Cairo University
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Department of Poultry Diseases

Recent studies on salmonella infection in chickens

A Thesis presented by

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Dedication

I dedicate this work to my mother, my husband Hossam, my kidsAser&Younes

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"RECENTSTUDIESON SALMONELLA INFECTION IN CHICKENS"

ABSTRACT

This study was designated to investigate the incidence of Salmonella in different chicken farms broiler, layer and breeder of different ages through bacteriological examination for different types of samples and to identify zoonotic serotypes of Salmonella by Polymerase Chain Reaction assay. A total number of 263 samples.(171 organ samples as fallow: 82 liver, 51 yolk sac, 20 spleen, 16 ovary, 2heart and 90 fecal swap and 2 litter samples) were obtained from 93 different poultry farms in different localities at 6 governorates Qalubia, Sharkya, Gharbya, Esmailia, Dakhelia and Giza during the period from 2013 to 2015. The samples were collected under complete aseptic condition from chickens suspected to be infected with salmonellosis. The incidence of salmonella among chicken farms was 5.3% (14/263). It was (15.1%) among the broiler farms and (10.5%) among the layer farms by conventional culture methods. The results obtained showed that the incidence of Salmonella in different organ samples were as follows: 10.97% among liver samples and it considered the highest incidence of Salmonella isolation followed by yolk sac 7.8% while the lowest rate of Salmonella isolation was from the spleen 5%, no isolation from heart, ovary, fecal swabs and litter samples and it is belonging to four serotypes. *S.*Enteritidis and *S.*Typhimurium indicated the highest incidence (42.85% and 28.57% respectively), while the other serovars*S.*Kentucky and *S.*Muenster were lower in incidence (21.42% and 7.14% respectively).The detection of (*invA*) gene provides that all isolates were positive for it except three isolate. To understand the role of immune mechanisms in protecting chickens from *Salmonella* infections, we examined the immune responses of infected one-week-old chickens to different isolated Salmonella serotypes Enteritidis, Typhimurium, Kentucky and Muenster, as well as assessed cecal and spleenic colonization, monitored histopathological changes in different organs of infected chickens.All the examined salmonellae were able to colonize the caeca in an efficient way and considered good colonizer but they showed a slower colonization in spleen *S.* Muenster colonized the ceca more efficiently than other serotypes followed by *S.*Kentucky and *S.*Typhimurium but did not behave the same in the spleen. Using quantitative real-time reverse transcription (RT)-PCR, mRNA expression of various cytokines, interleukin (IL)-6 and interleukin (IL)-8 were examined in cecal tonsils. As a result, all tested serotypes were able to infect epithelial cells and the lamina propria of cecum, liver, spleen, and were ableto stimulateIL6 gene expression and showed slight up regulation in IL8 gene expression. Notably, S. Muenster showed the highest microscopic alteration and the highest IL6 gene expression than other serotypes correlated with its great cecal colonization. These finding correlate with the pathogenesis of salmonella in poultry. Infection with non-host adapted serotypes S.Enteritidis, S.Typhimurium produces a strong inflammatory response that may limit the spread of Salmonella largely to the gut.

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LIST OF ABBREVATIONS

Abbreviation	Meaning
AB	Antibody
BGA	Brilliant Green Aga
BHI	brain heart infusion broth
BPW	buffered peptone water
BS agar	bismuth sulfite agar
BW	Body weight
CBH	cutaneous basophil hypersensivity
CFU	Colony forming unit
CKC	chicken kidney epithelial cells
CT	Caecal tonsil
DNA	Deoxy Nucleic Acid
DPI	days post inoculation
D W	Distilled water
EU	European Union
FCR	Feed conversion rat
Fig	Figure
fliC	Flagellar gene C
HD11	chicken macrophages
HE agar	Haematoxlene Eiosin agar
H&E	Hematoxylin-eosin stain

H2S	Hydrogen sulfide
IAC	internal amplification control
IFN	Interferon
Ig	Immunoglobulin
IL	Interleukin
iNOS	inducible nitric oxide synthase
LITAF	Lipopolysaccaride-induced tumour necrosis alpha factor
LPS	Lipopolysaccharide
invA	Invasion gene
K.	*Klebsiella*
MHC	Major histocompatibility complex
MIP	Macrophages inhibitory protein
MKTT broth	Muller-Kauffmann tetrathionate/novobiocin both
MPN	Most-probable-number
MW	Molecular weight
NDV	Newcastle disease vaccine
P.	*Proteus*
PCR	Polymerase chain reaction
PM	Post mortum
PT4	phage type 4
RBCs	Red blood cells

RT-PCR	Real time- Polymerase chain reaction
RV	Rappaport-Vassiliadis
S.	*Salmonella*
SE	*S. Enteritidis*
SK	*S. Kentuky*
SM	*S. Monestrum*
SP	*S. Pullorum*
ST	*S. Typhimurium*
SPF	Specific pathogen free
SPI	Salmonella pathogenicity island
Spv	*Salmonella* plasmid virulence
SIM agar	sulfur –indole- motility agar
SRBC	sheep red blood cell
S.S.agar	Salmonellae-shigella agar
ssDNA	single-stranded DNA
TLR	Toll-likereceptor
TSI	Triple Sugar Iron
TT broth	Tetrathionate broth
TTBG	Tetrathionate broth with brilliant green
UK	United kingdom
XLD	Xylose Lysine Desoxycholate