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STUDIES ON BACTERIA ASSOCIATED WITH DIARRHEA IN BROILER CHICKENS WITH SPECIAL REFERENCE TO SALMONELLA

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ABSTRACT

A total of 750 samples were collected from liver, intestine and coloaca from 250 broiler chickens.510 samples were collected from Diarrheic chickens and 240 samples from apparently healthy chickens from farms in Elgharbia governorate (Egypt). Samples were examined bacteriologically, seventy four sample (43.5%) were found to be positive for Escherichia coli that identified biochemically, thirty samples (17.6%) were found to be positive for Salmonella species that identified biochemically and seven samples were detected serologically and eleven samples detected by PCR. Twenty three samples (13.5%) were found to be positive for Proteus mirabilis that identified by biochemical and serological tests.

INTRODUCTION

Salmonella entrica serovar Typhimurium, is one of the major most significant infectious bacterial pathogen affecting poultry ***(fatma et al., 2012)*** and characterized by it's Zoonotic importance ***(Moussa et al., 2012).***

Escherichia coli is one of the normal bacterial flora in the gastrionestinal tract of poultry. 10-15% of the intestinal coliforms in chickens are of pathogenic serotypes ***(Alimehr et al., 1999).***

The outer membrane sidophere receptor gene iroN, which was first reported in *Salmonella entrica* affect the virulance of avian pathogen *Escherichia coli* ***(Baumler et al., 1998 and Dozois et al., 2003).***

Proteus isolates and its microbial resistance from poultry were recorderd ***(Mostafa, 2013).***

Klebsiella organisms are known to play an important role as etiological agents of various diseases in birds and are found to be associated with different diseases as respiratory affections, septicemia, peritonitis, salpingitis, air sacculitis, omphalitis, arthritis, panophthalmitis and intestinal disturbances .such diseases cause great economic losses in poultry industry not only due to high mortality rates in young birds, slow growth and poor food conversion rates in growing birds, but also due to decrease in egg productions and hatchability of the infected eggs, ***(Plesser et al., 1975, Reninie et al., 1990 and Mahalingam et al., 1998).***

Pseudomonas aeroginosa is an apportunistic pathogen that can invade fertile eggs causing death of embryos and virulent strains can cause diarrhea dehydration, dyspnea, septicemia, and death to newly hatched chickens ***(Hebat – allah Abd, 2004).***

The use of antimicrobials in poultry production, both to compact diseases as growth promoters, has been associated with the appearance antimicrobial resistance ***(Gyles, 2008).***

Due to the significance of *Salmonella* spp. Infection in poultry industry and its zoonotic importance and affecting the virulence of normal flora apportunistic pathogenes, Evaluation of entric microbial

susceptibility of *Salmonella* spp isolated from broiler chickens contributes to its resistance and control. So the aim of the work is:

1. Isolation, biochemical and serological identification of recovered *Salmonella* species.
2. Molecular confirmation of *Salmonella* spp.
3. Antibiogram of isolated *Salmonella* spp.

MATERIAL AND METHODS

Samples collection:

A total of 750 samples from 250 broiler chickens were collected from farms in EL-Gharbia governorate (Egypt), 510 samples from diarrheic chickens. The samples were collected from liver, intestine of dead birds and coloacal swabs from living birds .Samples were collected in sterile buffered peptone water and taken to the laboratory on the day of collection under refrigeration with minimum of delay and incubated at 37°C for 24 hours.

Bacteriological examination:

Isolation of *Salmonella: (Collee et al., 1996) and (Waltman, 1999).*

After prenrichment 0.1 ml of the broth culture was transferred into 10 ml Rappaport vassiliadis broth and incubated at 42°C for 24-48 hours .Rappaport vassiliadis broth samples were streaked onto XLD agar plates and incubated overnight at 37°C .Typical colonies were picked and further investigation by morphological identification using Gram stain and biochemical identification.

Serological typing of *Salmonella* organisms was performed according to *(Kauffman, 1974)*:

DENKA SEIKEN CO.,Japan antisera was obtained from food analysis center,Benha University ,faculty of veterinary medicine.

A- Identification of somatic (O) antigen " Slide agglutination test ".

B- Identification of flagellar (H) antigen " Tube agglutination test ".

In vitro antibiotic sensitivity of *Salmonella* isolates according to National committee for clinical laboratory standards *"NCCLS" (2001)* and *(Srivani, 2011).*

Determination of the susceptibility of the isolated *Salmonella* to antibiotic discs was adopted using diffusion break point technique, the discs that used for *Salmonella* were Amoxicillin, Ampcillin, Chloramphenicol, Ciprofloxacin, Erythrombycin, Gentamycin, Kanamycin, Nalidixic acid, Neomycin, Norfloxacin, Oxytetracycline, Pencillin, Streptomycin and Salphamethoxazol.

Polymerase chain reaction technique:

DNA of the *Salmonella* was extracted and specific primers for *Salmonella* organism were used ***(Alvaez et al.,2004)***.

Sequence of primer:

Primer	Sequence	Amplicon size (bp)	Target	Reference
Sallmonella serotyping				
OMPCF OMPCR	ATCGCTGACTTATGCAATCG CGGGTTGCGTTATAGGTCTG	204	*Salmonella*	*Alvarez et al. (2004)*
ENTF ENTR	TGTGTTTTATCTGATGCAAGAGG TGAACTACGTTCGTTCTTCTGG	304	Entertidis	*Alvarez et al. (2004)*
TYPHF TYPHR	TTGTTCACTTTTTACCCCTGAA CCCTGACAGCCGTTAGATATT	401	Typhimurium	*Alvarez et al. (2004)*

DNA amplification:

PCR were performed in a final volume of 25 µl. the optimized PCR mixture consisted of 1.5 mM $MgCl_2$, 200 µM deoxynucleoside triphosphates, 1 U of Taq polymerase, 60 pmol of 1C DNA per sample and DNA template 5 µl. Distilled water was added to bring the final volume 25 µl.

PCR protocol:

Consisted of the following steps : (i) an initial denaturation step of 2 min at 95°C, (ii) 30 cycles, with 1 cycle consisting of 1 min at 95°C, 1 min at 57°C and 2 min at 72°C and (iii) final elongation step of 5 min at 72°C.

Detection of PCR product:

The PCR products were elctrophoresed in 2.5% agarose gel, stained with 2 µg Ethidum bromide and photographed under UV light.

RESULTS

Table (1): Incidence of bacteria isolated from diarrheic chickens

Enteric bacteria	N. of examined DC	N. of Samples	Numbers and incidences of enteric bacteria	
			No	% per DC
Escherichia coli	170	510	74	43.5
Salmonella spp.	170	510	30	17.6
Proteus mirabilis	170	510	23	13.5

- DC = Diarrheic Chickens.
- AHC = Apparently Healthy Chickens as a control
- Incidence according to number of birds.

Table (2): Results of serological identification of isolated *Salmonella* species.

Identified Strains	Number	Group	Antigenic Structure	
			O	H
Salmonella Anatum	1	E_1	3, 10, 15, 34	e, h : 1, 6
Salmonella Typhimurium	2	B	1, 4, 5, 12	i : 1, 2
Salmonella Dublin	1	D_1	1, 9, 12	g, p :
Sallmonela Enteritidis	2	D_1	1, 9, 12	g, m : 1, 7
Salmonella Kentucky	1	C_3	8, 20	i : z6

Table (3): Results of polymerase chain reaction of the isolated *Sallmonella* spp.

Organism	No. of positive samples	% of positive sample *
Salmonella	11/30	36.6
Salmonella Entertidis	1/30	3.33
Salmonella Typhimurium	2/30	6.6

* % Calculated from number of isolated Salmoneella spp. strains

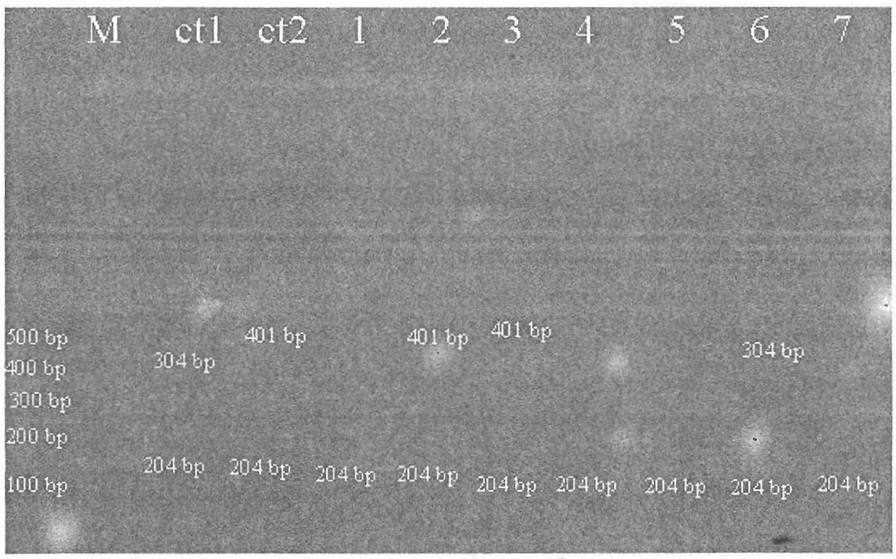

Fig.(1): Multiplex PCR amplification profile, (M=100 bp, ct1 = control positive of *S*.Enteritidis (*Salmonella* spp. 204bp and *S*.Enteritidis 304bp), ct2 = control positive of *Salmonella* spp. 204bp, *S*. Typhimurium 401bp), lane 2 and 3 positive *Salmonella* Typhimurium lane 6 positive *S*. Enteritidis, while lanes 1,4,5 and 7 are positive *Salmonella* species. 204bp)

Table (4): Antibiotic susceptibility of *Salmonella* Anatum, *Salmonella* Dublin, *Salmonella* Kentucky, *Salmonella* Enteritidis and *Salmonella* Typhimurium isolated from diseased chickens to chemotherapeutic agents :

Antimicrobial agent	Diffusion zone break point (mm)	*S.* Typhimurium	*S.* Enteritidis	*S.* Kentucky	*S.* Anatum	*S.* Dublin
Amoxicillin(AMX)	≤ 14	8 (R)	15 (I)	9 (R)	12 (R)	5 (R)
Ampicillin (AM)	≤ 13	5 (R)	11 (R)	8 (R)	10 (R)	5 (R)
Chloramphenicol (C)	≤ 12	1 (R)	6(R)	4 (R)	3 (R)	3 (R)
Ciprofloxacin (CP)	≤ 15	9 (R)	18 (S)	16 (I)	19 (S)	11 (R)
Erythromycin (E)	≤ 13	2 (R)	3 (R)	5 (R)	3 (R)	1 (R)
Gentamycin (GM)	≤ 12	16 (S)	20 (S)	19 (S)	13 (I)	16 (S)
Kanamycin (K)	≤ 13	14 (I)	17 (S)	7 (R)	10 (R)	18 (S)
Nalidixic acid (NA)	≤ 13	5 (R)	14 (I)	8 (R)	15 (I)	9 (R)
Neomycin (N)	≤ 12	9 (R)	9 (R)	14 (S)	13 (I)	7 (R)
Norfloxacin (NOR)	≤ 12	13 (I)	13 (I)	11 (R)	16 (S)	9 (R)
Oxytetracycline (T)	≤ 14	6 (R)	14 (I)	6 (R)	15 (I)	8 (R)
Penicillin (P)	≤ 20	7 (R)	13 (R)	10 (R)	9 (R)	3 (R)
Streptomycin (S)	≤ 11	2 (R)	3 (R)	5 (R)	3 (R)	1 (R)
Sulphamethoxazol (SXT)	≤ 10	5 (R)	6 (R)	3 (R)	11 (I)	2 (R)

DISCUSSION

Results in table (1) revealed that *Escherichia coli* isolated with an incidence of 43.5% our results partial similar with ***Barbour et al. (1985)*** and ***Cardoso et al. (2006)*** reporting incidence 40.4% and 47.1% respectively while higher incidence recovered by ***El- Boray and Abo-Taleb (2002)*** and ***Hany (2013)*** with an incidence 74.54% and 58.33% respectively. On the other hand lower incidence recovered by ***El Morsi (1998)*** with an incidence 20%.

Also in table (1) results revealed that *Salmonella* spp. isolated with an incidence of 17.6% that agree with ***Abeer (2004)*** and ***Kassay et al. (2010)*** with an incidence 18.8% and 16.1% while higher incidence was recovered by ***Abd El.Galil et al. (1993)*** with an incidence 25%. on the other hand lower isolation rate obtained from ***walid et al. (2010) and Habtamu et al. (2011)*** with and incidence 5.6% and 2.7% respectively.

Proteus isolated with an incidence 13.5% and this result was partial similar with ***Abeer (2004)*** who isolated it with an incidence 14.9%. while higher rate was recoverded by ***Mohamed (1994)*** and ***Cardoso et al.(2006)*** with an incidence 25.77% and 66.7% respectively.

In table (2) our study found that serological identification of *Salmonella* spp. Showed that 7 isolates serologically typed and 2 isolates belonged to *S.* Typhimurium, 2 isolates belonged to *S.*Enteritidis, 1 isolates belonged to *S.* Kentucky, 1 isolates belonged to *S.* Anatum and 1 isolates belonged to *S.* Dublin. While ***Mohamed (2003)*** the serological identification of *Salmonella* revealed *S.* Typhimurium and *S.* Enteritidis were the only isolated serovars but in ***Rianatou et al. (2006)*** serological typing of 21 of *Salmonella* isolates showed that the most prevalent were *S.* Kentucky 30%, *S.* Muenster 13.3%, *S.* Brancaster 8.8% and *S.* Enteritidis and *S.* Hader 6.6%.

Results in table (3) revealed that *Salmonella* examination giving PCR product of 204 bp size and multiplex PCR amplification results using primers specific for *Salmonella* Entertidis giving PCR product of 304 bp size and *Salmonella* Typhimurium 401 bp size. And this agree with ***Alvarez et al. (2004)*** and ***Hassan (2011)***, and disagree with and ***Siddique et al. (2009)***and ***Ahmed et al. (2012)*** who revealed that *Salmonella* examination giving PCR product of 284 bp size.

In table (4) *S.* Typhimurium, *S.* Enteritidis, *S.* Kentucky, *S.* Anatum *and S.* Dublin isolates were resistant to ampicillin, chloramphenicol, erythrmoycin, pencillin, streptomycin, sulphamethoxazol except *S.* Anatum is moderately resistant and amoxicillin except *S.* Enteritidis is moderately resistant and sensitive to gentamycine except *S.* Anatum while S. Enteritidis and *S.* Anatum are moderately resistant to nalidixic acid, *S.* Typhimurium and S. Enteritidis are moderately resistant to norfloxacin and *S.* Enteritidis and *S.* Anatum are moderately resitant to oxytetracycline this results disagree with the results given by ***Ludovico et al. (2005)*** *and* ***Fernanda et al. (2006)*** and partial similar to ***Akter et al. (2007)*** *and* ***Fatma et al. (2012).*** *S. Enteritidis* sensitive to gentamycin and this agree with ***Ahmed et al. (2012)***.

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REFERENCES

- ***Abd El Galil, Y., El Bakry, M. and Amara , A. (1983):*** Bacterial causes of early chicks mortalities in Sharkia Governorate.proceeding 17th world poultry congress,557-558.
- ***Abeer E.A. (2004)*** *:* Bacterial causes of early mortality in broilers chicken. M.V.Sc. thesis (Microbiology) Fac. of Vet. Med., Tanta University.

- ***Ahmed M. Ammar, Salwa M. Helmy, Soad A. Abd El-Wanis and Nehal M. Nabil (2012)***: Detection of salmonellosis and pasteurellosis in ducks using polymerase chain reaction technique (PCR). KafrElsheikh Vet. Med. J. Vol. 10 No. 1 (61 - 79). Anim health Res Rev 9, 149-158.

- ***Barbour E.k.; Nabbut, N.H. and Al-Nakhli, H.M. (1985):*** Use of epidemiological markers to identify the source of *Escherichia coli* infections in poultry. Am. J. Vet. Res., 46(4) : 989-991.

- ***Baumler AT, Norris TL, Lasco T, Voight W., Reissbrodt R, Rabsch W, Heffron F(1998) :*** IroN, a novel outer membrane sidophere receptor characteristic of *Salmonella enterica*. T Bacteriol 180, 1446-1453.

- ***Collee, J,G., Miles, R.s. and Watt, B. (1996):*** Tests for the identification of bacteria . in practical Medical Microbiology (Eds. Colle, J.G., Marmion B.P fraser, A.g. and Simmons, A.) Churchill living stone, New York , Edinburg and London 131-149.

- ***Dozois CM, Daigle F, Cartiss R 3rd (2003):*** Identification of pathogenic- specific and conserved genes expressed in vivo by an avian pathogenic *Escherichia coli* strain Proc Natl Acad Sci USA 100, 247- 252.

- ***El Morsi M.E.M. (1998)***: Occurrence of food poisoning organisms in poultry products with special reference to *Campylobacter* : Ph. D. thesis (Meat Hygiene). Fac. Vet. Med., Zagzig University.

- ***El-Boraay I.M. and Abo. Taleb A.H. (2002):*** Natural and experimental infection with *E. coli* and / or *Colistridin perfesingens* type an broiler chickens. Zag. Vet. J., 30 (1) : 52 - 64.

- ***Fatma .AG , El-Gohary A.H., El-Bably .M.A, and Mohamed A.A. (2012):*** In-vitro antibiotic sensitivity of isolated strains of *Salmonella* and *E. coli* from poultry farms. 7th Int., Sci. Conf., Mansoura 28-30 August.

- ***Fernanda Arboite de Oliveira, Adriano Brandelli, Eduardo Cesar Tondo (2006):*** Antimicrobial resistance in *Salmonella* enteritidis from foods involved in human salmonellosis outbreaks in Southern Brazil. The new microbiologica, 29, 49 - 54.

- ***Gyles, Cl (2008):*** Antimicrobial resistance on selected bacteria from poultry.

- ***Habtamu Taddle Menghistu, Rajesh Rathore, Kulip Dhama and Rajesh Humar Agarwal (2011)***: Isolation, identification and polymerase chain reaction (PCR) detection of *Salmonella* species from field materials of poultry origin. International Journal of Microbiological research 2(2) : 135 - 142.

- ***Hany M. Yehia (2013):*** Antimicrobial resistance patterns of Enterobacteriaceae and non Enterobactericae isolated from poultry intestinal. life science journal, 10 (1).

- ***Hassan H.M. Kassem (2011):*** Molecular characterization of antimicrobial resistance in Gram negative bacteria isolated from diarrheic sheep. M.V.Sc. thesis Fac. Vet. Med., Kafr Elsheikh University.

- ***Hebat - Allah Abd - El Halim Mohamed (2004)***: Studies on *Pseudomonas* species in chicken embryos and broilers in Assiut Governorate. Ass. Univ. Bull. Environ Res. Vol. 7. No. 1, March.

- ***Juan Alvarez, Mertxe Sota, Ana Belén Vivanco, Ildefonso Perales, Ramon Cisterna, Aitor Rementeria .and Javier Garaizar (2004)***: Development of a multiplex PCR technique for detection and epidemiological typing of *Salmonella* in human clinical samples. Journal of clinical microbiology, Apr., P. 1734-1738.

- ***Kassaye Aragaw, Lencho Terefe and Mesde Abera (2010)***: Prevelance of *Salmonella* infection in intensive poultry farms in Hawassa and isolation of *Salmonella* species from sick and dead chickens. Ethiop. Vet. J. 14 (2), 115 - 124.

- ***Kauffman G. (1974)***: Kauffmann white scheme. J. Acta. Path. Microbiol. Sci., 61 : 385.

- ***Ludovico Dipineto, Claudia Scarpetta, Mariangela Sensale, Antonio Baiano, Lucia Francesca Menna, Alessandro Fioretti (2005)***: Antimicrobial susceptibility of *Salmonella* spp. strains isolated from layer hens in Campania region from 2000 to 2003. Ital. J. ANIM. SCI. Vol. 4, 279 - 281.

- ***M. Alimehr, G. Sadeghi - Hashjin, S.A. Pourbakhsh and K. Nofouzi (1999)***: Isolation, identification and in vitro susceptibility of avian *Escherichia coli* to selected fluroquinoloness. Arch. Razi Ins., 50.

- ***M.R. Akter, K.A. Choudhury, M.M. Rahman and M.S. Islam (2007)***: Seroprevalance of Salmonellosis in layer chickens with isolation, Identification and antibiogram study of their casual agents. Bangl. J. Vet. Med. 5 (1 & 2) : 39 - 42.

- ***Mahalingam, P., Masillamony, P.R., Palaniswami, K.S. and Venugopalan, V.T.(1988):*** virulance attributes of *E.coli* and *Klebsiella* species isolates from hatcheries . Ind. Vet. J.,65(4) 283-287.

- ***Mohamed N.S. (2003):*** A survey of *Salmonella* contamination in chicken carcass and giblets in central Ethiopia. Revue de Medicine Vet., 154 (4) : 267 - 270.

- ***Mohamed, A.R.A.(1994):*** studies on the occurance of *Proteus* species in poultry with especial reference to its antigenic relationship. ph.D. thesis (Microbiology), Fac. of Vet . Med., Mosho for, Benha branch, Zagazig University.

- ***Mostafa Nemati (2013):*** Antimicrobial resistance of *Proteus* isolates from poultry. European Journal of experimental biology, 3 (6) : 499 - 500.

- ***Moussa, I.M., Ashgan M.H., Mahmoud M.H. and Al-Doss A.A. (2012):*** Rapid detection and characterization of *Salmonella entrica* serovars by multiplex polymerase chain reaction assay. African Journal of Biotechnology Vol. 11 (14), PP. 3452 - 3458, 16 February.

- ***National Committee for Clinical Laboratory Standards "NCCLS" (2001):*** Performance standards for antimicrobial susceptibility testing. Supplement M100-S11. Villanova, PA, USA.

- ***Plesser , O., Even-Shoshan , A. and Bendheim ,U. (1975):*** The isolation of *Klebsiella pneumoniae* from poultry and hatcheries. Refuah Vet., 32(3):99-105.

- ***Rennie, R. P., Andeson, C.M., Weinsely, B.C.,Albritton , W.L. and Mahony ,D.E. (1990):*** *Klebsiella pneumonia* gastroenteritis masked by *Clostridium perfringens* .J . Clin. Microbiol .,28 (2):216-219.

- ***Rianatou Bada – Alambedji, Assitou Fofana; Malang Seydi, Ayayi Justin Akakpo (2006):*** Antimicrobial Resistance of *Salmonella* isolated from poultry carcasses in DAKAR (SENEGA). Brazilian Journal of microbiology. 37 : 510 - 515.

- ***Siddique, R.A., Saxena M. and Lakhchaura, B.D. (2009):*** PCR based rapid detection of *Salmonella* from poultry samples. Indian J. Public Health. 53 (4) : 226 - 228.

- ***Srivani, R. (2011) :*** Studies on antimicrobial susceptibility pattern of *Salmonella* isolates from Chennai, India. Inter. J. Pharma and Bio Sciences, 2 : 435 - 442.

- ***W.M. Cardosa, W.F. De Oliveira, J.M. Romo, F.A.C. Sampaio, T.G.V. Moraes, R.S.C. Teixeira, S.R. Camara, R.P.R. Salles, A.A. De Siqueira, G.C. Nogueira (2006):*** Enterobacteria isolation in broiler carcasses from commercial establishments in Fortaleza, Ceara State, Brazil. Arq. Inst. Biol., São Paulo, V. 73, n. 4, P 383 – 387.

- ***Walid Q. Alali, Siddhartha Thakur, Roy D. Berghans, Michael P. Martin and Wondwossen A. Gebreyes (2010):*** Prevalence and distribution of *Salmonella* in organic and conventional broiler poultry farms. Foodborne pathogens and disease, Vol. 00, Number 00.

- ***Waltman W.D. (1999):*** Methods for isolating Salmonellae from poultry and the poultry Environment in : *Salmonella enterica* serovar Enteritidis in humans and Animals epidemiology, pathogenesis and control. (Eds. Saeed A.M., Gast R.K.,Potter M.A. and Wall P.G.). Iowa state University press, Amens, Iwa, USA. 419-432.

دراسات على البكتريا المصاحبة للإسهال في دواجن التسمين مع الاهتمام ببكتريا السالمونيلا

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تم تجميع 750 عينة من الكبد والأمعاء ومسحات من فتحة المجمع منهم 510عينة من طيور تعانى من الإسهال و240عينة من طيور سليمة ظاهريا وتم تجميعهم من 250 فرخه تسمين من مزارع بمحافظة الغربية. وتم عمل تشخيص معملى باستخدام الفحص الميكروسكوبى والزرع باستخدام الأوساط البكتيرية المتعددة ، والاختبارات البيوكيميائية والسيرولوجية واستخدام تقنية البى سى آر.

والنتائج أظهرت أن نسبة الإصابة بالإيشريشيا كولاى 43.5٪ ونسبة الإصابة بالسالمونيلا 17.6٪ ونسبة الإصابة بالبروتيس ميرابيلس 13.5٪.

وتم تصنيف عترات السالمونيلا وتبين أنها سالمونيلا تايفيموريم وسالمونيلا انتريتيدس وسالمونيلا دابلن وسالمونيلا أناتم وسالمونيلا كينتاكى ولوحظ أن عترات السالمونيلا حساسة لبعض المضادات الحيوية مثل الجنتاميسين ماعدا السالمونيلا كينتاكى أقل حساسية له.

كما أنها مقاومة لبعض المضادات الحيوية مثل أمبسيلين وكلورمفنيكول وإيريثرومايسين وبنسيلين وستربيتومايسين. تم أيضاً إجراء اختبار البى سى آر لبعض عترات السالمونيلا المعزولة للتشخيص السريع والدقيق.