thesis study, ram semen samples collected via electroejaculation were pooled and divided into seven groups. Different doses of Mitoquinone (MitoQ; 100, 150, 200 nM) and Caffeic Acid (CA; 50, 100, 150 μ M) were added to a Tris-based extender. Following the freeze-thaw process, motility (CASA), plasma membrane integrity, acrosome integrity, mitochondrial membrane potential, DNA fragmentation (TUNEL), MDA, and TAC levels were evaluated. Additionally, the expression levels and DNA methylation profiles of the OGG1/ROMO1 genes were analyzed.

As a result, the treatments with 200 nM MitoQ and 150 µM CA were found to be effective in ram semencryopreservation. This study is the first to evaluate the relationships between OGG1/ROMO1 gene expression and DNA methylation levels, and sperm parameters in MitoQ and CA supplemented ram semen. It provides valuable insights into the molecular and epigenetic effects of antioxidants. The findings support the role of epigenetic mechanisms in regulating gene expression and highlight the need for more comprehensive studies in this field.

APPLICATION AREAS OF THE THESIS RESULTS

In this thesis study, the aim was to preserve sperm quality during the freezing process by adding antioxidants such as mitoquinone and caffeic acid to the extender, in order to prevent quality loss caused by oxidative stress. Additionally, the expression levels and epigenetic methylation profiles of the OGG1 and ROMO1 genes associated with DNA damage repair and oxidative stress in ram sperm were evaluated, thereby revealing molecular-level contributions. This thesis presents not only spermatological findings but also innovative insights from a molecular biology perspective.

ACADEMIC ACTIVITIES

Sulandırıcıya ilave edilen farklı antioksidan maddelerin koç spermasının dondurulabilirliği ve sperm OGG1/ROMO1 gen ekspresyonu ve metilasyonu üzerine etkileri (ÖNAP- 2021/609 Priority Discipline: Molecular Biology and Genetics)-Scholarship

Yılmaz, M.M., Cimen, T., & Ustuner, B. (2024) Effects of mitoquinone and caffeic acid supplemented extender on the freezability of ram semen. In *Turkish & Italian Joint International Animal Reproduction Congress Kemer, Antalya, Türkiye* (p. 219-222).

Yılmaz, M.M., Ardicli, S., Cimen, T., & Ustuner, B. (2025). Effects of Mitoquinone and Caffeic acid on spermatological parameters and OGG1/ROMO1 gene expression of post-thawed ram semen. Animal Reproduction Science, 107858. https://doi.org/10.1016/j.anireprosci.2025.107858

YÖK 100/2000- Priority Discipline: Molecular Biology and Genetics (Gene Therapy and Genome)- **Scholarship** (2020-2024)