EFFECT OF VITAMIN C, VITAMIN E, AND ALPHA LIPOIC ACID ON ANTIOXIDANT DEFENSE SYSTEM AND IMMUNE-RELATED GENE EXPRESSION IN CHICKENS

By

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THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences

(Poultry Production)

Department of Animal Production
Faculty of Agriculture
Cairo University

EGYPT

2018

APPROVAL SHEET

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Department: Animal Production **Branch:** Poultry Physiology
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ABSTRACT

This study was conducted to investigate the effect of vitamin C, vitamin E, and alpha lipoic acid on antioxidant defense system and some immune cytokines gene expression in chickens. Therefore, two experiments were conducted at the South China Agricultural University, Guangzhou, China. In the 1st experiment, broiler eggs (n = 90) were assigned to three equal groups after 18 days of incubation (first group was non-injected, second group was injected with saline, the third group was injected with 3 mg/egg vitamin C), where the eggs were injected in the air sac. In the 2nd experiment, 240 one-day-old chicks were assigned randomly to either a basal diet (control group) or basal diet supplemented with vitamin C (200 mg/kg diet), basal diet supplemented with vitamin E (100 mg/kg), or basal diet supplemented with alpha lipoic acid (ALA, 500 mg/kg) for 28 days from hatching. At 23 days of age, the broilers in the three groups were exposed to oxidative stress by dexamethasone (DEX) for three alternating days.

The most important results could be summarized as follow: Experiment 1: *In ovo* injection of vitamin C significantly increased mRNA expression of glutathione peroxidase (GSH-PX) and superoxide dismutase (SOD). Whereas, the mRNA level of interleukin 1 β (IL-1β), interleukin 6 (IL-6), and tumour necrosis factor α (TNF-α) in the spleen were significantly decreased. Experiment 2: At 28 days, birds fed the ALA-supplemented diet and exposed to oxidative stress by DEX had the lowest activity levels for T-AOC, SOD, and GSH-PX in the plasma and liver ($P < 0.05$), and the greatest activity levels in the MDA level. ALA significantly decreased the mRNA expression levels of the IL-1β, IL-6, IFN-γ, and TNF-α genes compared with the other groups during oxidative stress by DEX. This study suggests that, ALA is more effective for normalizing the oxidative stress induced by DEX than vitamin C or vitamin E.

Key words: alpha-lipoic acid, antioxidant, broiler, immune gene expression, *in ovo* injection, oxidative stress.

DEDICATION

I dedicate this work to whom my heartfelt thanks; to my beloved husband, Dr. ***Ahmed Mohamed Fouad****, Assistant Professor of Poultry Nutrition, Faculty of Agriculture, Cairo University, and to our lovely sweet daughters* ***MennatAllah*** *and* ***Mariam****, and my parents Without your support and love, I could not have accomplished many of the things I have.*

AKNOWLEDGEMENT

First and foremost, all praises and endless thanks are devoted to Allah - only God- who gave me the capability to do this study.

I wish to express my sincere thanks, deepest gratitude and appreciation to my supervisor, Prof. Dr. ***Abdel-Rahman Mohamed Atta****, Professor of Poultry Physiology, Faculty of Agriculture, Cairo University for his support, encouragement and guidance throughout my study. I would like to thank you for all you have taught me, you encouraged me to go abroad for higher studies. You believed in my abilities and gave me a lot of freedom to accomplish this thesis as I set in my mind to, thus letting me grow into a confident and independent person and researcher.*

Also, my deepest thanks, gratitude and sincerest appreciation to my co-advisors, Prof. Dr. ***Fatma Rasmy Mohamed Hassan****, Professor of Poultry Management, Faculty of Agriculture, Cairo University for being a supportive advisor anyone could hope to have. I would like to thank her for encouragement, continuous valuable suggestion and guidance. I cannot thank you enough for trusting in my abilities.*

I would like to express my utmost gratitude to Prof. Dr. ***Magdi Mohamed Mashaly****, Professor of Poultry Physiology, Faculty of Agriculture, Cairo University, for his encouragement and revision of the manuscripts of this thesis. Thank you for giving me a continuous push to be the best at everything.*

I warmly acknowledge, with deep gratitude and appreciation, Prof. Dr. ***QingHua Nie****, Vice Dean of College of Animal Science, South China Agricultural University, Guangzhou, China for allowing me to work in his laboratory. I am truly grateful for your invitation as one of your students into your lab. Thanks for all the financial support throughout my research. Thanks for your*

encouragement and for your confidence in me and for being always so supportive and interested in my work.

Deep thanks and sincere appreciation due the Department of Animal Genetics, Breeding and Reproduction, College of Animal Science, South China Agricultural University, Guangzhou, China, for their kindness and help and making my work pleasant and enjoyable. Many thanks to ***Biao Chen, Bolin Cai, Donghang Shen, Guihuan Li, Hongjia Ouyang, Jingyou Wang, Lianghui Zhou, Min Feng, Shudai Lin, Wenwu Zhang, Wen Luo, Yuanfang Li, Zhenhui Li, Zhijun Wang*** *for their excellent help during my research. Special thanks and sincere appreciation to* ***ChengWu Lei, Huxiao Quan, LuoSi Lin, YeJing Jing, ZuoXu Dong****, Key Laboratory of Animal Nutritional Regulation, Guangzhou, China. You were always ready to help when I needed you. It was a pleasure working with you.*

Special deep appreciation is given to my parents, my two younger sisters, and my brother for their nonstop love, support and encouragement throughout my life. A special thanks to my mother-in law. Words cannot express how grateful I am to you for all the sacrifices that you have made.

Special thanks are extended to my husband Dr. ***Ahmed Mohamed Fouad*** *and my daughters,* ***MennatAllah*** *and* ***Mariam****, who have always supported my heart and soul with endless love and encouragement.*

All my friends deserve my warm gratitude for all the encouragement, support, and love offered along the period of postgraduation.

Last but not least, I would like to thank everyone who supported and helped me during my Ph.D. study.

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