Salmonella infection in Broiler flocks in Egypt

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Salmonella infections are considered to be the most important disease affecting poultry. The disease causes severe damage among young birds with a high mortality rate. Adult birds are often chronic carriers of Salmonella organisms without outward signs. In the present study the prevalence of Salmonella species in the broiler flocks was 10.37\% among 3 governorates in Egypt (Al-Qalyubia, El-Gharbia and El-Ismailia). The highest incidence of salmonella was recorded in El-Gharbia then El-Ismailia and AL-Qalyubia. The incidence of salmonellae in the closed system farms was higher than the open system farms. It was noticed that the most common Salmonella serotype was Salmonella Enteritidis followed by Salmonella Kentucky, Salmonella Newport, Salmonella Derby, Salmonella Typhimurium and Salmonella Infantis. Salmonellae were isolated from intestine, yolk sac, heart, liver and spleen. The incidence rate was highly reported on 5\textsuperscript{th} week age then 1\textsuperscript{st} week, 4\textsuperscript{th} week, 2\textsuperscript{nd} week, 6\textsuperscript{th} week and the 3\textsuperscript{rd} week. It is clear that salmonella infection still prevalent in poultry farms in Egypt.

Keywords: Salmonella, Broiler, closed system farms, open system.

INTRODUCTION

In poultry, which represents important source of cheap protein throughout the world, avian salmonellosis continue to cause economic losses, particularly in those parts of the world where the poultry industries are continuing to intensify and where open sided housing is common. Salmonellae are responsible for considerable losses in the poultry industry through the death of birds and loss in production and it is estimated to cost poultry farmers in some countries.

Avian salmonellosis is an inclusive term designating a large group of acute and chronic diseases of poultry caused by any one or more member of genus Salmonella under the family Enterobacteriaceae. However, particular Salmonella serovars may be encountered more frequently in one country than the other (Capita et al., 2003 and Liljebjelke et al., 2005). So the aim of the study was to survey the present status of Salmonella organism in broiler flocks.

MATERIALS AND METHODS

Samples:

A total of 482 samples (liver, intestine, spleen, heart and yolk sac) were collected from moribund broiler chickens showing diarrhea and respiratory distress of different ages ranged from 1 to 42 day old age, reared in deep litter under open and closed systems of housing from 3 Governorates (AL-Qalyubia, El-Gharbia and EL-Ismailia) as shown in Table 1.
Table (1) Distribution of total examined samples from moribund and apparently healthy chicks.

<table>
<thead>
<tr>
<th>Data of samples</th>
<th>Distribution of examined samples from different governorates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farms</td>
<td>AL-Qalyubia</td>
<td>El-Gharbia</td>
</tr>
<tr>
<td>Open</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Closed</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>System of housing</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Number of birds</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Liver</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Intestine</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Heart</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Spleen</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Yolk sac</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Total No. of Samples</td>
<td>151</td>
<td>187</td>
</tr>
</tbody>
</table>

Table (2) Incidence of salmonellae according to the Governorates

<table>
<thead>
<tr>
<th>Governorate</th>
<th>No. of Samples</th>
<th>Salmonellae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Positive number</td>
</tr>
<tr>
<td>El –Gharbia</td>
<td>187</td>
<td>25</td>
</tr>
<tr>
<td>El –Ismailia</td>
<td>144</td>
<td>15</td>
</tr>
<tr>
<td>AL-Qalyubia</td>
<td>151</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>482</td>
<td>50</td>
</tr>
</tbody>
</table>

Isolation and Identification of Salmonellae:
All samples (Heart-liver-Intestine-Spleen-Yolk sac) were collected under aseptic conditions and safety precautions. These samples were collected in sterile condition using sterile scissors and forceps and collected in sterile bags. The procedure for isolation and identification of *Salmonellae* were conducted according to the ISO 6579 (2005) and Quinn et al., (2002). Diagnostic poly and monovalent *Salmonella* “O” and “H” antisera were used for serological identification of *Salmonella* isolates (*Salmonella* diagnostic antisera, Sifin Institut for Immun preparate and Nahrmaden GmbH Berlin, Germany) according to Kauffmann and Das Kauffmann (2001).

RESULTS
Fifty suspected *Salmonella* isolates out of 482 examined samples were detected with an incidence of 10.37%. The highest incidence of salmonellae was in El-Gharbia (13.37 %) then El-Ismailia (10.42 %) and AL-Qalyubia (6.62 %) as shown in Table 2. The rate of *Salmonella* isolation in the closed system farms (14.67 %) was higher than in the open system farms (8.43 %) as shown in Table 3. Salmonellae were isolated from intestine (17.39 %), yolk sac (13.64 %), heart (11.3 %), liver (7.83 %) and spleen (4.35%) as shown in Table 4.

The highest incidence of salmonellae was recorded in the 5th week of age (20.24%) then the 1st week (11.11 %), 4th week (10 %), 2nd week (9.21 %), 6th week (5.88%) and the 3rd week (2.9 %) as shown in Table 5.

By using polyvalent and monovalent *Salmonella* O and H antisera, *Salmonella* isolates were serotyped as: *S. Enteritidis* (56%), *S. Kentucky* (16 %), *S. Newport* (12 %), *S. Derby* and *S. Typhimurium* (4 % each) and *S. Infantis* (2%) as shown in Table 6.
DISCUSSION
The present study was carried out to survey salmonella infection in broiler flocks in Egypt. According European Food Safety Agency (EFSA) (2007) an average of 23.7% of broiler farms in EU were Salmonella positive, with a wide variation (0 to 68%) between countries, the most common serotypes were S. Enteritidis, S. Infantis, S. Mbandaka, S. Typhimurium and S. Hadar.

It is clear that, 50 out of 482 samples were positive to salmonellae (10.37 %). These results could be comparable with those reported by Emad...
Salmonella infection still prevalent in poultry farms in Egypt. The present study indicated the presence of serotype variations of Salmonella organism in Egypt particularly in Al-Qalyubia, El-Ismailia and El-Gharbia, and isolated from different organs, on different ages from either open or closed house system.

CONFLICT OF INTEREST
The present study was performed in absence of any conflict of interest.

ACKNOWLEDGEMENT
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AUTHOR CONTRIBUTIONS
S.S., A.A.S., J.J. designed the project, performed experiments, analyzed data, and prepared the manuscript; S.Z.E. and Y.I.Y. aided in the analysis of data, provided valuable comments and ideas, and technical assistance during the development of the project; J.J., S.Z.E. and Y.I.Y. designed and supervised the work; and S.S. and A.A.S. wrote the manuscript.

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