

INFECTIOUS BRONCHITIS (IB)

Infectious Bronchitis (IB) (**Avian Infectious Bronchitis**; AIB) is a highly infectious and contagious respiratory disease of chickens.

IB occurs world-wide and assumes a variety of clinical forms, the principal one being **RESPIRATORY** disease that develops after infection of the respiratory tract tissues following inhalation or ingestion. Infection of the **oviduct** at a very young age can lead to permanent damage and, in hens, can lead to cessation of egg-laying or production of thin-walled and misshapen shells with loss of shell pigmentation. IB can also be **nephropathogenic** causing **acute nephritis**, **urolithiasis** and mortality, especially in young birds. After apparent recovery, chronic nephritis can produce death at a later time.

The infection is of great economic importance due to its **adverse effect on egg production and egg quality in layers**, and on **production in broilers**.

ETIOLOGY

IB is caused by **avian infectious bronchitis virus** (IBV), which is member of the genus **gammaCoronavirus**, subfamily *Coronavirinae*, family *Coronaviridae*, in the order *Nidovirales*. Coronaviruses are enveloped, having non-segmented, positive-sense, single-stranded RNA genome.

Only the chicken is naturally infected. The **respiratory form** is more severe in young chicks, whereas the **nephritic form** is mainly seen in birds under 10 weeks of age. Intercurrent infections with other pathogens (NCV, IBD, ILT, E coli etc) predispose to more severe and prolonged respiratory disease.

SPREAD

The disease is transmitted by direct air-borne route, direct chicken-to-chicken contact and indirectly through mechanical spread (contaminated poultry equipment or egg-packing materials, manure used as fertiliser, farm visits, etc.).

Transmission through the egg is exceptional.

PATHOGENICITY

Infectious bronchitis virus (mV) readily infects the respiratory tract and produces characteristic lesions in the **TRACHEA**. The virus can replicate in tissues of the respiratory tract, intestinal tract, kidneys and the oviduct. The virus replicates in the cytoplasm.

In many cases, recovery occurs unless the chickens are very young, or airsacculitis (inflammation of airsac) develops from secondary bacterial infection, or kidney disease follows the respiratory phase. Virulent strains of IBV, however, induce severe respiratory disease with mortality.

SIGNS

Infection may be asymptomatic, or may result in signs of the respiratory or reproductive system disease. Period of incubation is 1-3 days.

The **respiratory** syndrome is the most common in birds of all ages. Signs include rales (rattling), gasping and sneezing, watery nasal discharge, lachrymation, and facial swelling. Young chickens have labored breathing, gasp and breathing noises are more noticeable at night while the chickens are resting.

Two syndromes reflect disease of the **reproductive** tract.

- i. The most common is due to damage to the functional oviduct. This results in reduced egg production and quality. Reduced egg production may sometimes be in excess of 50%.

Return to full laying may take 4-6 weeks, but the expected potential production is never attained.

Resumption of production may be accompanied by deterioration in egg quality. Eggs may be smaller than normal, **misshapen**, lacking symmetry, or show **corrugations** in outline. The shells may be **depigmented**, have **calcareous deposits**, are thinner than normal, or the **shell may be absent** entirely. Internally, the albumen loses its viscosity (thickness and stickiness) ("**watery whites**"), and the chalazae are often broken so that the **yolk floats free**.

- ii. The less common form of the reproductive tract disease is associated with **abnormal development of the oviduct** following infection of very young susceptible chicks with certain strains of virus. There may be partial or complete failure of the oviduct to develop, or at maturity the ova are taken up by the malformed oviduct, and are shed into the body cavity. Such birds fail to lay ("**blind layers**").

In the **nephritic** form, usually affecting young growing birds, there is marked depression, often with respiratory signs, and mortality as high as 30% in the severe form.

LESIONS

Grossly, there may be **serous, catarrhal, or caseous exudate in the Trachea, nasal passages, and sinuses**.

Airsacs may appear cloudy, or contain a yellow caseous exudate with fibrinous inflammation. In chicks died due to IB, a **yellow-caseous plug** may be seen obstructing lower trachea or bronchi. Small areas of pneumonia may be seen around the large bronchi. Microscopically, the mucosa of the trachea is oedematous. Trachea and bronchi show loss of cilia, rounding and sloughing of epithelial cells, and infiltration of heterophils and lymphocytes. If airsac involvement occurs, there is oedema, epithelial cell desquamation, and some fibrinous exudate within 24 hours.

Nephropathic infections produce swollen and pale kidneys with the tubules and ureters distended with **urates**. Kidney lesions are mainly those of an **interstitial nephritis**. The virus causes granular degeneration, vacuolation and desquamation of the tubular epithelium, and massive infiltration of heterophils in the interstitium in acute stages of the disease. The lesions in tubules are most prominent in **medulla** with focal areas of necrosis. In urolithiasis, the ureters are distended with urates and often contain large calculi composed mainly of urates.

Disease of the functional **oviduct** results in decreased height and loss of cilia from epithelial cells, dilation of the tubular glands, infiltration of subepithelial tissues with mononuclear cells and proliferation of lymphoid follicles, and later oedema and fibroplasia.

DIAGNOSIS

- The clinical features, gross and microscopic lesions, may be suggestive but are not diagnostic of IB.
- **Serological Tests:**
 - ✓ **ELISA:** are most suitable for routine serological testing and can detect antibodies caused by vaccination and field exposure. ELISA can detect antibody responses to all serotypes.
 - ✓ The **Virus Neutralization (VN)** and **Haemagglutination Inhibition (HI)** tests are more serotype specific, especially in young birds that have not been exposed to different IBV.
 - ✓ The **Haemagglutination Inhibition (HI)** test is used in the diagnosis and routine flock monitoring of vaccine responses

- **Reverse Transcriptase- Polymerase Chain Reaction (RT-PCR):** for confirmed detection and serotyping of virus, as the IBV is RNA virus.
- **Virus Isolation** in embryonated chicken eggs.

Differential Diagnosis:

The respiratory form must be differentiated from other acute respiratory diseases such as Ranikhet disease (RD), infectious laryngotracheitis (ILT), and infectious coryza (IC).

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