

Infectious Bronchitis Virus (IBV)

Extended Version

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**
 - **Gasping, 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



Soft misshapen eggs:

IBV replication in reproductive tract disrupts normal egg shell calcium deposition

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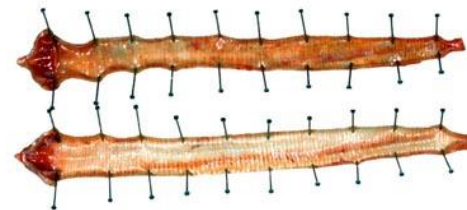
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Test(s) of choice: (continued)

- **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)
 - OR
 - Analyzed by nucleotide sequencing
 - **Most frequently used test to genotype strains**
 - Monoclonal antibody (MAb)
 - Serotype-specific



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IBV top: Mild catarrhal exudate, tracheal lumen.

IBV bottom: In more advanced cases the trachea may contain serous, catarrhal, or caseous exudate

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 vaccs 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**



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IBV is shed in nasal excretions and feces of infected birds.

In production facilities, IBV spreads quickly from bird to bird, via direct contact w/ contaminated feed, water, equipment and infected birds.

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

Refs: Merck Manual, 10th ed: [Infectious Bronchitis](#), Images courtesy [Cornell University Atlas of Avian Diseases](#)