Lecture title: infectious bronchitis

Lecturer Affiliation: Department Microbiology, College of Veterinary Medicine, University of Mosul, Mosul, Iraq. Fanar1976@uomsul.edu.iq

- **Infectious bronchitis virus** (IBV) is an avian gammacoronavirus that **causes disease only in chickens**; however, the virus has also been found in pheasants and peafowl, which can be subclinically infected.
- **Cause**
- Gamma corona-virus is the causal agent. Several different **serotypes** of IB virus are known to exist.
- **Transmission**

It can be transmitted by:

1. Aerosol
2. ingestion of contaminated feed and water
3. contact with contaminated equipment and clothing.

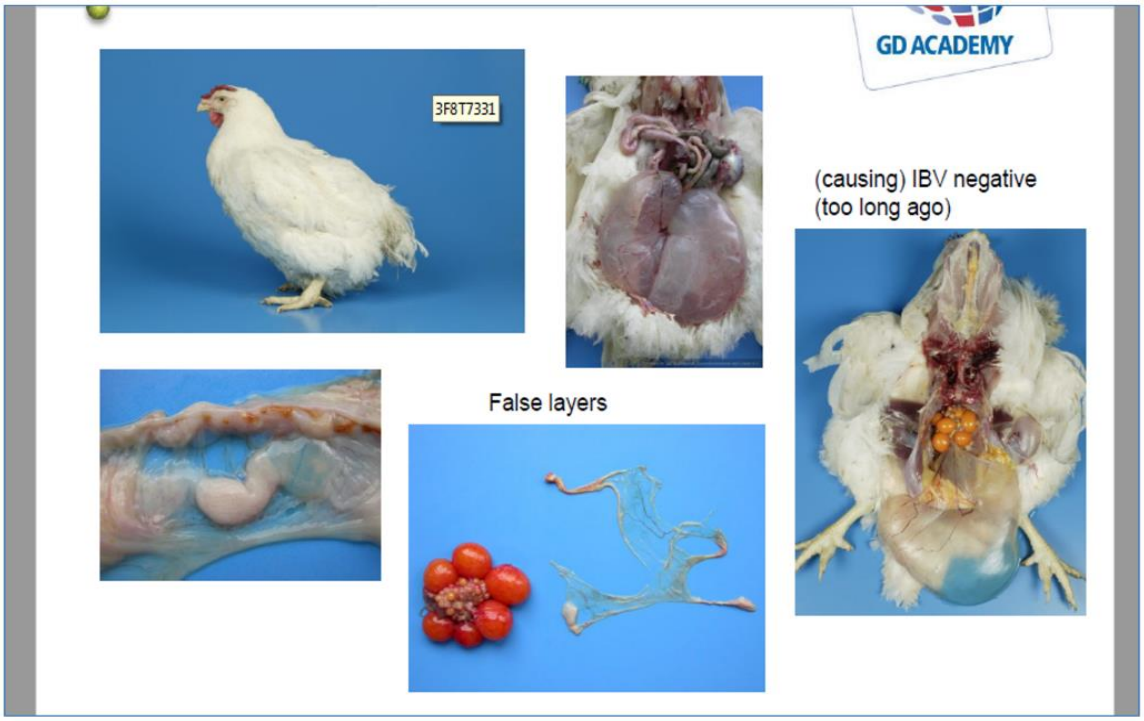
Note : Naturally infected chickens and those vaccinated with live IBV can shed virus intermittently for up to 20 weeks after infection. The incubation period is generally 24–48 hours, and the peak in excretion of the virus from the respiratory tract lasts 3–5 days after infection.

- **The severity of disease and the body systems involved are influenced by the following factors:**
- strain of the virus
- age, strain, immune status, and diet of the chicken
- ventilation, ammonia concentrations, temperature, and other environmental factors
- **Economic Significance**
- The disease is characterized by respiratory signs, reduced weight gain, and reduced feed efficiency in meat-type broiler chickens infected with the virus. Infection also predisposes broilers to secondary opportunistic bacterial infections that can result in air sacculitis, pericarditis. Morbidity is almost always 100%. Some strains of IBV are **nephropathogenic** and can cause high mortality due to kidney failure in susceptible birds.

- In layer and breeder chickens, infection may result in reduced egg production of up to 70% and declines in eggshell quality. The virus can replicate in the oviduct and cause **permanent** damage in young hens resulting in limited egg production over a prolonged period of time and birds that fail to come into production **(false layers syndrome).** Eggs from breeds with pigmented shell may become pale, misshapen, with thin, soft, wrinkled, rough appearance. albumen can have a watery viscosity. Egg production often recovers but may be permanently depressed in flocks with no immunity to the virus.
- Infection is initiated via the respiratory tract regardless of the tissue tropism of the strain (respiratory, kidney, reproductive organs). The virus replicates and can produce lesions in many types of epithelial cells, including those of the respiratory tract (nasal turbinates, Harderian gland, trachea, lungs, and air sacs, kidney, and reproductive organs (oviduct, testes).
- Many strains also grow in many cells of the alimentary tract (esophagus, proventriculus, duodenum, jejunum, bursa of Fabricius, cecal tonsils, rectum, and cloaca) often with little pathobiological clinical effect.

- **Clinical signs**
- In young chicks IB virus infection causes a cheesy exudate in the bifurcation of the bronchi, thereby causing asphyxia, preceded by severe respiratory distress **("pump handle" breathing)**. In older birds IB does not cause mortality. Egg production will decrease dramatically, deformed eggs with wrinkled shells will often be laid.
- In most outbreaks, the mortality rate is approximately 5%, but it can be as high as 60% when disease is complicated by concurrent bacterial infection or when nephropathogenic strains induce interstitial nephritis.

- **Pathology**
- Infected chickens have serous, catarrhal, or caseous exudate in the trachea, nasal passages, and sinuses.
- Mucus and redness in tracheas, froth in airsacs in older chickens. In young chicks a yellow cheesy plug at the tracheal bifurcation is indicative of IB infection.
- Air sacs may be foamy during the acute infection and then may become cloudy and contain a yellow caseous exudate.
- Infection with nephropathogenic IBV strains results in swollen, pale kidneys and distention of the tubules and ureters with urates. Urate deposition results from kidney damage and dehydration and can lead to increased morbidity and mortality rates. In birds with urolithiasis, the ureters can be distended with urates and contain uroliths, and the kidneys can be atrophied.



- **Diagnosis**

Diagnosis of IB is based on the

1. clinical history and picture
2. Lesions including post-mortem findings in the flock
3. seroconversion (rising IBV antibody titers)
4. IBV antigen detection by a number of antibody-based antigen capture assays,

5- virus isolation, and detection of IBV RNA

6- Isolation of the virus in the laboratory.

- Thorough diagnosis of IBV includes identification of the serotype or genetic type of the virus so that appropriate vaccines can be used.

Differential Diagnosis

The clinical presentation of IB may resemble mild forms of other acute respiratory diseases such as:

1. Newcastle disease (ND)
2. ILT
3. low-pathogenicity avian influenza
4. avian metapneumovirus
5. infectious coryza

- **Treatment and control**
- There is no treatment for infectious bronchitis. Secondary bacterial infections may be prevented by, or treated with antibiotics. Prevention by vaccination is the best method to control IB.

Vaccination

- The live, attenuated vaccines used for immunization against IBV can produce mild respiratory signs.
- These vaccines are initially administered to 1- 14 day-old chicks by spray, or eye drops
- layers and breeders are commonly revaccinated approximately 2 weeks after the initial vaccination.
- Revaccination with a different serotype can induce broader protection.
- Additional live, attenuated or killed, adjuvanted vaccines can be used in breeders and layers to prevent egg production losses, as well as to pass protective maternal antibodies to progeny.

- Antibody titres depend on
  - Age of vaccination
  - Level of maternally derived antibodies at the time of vaccination
  - Variation in level of maternally derived antibodies at the time of vaccination
  - Quality of vaccine application
  - Vaccine of choice
  - Vaccination schedule, number of vaccinations, interval between vaccinations
  - Kind of bird
  - Interval between vaccination/challenge and sampling
  - Local field strains, variants

Strain variation is our real challenge
Control depends on our ability to diagnose and control these pathogens

Key points

- The ability of the virus to quickly mutate requires constant surveillance to identify IBV types circulating in a specific geographical region.
- Different antigenic types do not cross-protect, making it extremely important to choose the appropriate vaccine(s) specific to a particular geographical region for protection.