BACTERIA ASSOCIATED WITH ENTERITIS IN BROILERS IN FAYOUM GOVERNORATE

*A.A.Moawad,* **Mahmoud Essam Hatem and ***Hammad Osama Hammad.


ABSTRACT

600 samples were collected from diarrheic broiler chickens and from apparently normal chickens in Fayoum Governorate. The bacteriological examination revealed that a total of 530 bacterial isolates were recovered from the 600 broiler chickens under examination. Cloacal swabs (130), cecal contents (350), unabsorbed yolk sac (40), liver and gall bladder (40) and heart blood (40).

Concerning the type of isolated bacteria from broiler chickens E. coli was the predominate (59.3) %. 53.3% of isolates were from diarrheic birds and 6.0% from apparently healthy chickens, followed by Proteus mirabilis (14.8%). Out of them were 11.6% from diarrheic birds and 3.2% from apparently healthy birds. And Proteus vulgaris (3.3%). Out of them were 2.5% from diarrheic broiler chickens and 0.8% from apparently healthy one.

E. coli was the most predominant bacteria recovered from the examined cases. 50 isolates of E. coli which were isolated from large intestines tested for in vitro pathogenicity using Congo red dye. The result showed fundamental variation for the growth of E. coli of diarrheic and apparently healthy origin on Congo red dye as 86% of E. coli isolated from chickens gave red colonies (pathogenic) while 16% of E. coli isolates did not bind to Congo red dye gave white colonies (non pathogenic).
Eight E. coli isolates recovered from examined diseased broiler chickens were serotyped and revealed the following: 3 isolates O114 K90, 2 isolates O26 K60, 2 isolates and one isolate O91 K - .

Ten Salmonella spp. isolates recovered from examined diseased broiler chickens were serotyped and revealed that 6 isolates were belonging to Salmonella Enteritidis and 4 isolates belonged to Salmonella Virchow.

Aeromonas hydrophila, Salmonella Enteritidis, Salmonella Virchow and E. coli were examined for antibiotic sensitivity test. It was found that Aeromonas hydrophila isolates were sensitive to gentamycin, doxycycline, norfloxacin, enrofloxacin, chloramphenicol and ciprofloxacin, Salmonella Enteritidis isolates were sensitive to chloromphenicol, enroloxacin, norfloxacin, colistin, ciprofloxacin and Gentamycin, neomycin and doxycycline, but Salmonella Virchow isolates were sensitive to chloromphenicol, enrofloxacin, norlloxin, colistin, neomycin, ciprofloxacin, gentamicin, cephalaxin and doxycycline, while E. coli isolates were sensitive to gentamicin, doxycycline and norfloxacin, chloramphenicol, cephalaxin and colistin.

**Key Word:** Enteritis, Broilers, Fayoum Governorate.

**INTRODUCTION**

Outbreaks of severe diarrhea followed by death which occurred every autumn for several years in 2 to 4 weeks old chicken on a poultry farm were recorded by He et al. (1981).

**Verma and Adiakha (1971)** isolated E. coli, Salmonella Anatum, Salmonella Stanly, Klebsiella species, Proteus species and paracolon bacteria from 359 chickens showing chronic respiratory disease, septicemia, unabsorbed yolk sac and enteritis.
There is no doubt that *Salmonella* species are among the most important causative agents which infect poultry populations and cause great losses and hazards to public health (*EL-Sayed, 1997*).

*Escherichia coli* is a normal inhabitant of the intestinal tract of birds, these organisms are capable of producing diseases under the influence of predisposing factors, like inadequate and faulty ventilation, over crowding, thirst and extremes of temperature. Consequently, losses due to *E. coli* infection occur as a result of high mortality during rearing and reduced weight gain (*Kaul et al., 1992*).

Family *Enterobacteriaceae*, which is composed of numerous inter-related Gram negative and oxidase negative bacteria, may constitute a great hazard to poultry industry. Some of them like *Klebsiella* assume a great significance. Many *Klebsiella* species are intestinal pathogens or commensals, while a few species are saprophytic mainly in the soil, water and feed rations (*Arora et al., 1986*). As *Klebsiella* group is concerned, it comprises many important species associated with diseases in birds, animals as well as human beings (*Mackay, 1988*). The *Klebsiella* organisms are known to play an important role as etiological agent 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 resulting in high mortality rates in young bird an decrease in egg production and hatchability of the infected eggs (*Plessser et al., 1975; Mahalingam et al., 1988 and Rennie et al., 1990*).

*Proteus species* were isolated from recently dead broilers chicks with an incidence of 25.8% (*Mahmoud and Moussa, 2000*).
MATERIAL AND METHODS

Samples:

A total of 600 broiler chickens from different farms at Fayoum governorate were subjected to bacteriological examination in the present investigation. Out of which 500 chickens were suffeed from enteritis and showed dullness, huddling, ruffled feather, diarrhea and low body gain. The rest of 100 broiler chickens were apparently healthy chickens from the same farms and were used as controls.

Table (1): Number of examined broiler chickens in different farms at Fayoum governorate.

<table>
<thead>
<tr>
<th>Farms</th>
<th>Number of examined birds</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apparently healthy</td>
<td>Diarrheic</td>
</tr>
<tr>
<td>Tamia</td>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>Senores</td>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>Itsa</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Ibshawi</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>500</td>
</tr>
</tbody>
</table>

Table (2): Distribution of samples collected from broiler chickens.

<table>
<thead>
<tr>
<th>samples</th>
<th>Intestinal swabs</th>
<th>Cecum contents</th>
<th>unabsorbed yolk sac</th>
<th>Liver and gall bladder</th>
<th>Heart blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>130</td>
<td>350</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Media used for bacteriological isolation:

The media used in the present study were:

Transport medium:

Stuart transport media (Oxoid)

Liquid media:

Pre-enrichment medium:

1% buffered peptone water (Oxoid)
Salmonella enrichment media:

Selenite F-broth (Oxoid):

It is a selective medium for isolation of salmonella:

Selective solid media for plating:

MacConkey's bile salt lactose agar medium (Oxoid):

A selective medium to differentiate between coliforms and non-lactose fermenters with inhibition of Gram-positive organisms.

Salmonella - Shigella (SS) agar (Oxoid):

It was used as a differential selective medium for the isolation of Salmonella from clinical specimens.

Xylose lysine deoxycholate (XLD) agar (HIMEDIA):

It was used as a differential selective medium for the isolation of Salmonella from clinical specimens.

Aeromonas agar base (Oxoid):

It was used as a differential selective medium for the isolation of Aeromonas from clinical specimens.

Congo red medium (Berkhoff and Vinal, 1986):

It was used for differentiation between pathogenic and non-pathogenic E. coli. The medium consist of trypticas esoya agar (Oxoid) supplemented by 0.03% Congo red dye (Sigma) and 0.15% bile salts (Sigma).

Media used for biochemical reactions:

All media used were prepared according to Cruickshank et al. (1975).
- **Peptone water 2% (Oxoid):**
  It was used for detection of indole production using Kovac's reagent.

- **Glucose phosphate broth:**
  It was used for Methyl red (MR) reaction and Voges proskauer (VP) test.

- **Simmon's citrate agar (Oxoid):**
  It was used for citrate utilization test.

- **Christensen's urea agar base (Oxoid):**
  It was used for testing urease enzyme activity.

- **Soft agar medium (0.5 %):**
  It was used for detection of motility as well as short term preservation of isolates.

- **Triple sugar Iron agar (TSI) (Oxoid):**
  It was used for detection of hydrogen sulphide production as well as fermentation of glucose, lactose and sucrose by change in butt and slants.

- **Reagents and chemicals:**
  1. **Kovac's reagent for indol test:**
  2. **Tetramethyl-P-Phenylenediamine dihydrochloride 1%:** Solution was used for Oxidase test.
  3. **Methyl red 0.04%:** Solution was used for Methyl red test.
  4. **Voges Proskauer reagents (VP).**
  5. **Sterile urea solution 40%:**
  It was added to Christensen's urea agar base (Oxoid) and used for urease test.

7. Phosphate buffer saline (PBS): It was used for serotyping of Salmonella.

8. Hydrogen peroxide 3.0%: It was used for catalase test.

Material used for API 20 E test:

- Media and reagents:
  - 5ml of NaCl 0.85% medium, TDA reagent, JAMES reagent, VP 1 reagent, VP 2 reagent, NIT 1 reagent, NIT 2 reagent and 25 API 20 E strips
  - 25 incubation boxes, 25 result sheets, 1 clip seal, pipettes, Ampoule protector and general microbiology equipment.

Material used for antibiogram determination:

Nutrient broth (Oxoid), Muller Hinton agar (Oxoid) and Antibacterial disks used for sensitivity test (Oxoid).

Antisera used for serotyping of E.coli isolates: (SIFIN Institut Berlin, Germany).

- Available polyspecific products:
  - Anti-Coli I, Anti-Coli II and Anti-Coli III

- Available monospecific products:

<table>
<thead>
<tr>
<th>Anti-Coli O 128 : (K 67)</th>
<th>Anti-Coli O 142 : (K 86)</th>
<th>Anti-Coli O 112 : (K 58)</th>
<th>Anti-Coli O 157 : (K -)</th>
<th>Anti-Coli O 114 : (K 90)</th>
<th>Anti-Coli O 158 : (K -)</th>
<th>Anti-Coli O 118 : (K -)</th>
<th>Anti-Coli O 164 : (K -)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-Coli O 25 : (K 11)</td>
<td>Anti-Coli O 119 : (K 69)</td>
<td>Anti-Coli O 125 : (K 70)</td>
<td>Anti-Coli O 55 : (K 59)</td>
<td>Anti-Coli O 126 : (K 71)</td>
<td>Anti-Coli O 78 : (K 80)</td>
<td>Anti-Coli O 127 : (K 63)</td>
<td>Anti-Coli O 86 : (K 61)</td>
</tr>
</tbody>
</table>

Antisera used for serotyping of *Salmonella* isolates:

(MAST ASSURE SALMONELLA ANTISERA Mast Diagnostic
Mast House, Derby Road, Bootle, L20 1EA.)

Liquid stable antisera for the determination of O, H and Vi antigens for the serological identification of Salmonellae.

**Methods**

**Collection of samples:**

*(Edward’s and Ewings (1972), Finegold and Martin (1982) and Krieg and Holt (1984)).*

All samples of chickens from different farms in Fayoum governorate (Tables 1 and 2) were collected and transported in an ice box to the laboratory as soon as possible, Swabs were collected in Stuart medium and transported in an ice box to laboratory as soon as possible, then inoculated in 10 ml sterile buffered peptone water and incubated at 37°C for 24 hours incubation, About one ml was transferred to 10 ml selenite-F broth then incubated at 37°C for 18 – 24 hours. A loopful from the selenite- F broth inoculated with the samples was streaked onto Salmonella Shigella (S.S.) agar and Xylose lysine deoxycholate (XLD) agar then incubated at 37°C for 24 hours. Each separate loopful was directly inoculated into separate nutrient broth tubes and then subcultured onto MacConkey agar. The inoculated broth and the streaked agar medium was incubated at 37°C for 24 hours. Pure colonies were picked up and preserved on slope agar for further morphological, biochemical and serological identification.
Isolation of *E. coli*, *Klebsiella pneumoniae*, *Pseudomonas spp.*, *Proteus spp.* and *Aeromonus hydrophila* by direct plating method: *(Cruickshank et al., 1975).*

Fecal samples were subjected for bacteriological examination.

**Identification of bacterial isolates:** *(Cruickshank et al., 1975).*

**Morphological identification and detection of motility:** *(Cruickshank et al., 1975).*

**Biochemical identification by conventional methods:** *(Quinn et al. (2002); Koneman et al. (1995) and Finegold and Martin (1982)) were using the following tests: Oxidase test, Catalase test, Indole test, Methyl red test (MR), Voges-Proskauer test (VP), Citrate utilization test, Urea hydrolysis test, Hydrogen sulphide test, as well as fermentation of glucose, lactose and sucrose by change in butt and slants.*

**Biochemical identification by API 20 E test:** *(BioMerieux Sa – France)*

**In-vitro antibiotic sensitivity of Aeromonas, Salmonella spp. and E. coli isolates:** *(Finegold and Martin (1982)).* Reading of the results was interpreted according to *NCCLS (2002).*

**Serological typing of isolated bacteria:**

It was done at the National Laboratory for Veterinary Quality Control of Poultry Production (N.L.Q.P.) Dokki, Giza.

1- **Serological identification of E. coli**: *Ewing (1986).*

2- **Serological identification of Salmonella serovars:** *(Kauffman, 1974)*
RESULTS

Incidence of bacteria isolated from diarrheic chickens and apparently healthy chickens:

<table>
<thead>
<tr>
<th>M.O.</th>
<th>*AHC</th>
<th>**DC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO.</td>
<td>%</td>
<td>NO.</td>
</tr>
<tr>
<td>E. coli</td>
<td>36</td>
<td>6.0</td>
<td>320</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>19</td>
<td>3.2</td>
<td>70</td>
</tr>
<tr>
<td>Salmonella spp.</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>Proteus vulgaris</td>
<td>5</td>
<td>0.8</td>
<td>15</td>
</tr>
<tr>
<td>Aeromonas hydrophila</td>
<td>-</td>
<td>-</td>
<td>19</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>-</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Pseudomonas spp.</td>
<td>-</td>
<td>-</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>10.0</strong></td>
<td><strong>484</strong></td>
</tr>
</tbody>
</table>

* AHC = Apparently healthy. **DC=Diarrheic.

Table (3): Results of bacteriological examination.

Incidence of different mixed bacteria isolated from diarrheic chickens:

<table>
<thead>
<tr>
<th>Mixed bacteria</th>
<th>NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli + Salmonella spp.</td>
<td>8</td>
<td>1.3</td>
</tr>
<tr>
<td>E. coli + A. hydrophila.</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>E. coli + Klebsiella pneumoniae.</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>E. coli + P. Mirabilis.</td>
<td>22</td>
<td>3.6</td>
</tr>
<tr>
<td>E. coli + P. vulgaris.</td>
<td>9</td>
<td>1.5</td>
</tr>
<tr>
<td>E. coli + Pseudomonas pneumoniae.</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>Salmonella spp. + A. Hydrophila.</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Salmonella spp. + P. mirabilis.</td>
<td>12</td>
<td>2.0</td>
</tr>
<tr>
<td>A. hydrophila. + P. mirabilis.</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>Klebsiella pneumoniae + P. mirabilis</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>A. hydrophila. + P. vulgaris.</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>85</td>
<td>14.16</td>
</tr>
</tbody>
</table>
Table (4): Type of mixed bacteria among examined chicken.

Incidence of bacteria isolated from different organ of diarrheic chickens:

<table>
<thead>
<tr>
<th></th>
<th>Intestinal swabs</th>
<th>Cecum contents</th>
<th>Unabs. Yolk sac</th>
<th>Liver &amp; G.B.</th>
<th>Heart blood</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. coli</em></td>
<td>56</td>
<td>196</td>
<td>14</td>
<td>28</td>
<td>26</td>
<td>320</td>
</tr>
<tr>
<td><em>P. mirabilis</em></td>
<td>17</td>
<td>33</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td><em>Salmonella Spp.</em></td>
<td>0</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td><em>P. vulgaris</em></td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td><em>A. hydrophila</em></td>
<td>11</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td><em>Klepsiella pneumoniae</em></td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td><em>Pseudomonas spp.</em></td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>93</strong></td>
<td><strong>275</strong></td>
<td><strong>35</strong></td>
<td><strong>44</strong></td>
<td><strong>37</strong></td>
<td><strong>484</strong></td>
</tr>
</tbody>
</table>

G.B.= gall bladder

Table (5): Recovered bacteria isolated from different diarrheic chicken organs.

Congo red binding activity of recovered *E. coli*:

<table>
<thead>
<tr>
<th>Congo Red Binding</th>
<th>* AHC</th>
<th>** DC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AH</td>
<td>%</td>
<td>D</td>
</tr>
<tr>
<td>Positive</td>
<td>3</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>Negative</td>
<td>7</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total examined</strong></td>
<td><strong>10</strong></td>
<td><strong>20</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

* AHC = Apparently healthy  ** DC = Diarrheic
Table (6): Results of *in vitro* differentiation between pathogenic and non pathogenic *E. coli*.

Antibiotic susceptibility of isolates to chemotherapeutic agents:

**Antibiotic susceptibility of *Aeromonas hydrophila* isolated from diseased chicks:**

<table>
<thead>
<tr>
<th>Antibacterial agents</th>
<th>Sensitive (S)</th>
<th>Intermediate (I)</th>
<th>Resistant (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>1 25</td>
<td>1 25</td>
<td>2 50</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>1 25</td>
<td>1 25</td>
<td>2 50</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>3 75</td>
<td>1 25</td>
<td>0 0</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>1 25</td>
<td>2 50</td>
<td>1 25</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>3 75</td>
<td>1 25</td>
<td>0 0</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Neomycin</td>
<td>1 25</td>
<td>1 25</td>
<td>2 50</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>1 25</td>
<td>1 25</td>
<td>2 50</td>
</tr>
<tr>
<td>Colistin</td>
<td>1 25</td>
<td>2 50</td>
<td>1 25</td>
</tr>
</tbody>
</table>

*S = Sensitive  **I = Intermediate  ***R = Resistant*

Table (7): The results of disc diffusion test on *A. hydrophila* isolates.

**Antibiotic susceptibility of *Salmonella Enteritidis* and *Salmonella Virchow* isolated from diseased chickens:**

<table>
<thead>
<tr>
<th>Antibacterial agents</th>
<th>S. Enteritidis</th>
<th></th>
<th></th>
<th>S. Virchow</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>S</em></td>
<td><strong>I</strong></td>
<td>*<strong>R</strong></td>
<td><em>S</em></td>
<td><strong>I</strong></td>
<td>*<strong>R</strong></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>1 25</td>
<td>2 50</td>
<td>0 0</td>
<td>0 0</td>
<td>3 75</td>
<td>1 25</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>0 0</td>
<td>1 25</td>
<td>3 75</td>
<td>0 0</td>
<td>1 25</td>
<td>3 75</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>1 25</td>
<td>2 50</td>
<td>1 25</td>
<td>2 50</td>
<td>1 25</td>
<td>1 25</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Neomycin</td>
<td>3 75</td>
<td>1 25</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>3 75</td>
<td>1 25</td>
<td>0 0</td>
<td>2 50</td>
<td>1 25</td>
<td>1 25</td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>0 0</td>
<td>1 25</td>
<td>3 75</td>
<td>0 0</td>
<td>1 25</td>
<td>3 75</td>
</tr>
<tr>
<td>Colistin</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
<td>4 100</td>
<td>0 0</td>
<td>0 0</td>
</tr>
</tbody>
</table>

*S = Sensitive  **I = Intermediate  ***R = Resistant*
Bacteria Associated With Enteritis In Broilers In Fayoum Governorate.

Table (8): The results of disc diffusion test on *Salmonella* Enteritidis and *Salmonella* Virchow.

Antibiotic susceptibility of *E. coli* isolated from diseased chickens:

<table>
<thead>
<tr>
<th>Antibacterial agents</th>
<th><em>S</em></th>
<th></th>
<th><strong>I</strong></th>
<th></th>
<th>*<strong>R</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>50</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>25</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Chloram-phenicol</td>
<td>3</td>
<td>75</td>
<td>1</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>3</td>
<td>75</td>
<td>1</td>
<td>25</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>50</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>3</td>
<td>75</td>
<td>1</td>
<td>25</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Neomycin</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>25</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>4</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>4</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>4</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>25</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Colistin</td>
<td>3</td>
<td>75</td>
<td>1</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*S* = Sensitive  **I** = Intermediate  ***R** = Resistant

Table (9): The results of disc diffusion test on *E. coli* isolates.

**Results of serological identification:** Results of serological identification of *E. coli* isolates:

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>O114 K90</td>
<td>3 isolates</td>
</tr>
<tr>
<td>O26 K60</td>
<td>2 isolates</td>
</tr>
<tr>
<td>O126 K71</td>
<td>2 isolates</td>
</tr>
<tr>
<td>O91 K -</td>
<td>one isolate</td>
</tr>
<tr>
<td>Total</td>
<td>8 isolates</td>
</tr>
</tbody>
</table>

Results of serological identification of *Salmonella spp* isolates:

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmonella Enteritidis</em></td>
<td>6 isolates</td>
</tr>
<tr>
<td><em>Salmonella Virchow</em></td>
<td>4 isolates</td>
</tr>
<tr>
<td>Total</td>
<td>10 isolates</td>
</tr>
</tbody>
</table>
DISCUSSION

In the present investigation 600 different samples were collected from diarrheic and apparently healthy broiler chickens in Fayoum governorate. The recovered bacterial isolates were *E. coli* (59.3%), *Proteus mirabilis* (14.8%), *Salmonella* spp. (5.2%), *Proteus vulgaris* (3.3), *Aeromonas hydrophila* (3.2%), *Klebsiella* spp. (2.5%) and *Pseudomonas* spp. (2.3%).

*E. coli* was isolated in high incidence which agrees with Khalid (1990), Mukhopadhyaya and Mishra (1992), El-Gaber and El-Gohary (1995), Emad (1996), Mahmoud and Moussa (2000) and Abeer (2004) who isolated *E. coli* with incidences of 57.6%, 59.8, 59%, 62%, 60% and 55.6% respectively. While higher incidences of *E. coli* were recovered by El-Sukhon (1990), Sara et al. (1995), Salman (1999), Gomis et al. (2000) and Farghaly (2000) who recovered 67.7%, 100%, 73.3%, 67.2% and 72.9% isolation rates, respectively.

These variations may be attributed to the pathogenicity of *E. coli* for chickens which had been correlated with numerous extrinsic and intrinsic bird related factors and conditions. These extrinsic factors include environmental conditions, exposure to other infections agents, virulence of bacteria, levels and duration of exposure, while the intrinsic factors affecting susceptibility of the bird include age, route of exposure, active and passive immune status and bread of chickens (Deb and Harry, 1976; Gaven, 1978 and Suelam, 2003).

Our study revealed also that *Salmonella* spp. Isolated with an incidence of 5.2% this result agree with Shouman and Moustafa (1972), Lu et al. (1986), Venkana et al. (1996), Jindal et al. (1999) and...
Mohamed (2003) who recovered Salmonella in incidences of 3.6 %, 4.4%, 6.3%, 5% and 4%, respectively. Lower recovery rates were obtained by Bayoumi et al. (1979), El-kady (1986), El-Gohary (1989) and Kim et al. (2003) who recovered Salmonella in incidences of 1.6%, 0.8%, 0.74% and 1.6%, respectively. Higher results obtained by Abd El-Galil et al. (1983), Emad (1996), EL-Morsi (1998), Mahmoud and Mousa (2000), Suelam (2003), Amen (2004), Rehan (2004) and Abeer (2004) who recovered Salmonella in incidences of 25%, 10%, 12%, 9.17%, 9.8%, 18.8%, 12% and 18.8% respectively.

Aeromonas hydrophila was recovered in the present study in an incidence of 3.2 % which agree with that recovered by Glunder (1988) and Ahmed (2004) who recovered A. hydrophila in incidences of 3.6% and 2.33 %, respectively.

Proteus spp. were recovered in an incidence of 18.1% which is more or less similar to Taha (2002), Suelam (2003) and Abeer (2004) who isolated it with incidences of 15%, 15.5% and 14.9%, respectively, while lower rate was obtained with Sarma et al. (1985) (10.6 %) and higher rate was recovered by Mohamed (1994) (25.77%).

Klebsiella spp. were recovered in an incidence of 2.5% which is relatively in agreement with Abd El-Galil et al. (1983) Osman (1992) Abd El-Motelib El-Zanaty (1993) Taha (2002) and Suelam (2003) who isolated it in incidences of 3%, 4%, 4.8%, 4.3% and 3.4%, respectively. while lower rate was obtained by Flamer and Drewes (1988)(0.6%) and higher rates were obtained by Niazi et al. (1981), Ann et al. (1982), Ali et al. (1984), Choudhury et al. (1993), Zakhary (1998) and Abeer (2004) who recorded isolation rates of 27.64%, 27%, 7%, 8.2% 29.1%, and 19.14%, respectively.
*Pseudomonas* spp. were recovered in an incidence of 2.3% which is in agreement with *Awaad et al. (1981)* and *Osman (1992)* who isolated it in incidences of 2.9% and 2%, respectively. Relatively in agreement with *Castro et al. (1989)* *Younes et al. (1990)* *Choudhury et al. (1993)* who isolated it in incidences of 5%, 4.9% and 4.7% respectively, while higher rates were obtained by *Shahata et al. (1988)* *Venkanagouda et al. (1996)* *Emad (1996)* *Mahmoud and Moussa (2000)* *Shosha (2003)* *Suelem (2003)* *Abeer (2004)* who recorded isolation rates of 18.2%, 6.06%, 8.7%, 6.7% 10%, 10.6% and 16.4%, respectively.

As *E.coli* is a normal inhabitant in the intestinal tract of birds so, its isolation from feces of broiler (diarrheic or apparently healthy) have no significance unless determination if it was pathogenic or non pathogenic could be achieved, For this purpose Congo red binding activity of *E. coli* isolates was determined in the present work. The results showed fundamental difference between the percentage of Congo red (CR) positive (red colored colonies) *E. coli* (pathogenic) (86%) and Congo red (CR) negative (white colored colonies) *E. coli* (non pathogenic) (14%).

The pattern of antibiotic susceptibility of the most prevalent intestinal pathogens was done *in vitro* and the obtained data revealed that *Aeromonas hydrophila* isolates were sensitive to gentamicin, doxycycline, norfloxacin, enrofloxacin chloramphenicol and ciprofloxacin. This is in agreement with *Forbes et al. (1998)*, *Kelley et al. (1998)* and *Altwegg (1999)* and some whate agree with *Ahmed (2004)* but is in disagreement with the result given by *El khashab and El yazed (2001)*.

*Salmonella* isolates were sensitive to chloromphenicol, enrofloxacin, norfloxacin, colistin, ciprofloxacin, gentamycin, neomycin and doxycycline.
This results agree with Gyurov (1986), Wasniewski and Galazka (1992), Hoszowski et al. (1998) and Lakshmi et al. (2006) and is in disagreement with the result given by Hermans et al. (1996), Rzedzicid et al. (1997), Cormican et al. (2002) and Hernandez et al. (2002).

*E. coli* isolates were sensitive to gentamycin, doxycycline and norfloxacin, chloramphenicol, cephalexin, enrofloxacin and colistin sulphate. This results agree with Ghosh (1987), Filali et al. (1988), Khalid, 1990), Bebora et al. (1994), Gowda et al. (1996) and Vakani et al. (1997) and differ from those recovered by Cloud et al. (1985), Kaul et al. (1992), Amara et al. (1995) and Saenz et al. (2001).

This variation in results could be due to intensive haphazard antibiotics therapy usually given by owners in most cases of bacterial infections in broiler chicken farms especially in Fayoum governorate.

**REFERENCE**


Bacteria Associated With Enteritis In Broilers In Fayoum Governorate.


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− **Gaven, E. (1978)**: Observation on experimintal infection of chicks with *E. coli*. Avian pathology, 7: 312-327.


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Bacteria Associated With Enteritis In Broilers In Fayoum Governorate.

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ผลกระทบ البكتيريا

يعتبر الثروة الداجنة من أكثر الثروات الحيوانية توفيراً للبروتين الغذائي كمصدر حيوي وأن
من اخطر الأمراض التي تؤثر على هذه الثروة البكتيريا المعوية التي تلعب دوراً رئيسيًا في نقص
المعدل التحويل الغذائي للطائر إلى جانب الخسائر المادية التي تنتج عن ارتفاع معدل الوفيات ومن
هذا المنطلق تأتي هذه الدراسة كمحاولة مبسطة لإتلاف الضوء على ما يلي:

1. الكشف عن دور البكتيريا كعامل مساعد لارتفاع معدل الإسهال والتفوق في دواجن التسمن
2. التصنيف البيوكيميائي لـ7 لكبكل من مسببات مع الاستعانة بنظام API 20 E
3. التصنيف السيروالوجي لبعض من هذه المعزولات.
4. إيجاد أفضل المضادات البكتيرية لـ9 تستخدم في العلاج والمساعدة في وضع حد لهذه المشكلة.

أجريت هذه الدراسة في محافظة الفيوم عن طريق اخذ العينات من مزارع منتشرة في مدن
 مختلفه بالمحافظة هي: ايشوي- أطسا- سنورس- طامية حيث تم تجميع 600 عينة مختلفة من
فتة المجمع ومن الكبد والمرارة والقلب والأمعاء من دواجن التسمن في أنصار مختلفة والتي أعطت
530 عينة ميكروبية لميكروبات مختلفة وكانت العينات عبارة عن 500 عينة من طيور بها علامات
الإسهال المعوي و 100 عينة من طيور سليمة ظاهريا وقد أوضح الفحص البكتيريولوجي لهذه
العينات التالية:

• أظهر الفحص البكتيري سيادة الميكروب القولوتي الإبشيشياكولي على الميكروبات الأخرى
وكان نسبت عزلة 59.3% منها 53.3% من الطيور المصابه بالإسهال و 6% من الطيور
السليمة ظاهريًا.
Bacteria Associated With Enteritis In Broilers In Fayoum Governorate.

- The prevalence of bacterial enteritis in broilers in Fayoum Governorate was found to be 14.8%.
- Among these, 11.6% were salmonella, 3.2% were E.coli, 5.2% were Proteus, 3.2% were Klebsiella, 2.5% were Bacillus, and 2.3% were Serratia.
- A total of 85 cases were classified into 6 species:
  - O114 K90
  - O91 K–
  - O126 K71

- The classification system used was API 20 E for enteric bacteria.
- The results showed:
  - 86% of the samples were thermophilic Campylobacter and 14% were non-thermophilic.

- A more detailed examination under a microscope confirmed the following:
  - Three cases of O114 K90
  - 60 cases of O26 K90
  - 71 cases of O126 K71
  - 1 case of O91 K–

- The remaining cases could not be classified.

كما تم تصنيف عشرة عترات من السلمونيلا للحصول على نوعين هما:

٠ ٦ عترات سالمونيلا انتيرتيدس.
٠ ٤ عترات سالمونيلا فيرشاو.
٠ وباحي العترات لم يمكن تصنيفها.

كما تم فحص كل من ميكروب الأبريومونس والسالمونيلا انتيرتيدس و السالمونيلا فيرشاو والإبشرياكولاي لاختبار الحساسية وقد اتضح أن ميكروب الأبريومونس كان كل من الجنتاميسين والدوكسيسيكلين والنيروفوكساسين والإيروفاكسين هم أقوي المضادات البكتيرية 100% من السيريفوكساسين والكلورامفينيكول 75% ثم كان السيفالكسين والكولستين 50% متوسطي الحساسة أما المقاومة فكانت لكل من الأموكسيسيلين والأمبيسيللين والنيومايسين والإريثرومايسين.

بينما كان ميكروب السلمونيلا انتيرتيدس شديد الحساسية 100% لكل من الجنتاميسين والنيروفوكساسين والإيروفاكسين والسيروفوكساسين والكلورامفينيكول والكولستين وكانت 75% مع السيفالكسين والدوكسيسيكلين أما في حالة السيفالكسين فكانت متوسطة الحساسية 50% وكانت المقاومة مع الأموكسيسيلين والأمبيسيللين والإريثرومايسين.

أما في حالة ميكروب السلمونيلا فيرشاو فكان شديد الحساسية 100% لكل من الجنتاميسين والنيروفوكساسين والإيروفاكسين والسيروفوكساسين والكلورامفينيكول والنيومايسين والكولستين كانت 75% مع الدوكسيسيكلين والسيفالكسين أما في حالة الأموكسيسيلين فكانت متوسطة الحساسية 50% وكانت المقاومة مع الأمبيسيللين والإريثرومايسين.

وفي حالة ميكروب الإبهرسيا كولاي فكان شديد الحساسية 100% لكل من الجنتاميسين والنيروفوكساسين والدوكسيسيكلين وكانت 75% مع الإيروفاكسين والكلورامفينيكول والكولستين والسيفالكسين. أما في حالة السيريفوكساسين والأموكسيسيلين فكانت متوسطة الحساسية 50% وكانت المقاومة مع الأمبيسيللين والإريثرومايسين.