INFECTIOUS BRONCHITIS
(IB)

DEFINITION

Infectious bronchitis (IB) is an acute, highly contagious, virus-caused disease of chickens characterized by respiratory signs (gasping, sneezing, coughing, and nasal discharge), severe renal disease associated with nephrotropic strains, and a marked decrease in egg production.

OCCURRENCE

1. IB occurs naturally only in chickens. All ages are susceptible, assuming they have not had prior exposure to the virus or are not passively immune.

2. The disease is present in all countries where chickens are raised in large numbers. In the United States the disease occurs frequently and throughout the year, even in vaccinated flocks.

HISTORICAL INFORMATION

1. In 1930, IB was first observed in young chicks. By the 1940’s, IB was a serious disease of laying flocks causing marked loss in egg production. Nephropathogenic IB was first observed in the 1960s.

2. The virus was first isolated by Beach and Schalm in 1936 and multiple serotypes were first reported in 1956.

3. Vaccination became commercially available in the 1950’s and is currently practiced worldwide.

ETIOLOGY

1. IB is caused by a coronavirus. The virus is fairly labile and can be destroyed by many common disinfectants.

2. The virus is resistant enough to survive in 50% glycerin in most mailed tissue specimens. The fresh trachea and lung of an infected chicken can be submitted this way for virus isolation.

3. IB virus without enzyme treatment does not hemagglutinate erythrocytes as do Newcastle and influenza viruses.

4. There is great antigenic variation among IB viral strains and many serotypes of the virus have been identified. Four common serotypes (Connecticut, Massachusetts, Arkansas 99 and O72) are used in U.S. vaccine preparation. Cross-protection among serotypes is highly variable.

5. Some IB viral strains have a distinct predilection for renal tissue and these nephrotropic strains can induce significant mortality.

6. IB virus retains a great capacity to mutate, thus making classification of strains difficult.

EPIZOOTIOLOGY

1. Transmission of IB is by inhalation of virus-containing droplets expelled by infected, coughing chickens. Aerosol transmission is suspected of occurring over considerable distance. Spread of infection throughout a flock is explosively rapid.
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2. The virus of IB may persist on contaminated premises for approximately 4 weeks or longer under favorable conditions. Susceptible birds brought on the premises during that interval may contract the disease.

3. A few birds may remain carriers and shedders of the virus for months after infection. They intermittently eliminate virus in secretions and discharges, thus exposing susceptible chickens or contaminating premises.

4. Vertical transmission has not been documented.

CLINICAL SIGNS

Baby chicks

1. Signs include coughing, sneezing, rales, and nasal and ocular discharge [Fig. 1; Infectious bronchitis; Univ Montreal]. Morbidity is virtually 100%, although severity of signs varies. Signs can develop within 48 hours postinfection.

2. There is weakness, depression, and huddling near heat sources.

3. Mortality in young chicks is usually negligible unless the disease is complicated by another infectious agent. Nephrogenic strains may cause high mortality.

Laying chickens and broilers

1. There is coughing, sneezing, and rales. Seldom is there nasal or ocular discharge.

2. Egg production drops markedly (up to 50%). Effects on production can last 6-8 weeks or longer. Eggs are often soft-shelled or misshapened [Fig. 2; Infectious bronchitis; Univ Montreal]. Egg albumin may be watery. Low egg quality and shell irregularities may persist long after an outbreak of IB. Chickens that had IB or a severe reaction to IB vaccine when less than 2 weeks old may suffer permanent damage to the oviduct resulting in poor-to-no egg-laying capacity.

3. Chickens that have IB or a severe reaction to IB vaccination may develop airsacculitis, due to an increased susceptibility to secondary infectious agents (especially \textit{E. coli} or \textit{Mycoplasma gallisepticum}). This complication can be very severe and may accentuate respiratory signs, especially in young chickens.

4. Mortality associated with swollen pale kidneys and urolithiasis is induced by nephrotropic IB strains in pullets and even in mature birds.

LESIONS

1. There is mild to moderate inflammation of the upper respiratory tract. There may or may not be airsacculitis. Severe airsacculitis is manifested as a marked thickening and opacity of the air sac membranes and often is accompanied by much exudate in the air sacs. Airsacculitis can result in high mortality in young, growing birds, especially if husbandry is poor. Older birds are usually more resistant.

2. The kidneys sometimes are swollen and the ureters and tubules contain uric acid crystals, especially in young birds, including broilers.

3. Yolk material frequently is present throughout the peritoneal cavity and the ovarian follicles appear flaccid. These lesions are not specific for IB but accompany many acute diseases of layers.

4. In layers that had IB or a severe vaccination reaction while less than 2 week old, there may be abnormalities of the oviducts (particularly the middle third) in occasional birds. Oviducts may be hypoplastic or cystic and such birds may deposit yolks or fully formed eggs in the abdominal cavity and are referred to as internal layers.
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DIAGNOSIS

1. Tests of paired acute and convalescent serum can be very useful in demonstrating a specific immune response. Several procedures including serum-virus neutralization, enzyme-linked immunosorbent assay (ELISA) and modified hemagglutination inhibitions are available.

2. For diagnosis it is necessary to isolate and identify the IB virus. This usually is done in 9-12-day-old chick embryos. Trachea, lungs, air sacs, and kidneys are good sources of virus. In infections beyond 1 week duration, cloacal swabs are preferred. Confirmation of IB virus and its serotype can be done by various antibody methods using monoclonal antibodies. PCR, RTPCR and nested PCR have been used to identify IB viral serotypes.

3. Nine to 12-day-old chick embryos inoculated with supernatant containing IB virus develop lesions that are useful in diagnosis. The mesonephros of living embryos surviving 5-7 days postinoculation contains excessive urates. IB virus causes dwarfing and stunting of some inoculated chick embryos. Also, the amnion and allantois are thickened and closely invest the embryo. After initial isolation it may be necessary to passage the virus three to five times to obtain embryo lesions. The alterations are duplicated by some lentogenic strains of Newcastle virus.

4. Egg fluids from inoculated embryos do not hemagglutinate erythrocytes if IB virus is present but will hemagglutinate if Newcastle virus is present.

5. The fluorescent antibody technique or electron microscopy can be used on tracheal samples for rapid diagnosis of IB but do not differentiate the serotype.

CONTROL

1. Modified live virus vaccines are used in young chickens for prevention. Vaccines are effective only if they contain the right serotypes of virus for a given area. If given to chicks carrying parental immunity, vaccination should be repeated at least once. Polyvalent bronchitis vaccines are sometimes used but can cause more severe vaccine reactions in naive chicks. Infectious bronchitis vaccine is often combined with Newcastle vaccine in the same vial but can cause interference with the Newcastle vaccine if not commercially prepared as a combination vaccine. Vaccines are generally applied via the drinking water or by spray. Utmost care needs to be taken to preserve the vaccine integrity as the vaccine virus can be prone to inactivation under adverse conditions.

2. Vaccinated birds should be watched carefully for possible onset of airsacculitis following vaccination. If signs or lesions of airsacculitis are detected, broad-spectrum antibiotics added to the feed or water will usually minimize the airsacculitis and reaction.

3. Killed virus vaccines (oil emulsion base) are now widely used. They are administered by injection (subcutaneous or intramuscular) to breeders or layer replacement pullets from 14 to 18 weeks of age. They induce high and sustained antibody levels.

TREATMENT

1. No effective treatment of IB is known although broad-spectrum antibiotics may control the complications. If there are no complications of IB infection or vaccination, medication following vaccination or infection is not indicated.

2. For baby chicks with IB, it may be helpful to increase the room temperature, encourage the birds to eat by using a warm moist mash, and correct any apparent management deficiencies.