International Scholars Journals

African Journal of Poultry Farming ISSN: 2375-0863 Vol. 10 (2), p.001, June, 2022.
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Commentary

Clinical signs and diagnosis on avian infectious bronchitis in chickens

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Received: 01-Apr -2022, Manuscript No. AHPF-22- 67702; Editor assigned: 04-Apr -2022, PreQC No: AHPF-22- 67702 (PQ); Reviewed: 19-Apr -2022, QC No: AHPF-22- 67702; Revised: 25- Apr -2022, Manuscript No: AHPF-22- 67702 (R). Published: 02-May-2022

ABOUT THE STUDY

Chickens that have avian infectious bronchitis (IB) have a severe and contagious respiratory condition. It is marked by respiratory symptoms as gasping, coughing, sneezing, tracheal rales, and nasal discharge. The illness is brought on by the avian infectious bronchitis virus (IBV), a coronavirus (Coronaviridae, Orthocoronavirinae, genus Gammacoronavirus, subgenus Igacovirus). Severe respiratory distress may happen in young hens. Respiratory distress, nephritis, a decline in egg production, and a loss of both internal and exterior egg quality watery egg whites, fragile, soft, uneven or rough shells, and shell less eggs are all documented in layers.

Clinical signs

The most severe cases of coughing and rattling occur in young hens, such as broilers, and they quickly spread to other chicks that are confined or nearby. In flocks without vaccinations, morbidity is 100 per cent. The viral strain has an impact on mortality. Within two weeks, respiratory symptoms will diminish. However, some strains can lead to a kidney infection and toxemia-related death. Younger hens may pass away from kidney failure or tracheal blockage by mucus. The cecal tonsils may continue to be infected. There may be brief respiratory symptoms in laying hens, but rate of death may be insignificant. Egg production, however, rapidly declines. The majority of eggs that are produced are malformed and unappealing. Many deposited eggs are unsuitable for incubation or sale because they have a thin or flimsy shell and weak albumen. Normal-colored eggs have a normal hatchability since they are a sign of normal shells, such in brown chickens.

Cause

IBV was the first coronavirus described and varies genetically and phenotypically, with hundreds of serotypes and strains described. The most updated classification of IBV places the virus in Coronaviridae, Orthocoronavirinae, genus Gammacoronavirus, subgenus Igacovirus. The coronaviruses contain the largest known viral RNA genome in number of nucleotides, of approximately 30,000 bases. The virions are enveloped and characterized by large surface projections partially embedded in the double lipid layer. The genome consists of RNA of a single monopartite strand and is coated by the N protein. IBV diversity, as for all RNA viruses, may occur as transcriptional error and nucleotide substitution. If a different amino acid is encoded and the new phenotype has distinct biological features, nucleotide variants in the gene encoding the distal S protein region (S1) may become particularly relevant (strain). While still capable of adhesion to cell receptor and fusion, amino acid alterations in the receptor binding domain of the S1 spike protein area that are important in the adsorption to the cellular receptor may resist neutralisation by antibodies. Variations may infect chickens with immunity to heterologous variants as a result of selective pressure and emerge with an evolutionary advantage. Furthermore, due to the production of seven sub genomic mRNAs during IBV replication, which enables reassortment in coinfections, significant genomic alterations will take place with the exchange of entire gene segments. Reassortment appears to contribute to the genetic variety of the IBV genome in nature and can happen when two coronavirus IBV strains infect a host cell.

Diagnosis

Because of their difficulty in differentiating, chicken respiratory disorders may not always be identified simply on respiratory symptoms and lesions. Other illnesses like mycoplasmosis, caused by Mycoplasma gallisepticum (a chronic respiratory disease), Newcastle disease, caused by mesogenic strains of Newcastle diseases virus (APMV-1), avian metapneumovirus, infectious laryngotracheitis, and avian infectious coryza, caused by Avibacterium paragallinarum, may exhibit clinical symptoms that resemble IB at certain stages. Different etiologies, such as dehydration, other viruses (such as the infectious bursal disease virus, which is the cause of Gumboro disease), and toxins (such as the ochratoxins of

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Aspergillus ochraceus), can result in similar kidney lesions. Egg Drop Syndrome 76 (EDS), which is brought on by infections with an atadenovirus and an avian metapneumovirus, is another condition that affects laying hens and results in abnormally low egg output. IB is currently more prevalent and widely dispersed than EDS. IBV has a wide genetic and phenotypic variability, which has led to frequent vaccine failures. New IBV strains that are not included in commercial vaccines can also infect flocks that have IB vaccinations. By repeated exposure to chickens in densely populated areas, attenuated vaccines will revert to virulence and may reassort with field strains, producing potentially significant variations. Viral isolation and characterization are necessary for a conclusive diagnosis. For virus characterization, the genomic amplification (PCR) method will enable very precise description of strains in accordance with the designed oligonucleotide primers and target gene. First, viral RNA is reverse-transcribed into cDNA, followed by cyclic amplification of cDNA and sequencing of products. The nucleoprotein, matrix, or S2 encoding genes are examples of broadly responsive universal gene targets. Sequencing of the S1 encoding gene products may result in phylogenetic findings that are on par with serotyping. Tagged antibodies, such as those produced by direct immunofluorescence or immunoperoxidase, may be used in IBV antigen detection techniques. Indirect immunofluorescent antibody testing, ELISA, and haemagglutination inhibition can all be used to identify IBV antibodies.