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Review Article

Egg Drop Syndrome 76 (EDS76) in Birds

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Abstract

Due to the egg drop syndrome76, frequent outbreaks worldwide cause disaster in the poultry industries. It is hard to detect infected birds from the beginning before sexually mature, so the disease is discovered late at the peak of production by a sudden dramatic decrease in eggs at peak of production, and no way to treat the virus than prevention and vaccination against the causative infection (egg drop syndrome 76 virus).

Keywords: *Egg Drop Syndrome76; Thin-Shelled Egg; Rough Shaped; Laying Hen Industry*

Scientific Background

Egg drop syndrome 76 (EDS 76) is a viral disease causing a serious problem in lying breeders around the world, which threats the poultry industries by causing a dramatic economic disaster at peak production of up to 40% [2,3,9,10,14,15]. This disease causes a critical concern among breeders around the world, due to the huge income of these industries. The causative agent is duck *Atadenovirus* A, the virus was introduced to the poultries through contaminated Marek's vaccine [2,5,12,16]. The actual influence of the EDS 76 virus is on the chicken industry. Though the first outbreaks were faced by removing EDS 76 virus from laying flocks, it became endemic in birds world-wide. The ducks and the geese are the natural carrier of this virus and were introduced from ducks to chickens through direct contact with ducks and geese or indirectly by contaminated water [1,8]. This disease was first found in Sudan in 1994 and a recurrent outbreak was reported in 2022 [4,17].

Causative agent

Duck *Atadenovirus* is under responsibility for egg drop syndrome 76 in laying hens, which attributes to the family Adenoviridae and member of the genus *Atadenovirus*, and just only one serotype has been discovered (adenovirus 127) [13,14,16,19].

History of the disease

EDS 76 was first mentioned in birds in the 1970s [5,14,11]. The first outbreaks were introduced through the contaminated vaccine of Marek's disease, which infected laying flocks [2,5,12,16].

Geographic distribution

EDS virus (Duck *Atadenovirus* A) can be found worldwide in geese and ducks. Infected chickens are found in Africa, Asia, Europe, North America, and Latin America. An outbreak of the respiratory disease occurred in two related flocks of ducks in Canada in 2007. In the U.S., the maximum reports of outbreaks in domesticated birds were published in 1978-79 (healthy ducks and chickens). Serological surveys have confirmed duck *Atadenovirus* in wild waterfowl in North America.

Susceptible host

The natural or carrier hosts for duck *Atadenovirus* A are Waterfowl, including domesticated (Pekin, Muscovy) ducks, and geese, which also occur in various wild waterfowl [5,9,19]. Clinical cases impacting egg production have been reported in chickens, quail, and turkeys. infected turkeys, guinea, and pheasants fowl were experimentally confirmed. The period of virus shedding is limited or the birds are infected before hatching [6], so the isolation succeeded just from domesticated birds. Antibodies have been confirmed in cattle egrets, gulls, and pigeons, and two captive owls, a captive stork, and a captive swan. the owls and the stork have been reported [14,15].

Transmission of the disease and epidemiology

The transmission of Duck *Atadenovirus* A requires two ways, vertical transmission through the interior and exterior of the egg containing the virus. Chicks hatched from infected eggs playing important role in the contamination of the flock's environment by secreting the live virus from the intestinal tract or after maturing by secreting the virus in eggs or dropping from replication in the oviduct [8,10,14].

EDS 76 virus (duck *Atadenovirus* A) is also transmitted horizontally between birds by mainly oral route. Duck *Atadenovirus* A can be spread across contaminated equipment and water. Many outbreaks from contact with wild birds or contaminated water by wild birds' feces [8,10]. No evidence of the insects' transmission [OIE 2017].

Disinfection

Adenoviruses are tolerated by many used disinfectants including lipid solvents, 2% phenol and 50% alcohol. Sodium hypochlorite, iodophors, chlorine dioxide, aldehydes, and some other disinfectants have confirmed achievement against some adenoviruses, although special agents may need prolonged contact times. EDS virus could be kept its virulence in a wide pH range, from pH (3 - 10). They also have power against heat but are sensitive to autoclaving.

Incubation period

The period for Duck *Atadenovirus* until appears symptoms 'is highly changing, as birds infected in ovo or as chicks keep healthy until they begin laying eggs. Experimentally infected ducklings and goslings showed respiratory signs starting 2 - 4 days after inoculation. Experimentally infected laying chickens produced abnormal eggs 10 to 24 days after inoculation, and experimentally infected quail began laying abnormal eggs after 9 days.

Clinical signs and pathogenicity of the disease

The infected chickens usually manifest healthy without respectable illness but show abnormal eggs and a sharp decrease of eggs at the predicted peak of production. The first signs of Egg Drop Syndrome 76 are usually a loss of color in pigmented eggs, followed by the production of roughly shaped, thin-shelled, shell-less eggs, soft-shelled and chalky shells [3,7,8,18]. Some found the infected chickens

develop transient diarrhea due to exudate and fluid from the oviduct and dullness or inappetence before the changes in egg laying. Vaccination groups usually show a series of small disease cases, with less effect on egg laying. The rarely high mortality due to outbreaks of respiratory signs, in ducklings and goslings.

Post mortem lesions

In lying chickens and other gallinaceous birds, the lesions are minimal and bound to the female reproductive tract. Due to inefficient ovaries, edema and white fluid or exudate in the uterus, and leanness of the oviducts were confirmed. In experimented infected birds there are signs were joined by expansion and congestion of the spleen in some birds.

Pathologist confirmed a plug of gelatinous to firm, white, opaque material in the trachea that the most lesions appeared in the respiratory disease in ducklings and goslings. Edematous with varying degrees of congestion was reported. Ecchymoses on the epicardium, mottling in the liver, and slight expansion of the spleen were also confirmed by experimental studies.

Diagnostic tests

The diagnostic methods confirmed that the nucleic acid and antigenic regions of duck *Atadenovirus* A were found in the reproductive tract, especially the uterus of sick hens. The duck *Atadenovirus* A was detected in cloacal swabs and may be found in other internal organs. The PCR techniques are reported to be repeatedly positive. If the virus is not found in, due to the period of virus shedding relatively short.

Control of the disease

Treatment

First, the viral disease is resistant to an antibiotic, so no specific drugs are available just drugs for secondary bacteria to rise the immune response.

Prevention

It is not easy to discover viral infection from the beginning before sexually mature. Healthy groups should be kept away from contact with domesticated and wild birds to avoid infection, especially waterfowl and their environments.

Control

Duck *Atadenovirus* A can got in a poultry flock in infected eggs or infected replacement birds. It is hard to detect this virus in infected chickens before they become sexually mature. The duck *Atadenovirus* A has been eradicated from breeding chickens or has flocks attested to be virus-free in some countries. Healthy flocks should also be kept from contact with domesticated and wild birds to avoid infection, especially waterfowl and their environments.

A healthy environment, including cleaning and disinfection of any shared equipment, can reduce the risk of fomites. This virus is thought to reach a flock on contaminated egg trays. Devoted farm equipment and egg trays help lessen this risk. egg trays should be cleaned and disinfected before use. contaminated water should be chlorinated.

Vaccination does not prevent birds from becoming infected but could prevent clinical signs and decrease virus shedding, although they. Premeditated birds, examined vertically for antibodies, can be used to detect virus circulation in a vaccinated flock.

Quarantine and depopulation of infected farms must be followed by cleaning and disinfection may be utilized during some outbreaks.

Morbidity and mortality

Duck *Atadenovirus* is most found in laying chickens, and sometimes in quail and other gallinaceous birds. An infected experimentally explained that quail are as susceptible to this illness as chickens. We found usually the outbreaks in chickens last 4 to 10 weeks with a 10 - 40% dropping in the egg at peak of production. In a flock with solid immunity, this decrease in production may be as a few as 2 - 4%. All flocks of hens are susceptible. No deaths were reported in chickens, turkeys, and quail.

Conclusion

The clinical signs in young goslings and ducklings are a respiratory infection that may be young birds not being protected by maternal antibodies. Many outbreaks confirmed that the mortality rates are about 2 - 5% in ducklings and 6 - 7% in goslings.

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