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Epidemiological and Bacteriological Studies on Dead-in-Shell Embryos

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Abstract

The deployment of dead-in-shell embryos, the bacterial etiology of the condition, and the epidemiology of the dead embryos in three local hatcheries in Erbil province were investigated using standard bacteriologic techniques. Deployment of the condition in the three hatcheries was found to be 37%, 21.6% and 40.5% respectively. Bacteria that were isolated arranged in order of decreasing frequency, included *Escherichia coli, Staphylococcus spp, Streptococcus spp, Pseudomonas spp*. The number of dead-in-shell embryos in association with the various bacteria isolated from the three hatcheries were 18 (*Escherichia. coli),* 8 *(Staphylococcus spp),* 2 *(Streptococcus spp),* 9 *(Pseudomonas spp)*.

Epidemiologically from this study, it was concluded that dead-in-shell embryos are quite common in hatcheries in Erbil Province and that bacterial contamination in the hatcheries constitute an important threat to the poultry industry in the area.

Keywords: *Pseudomonas spp;* Embryo; Yolk sac

Introduction

Several types of bacteria have been associated with infection of yolk sac and death of chicken embryos. The most common of these are *Staphylococcus, Streptococcus, Klebsiella, Escherichia coli, Enterobacter, Citrobacter, Proteus, Salmonella, Pseudomonas spp.* and *Mycoplasma* [1-4]. Fungi have been also reported with dead-in-shell embryos [5,4]. Bacteria that cause dead-in-shell embryos are usually those of the normal bacterial flora of the intestinal tract, skin or feather. The bacteria can migrate to yolk and cause death of the embryos and hatched chicks. Bacteria may also gain entrance to the egg as a result of the ovary and ovarian follicles (transovarian transmission) [1].

The purposes of the present study were: 1) to determine the bacterial causes of dead-in-shell chicken embryos; 2) to exhibiting the epidemiologic state of these isolated bacteria; 3) to report certain recommendations to minimize the deployment of death of embryos in the hatcheries.

Materials and Methods

Ten unhacthed solid eggs were collected at the end of the incubation period from each of three different local hatcheries in Erbil province. Egg collection was done twice monthly over a period of 18 months (2011-2012). During each visit, 15 unhacthed eggs were collected randomly to form one sample.

In the laboratory, a sample of five eggs was chosen as a representative sample from each hatchery. The eggs were washed thoroughly with a disinfectant (2% tincture iodine) and after dryness they were mopped with alcohol. Opening of the eggs was done aseptically and yolk contents were collected into sterile containers. In case of eggs with fully developed embryos, the unabsorbed yolk was used for pooling. Culture media that were used for bacterial isolation were Blood agar, MacConkey agar and Mannital salt agar. Identification of bacterial isolates were done on the basis of their colonial, morphological, cultural and biochemical properties [6,7].

Results

The types, numbers, and percentages of bacterial isolates done dead-in-shell embryos from the three hatcheries are presented in Table 1. A total of 37 bacterial isolates were encountered in the three hatcheries. The total isolated bacteria from the three hatcheries arranged in order of decreasing frequency were *Escherichia coli* (18 isolates), *Pseudomonas spp.* (9 isolates), *Staphylococcus spp.* (8 isolates), *Streptococcus spp.* (2 isolates).

The number of dead-in-shell embryos with yolk sac infection in association with the various bacteria isolated from the three hatcheries and the severity of lesions in various organs of the dead-in-shell embryos are presented in Table 2.

From data presented in this Table 2 it becomes apparent that the most severe lesions were associated with *Escherichia coli*. All of the examined internal organs exhibited vascular changes and they were red congested in color and hemorrhagic.

Discussion

In this study, the prevalence rates of dead-in-shell chicken embryos in the three local hatcheries were 37%, 21.6% and 40.5% respectively. From these figures it would seem that the condition is quite common in hatcheries in Erbil Province. However a similar study has been in the Nenevha Province and according to that study it was possible to evaluate these figures. Bacteria that were isolated in this study are similar to those isolated by other workers in Nenevha (1) and other parts of the world [2,4,8]. *Escherichia coli* constituted 48.6% of the bacteria isolated from the three hatcheries. This finding is in agreement with that reported by others working on the same topic and in the same geographic location [1,9,10]. Similarly, *Escherichia coli* are responsible for the largest numbers of dead embryos in the three hatcheries (7 dead embryos). These lesions were consistent with *Escherichia coli* infection and they were similar to those reported in the literature [1].

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Bacterial isolates	No. of isolates Hatch 1	% of isolates Hatch 1	No. of isolates Hatch 2	% of isolates Hatch 2	No. of isolates Hatch 3	% of isolates Hatch 3	Total No. of isolates	% of isolates
Escherichia coli	7	50	4	50	7	46.6	18	48.6
Streptococcus spp.	1	7.1	-	-	1	6.6	2	5.4
Staphylococcus spp.	2	14.2	2	25	4	26.6	8	21.6
Pseudomonas spp.	4	28.5	2	25	3	20	9	24.3
Total		100%		100		100%		100%

Table 1: Numbers and percentages of bacterial isolates from dead-in-shell embryos from three local hatcheries.

Bacterial isolates	No. of dead embryos	Gross lesions in heart	Gross lesions in Liver	Gross lesions in Spleen	Gross lesions In Intestine	Gross lesions in Lung
Escherichia coli	7	++	+++	++	+++	+
Staphylococcus spp.	4	++	++	++	++	+
Streptococcus spp.	3	+	+	+	++	+
Pseudomonas spp.	4	++	+	+	+	-

+ = Mild lesion. ++ = Moderate lesion. +++ = severe lesion. - = No lesion

Table 2: Bacterial isolates, numbers dead embryos with yolk sac infection and degree of severity of lesions in various organs of dead embryos in three local hatcheries.

In view of the high prevalence of dead-in-shell chicken embryos in local hatcheries, it could be recommended that:

- All trays used for hatching should be disinfected before being used for the next hatch. Disinfection could be accomplished though dipping of trays in a tank of suitable disinfectant with formaldehyde in the hatcher.
- Egg used in the hatch must be cleaned and disinfectant in a manner similar to that used in cleaning and disinfection of the trays used for hatching. In fact, the two processes could be done together.
- Eggs to be used for hatching must be obtained from a well-known and good breeder "code" (source of hatching eggs).
- All hatcheries must be under veterinary supervision and they must be visited periodically by the veterinarians to assure clean and healthy hatching.

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