Infectious Bronchitis Virus (IBV)

**Classic case:** CHICKENS ONLY
- **YOUNGEST** birds gasping, sneezing, huddling with ruffled feathers
- Breeders & layers, SHARP↓egg production & abnormal eggs

**Presentation:**
- **Highly contagious** acute upper RESPIRATORY disease
  - Up to **100%** morbidity, usually **low mortality (<5%)**
  - **ALL** chickens susceptible
- **IBV strains predilection for- THINK 3 R’s**
  - Respiratory tract
  - Renal system
  - Reproductive tract
- **Clinical signs vary with:**
  - **Age**
    - Youngest birds- SEVERE respiratory signs
    - Older birds- ↓ egg production, subtle resp. sx
  - **Immune status**
  - **Virulence**
    - Nephropathogenic strains (Up to 60% mortality)
    - Produces interstitial nephritis
  - **Stressors** (egg-laying)
  - **Concurrent 2° infections** (increases mortality)
    - *Escherichia coli*, Mycoplasmosis

**Clinical signs:**
- Chicks less than 2 weeks old
  - Depression, ruffled feathers, huddling near heat sources
  - Coughing, sneezing, nasal discharge
  - Gasp ing, tracheal rales
  - Ocular discharge (*epiphora*)
  - Swollen sinuses
  - Decreased feed intake, weight loss
  - +/- Permanent damage to oviduct
    - Impairs egg-laying capacity
- Young chickens more than 6 weeks of age
  - Similar signs, but **LESS severe**
  - Facial swelling with concurrent 2° bacterial sinusitis

IBV, Chick: Severe
Gasping, respiratory distress

IBV, Adult: More subtle
dyspnea, tracheal rales caused by accumulation of exudate in upper resp. tract, pneumonia in lungs.

Chronic epiphora associated with IBV can lead to secondary periocular feather loss.
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**Presentation:**

**Clinical signs:** (continued)

- **Adults**
  - More subtle respiratory signs
    - Observable only when birds quiet (night)
  - **Nephropathogenic strains**
    - Birds recover from early respiratory signs
      - Develop diarrhea
      - +/- Fatal secondary urolithiasis

- **Broilers**
  - Poor feed conversion and reduced growth rate
  - Condemnation of meat at processing

- **Layers**
  - Decreased egg production (up to 50%)
  - Abnormal eggs
    - Misshapen, *Wrinkled* eggs
    - Thin-shelled
    - Watery albumen
    - Abnormal color, surface

**DDX:** Avian influenza, infectious coryza, infectious laryngotracheitis, Newcastle disease, mycoplasmosis, avian metapneumovirus

**Test(s) of choice:** REPORTABLE IN SOME STATES

- Field diagnosis – Clinical signs, lesions
- Necropsy
  - Respiratory tract
    - Trachea, bronchi, sinuses, conjunctiva
      - Edema
      - Serous, catarrhal or yellow caseous exudate
      - Usually NON-hemorrhagic
    - Young dead birds: caseous plug in trachea, bronchi
    - Lungs- +/- pneumonia
  - Secondary bacterial infections (eg. Coliform bacteria)
    - Air sacculitis: cloudy, thickened, caseous yellow exudate
    - Pericarditis, perihepatitis
  - Nephropathogenic strains
    - Pale, swollen kidneys
    - White urates in distended tubules, ureters
  - Reproductive
    - Occluded, hypoglandular, cystic oviducts
    - Egg yolk peritonitis secondary to ruptured follicles

![Swollen kidneys with white accumulation of urates. Nephropathogenic strain IBV](image)

![Soft misshapen eggs: IBV replication in reproductive tract disrupts normal egg shell calcium deposition](image)
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Test(s) of choice: (continued)

- **Virus Isolation**
  - Inoculation of chick embryos
  - Chorioallantoic fluid inoculated with IBV produces
    - Negative hemagglutination reaction with chicken RBCs
    - Avian influenza & Newcastle produce a positive hemagglutination reaction

- **Serology**
  - Using paired serum samples
  - A rise in IBV antibody titer indicates IBV infection
    - ELISA
    - Virus neutralization (VN)
    - Modified hemagglutination inhibition (HI)
    - Immunofluorescent antibody assay (IFA)
    - Immunodiffusion

- **Electron microscopy or IFA** (RAPID diagnosis)
  - Using tracheal samples
  - Does not distinguish serotype

- **Identification of serotype**
  - RT-PCR followed by
    - Restriction fragment length polymorphism (RFLP)
    - Analyzed by nucleotide sequencing
    - Most frequently used test to genotype strains
  - Monoclonal antibody (MAb)
    - Serotype-specific

Rx of choice: **No specific treatment**

- **Supportive care**
  - Warm poultry house environment may decrease mortality in cool weather

- **Antibiotics**
  - During initial stages of disease
    - May reduce mortality due to 2° infections

Prognosis: **Substantial economic losses**

- **Most birds recover**, however economic losses can be severe
  - Loss of eggs, decreased growth rate,
  - Meat condemnation, permanent damage to layers
  - Clinically recovered/ asymptomatic birds (carriers) are most important vector
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**Prevention:**

- **Difficult to control**
  - Highly contagious
  - Numerous serotypes
  - Multiple serotypes may be present simultaneously in same region
  - No cross protection between serotypes
- **Vaccination**
  - **Attenuated live vaccine**
    - To be effective, **MUST contain appropriate serotype(s) for region**
    - Administered in drinking water, coarse spray, or eye drop
    - Attenuated live vaccines may increase in virulence after back passage in chickens
  - **Killed oil-emulsion vaccine**
    - Administered by IM or SQ injection
    - Reduces viral replication in respiratory tract
    - May reduce spread and transmission to other birds
    - Reinforces immunity
    - Protects reproductive tract
    - Prevents egg production losses
    - Affords maternal immunity to newly hatched chicks first 1-3 weeks of life
- **Strict biosecurity**
- **Strict sanitation protocols** ‘All-in, All-out’ flock management

**Pearls:** Economically important disease worldwide, NOT Zoonotic

- Thought to be the most infectious of the diseases of poultry
- Infectious bronchitis virus (IBV)
  - **Coronavirus** – single stranded RNA virus
  - Incubation 18-48 hrs
- **IBV occurs cyclically**
  - As immunity declines OR exposure to different serotypes
- Transmission by direct contact, fomites
  - Shed in feces, respiratory discharges of infected birds
  - Spread by airborne droplets, ingestion of contaminated feed, water, equipment and clothing of caretakers
- Some birds, internal organs become persistently infected
  - Results in intermittent viral shedding
  - Increases flock-to-flock spread by unknowingly contaminated personnel
- **Clinically recovered/asymptomatic birds (carriers) are most important vector**

**Images worth a look:**

*Infectious bronchitis*, more clinical and post-mortem images, Cornell University Atlas of Avian Diseases

*Wrinkled eggs, Trachea full of mucus, Air sacculitis*, Merck Vet Manual 10th edition online