Infectious Bronchitis (IB)

Introduction

Infectious bronchitis (IB) is an acute, respiratory, highly contagious devastating disease to any poultry operation. It affects chickens of all ages, types and breeds. It affects the respiratory, renal (kidney) and reproductive systems causing severe economic loss in the broiler and in the egg layer industry.

Distributed worldwide, IBV is highly transmissible and is a tremendous hazard for unvaccinated flocks. The disease is caused by a coronavirus which is known to have a high mutation rate. Thus, many serotypes (and subtypes) of IB virus exist throughout the world. The arrival of new IB variants poses a continuous problem for the poultry industry.

The most common serotype is Massachusetts and Connecticut. Arkansas strains and other variants have not been consistently isolated; however, there are hints of the variant serotypes emerging in the field of poultry production. The virus has the ability to mutate and undergo recombination producing these variant or un-typable strains. The concern is that these new strains are becoming more difficult to control through vaccination efforts and the lack of bio-security measures.

Transmission:

The virus spreads rapidly among chickens in a flock. The route is usually by inhalation of virus droplets produced by coughing or sneezing of chickens. We cannot rule out the potential spread between flocks where the farms are in close proximity or downwind from infected flocks. The incubation period, before clinical signs are apparent, can be observed from 18 to 36 hours post infection. Birds become ill, production parameters are damaged and carrier birds become a centre of infection for other farms or naïve birds. Vectors (e.g. rodents) do not appear to be a factor in the spread of the disease. Also IB is not transmitted vertically through the egg.

Disease:

The incubation period of the virus is 18 to 36 hours. This depends on the dosage, route of inoculation and susceptibility of the chicken. In chicks, there can be signs of gasping, coughing and nasal discharge. Wet eyes and swollen sinuses are occasionally seen under severe conditions. The chicks are depressed, lethargic and usually huddle close to each other. Feed consumption, water consumption and weight gain are depressed. The concern is not only the production loss but the challenge of secondary bacteria such as E. coli.

In adult laying flocks, a drop in egg production usually follows the respiratory symptoms of gasping and coughing. Frequently, drops in egg production are observed without any incidence of poor eggshell quality (wrinkled eggs, slab sided eggs). Pullets in good condition and in the first few weeks of production suffer only a slight drop in production and usually regain normal production in a few weeks. Older birds may not bounce back as quickly, and may not reach normal egg production for the balance duration of lay. IB strains that target the reproductive tract could have a permanent role in the shell and internal egg quality.
Reproductive forms of IBV occur in lay, especially in flocks that are not adequately protected through vaccination. These flocks can suffer large drops in egg production. The virus can cause a direct insult to the ovaries and the reproductive tract. As indicated, this is observed as eggshell abnormality such as wrinkled, rough or slab sided eggs. One must not assume that all eggshell abnormalities are related to IBV challenges. Careful examination and diagnostic procedures must be in place to pinpoint the cause.

Respiratory forms of the disease are usually observed in poorly vaccinated flocks. Secondary bacteria such as E. coli can complicate the production parameters minimizing profit returns.

Lesions include inflammation and accumulation of mucous in the trachea, nasal passages and sinuses. Air sacs may be cloudy and thickened. This is more pronounced in young birds with diminishing signs in older birds.

Some strains of the virus, referred to as nephropathogenic IB viruses, infect the kidneys and cause permanent renal damage. Infected chickens excrete watery droppings, resulting in wet litter. Urates are common and can be identified easily in the droppings and in the kidneys and ureters at necropsy. The kidneys of affected birds are pale, mottled, and can be 2 to 3 times their normal size. Even though mortality in uncomplicated IB outbreaks can be relatively low, infection with nephropathogenic strains may cause high mortality. Lesions include swollen and inflamed kidneys, distension of the ureters with buildup of urate deposits (gout).

The strains most frequently identified with the renal form of the disease include Gray, Holte and the Australian T strain. Recently, newer nephropathogenic strains of IB virus have been isolated in India.

**Signs in chicks:**
- Depression.
- Huddling.
- Loss of appetite.
- Coughing, gasping, dyspnea.
- Wet litter.
- Diarrhea.
- Diuresis.

**Signs in laying birds:**
- Drop in egg production (20–50%).
- Soft-shelled eggs.
- Rough shells.
- Loss of internal egg quality.
- Coughing, sneezing.
- Rales may or may not be present.
Diagnosis of IB:

- IB – Urolithiasis.
- IB – Gout.
- IB – Watery Albumin.
- IB – Misshapen egg with rough surface.
- IB – Thin shell of eggs.

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- Some of the birds show a peculiar stance (penguin-like) and a pendulous abdomen. These cases were associated to earlier outbreaks of nephropathogenic infectious bronchitis.
Besides preventive measures that include biosecurity and vaccination, the service of diagnostics, utilizing qualified veterinary supervision and laboratory support, are the key elements and attributes in assisting in making a proper diagnosis of IBV infection in a broiler, pullet or layer flock. We need to follow set guidelines or procedures to optimize our potential in coming to a diagnostic conclusion.

Serological Profiles:

As with any other foreign protein, the chicken responds to IBV field infection or vaccination by producing specific antibodies. Peak titers are achieved 7 to 8 days post infection and gradually decline if no further insult or vaccination is presented to the bird. As this antibody is only present for a short period of time, it provides a useful tool in the diagnosis of a recent IBV infection. Antibody measured by serological techniques (ELISA) can be detected as early as 7 days post infection with highest titers found at approximately 10 – 14 days post infection.

Serological profiles should always be evaluated on a flock basis and not on an individual bird. It is important to ensure a sample that is representative of the whole flock, with a minimum sample size of 20 birds. It is important to always test paired sera at the same time.

Again, the sampling should be at the time of vaccination or at the onset of the disease (acute) with the convalescent sample 3 weeks later. On problem farms, we should follow regular flock sampling (every 10 weeks). Serum can be separated and stored by freezing, to be kept at a later date for testing, if required. Rising titers between samples may indicate exposure. Experience will indicate normal ranges of titers resulting from vaccination programs. A field challenge will usually result in a higher titer than normally resulting from vaccination.

IBV Serotypes:

There are many serotypes worldwide. It is very important to remember that there is often cross protection between different IBV serotypes, hence new vaccines are not as often needed. However, it is critical that the diagnostic laboratory have the needed specimens so that IBV serotyping can occur. Many tests are available; by far the most revealing in our system today is the use of reverse transcriptase – polymerase chain reaction (RT–PCR).

Summary:

Sound field investigation to resolve an IBV challenge should make use of all tests that are
available. Critical to the submission is communication with professional support groups (veterinarians, pathologists) and tardiness to get the challenge resolved as soon as possible. Too often production drops are left unnoticed because of the failure to communicate and contact the proper professional groups. In order to advance our knowledge and understanding of the role the IBV, we have to have a better understanding of what we can do ourselves.

Paired sera, freezing of serum in problem farms, representative whole bird submissions, sentinel bird placements and following diagnostics out to the end will help us better understand our needs. For further information on IBV surveillance and diagnostic protocols, it is advised to contact a poultry veterinarian in your area.

**Recent findings on suspected IB cases in India:**

Now-a-days, we get many cases wherein post-mortem lesions are not very specific of one particular condition, but are indicative of simultaneous involvement of many conditions. Some of these may be infectious and some other may be non-infectious. We must try to address all the possible causes of the post-mortem lesions observed in the dead birds.

In case of IB virus infection also, excessive swelling of kidneys and/or visceral gout are described as post-mortem gross lesions; while wet litter condition and huddling are described as symptoms of the disease. However huddling may be seen in some bacterial infections; so also it could be due to some mistakes in brooding management. Wet litter may be due to some other enteric problem in chicks or due to some nutrition related problem. Excessive swelling of the kidneys could be seen in toxicity due to some nephrotoxic substances. Gout may be result of IB variant infection or management mistakes or nutritional imbalance. The possibility of nephropathogenic IB virus has to be considered along with other possible factors.

There were few cases in India where excessive kidney swelling, wet litter and huddling were observed at 2nd week in commercial broilers. These flocks were suspected for IB. But they got recovered after just an anti-toxin treatment!!!!

Looking into these facts, we feel it necessary to address all these issues before finally coming to the conclusion of IB virus infection in the flock under investigation.