



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY



Cairo University
Faculty of Veterinary Medicine
Department of Clinical Pathology



Clinicopathological Studies on Avian Colibacillosis in Broilers

A Thesis submitted by

Waleed Abu El Hammed Abd El Gafaar Mutawa

(B.V.Sc., Faculty of Veterinary Medicine, Cairo University, 2006)

(M.V.Sc., Faculty of Veterinary Medicine, Cairo University, 2013)

For

The Degree of Ph.D.

(Clinical Pathology)

Under supervision of

Prof. Dr. Mohamed Ibrahim Dessouky Prof. Dr. Hamdy Soufy Ismail

Prof. of Clinical Pathology
Faculty of Veterinary Medicine
Cairo University

Prof. of Clinical Pathology
Veterinary Research Institute
National Research Centre

2021



Cairo University
Faculty of Veterinary Medicine
Department of Clinical Pathology



Supervision Sheet

Prof. Dr. Mohamed Ibrahim Dessouky

Prof. of Clinical Pathology
Faculty of Veterinary Medicine
Cairo University

Prof. Dr. Hamdy Soufy Ismail

Prof. of Clinical Pathology
Veterinary Research Institute
National Research Centre

2021



Cairo University
Faculty of Veterinary Medicine
Department of Clinical Pathology



Name: Waleed Abu El Hammed Abd El Gafaar Mutawa
Date of birth: 16/7/1983
Nationality: Egyptian
Degree: Ph.D. in Veterinary Medical Sciences (Clinical Pathology)
Title of Thesis: Clinicopathological studies on avian colibacillosis in broilers

Supervisors:

Prof. Dr. Mohamed Ibrahim Dessouky, Prof. of Clinical Pathology, Faculty of Veterinary Medicine, Cairo University.

Prof. Dr. Hamdy Soufy Ismail, Prof. of Clinical Pathology, Veterinary Research Institute, National Research Centre.

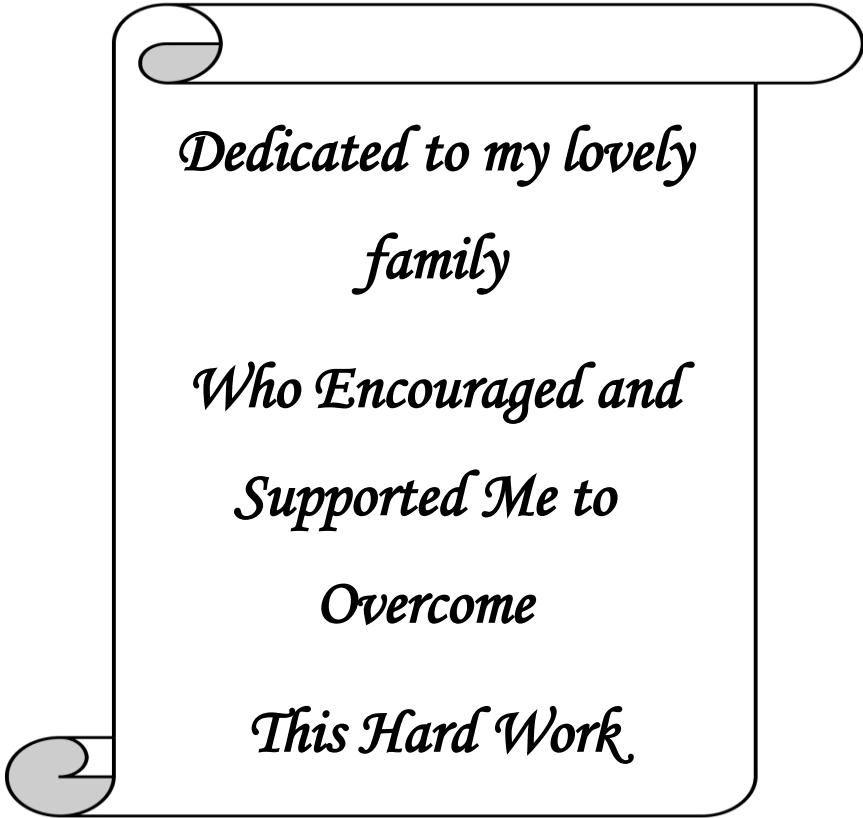
ABSTRACT

This study aimed to evaluate the most predominant strain of avian pathogenic *Escherichia coli* (APEC) causing colibacillosis with respiratory manifestation in broiler chickens in Egypt. Isolation and serotyping identification for the isolates of *E. coli* were performed. Prevalence of APEC was made by detection of the 8 virulence-associated genes “*astA*, *iss*, *irp2*, *papC*, *iucD*, *tsh*, *vat*, and *cva/cvi*” using multiplex PCR. Antibacterial sensitivity test for antibiotics disc and oregano at different concentrations (20%, 15%, 10%, and 5%), were estimated for the most important isolates of *E. coli*. After that, evaluating the efficacy of oregano oil 20% (in drinking water) and oregano powder 10% (on diet) for treatment and prophylaxis of broiler chickens experimentally infected with APEC O27-local isolate was performed. A total of 300 chicks -aged 19 days old- were randomly allocated into equal 6 groups; normal control (G1), Infected (G2), oregano treated (G3), antibiotic treated (G4), oregano control (G5), and oregano treated then infected (G6). Chickens of (G5) and (G6) were supplemented with oregano powder that contains 10% oregano essential oil in the diet (250 g /ton diet) from the 1st day old till the end of the experiment. At the age of the 19th, 20th, and 21st day, G2, G3, G4, and G6 were infected with 0.2ml of APECO27 (1×10^7 CFU/chick) via the intratracheal route. On the 22nd, 23rd, and 24th day of age, chicks of G3 & G4 were treated with oregano 20% (2 ml per 5 liters) and difloxacin (10 mg/kg b.wt.) in drinking water, respectively. On the 3rd, 6th, 10th, and 21st day post-infection, blood and tissue samples were collected from all groups for laboratory examination of the hemogram,

serum biochemistry, and histopathology of the vital organs. Results revealed that *E. coli* O27 was the most predominant serotype strain (11 out of 35 isolates). One isolate of APEC O27 out of 11 isolates has 6 virulence-related genes “*astA*, *iss*, *papC*, *iucD*, *vat*, and *cva/cvi*”. Difloxacin and oregano at a concentration of 20% have the highest percentage (100%) of sensitivity against 11 isolates of *E. coli* O27 strains. In G2 (infected only), chicks showed ruffled feathers, gasping, dullness, and loss of appetite, while mild symptoms were shown in birds of G3, G4 and G6. In G2, G3, G4, G5 and G6 chicks, the mortality rate recorded was 30%, 8%, 4%, 0% and 4%, respectively. Chicks of G2 and G4 developed macrocytic hypochromic anemia, leukocytosis, heterophilia, and lymphopenia. Values of AST, ALT, uric acid, and creatinine were increased, while total protein profile was decreased. After treatment with oregano, alterations were returned to the normal levels. In oregano supplemented groups, no significant alterations were detected. In birds of G2, G4 and G6, histopathological alterations were noticed in the internal organs (Lungs, trachea, liver, spleen and kidneys). In conclusion, *E. coli* O27 was the most predominant serotype infecting farms of broiler chickens where it caused alterations in blood picture, liver and kidney functions as well as histopathology of the internal organs. Oregano essential oil (solution 20% in drinking water or powder 10% in diet) could be used for the treatment or prophylaxis against APEC O27 infected broiler chickens.

Keywords: Avian pathogenic *E. coli* O27; isolation, oregano essential oil, serum biochemistry, hemogram, pathology.

Dedication



*Dedicated to my lovely
family*

*Who Encouraged and
Supported Me to
Overcome*

This Hard Work

ACKNOWLEDGEMENTS

*I would like to express my great gratitude to **Prof. Dr. Mohamed Ibrahim Dessouky**, Professor of Clinical Pathology, Faculty of Veterinary Medicine, Cairo University for his consistent supervision, encouragement, continuous help and support and constructive criticism throughout the work,*

*I would like to express my great gratitude to **Prof. Dr. Hamdy Soufy Ismail**, Professor of Clinical Pathology, National Research Centre, Dokki, Giza, for his consistent supervision, encouragement, continuous help and support during this work and constructive criticism which made the completion of the work possible.*

*I would like to acknowledge **Prof. Dr. Soad Mohamed Nasr**, Professor of Clinical Pathology, National Research Centre, Dokki, Giza for her moral support, continuous help, valuable advice, and encouragement during the entire course of this work,*

*I wish to express my sincere and deepest gratitude to **Dr. Ahmed Ali El-Shimy**, Assistant Professor of Clinical Pathology, National Research Centre, Dokki, Giza, for his valuable support and helpful supply during all stages of this work,*

*I would like to acknowledge **Dr. Ahmed Fotouh**, Researcher of Pathology, National Research Centre, Dokki, Giza, for his valuable and helpful support in the histopathology part of the study.*

*I would like to acknowledge **Dr. Haytham M. Hawash**, Researcher of Microbiology & Food Safety, in Reference Laboratory for Veterinary Quality Control, Animal Health Institute for his help in typing of *E. coli* isolates of the study.*

I would like to acknowledge Dr. Hend H.A.M Abdullah, Researcher of Animal Diseases, National Research Centre, Dokki, Giza, for her help in multiplex PCR of the study.

*Sincere gratitude should be expressed to **All Staff Members and My Colleagues** of the Clinical Pathology Department, Faculty of Veterinary Medicine, Cairo University, for their help and cooperation throughout the period of this study.*

*Sincere gratitude should be expressed to **All Staff Members and My Colleagues** in Parasitology and Animal Diseases Department, National Research Centre, Dokki, for their help and cooperation throughout the period of the study.*

Table of Contents

Chapter (1)

1. INTRODUCTION.....	1
----------------------	---

Chapter (2)

2. REVIEW OF LITERATURE.....	5
2.1. Avian colibacillosis.....	5
2.2. Beneficial effect of diet supplement with oregano.....	32
2.3. Effect of dietary oregano.....	39

Chapter (3)

3. PUBLISHED PAPERS.....	43
3.1. The first paper.....	43
3.2. The second paper.....	55

Chapter (4)

4. ACCEPTED PAPER.....	74
3.1. The first paper.....	74

Chapter (5)

5. DISCUSSION.....	90
--------------------	----

Chapter (6)

6. CONCLUSIONS AND RECOMMENDATIONS.....	96
6.1. Conclusions.....	96
6.2. Recommendations.....	97

Chapter (7)

7. SUMMARY.....	98
-----------------	----

Chapter (8)

8. REFERENCES.....	102
--------------------	-----

Chapter (9)

٩. الملخص باللغة العربية

