ANTIOXIDANT AND DEVELOPMENTAL CAPACITY OF RETINOL ON THE *IN VITRO* CULTURE OF RABBIT EMBRYOS

By

AHMED MAHMOUD ABDELALEEM KAMALELDIEN
B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Alazhar Univ., 2008

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APPROVAL COMMITTEE

Dr. AYMAN MOUSTAFA SAEED.....
Head Research, Biotechnology Department, Animal Production Research Institute, Agriculture Research Center

Dr. FARID KAMAL RAMZI STINO.....
Professor of Poultry breeding, Animal Production Department, Faculty of Agriculture, Cairo University

Dr. GAMAL MOHAMED KAMEL MEHAISEN.....
Professor of Poultry Physiology, Animal Production Department, Faculty of Agriculture, Cairo University

Date: 16/ 9 /2019

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. HOSAM MOHAMED SAFAA
Professor of Poultry Physiology, Fac. Agric., Cairo University

Dr. GAMAL MOHAMED KAMEL MEHAISEN
Professor of Poultry Physiology, Fac. Agric., Cairo University

Dr. MOHAMED FAHMY MAHMOUD SAAD
Senior Research, Biotechnology Department, Animal Production Research Institute, Agriculture Research Center

Name of Candidate: Ahmed Mahmoud Abdelaleem **Degree:** M.Sc.
Title of Thesis: Antioxidant and Developmental Capacity of Retinol on The *In vitro* Culture of Rabbit Embryos
Supervisors: Dr. Hosam Mohamed Safaa
Dr. Gamal Mohamed Kamel Mehaisen
Dr. Mohamed Fahmy Mahmoud
Department: Animal Production **Branch:** Poultry Production
Date: 16/9/2019

ABSTRACT

Oxidative stress is a major cause of defective embryo development during *in vitro* culture. Retinoids are recognized as non-enzymatic antioxidants and may have an important role in the regulation of cell differentiation and vertebrate development. However, there are not enough reports discussing the antioxidant and developmental capacity of retinoids, including retinol (RT), on the *in vitro* development of embryos recovered from livestock animals, particularly in rabbit species. Therefore, morula embryos obtained from nulliparous Red Baladi rabbit does were cultured for 48 hours in TCM199 in the absence of RT (control group) or in the presence of RT at concentrations of 10, 100 and 1000 nM. The developmental capacity to hatched blastocyst stage, the antioxidant biomarker assay and the expression of several selected genes were analyzed in each RT group. The data show that RT significantly ($P<0.001$) promoted the embryo hatchability rate at the concentration of 1000 nM to 69.44% versus 29.71% for the control. The activity of malondialdehyde (MDA) level was significantly ($P<0.05$) lower in the RT groups than the control group, while the total antioxidant capacity (TAC), superoxide dismutase SOD and glutathione peroxidase (GPX) activities were significantly ($P<0.05$) higher in the treatment of RT. Furthermore, RT treatment considerably up-regulated the relative expression of Gap Junction Protein Alpha 1 (GJA1), POU Class 5 Homeobox 1 (POU5F1) and Superoxide Dismutase 1 (SOD1) genes compared to the control group. The current study highlights the potential effects of RT as antioxidant in the culture media on the *in vitro* development of rabbit embryos.

Keywords: Antioxidant biomarkers, gene expression, *in vitro* development, rabbit embryo, retinol.

LIST OF ABBREVIATIONS

AI	Artificial insemination
ART	Assisted Reproductive Technology
CAT	Catalase
Cu/ZnSOD	Copper-zinc superoxide dismutase
CXs	Connexins
ET	Embryo transfer
GJA1	Gap Junction Protein Alpha 1
GJIC	Gap junctions intercellular communication
GJs	Gap junctions
GPX	Glutathione peroxidase
ICM	Inner cell mass
IVC	*In vitro* culture
IVEP	*In vitro* embryo production
IVF	*In vitro* fertilization
IVM	*In vitro* maturation
IVP	*In vitro* production
LPO	Lipid peroxidation
MDA	Malondialdehyde
MnSOD	Manganese superoxide dismutase
OCT4	Octamer-binding transcription factor 4
OS	Oxidative stress
p.c.	*Post coitus*
p.i.	Post insemination
PI	Propidium iodide
POU5F1	POU domain, class 5, transcription factor-1

RA	Retinoic acid
RAc	Retinoic acid acetate
RAREs	Retinoic acid response elements
RARs	Retinoic acid receptor
ROS	Reactive oxygen species
RT	Retinol
RXRs	Retinoid X receptor
SOD	Superoxide dismutase
TAC	Total antioxidant capacity
TCN	Total cell number
TE	Trophectoderm
t-RA	All-trans retinoic acid

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