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## Disease investigation of a dead in shell embryo in a desi chicken farm at Dindigul district of Tamil Nadu

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**Abstract**

The desi chicken, once domesticated in backyards and reared in free range for house hold purposes is gaining commercial market. In this study, a disease investigation was undertaken in a newly started desi chicken farm in Dindigul district upon the farmer's report. The embryonic death with no other clinical signs except low hatchability and dead in shell embryo was reported by the farmer. The etiology was identified based on growth characteristics, colony morphology and bio chemical characterization of the bacteriological agent. The etiology was diagnosed as *Pseudomonas* sp. which is common in broiler chicken, but the clinical disease in desi chicken is rarely encountered. The farmer was advised to use water sanitizers, disinfectants for the disinfection of farm premises and equipments. The hatchability gradually increased after the treatment of birds and implementation of disinfectant practices. This disease investigation signifies the biosecurity measures and basic sanitation to be followed in desi chicken flock maintained free range.

**Keywords:** Dead in shell embryo, *Pseudomonas*, embryonic mortality, contamination, biosecurity, disinfection

**Introduction**

Desi chicken farming flourishes in a high pace in tropical regions as the enterprise gives profit out of less investment of time and money. The lack of technical knowledge on the aspects of hygiene and biosecurity leads to the emergence of various diseases in desi chicken which are most commonly reported in cross breeds. The below standard hygiene of the farm premises and unsterilized incubation units lead to embryonic death and hence less hatchability. There are various factors which are reported to be the cause of dead in shell embryos, viz, embryonic anomalies<sup>[1]</sup>, dehydration of the embryo, adhesion of the developing embryo to the egg shell<sup>[2]</sup>, malpositioning of the embryo<sup>[3]</sup> and pathological conditions caused by bacterial or viral infections<sup>[4]</sup>. Among these factors, the hatchery waste and the waste water from cleaning the hatchery equipments serve as an important source of bacteriological agents. Hence ruling out the cause for the dead in shell embryo becomes little skeptical at farm level management.

This study aimed at investigating a dead in shell embryo reported from a desi chicken farm at Dindigul district of Tamil Nadu state in India. The farmer reported a drastic regression in hatchability in the recent past with least hatchability of 40%. The eggs were reported to be hatched at a common hatchery where eggs from various places are incubated and hatched on cost basis. The embryonic deaths which resulted in dead in shell embryos were reported by the farmer to occur during the 12-17 days of incubation. The disease form assumed no other clinical signs except low hatchability and dead in shell embryo. The dead embryo encased in the shell was investigated for probable etiological agent. Here we report the incidence of dead in shell embryo due to bacterial infection in a desi chicken farm with low hatchability.

**Materials and Methods**

**Examination of intact shell and dead embryo within:** Based on the anamnesis, the investigation started with the examination of the dead embryo for the presence of anomaly, adhesion to shell membrane and any possible malformation which led to the embryonic mortality.

**Identification of etiology of bacteriological origin:** To rule out the bacteriological agent which caused the embryonic mortality, the embryo inside the shell was examined.

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The shell was wiped thoroughly with 70% methanol to avoid cross contamination. The embryo was cut open and swabs were collected from the unabsorbed yolk sac.

The swab was inoculated into brain heart infusion broth overnight for enrichment. The culture was inoculated into brain heart infusion agar plate and McConkey agar plate. Biochemical characterization comprised of IMViC test, urease test and oxidase test.

### Results

The examination of the embryo and shell showed no anomalies in the embryo. The embryo was well hydrated and also found to be free of any adhesion from the inner sides of the egg shell. The growth of the bacteriological agent in brain heart infusion agar showed colonies producing green metallic sheen on the surface indicating pyocyanin production while non-lactose fermenting pale colonies were found on McConkey agar. The colony comprised of short rods which were gram negative by Gram's staining.

IMViC test revealed negative for indole, methyl red and Voges-Proskauer test and positive for citrate test. The colonies were also urease and oxidase positive. The etiology was diagnosed as *Pseudomonas* sp. through colony characteristics and biochemical characterization.

### Discussion

This study was undertaken to investigate the cause for dead in shell embryo in a desi chicken farm. The yolk sac infection caused by *Pseudomonas* sp. was ruled out which led to the death of the embryo. The farmer reported a reduced hatchability of 40% which is agreement with previous studies which reported 21.6-40.5% [5]. The fact that the eggs were hatched at a place where eggs from various sources are handled might have potentially led to the infection of the yolk sac. Considering the poor disinfection protocols followed in local hatcheries [6], the chances for infection of embryo with various bacteriological agents is not unlikely [7]. Pathogenic agents of bacterial origin cause mortality of embryo during second week of incubation as the deaths caused due to malpositioning of the embryo was caused during 18-21 days of infection [8]. This was concordant with our case in which the mortality was recorded during 12-17 of infection which further confirmed the cause of dead in shell embryo as a bacterial pathogen.

*Pseudomonas* sp. was reported to cause embryonic mortality among the other common bacteriological agents which could lead to dead in shell embryo like *Escherichia* sp., *Streptococcus* sp., *Staphylococcus* sp. [9]. The incidence of dead in shell embryo due to bacterial pathogen is common among cross bred broilers [8] and scanty reports are available as far as desi chicken is concerned. Fecal contamination of the egg shell could be a possible reason for the infection of the embryo. Apart from fecal contamination, poor sanitation of hatchery and equipments and stocking density were attributed to the poor hatchability and dead in shell embryo [10]. Further investigation is needed to rule out other causes like probable viral infections, low hatchability due to inbreeding and chances of transovarian transmission from carrier parent stock.

We suggest that the principle reason behind the disease incidence could be the negligence towards the practice of common sanitation and disinfection protocols in the farm as well as the hatchery environment. To curtail the water borne spread of the agent, the farmer was advised to use water

sanitizers, aldehyde based disinfectant-Korsolex® for the disinfection of farm premises and equipments. The hatchability gradually increased after the treatment of birds and implementation of disinfectant practices.

### Conclusion

Taken together, it may be concluded that the dead in shell embryo in the investigated desi chicken farm was due to the infection caused by *Pseudomonas* sp. The reason for the infection could be poor handling of eggs at hatcheries following lame sanitation and disinfection protocols. This disease investigation signifies the biosecurity measures and basic sanitation to be followed in a hatchery which handles eggs from various sources and also in desi chicken flocks maintained free range.

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