

تقليل استخدام المضادات الحيوية والأدوية في كتاكيت التسمين باستخدام الأجسام المناعية لصفار البيض

رسالة مقدمة من الطالبة

فاطمة عبد الله سعد محمد

بكالوريوس علوم زراعية أرشاد زراعي ومجتمع ريفي جامعة المنوفية 2003

دبلوم أنتاج وتربية دواجن كلية الزراعة جامعة المنوفية 2005

دبلوم العلوم البيئية الزراعية معهد الدراسات والبحوث البيئية جامعة عين شمس 2007

لاستكمال متطلبات الحصول على درجة

الماجستير في العلوم البيئية الزراعية

(قسم العلوم الزراعية)

معهد الدراسات والبحوث البيئية

جامعة عين شمس

2014

تقليل استخدام المضادات الحيوية والأدوية
في كتاكيت التسمين باستخدام الأجسام المناعية لصفار البيض

رسالة مقدمة من الطالبة

فاطمة عبد الله سعد محمد

بكالوريوس علوم زراعية أرشاد زراعي ومجتمع ري في جامعة المنوفية 2003

دبلوم أنتاج وتربية دواجن كلية الزراعة جامعة المنوفية 2005

دبلوم العلوم البيئية الزراعية معهد الدراسات والبحوث البيئية جامعة عين شمس 2007

للحصول على

درجة الماجستير في العلوم البيئية (العلوم الزراعية)

(تربية دواجن)

تحت إشراف

أ.د. أحمد جلال السيد

أستاذ تربية الدواجن، كلية الزراعة، جامعة عين شمس

د. محمود يوسف محروس

أستاذ مساعد تربية الدواجن، كلية الزراعة، جامعة عين شمس

د. هناء عوض محمد السمدوني

باحث بوحدة فيروسات الطيور، قسم بحوث وأمراض الدواجن ، معهد
بحوث صحة الحيوان بالدقي

REDUCING ANTIBIOTICS AND DRUGS IN BROILER CHICKS BY USING EGG YOLK ANTIBODIES

By

FATMA ABDALLAH SAAD MOHAMED

Agric. Sc. (Agricultural Extension), Monufia University, 2003
Diploma in Poultry Production and Breeding, Faculty of Agriculture
Monufia University, 2005
Diploma in Environmental Sciences, Sc. Agriculture Environmental
Science in Institute of Environmental, Studies and Research, Ain
Shams University, 2007

**A thesis submitted in partial fulfillment
of
the requirements for the degree of
Master of Environmental Science
in
Agricultural Science
(Poultry Breeding)**

Department of Agricultural Science

Institute of Environmental and Research

Ain Shams University

2014

REDUCING ANTIBIOTICS AND DRUGS IN BROILER CHICKS BY USING EGG YOLK ANTIBODIES

By

FATMA ABDALLAH SAAD MOHAMED

Agric. Sc. (Agricultural Extension), Monufia University, 2003
Diploma in Poultry Production and Breeding, Faculty of Agriculture
Monufia University, 2005
Diploma in Environmental Sciences, Sc. Agriculture Environmental
Science in Institute of Environmental, Studies and Research, Ain
Shams University, 2007

**A thesis submitted in partial fulfillment
of
the requirements for the degree of**

**Master of Environmental Science
in
Agricultural Science
(Poultry Breeding)**

Under the supervision of:

This thesis for M. Sc. degree has been approved by:

Prof. Dr. Ahmed Galal El-Sayed

Prof. of Poultry Breeding, Faculty of Agriculture, Ain Shams University

Prof. Dr. MAHMOUD YOUSSEF MAHROUS

Prof. of Poultry Breeding, Faculty of Agriculture, Ain Shams University

Dr. HANAA AWAD MOHAMED

Researcher of virology of Poultry Unit, Animal Healthy Research Institute,
Agriculture Research Center.

CONTENTS

	Page
LIST OF TABLES	I
LIST OF FIGURES	II
INTRODUCTION	1
REVIEW OF LITERATURE	4
1. Phenotypic Characters	4
1.1. Body weight	4
1.2. Body weight gain, Feed consumptions and Feed conversion	4
1.3. Carcass Characteristics.	5
1.4. Abdominal Fat	8
1.5. Mortality	8
2. Hen egg yolk antibodies (IgY)	9
2.1. Overview on egg yolk antibodies (IgY)	9
2.2. Hen egg yolk antibodies (IgY)	11
2.3. Immune Response Augmentation	13
2.4. Transfer of IgY into egg yolk	18
2.5. IgY production	19
2.6. IgY extraction	22
2.7. IgY use for passive immunization	26
MATERIALS AND METHODS	34
1. Immunization of hens	36
2. IgY primary purification	36
3.1. Measurements and observation	37
3.1.1. Body weight and body weight gain	37
3.1.2. Feed consumption and feed conversion ratio	37
3.1.3. Carcass measurements	37
4. Blood constituents	38
5. Immunocompetence measurements	38
5.1. Phytohemagglutinin injection (In vivo cell - mediated immunity assay)	38
5.2. Relative lymphoid organs weight	39
5.3. Measurement of the NDV specific humoral immunity	40

	Page
6. Statistical analysis	39
RESULTS AND DISCUSSION	40
1. Body weight and body weight gain	40
2. Body weight gain, feed consumption and feed conversion ratio.	42
3. Carcass characteristics	43
4. Abdominal fat	55
5. Blood parameters	55
6. Heterophils / lymphocytes ratio	57
7. Changes in lymphoid organ weights	59
8. Mortality rate	61
9. Cell-mediated immunity	62
10. Antibody level	63
SUMMARY AND CONCLUSION	66
REFERENCES	69
ARABIC SUMMARY	-

Table No.	LIST OF TABLES	Page
1	Summary of the IgY crude extraction methods	24
2	Effect of passive immunization by enteric pathogen-specific IgY	32
3	The composition and calculated chemical analysis of the experimental diets	35
4	Body weight of broiler chicks Strains as affected by egg yolk immunoglobulin injection	41
5	Body weight gain of broiler chicks Strains as affected by egg yolk immunoglobulin injection	41
6	Body weight gain, feed consumption and feed conversion ratio of broiler chicks Strains as affected by egg yolk immunoglobulin injection	43
7	Body weight and inedible meat parts of broiler chicks as affected by egg yolk immunoglobulin injection.	44
8	Edible meat parts of broiler chicks as affected by egg yolk immunoglobulin injection.	49
9	Breast, thigh and drumstick muscles of broiler chicks as affected by egg yolk immunoglobulin injection.	53
10	Blood parameters of broiler chicks as affected by egg yolk immunoglobulin injection.	56
11	White blood cells differentiated of broiler chicks as affected by egg yolk immunoglobulin injection.	58
12	Body weight, lymphoid organs and some organs of broiler chicks (5 wk) as affected by egg yolk immunoglobulin injection.	61

Figure No.	LIST OF FIGURES	Page
1	Comparison of the molecular structure of chicken IgY and rabbit IgG	25
2	Summary of the egg yolk antibodies utilization	33
3	low and height of ambient temperature	36
4	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Body weight (g.) in broiler chicks.	45
5	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Blood (%) in broiler chicks.	45
6	: Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Feather (%) in broiler chicks.	46
7	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Leg (%) in broiler chicks.	46
8	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Head (%) in broiler chicks.	47
9	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Inedible parts, (%) in broiler chicks.	47
10	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Dressing, (%) in broiler chicks.	49
11	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Gizzard, (%) in broiler chicks.	50
12	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Heart, (%) in broiler chicks.	50
13	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Liver, (%) in broiler chicks.	51

14	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Giblets, (%) in broiler chicks.	51
15	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Edible parts, (%) in broiler chicks.	52
16	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Breast, (%) in broiler chicks.	53
17	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Thigh, (%) in broiler chicks.	54
18	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on Drumstick, (%) in broiler chicks.	54
19	Effect of injected egg yolk containing immunoglobulin against NDV + IBDV and combination on abdominal fat in broiler chicks.	55
20	H/L ratio of broiler chicks as affected by egg yolk immunoglobulin injection.	59
21	Effect of egg yolk immunoglobulin injection on mortality number of broiler chicks	61
22	Effect of egg yolk immunoglobulin on cell-mediated immunity of broiler chicks.	63
23	Effect of egg yolk immunoglobulin on the antibody level for NDV + IBDV at 21 days of age.	65
24	Effect of egg yolk immunoglobulin on the antibody level for NDV+ IBDV at 35 days of age.	65

ACKNOWLEDGMENTS

Firstly, I wish to express my prayerful thanks to **ALLAH** for every thing.

My deepest gratitude and sincere thanks are extended to **Prof. Dr. Ahmed Galal EL-Sayed**, Professor of Poultry Breeding, Poultry Production Department, Faculty of Agriculture, Ain Shams University for his supervision, valuable advice, revising the manuscript and continues supporting during study.

I wish to express my sincere gratitude to **Dr. Mahmoud Yossef**, Associate Professor of Poultry Breeding, Poultry Production Department, Faculty of Agriculture, Ain Shams University for his supervision, encouragement and interest.

I deeply grateful and greatly indebted to **Dr. Hanaa Awad Mohamed** Researcher of virology of Poultry unit, Animal Healthy Research Institute, Agriculture Research Center, for his supervision, interest, encouragement ..

Many thanks are also due to head of Animal production Department, soul of **Prof. Dr., Mohamed EL-Achry** Professor of Animal Breeding and all staff members of Poultry Production Department, Faculty of Agriculture, Monufia University, especially thanks to **Dr. Tarek Eid** Researcher of Soil, Water and Environment Research Institute, Agriculture Research Center, **Mr. Abd-Elmoniem Mohamed Abd-Elmoniem**, Assistant lecturer, of Poultry Breeding, Poultry Production Department, Faculty of Agriculture, Ain Shams University **and Mr. Abdel-Aziz my husband** for their useful practical assistance.

My sincere gratitude also is due to **father, mother, brothers, sisters** for their encouragement and love.

ABSTRACT

The experiment was designed to evaluate the use of antibiotics Alternatives and some vaccination programs by using hyperimmunized egg yolk in broiler chicks. 500 one day old Hubbard and Cobb broiler chicks were used. They were divided into four groups; the first group is the control one, the second group was injected egg yolk containing immunoglobulin which type (Ig) against (NDV), IBDV and alternative antimicrobial agents to poultry production and processing. Bacteriocins are proteinaceous compounds of bacterial origin that are lethal to bacteria other than the producing strain within two strains of broilers. The present results showed that the broiler chicks injected egg yolk containing immunoglobulin against IBDV, NDV and combination recorded the highest hemoglobin and hematocrit level compared to control group. Similar trend was noticed for white blood cells count. However, there was no significant difference among treated groups for red blood cells count. With respect to the changes in lymphoid organs weight, the present results showed that the relative bursa weight was significantly decreased in a group injected with egg yolk containing immunoglobulin against IBDV + NDV compared to control group. The groups that are injected with egg yolk containing Ig against IBDV or NDV had significantly higher relative thymus weight compared to other groups. There was no significant difference among the treated groups for antibody titer against both NDV and IBDV.

Key words: Broiler, NDV, IBDV, Immunoglobulin

INTRODUCTION

In the chicken, the major antibody is called IgY. It was in 1893 that Klemperer first described the acquisition of passive immunity in birds, by demonstrating the transfer of immunity against tetanus toxin from the hen to the chick. This immunity was due to transfer of IgY from the mother to the offspring. The chicken is an excellent producer of antibodies, but despite this, is still an underused resource, this may be due to lack of information concerning the different methods and applications where IgY is more advantageous compared to the traditional mammalian IgG antibodies. This thesis is on the subject of IgY, where basic properties as well as direct applications of IgY, both in assays and in therapy have been studied.

The Paratyphoid in poultry is a major problem worldwide, not only because of the direct economic losses caused by mortality of young birds, which varies according to path type variety involved, and the health state and maternal immunity of birds, but also, primarily by causing a decrease in weight gain and increased health and prevention costs. On the other hand, feces of infected birds cause a wide spread of the bacteria due to pollution of soil, water, plants, tools and livestock facilities, etc. In recent years, the use of antimicrobials and inactivated and attenuated vaccines is to limit or prevent *Salmonella* spp. Infection in veterinary medicine has been questioned, due to the development of bacterial resistance to antibiotics, as well to the potential risks

posed by residues of antibiotics, and vaccines adjuvants in food products derived from animals for human consumption.

For these reasons, the use of these agents has been gradually restricted and other tools for the control of this disease, such as competitive exclusion through administration of prebiotics have been explored (**Rahimi et al., 2007**). Thus, the IgY technology is a supplementary tool for the prevention of poultry diseases and the generation of products and food by-products with higher microbiological safety. Infectious bursal disease virus (IBDV) is the causative agent of infectious bursal disease (IBD) that affects young chickens about 3-6 weeks of age. It is a highly contagious and acute viral disease that is characterized by destruction of lymphoid cells in the bursa of fabricius. Ever since the disease was recognized some 40 years ago, it continues to pose a threat to the commercial poultry industry. The economic impacts of the disease are manifold including losses due to morbidity and mortality, immunosuppression in the surviving chickens since IBDV infection exacerbates infections with other disease agents, reduction in the chicken's ability to respond to vaccination and risk of introduction to exotic places from importing infected poultry products.

Newcastle disease (ND) is one of the most important diseases affecting poultry throughout the world. Vaccine immunization is the major measure to prevent ND and has obtained good effect. However, there are still immunization failures in poultry which have become the major problem in infection prevention of this disease. It is generally acknowledged that

humoral immunity is the main immunity to Newcastle disease virus (NDV). The immunity to NDV was most commonly evaluated by measuring antibody titer in the sera by haemagglutination inhibition (HI) test and high protective titer of antibodies were generally accepted as a reliable indicator of flock immunity (**Beard and Hanson, 2003**). However, the phenomenon that the flock was not protected after challenge with virulent NDV while there was high level of antibodies in serum or was protected while there were only very low level antibodies in serum still occurred (**Awan et al., 1994**). It has been proved that the mucosal immunity represented by IgA production plays an important role in the development of protection in chickens vaccinated against ND vaccine (**Reynolds and Maraqa, 2000**). The bursa of Fabricius is the central lymphoid organ for B-cell lymphopoiesis and lymphocyte maturation, which provides the microenvironment necessary for the rapid growth of B cells that have undergone the genetic changes necessary to produce effective antibodies against foreign antigens. However, there are few reports about the effect of the damage or eccylosis of bursa of Fabricius on local mucosal immune response in chickens vaccinated with live ND vaccine.

REVIEW OF LETERATURE

1. Phenotypic Characters

1.1. Body weight

Development commercial poultry has become more complex and challenging because a wide range of objectives need to be considered simultaneously in order to reduce production costs, whilst improving health, welfare, and product quality. Consequently, breeding goals must include increased growth rate, breast muscle yield, decreased abdominal fat, improved development of the skeletal system and overall fitness **(Li et al., 2005)**.

Because of the consequent short rearing time to marketing favorable feed conversion ratio, is the main factor contributing to economically efficient broiler production. Accordingly, commercial breeding programs have been continuously selected for high growth rate (GR) and have achieved outstanding progress in developing fast-growing meat-type broiler chickens **(Druyan, et al 2008)**.

1.2. Body weight gain, Feed consumptions and Feed conversion

Rapid growth, because of the consequent short rearing time to marketing and favorable feed conversion ratio, is the main factor contributing to economically efficient broiler production. Accordingly, commercial breeding programs have been continuously selected for high growth rate (GR) and have achieved outstanding progress in developing fast-growing meat-