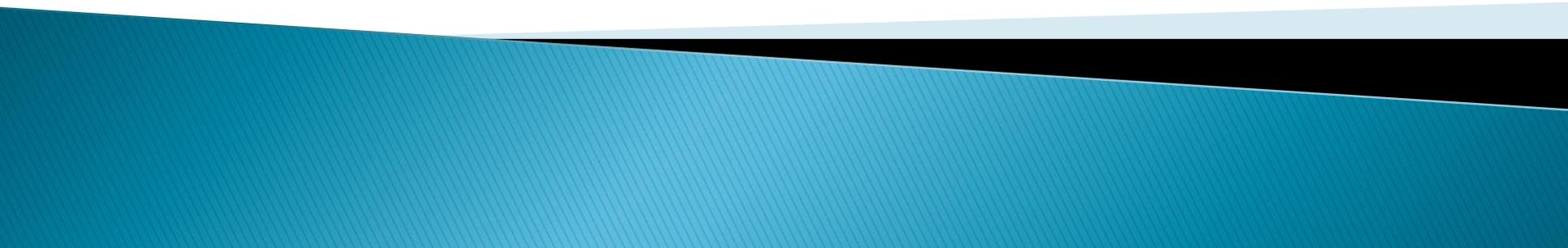


Differential Diagnosis of Main Respiratory Diseases of Chickens

Majed Ahmad Al-Attar



Introduction

- ▶ Diseases affecting the respiratory system are the most common and complex diseases seen in chickens.
 - ▶ In the field the respiratory diseases, are very rarely caused by single pathogen such as virus or bacteria or fungi.
 - ▶ Most respiratory signs in chickens are generally the same and non-specific.
 - ▶ There severity depends on the strain and type of agents involved and there pathogenicity and immune status of the host. as well as the environment and Managemental factors .
- 

Introduction, cont.

- ▶ The clinical signs range from nasal and ocular discharge, gasping, breathing from mouth, snick, wheezing with various mortalities.
- ▶ Seldom chicken die acutely without any clinical signs such as in Avian Influenza and Newcastle Disease .

Introduction, cont.

- ▶ Avian Influenza, Newcastle, Infectious Bronchitis, Infectious Laryngotracheitis, and other respiratory diseases,
 - ▶ share many clinical signs as well as pathological gross lesions which makes the differentiation between them difficult .
 - ▶ Involvement of other agents especially secondary Bacterial infections may complicate the differential diagnosis.
- 

Introduction, cont.

- ▶ Knowledge of the disease problem of the area, and knowledgeable veterinarians to perform
- ▶ Thorough examination for clinical signs in farm,
- ▶ Perform post mortem examination, and
- ▶ Collecting samples for the required laboratory tests.
- ▶ Confirmatory diagnosis require combination of approaches and techniques.
- ▶ Final diagnosis then can be made depending on the laboratory tests results.

Avian Influenza

Avian Influenza is caused by type A Influenza virus, belonging to the Orthomyxoviridae family. The virus is a single-stranded (RNA).

Serologically, AI classified into 16 Hemagglutinins (H1–H16) subtypes and 9 Neuraminidase (N1–N9) subtypes.

Avian Influenza virus infection have been reported in many species of domestic and wild birds worldwide.

Avian Influenza cont,

In chickens infections can be clinical but the signs are unpredictable depending on virus strain, host species , age and general health status.

Some strains (subtypes) are highly pathogenic (HP) for poultry and causes severe infections which result in high mortality.

Clinical Signs of AI infection

Generally most out breaks are caused by LPAI, in Iraq may be the situation is different? or maybe it is aggravated by concurrent infections or bad Managemental conditions especially bad ventilation and crudeness .

In most clinical infections , signs are mainly respiratory. In egg layers there will be decreases egg production and changes in the quality of eggs.

Clinical Signs of AI infection, cont

Morbidity and mortality are unpredictable, depending on the conditions that influencing the severity of the clinical signs mentioned earlier.

In the case of HPAI outbreaks may cause death following few signs. Occurrence is sudden and the duration is short. chickens are very sick and mortality may reach 100%.

Symptoms may be respiratory or enteric or nervous. Difficulty in respiration, diarrhea, edema of the head and comb and wattles. Hemorrhages on mucosal surfaces, on the shank of the leg and on the comb and wattles.

Main clinical signs of Low Pathogenicity and High Pathogenicity Avian Influenza

| Clinical Signs | LPAI | HPAI Onset sudden course short |
|---|-------------|---|
| Coughing ,sneezing, rales and lacrimation | + | + |
| Sinusitis | + | ++ |
| Edema of head, comb and wattles | + | +++ |
| Haemorrhages on skin | + | +++ |
| Depression | + | +++ |
| Diarrhea | + | + |
| Conjunctivitis | + | + |
| Nervous signs | - | + |
| Abnormal Eggs, decrease production | +++ | ++ |
| Morbidity | Variable | Very High |
| Mortality | Variable | Very High |

Red mottled discoloration of the shanks of a chicken infected with Avian Influenza Virus.

Source: Dr.Abdul-Latif, , Iraq & Afnan Livestock Services.



**Severe inflammation ,Congestion , hemorrhage & mucofibrinous exudates
with in the trachea of chicken infected with Avian Influenza**

Source: Afnan Livestock Services.



Proventricular hemorrhages of chicken infected with Avian Influenza virus and Hemorrhagic spots of the Pancreas .

Source: Afnan Livestock Services.



Newcastle Disease

Newcastle Disease Virus is APMV-1 , a single stranded RNA virus belonging to the genus **Avulavirus** of the family **Paramyxoviridae**. Eleven serotypes are recognized of the APMV-1, which is equivalent in meaning to Newcastle Disease Virus(NDV).

Newcastle Disease, cont.

In poultry the clinical signs of NDV infection can be subclinical to sudden severe clinical signs, with very high mortality that may reach 100%.

Signs of infection with NDV depend on many factors like, virus strain, species of birds, age, stress, concurrent infections and immune status of the host.

Newcastle Disease viruses have been classified to **Lentogenic**, **Mesogenic** and **Velogenic** depending on the clinical signs observed in infected chickens.

Clinical Signs of NDV (APMV-1) infection in Adult chickens

| Pathogroups | Young chicken infection |
|----------------------|---|
| Lentogenic Infection | Gasping, Sneezing, Coughing, rales, nasal and lacrimal discharge. Some birds may have swollen head. |
| Mesogenic Infection | Depression, exhaustion. Gasping, coughing, rough tweet, nasal discharge. CNS signs, abnormal position of head & neck (Torticollis) Paralysis, exhaustion, Mortality up 50% |
| Velogenic Infection | Signs similar to mesogenic strain, but more acute, mortality is very high (50-100%) |

Clinical Signs of NDV (APMV-1) infection in adult chickens

| Pathogroups | Adult chicken infection |
|----------------------|---|
| Lentogenic Infection | No clinical signs or mild Respirator signs, decrease egg production, soft-shelled, roughened or deformed. |
| Mesogenic Infection | Mild depression, anorexia , mild respiratory signs, low mortality or absent. may show nervous signs, Layers stop egg production with soft-shelled, roughened or deformed. |
| Velogenic Infection | Dyspnoea, diarrhea, conjunctivitis, paralyses, sticky nasal discharge and death. Survived chickens may show CNS signs, twisting of head and neck and circling. |

Newcastle Disease, cont

- ▶ Others classified Newcastle disease virus strains into five **Clinico-pathologica groups** according to the disease signs and lesions produced in susceptible chickens.
- ▶ These clinical signs have been grouped into 5 pathotypes in infected chickens.

Clinico-pathological groups of Newcastle Disease

Virus strains and isolates

| Pathotypes | Clinical Signs and Lesions |
|----------------------------------|--|
| Viscerotropic velogenic | Acute lethal Infection, Hemorrhagic lesions in the gut. High mortality. |
| Neurotropic Velogenic | High mortality preceded by respiratory and neurologic signs. no gut lesions... |
| Mesogenic | Low mortality, acute respiratory signs and occasional nervous signs in some birds |
| Lentogenic or respiratory | Mild or inapparent respiratory signs |
| Asymptomatic enteric | Replication in the gut but no signs subclinical enteric infection |

Newcastle Disease, cont

- ▶ The grouping of Newcastle Disease virus are not clear-cut and some overlapping between the signs of the different groups have been reported.



Greenish-White diarrhea of chicken infected with ND virus.



Nervous singe (Torticollis) of chicken infected with Newcastle Disease Virus



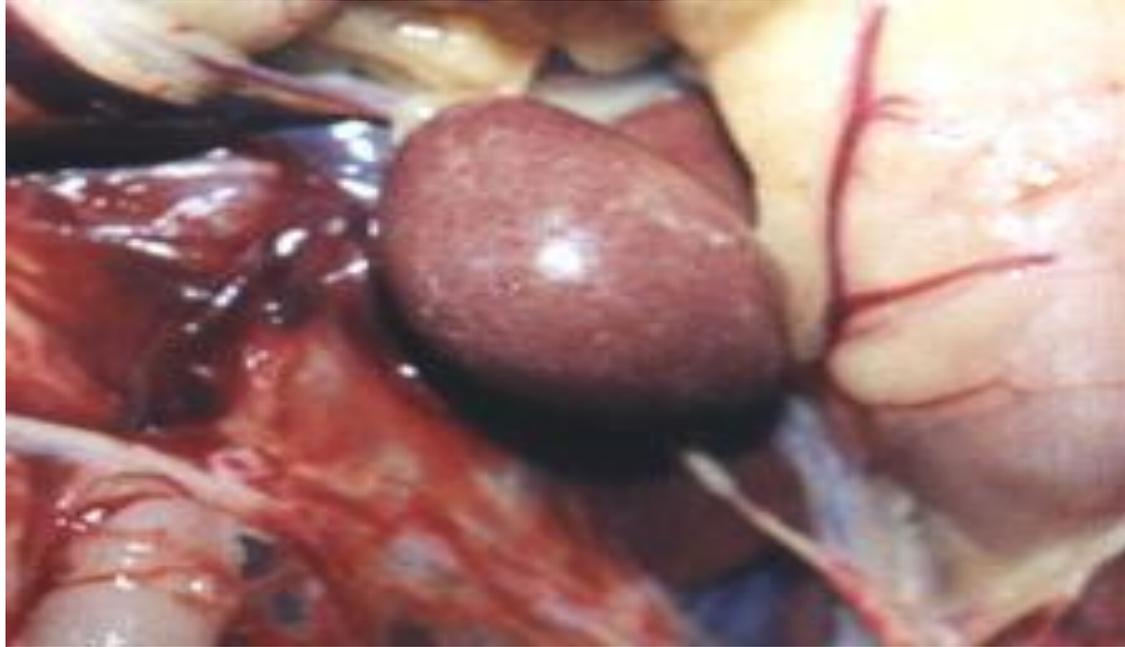
Severe conjunctivitis of chicken infected with ND virus



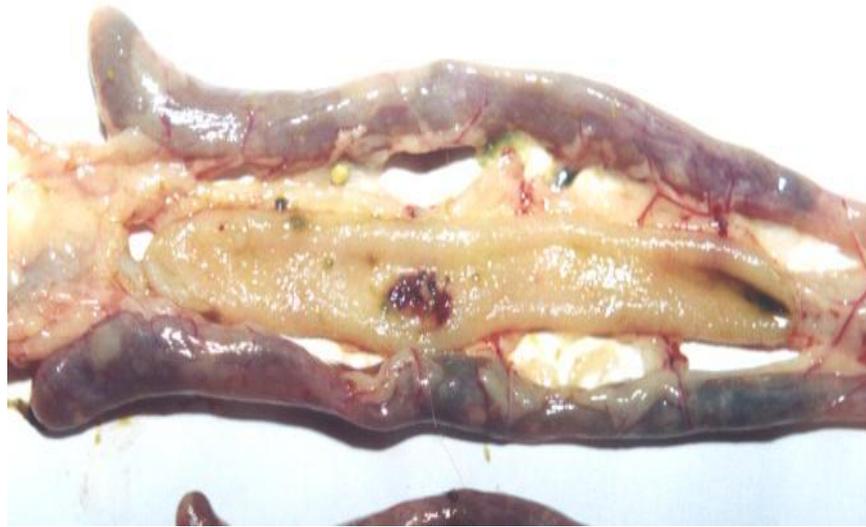
Inflammation and congestion of the trachea of chicken infected with ND virus



Proventricular hemorrhages .Chicken infected with ND virus.



Mottled spleen with white spots, of chicken infected with ND virus.



Necrotic hemorrhagic lesion in the Pyres Patches of a chicken infected with ND virus

Infectious Bronchitis

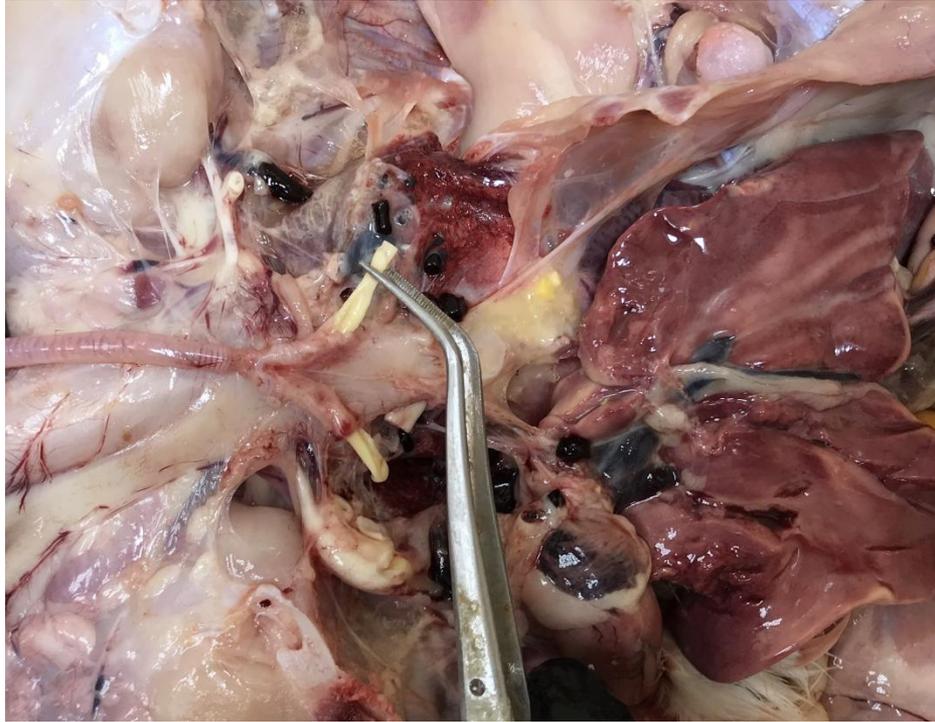
- ▶ **IB** is caused by a **Coronavirus**. Most (IBV) do not hemagglutinate RBC without enzyme treatment.
- ▶ There are significant antigenic differences between strains and many serotypes. There is little or no cross-protection between different serotypes.
- ▶ **Nephrotropic strains** infect renal tissue and can induce significant numbers of mortality.
- ▶ Interference with the normal development of the oviduct when hens infected at young age.
- ▶ High mutation rate of the virus, making diagnosis and control very difficult.

Clinical Signs of Infectious Bronchitis

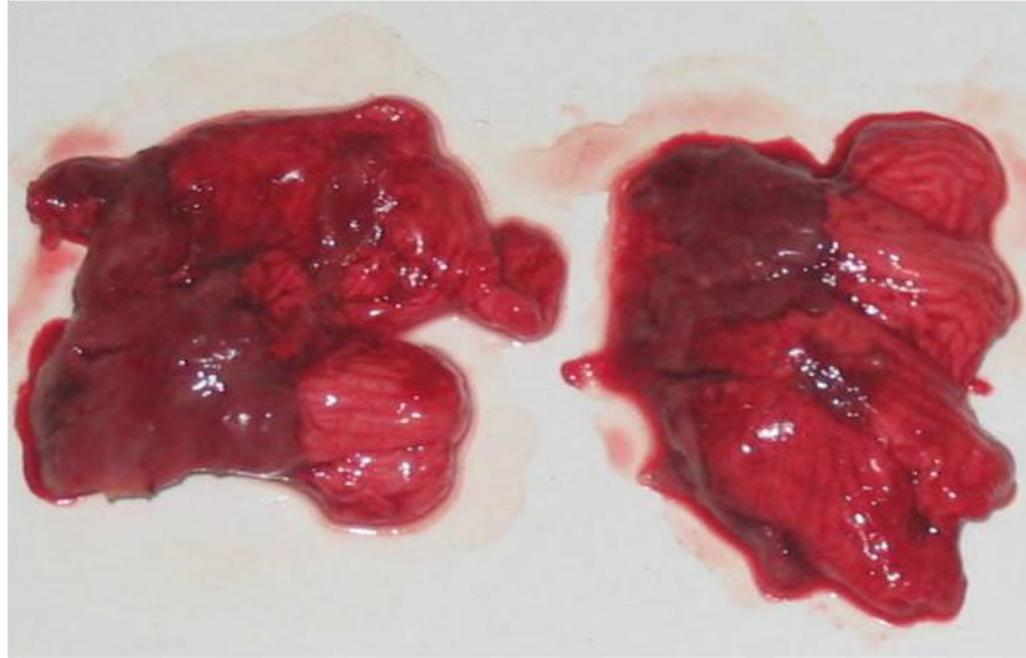
| Clinical Signs | Chicks | Broilers | Layers |
|---|--------|----------|----------------------------------|
| Coughing ,Sneezing, Rales Nasal & ocular discharge | +++ | ++ | Mild signs ± |
| Weakness, depression | + | ± | ± |
| Huddling near heat source | + | - | - |
| Morbidity | ++++ | +++? | ++? |
| Mortality | ++ | +? | +? |
| Mortality in nephrogenic or in complication with other infections. | +++ | ++ | ++ |
| Egg Production | - | - | Drop up to %50% for 6-8 weeks |
| Abnormal Eggs Soft-shelled, misshaped, watery albumin , | - | - | + |
| Hypoplplasia of oviduct If infection under 2 weeks of age or suffer severe reaction to vaccination | + | + | - |



Two chicks suspected to be infected with IB virus showing difficulty of respiration and extension neck.



Infectious Bronchitis of chickens . congested trachea containing fibrinous inflammatory exudates blocking the tracheal bifurcation

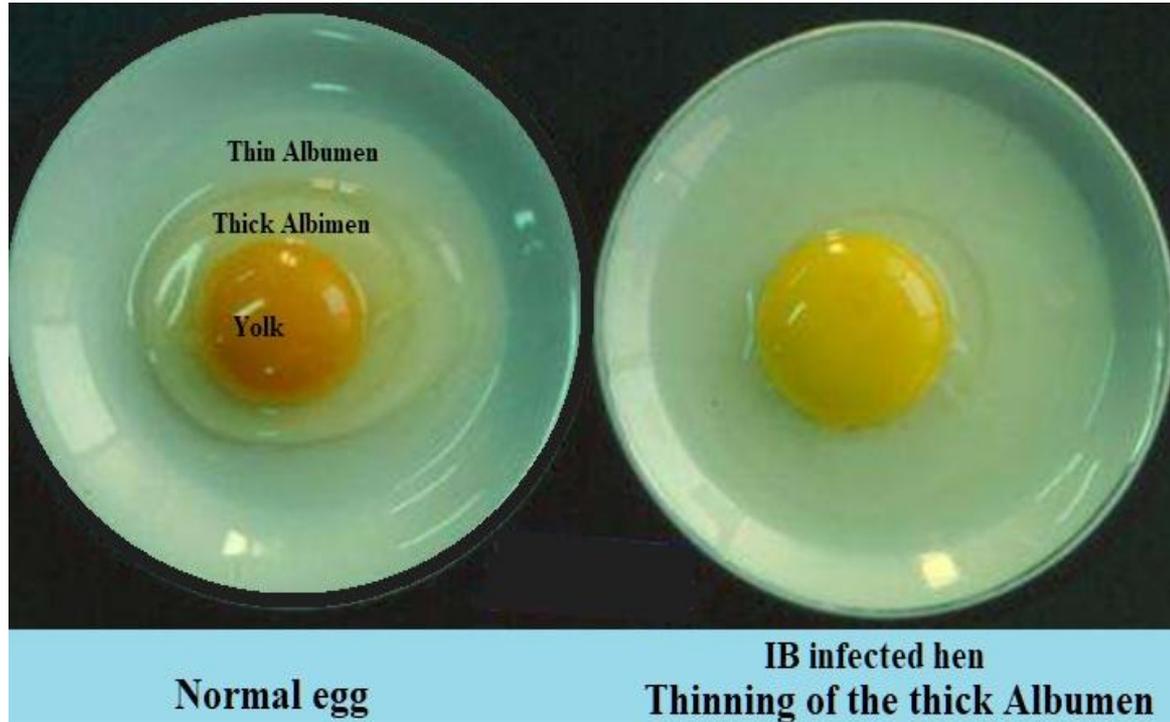


Lungs of chicken suspected to be infected with IB virus showing bronchopneumonia



Abnormal eggs (miss-shaped) of hens suspected to be infected with IB virus

Comparison between the contents of IB infected hen egg to normal egg



Infectious Laryngotracheitis

- ▶ ILT is an acute viral respiratory disease of chicken and rarely happens in pheasants and peafowl.
 - ▶ It is highly contagious disease caused by Gallid alpha Herpesvirus type1 (GaHV-1).
 - ▶ Easily transmitted by infected chickens and contaminated materials.
 - ▶ It occurs mostly in broilers more than 4 weeks of age or in mature or near mature chickens.
- 

Clinical signs of ILT

- ▶ Severe infections are characterised by marked dyspnoea, coughing, gasping and expectoration of bloody mucoid exudates and extension of the neck during inspiration .
- ▶ Also,the infection can be subacute with nasal and ocular discharge, conjunctivitis, tracheitis and rales. Generally the disease subside after about two weeks.
- ▶ The clinical signs are not pathognomonic especially in mild infections, conformation is needed by histopathology and by PCR.

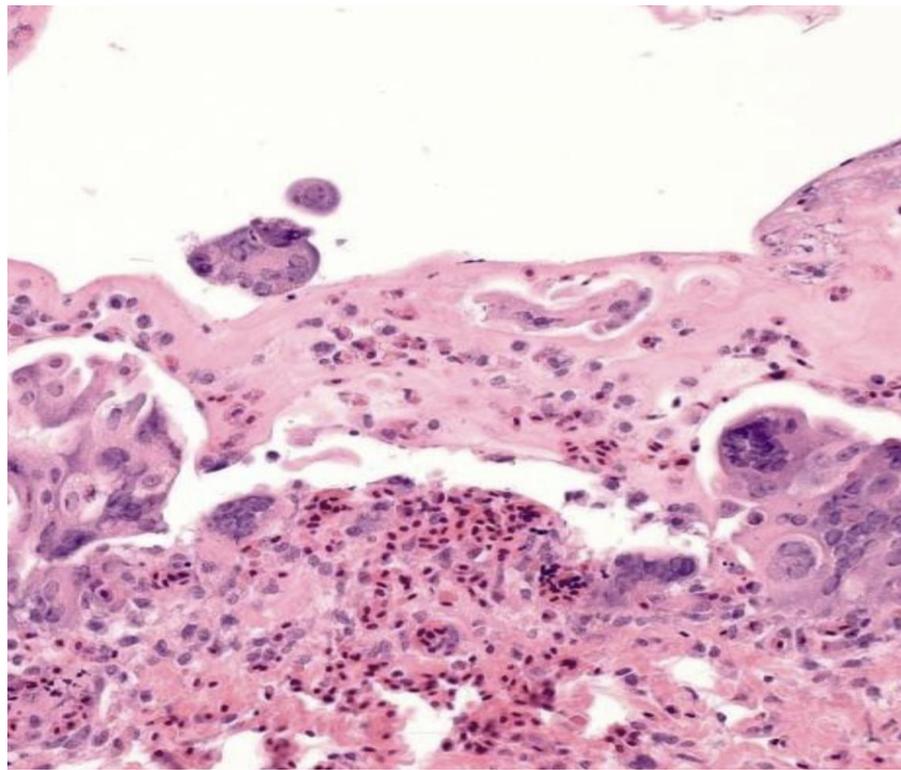
Clinical signs of ILT, cont.

- ▶ Mortality varies and may reach 50% in mature chickens, as a result of occlusion of trachea with hemorrhagic exudate.
 - ▶ The affected chickens remain carrier for life and stay as a source of infection for susceptible chickens.
 - ▶ The latent infection in the carriers can be reactivated under stressful condition.
 - ▶ Vaccination is commonly used for control in endemic places. Biosecurity is also, necessary for prevention.
- 

Infectious Laryngotracheitis, cont

Gasping and severe hemorrhagic tracheitis. Internet Photos





ILT histo., syncytial epithelial cells with intranuclear inclusion bodies

from:Dr.Tahseen Abdul-Aziz,Rollins Animal Diag. Lab. USA.

Swollen Head Syndrome

Avian Rhinotracheitis

- ▶ Swollen Head Syndrome in chickens and Turkey Rhinotracheitis are viral diseases caused by Avian **Metapneumovirus**.
 - ▶ Different subtypes of Avian Metapneumovirus have been isolated from chickens and turkey, they are member of the family **Paramyxoviridae**.
 - ▶ Wild birds, especially migratory birds are considered the natural source for Avian Metapneumovirus.
 - ▶ These viruses infect mainly the respiratory and reproductive systems which leads to respiratory signs and drop in egg production.
 - ▶ Economical losses are due to secondary bacterial infection.
- 

Signs of Swollen head syndrome

- ▶ a– Decreases appetite, weight and feed efficiency.
 - ▶ b– Facial and head swelling.
 - ▶ c– Frothy eyes and conjunctivitis.
 - ▶ d– Dyspnoea.
 - ▶ e– serous ocular and nasal discharge.
 - ▶ f– Sinusitis.
 - ▶ g– Snick.
- 

Swollen head syndrome

Second photo from D. Jammel Al-Maktary, Yemen



Lesions of Swollen head syndrome

- ▶ Lesions are more obvious on day 4–10 after infection .
- ▶ Rhinitis, tracheitis, sinusitis and aircacculitis.
- ▶ Clear serous mucus may be found in nasal cavity, turbinate, trachea and infraorbital sinuses, then turn to turbid and purulent during the course of infection.
- ▶ If complicated by secondary bacterial infection the inflammatory exudate in respiratory tract become large in quantity.
- ▶ This bacterial infection can result in Pneumonia, pericarditis , perihepatitis.

Virus isolation and serology is necessary for diagnosis.

Comparison of the main **clinical Signs** of Newcastle Disease ,Avian Influenza, Infectious Bronchitis, Infectious Laryngotracheitis and Swelling Head Syndrome

| Clinical Signs | Newcastle Disease | Avian Influenza | Infectious Bronchitis | ILT | Swollen Head Syndrome |
|---|-------------------|-----------------|-----------------------|-----|-----------------------|
| Coughing ,Sneezing, Rales Nasal & ocular discharge, lacrimation | ++ | +++ | +++ | +++ | +++ |
| Sinusitis | - | + | - | + | ++ |
| Edema of head, comb and wattles | ± some chickens | + | - | ++ | ++++ |
| Haemorrhages on skin | - | + | - | - | - |
| Depression | + | + | + | + | + |
| Diarrhea | + | + | + | - | - |
| Conjunctivitis | + | + | + | ++ | +++ |
| Nervous signs | + | + | - | - | - |
| Abnormal Eggs | + | ± | +++ | - | - |
| Mortality | + to +++++ | + to +++++ | + to ++ | +++ | + |

Comparison of the General **Gross Lesions** of Newcastle Disease ,Avian Influenza, Infectious Bronchitis, Infectious Laryngotracheitis and Swelling Head Syndrome

| Gross Lesions | ND | AI | IB | ILT | SHS |
|--|-----|-----|----|------|------|
| Vascular damage Hemorrhages, congestion and edema on serosal and mucosal surfaces. | +++ | +++ | + | +++ | ++ |
| Tracheitis | + | + | + | ++++ | + |
| Sinusitis | - | + | - | ++ | ++++ |
| Aircacculitis | - | + | + | - | ± |
| Bronchopneumonia | - | + | ++ | - | - |
| Hemorrhages and necrosis on skin, comb and wattles | - | ++ | - | - | - |
| Necrosis on Liver, kidney, spleen or lung. | - | + | - | - | - |
| Egg yolk peritonitis | + | + | + | ? | - |

Diagnosis tests for AI, ND, and AI

| Avian Influenza | Newcastle Disease | Infectious Bronchitis | Avian Influenza |
|---|--|--|---|
| Virus isolation by Chick embryo Inoculation | Virus isolation by Chick embryo Inoculation and Tissue culture | Virus isolation by Chick embryo Inoculation and Tracheal Organ culture. | Virus isolation by Chick embryo Inoculation |
| HA test | HA test | HA after enzyme treatment | HA test |
| Molecular Tests RT-PCR & rRT-PCR | Molecular Tests, RT-PCR, nested RT-PCR, rRT-PCR | Molecular Tests rRT-PCR | Molecular Tests RT-PCR & rRT-PCR |
| Agar gel immunodiffusion test for NP of type A | HI test for serotypes testing using polyclonal or monoclonal | Sequencing of RT-PCR product | Agar gel immunodiffusion test for NP of type A |
| Gene Sequencing for H and N subtypes | Serological detection in host, HI test. | Virus Neutralization | Gene Sequencing for H and N subtypes |
| HI test for sub types | | HI test after Neuraminidase treatment | HI test for sub types |
| Neuraminidase Inhibition , NI test | | Cross-Challenge | Neuraminidase Inhibition , NI test |
| Serological detection in host. ELISA, AGID. HI for confirmation of ELISA & AGID or when testing the exposure to specific subtype NI test for Ref.Lab. | | Serological detection in host by demonstrating ascending serum antibody response between acute and recovered chickens sera using ELISA. VN and HI test are not recommended | Serological detection in host. ELISA, AGID. HI for confirmation of ELISA & AGID or when testing the exposure to specific subtype NI test for Ref.Lab. |

Diagnosis tools for ILT and SHS

| TESTS | ILT | SHS |
|---|--|---|
| Clinical examination | signs post-mortem Lesions in severe infection | Severe Swelling of head |
| Histopathology | Demonstration of characteristic eosinophilic intranuclear Inclusion bodies | Immunohistochemical test of nasal turbinates by Peroxidase staining test. |
| PCR, serological test, ELISA, Electron microscopy | of DNA or antigen | SN test using monoclonal AB, RT-PCR, paramyxo-like by EM, FA and Immunodiffusion tests. HA negative |
| Chick embryo inoculation. Cell culture | Demonstration of typical plaques on CAM and Inclusion B. | Difficult to grow |

Infectious Coryza

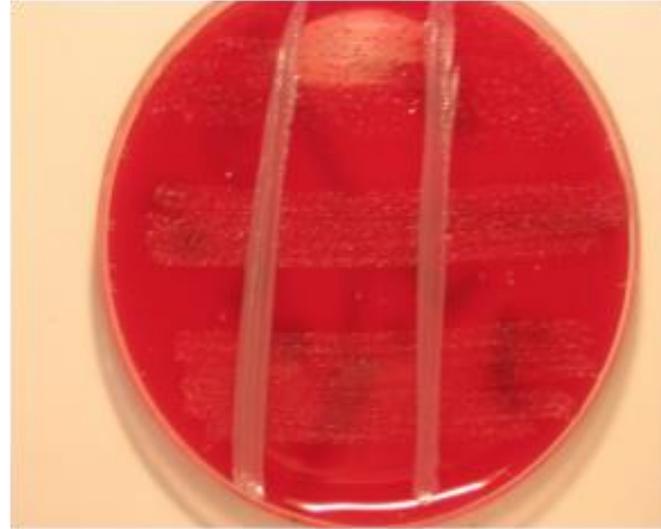
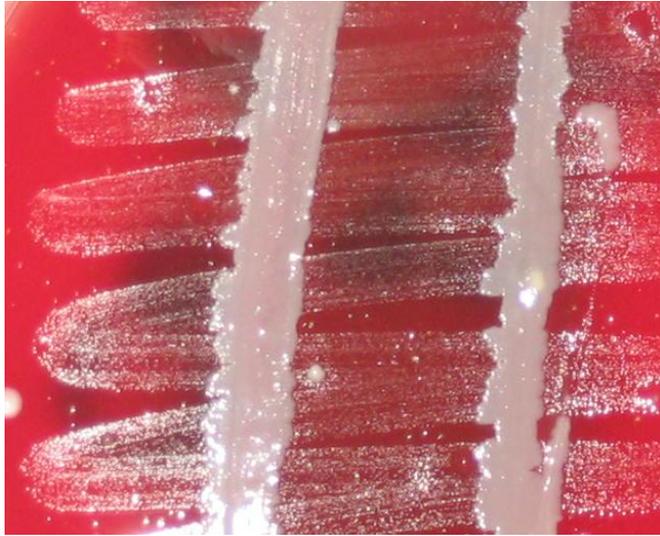
- ▶ An acute or subacute bacterial disease of chickens, pheasants and guinea fowl.
- ▶ The onset is rapid and morbidity is high.
- ▶ It is characterized by swelling of the facial sinuses and edema of the face , sneezing.
- ▶ Some time infection of lower part of the respiratory tract.
- ▶ Prolong disease in the flock is believed to be due to complications by other infectious agents especially *Mycoplasma gallisepticum*.
- ▶ All ages of chickens are susceptible but natural outbreaks happens in old chickens or chickens in production.

Infectious Coryza



Infectious Coryza, cont.

- ▶ The causative agent is *Avibacterium paragallinarum* (*Hemophilus paragallinarum*)
- ▶ A gram negative, bipolar-staining non motile rod some time filamentous.
- ▶ It require V-factor (Nicotinamide Adenine Dinucleotide – NAD). It grow on blood agar in the presence of *Staphylococcus aureus* as a nurse colonies.
- ▶ V-factor independent isolates have been reported.
- ▶ The preliminary diagnosis depend on typical history, clinical signs and lesions of Coryza, other reparatory diseases must be excluded.
- ▶ Isolation is necessary and experimental infection can be done to confirm the disease.



Growth of *Avibacterium paragallinarum* on blood agar
NAD independent isolate

Mycoplasma Infection in chicken

Mycoplasma belong to the Order Mycoplasmatales. Mycoplasma does not have cell wall, which accounts for their pleomorphic shape.

They are the smallest single cell organism that can be cultivated on artificial media. they have fried-egg colonies shape and because of the lack of cell wall they are resistant to Penicillin.

Four Mycoplasma species are considered pathogenic to commercial poultry, generally they infect the respiratory system. These species are *M. gallisepticum*, *M. synoviae*, *M. meleagridis* and *M. iowae*.

Mycoplasma gallisepticum is more common in chickens and will be presented in more details.

Mycoplasma gallisepticum, cont.

Chickens may be infected without clinical signs until triggered by stress by vaccination or by infection with respiratory viruses . Bad management and bad ventilation, leads to increased levels of ammonia and dust are a contributing factors in the severity of infection.

In chickens other respiratory viral or bacterial infections may complicate and increase the pathogenicity of M. gallisepticum infection

M. gallisepticum is transmitted transovarially in some eggs laid by inapparent infected carriers. Infected hatched chicks then transmit the agent horizontally to other chicks in the flock.

Mycoplasma gallisepticum, cont.

Infection can be through contamination of air, feed, water and the environment.

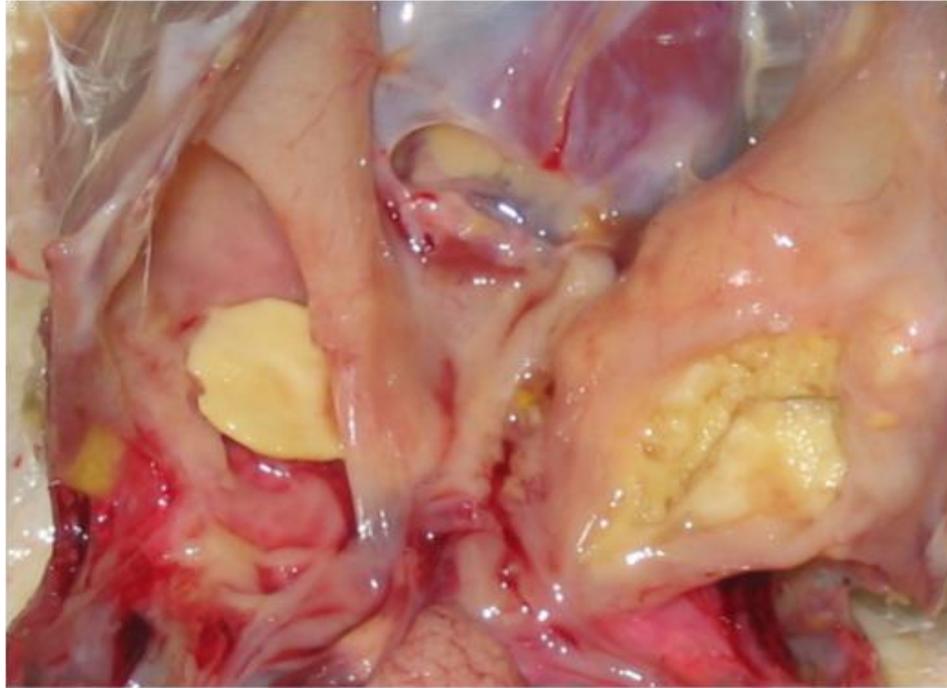
Clinical signs are developed slowly in the flock. Signs are similar to those observed with other chicken respiratory diseases.

Bad performance suggest the presence of a chronic disease.

Aircacculitis, fibrinous perihepatitis and pericarditis are a classical lesions but they are not pathognomonic and can be seen also in E. coli septicemia infection.

Prevention is based mostly on having chickens hatched from **M. gallisepticum-free** breeder flock.

Live vaccines are available commercially (for example, F-strain, TS 1 1 and 6/85) administered by spray or eye drop, as well as oil-emulsion bacterin is also available.



**Thickening of the thoracic air sac, and fibrinous exudate
Suspected Mycoplasma infection**

Escherichia Coli Infection

- ▶ Avian pathogenic or commensal E. coli are the causative bacteria of colibacillosis.
- ▶ It is one of the most commonly happening economically important bacterial disease of chickens worldwide.
- ▶ E. coli is a Gram negative, rod-shaped found normally in the intestine of chickens and in there environment.

Escherichia Coli Infection, cont.

- ▶ Though many E coli are non-pathogenic, some may acquired virulence genes which greatly increasing their pathogenicity.
- ▶ Other infections are due to infection with normally living non pathogenic (commensal) E. coli, that infect stressed weakened chickens by some predisposing factors such as mycoplasma infection , Infectious bronchitis, Newcastle disease, bad ventilation, or other environmental stresses.

Escherichia Coli Infection,cont.

- ▶ E. coli causes localized or systemic infections and cause syndrome like septicemia, airacculitis, pericarditis,, peritonitis ,cellulitis, salpingitis, yolk sac infection, omphalitis and lymphocytic depletion of the bursa and the thymus.
- ▶ In acute septicemia , chickens of 4–8 weeks old may die after showing anorexia and depression for a short time.

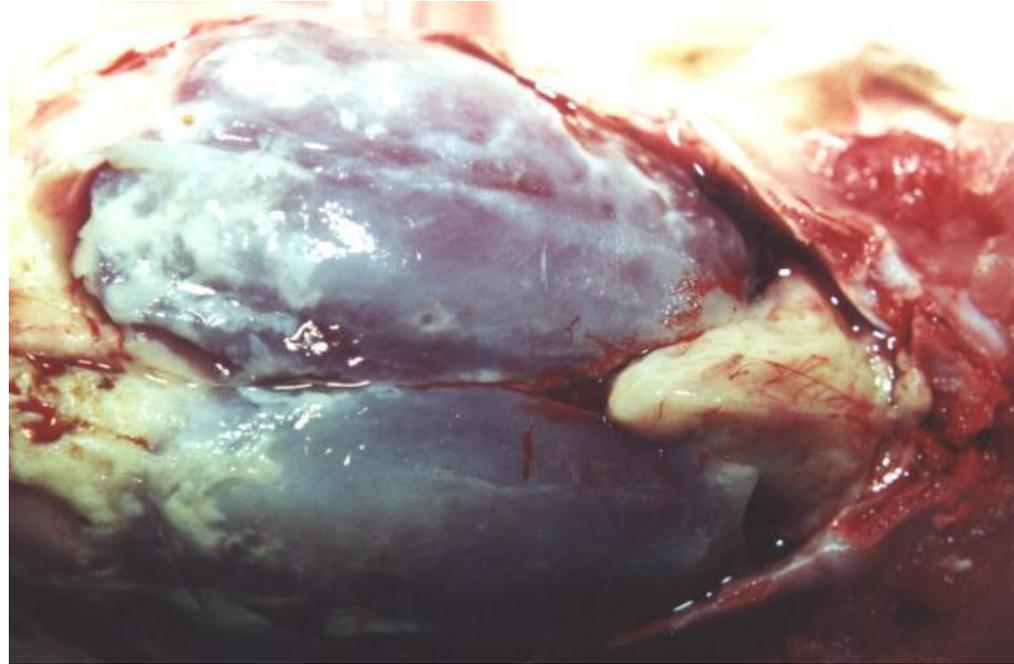
Escherichia Coli Infection, cont

- ▶ The clinical signs are non specific depending on the age, duration of infection, organs involved, coexistent of other diseases.
- ▶ Lesions of chickens died from septicemia are rare except for swollen, dark-colored liver and spleen and fluids in body cavities.
- ▶ Chickens that survive the acute infection may develop subacute fibrinopurulent airsacculitis, pericarditis peritonitis or arthritis.
- ▶ Airsacculitis a classical lesion of colibacillosis occur following respiratory exposure to large number of E. coli or after bacteremia.

Clinical signs of *E. coli* infection are non specific. Chickens severely affected with Classical airacculitis, fibrinous perihepatitis and pericarditis, having ruffled feathers, drooping head, and listless.



Classical lesions of aircacculitis, fibrinous perihepatitis and pericarditis.



Escherichia Coli Infection, cont.

- ▶ Since the clinical signs are non specific therefore, **isolation** of pure culture of E. coli is needed for diagnosis.
- ▶ Most E .coli isolated are **resistant** to many commonly used antibiotics, therefore good management and biosecurity is required to prevent the disease.
- ▶ **Vaccines has mixed effect** to provide protection against all types of Avian Pathogenic E. Coli causing colibacillosis.

Diagnosis tests for Infectious Coryza , E.col and Mycoplasma

| Tests | Infectious Coryza | Escherichia coli | Mycoplasma |
|----------------------------------|---|---|--|
| Gram staining of Smears | Pleomorphic Gram negative Bipolar rods | Gram negative rods | Dose not stain |
| Culture Medias, Selective media, | Grow on Blood agar with the presence of S. aureus (NAD) | Easy to grow on MacConkey & nutreant agar, Triple sugar iron agar | Difficult to grow Protein based media enriched with 10-15% serum, yeast extract. |
| Experimental Infection of | susceptible chicks signs and lesions within 3-5 days | Chick embryo inoculation for pathogenicity testing | Chick embryo |
| HI test | Can be used but is not preferable to other methods | - | Can be used For confirmation |
| Agglutination test | - | Can be used for O antigen typing and K antigen | Can be used but cross react with M. synoviae |
| ELISA test | - | - | Can be used For confirmation |
| PCR test | Real-time PCR assay | PCR for pathogenicity testing | PCR for tracheal swabs |
| Source for Isolation | Sinus Exudate on blood agar | From heart or liver Or visceral lesions | Exudates from trachea or sinuses or air sacs. Special media or chick embryo |

Comparison of the main characteristics of Infectious Coryza, Escherichia coli and Mycoplasma

| Characters | Infectious Coryza | Collibacillosis | Mycoplasma |
|-------------------------|--|---|--|
| Onset | rapid | Acute or subacute | Chronic |
| Morbidity | High | Some time high | High |
| Main signs | Swelling of the facial sinuses and edema of the face , sneezing. | anorexia and depression, Non specific respiratory signs | Poor performance, Non specific respiratory signs |
| Age susceptibility | More in old chickens or chickens in production | Newly hatched or in young chickens | All ages |
| Etiologic agent | Avibacterium paragallinarum | Avian pathogenic Escherichia coli Somatic antigen O like O1,O2,& O78 . K antigen (capsular) associated with virulence like K1 and K80 | Mycoplasma gallisepticum , M. synoviae, M. meleagridis and M. iowae. |
| Gram staining and shape | Gram negative bipolar-staining rod some time filamentous | Gram negative rods | Dose not stain with Gram stain pleomorphic shape Hoechst dyes, blue fluorescent dyes used to stain DNA immunofluorescence assay |

Comparison of the main characteristics of Infectious Coryza, Escherichia coli and Mycoplasma, cont.

| Characters | Infectious Coryza | Collibacillosis | Mycoplasma |
|------------------------------------|--|---|--|
| Motility | Non motile | Motile | Non-motile- |
| Cultural need | require V-factor (NAD) | Ordinary Nutrient media, Selective media MacConkey | Special media containing 10-15% serum |
| Colony morphology | Minute dew like | 1-2 mm round Dark pink on MC | fried-egg colonies shape |
| Characteristic lesions | swelling of the facial sinuses and edema of the face | Fatal septicemia or fibrinopurulent inflammation of air sac, pericardium, liver capsule | Catarrhal inflammation of Resp. passages ,thickening of air sacs |
| Vertical transmission through eggs | No | No | Yes |

Aspergillosis – Brooder Pneumonia

- ▶ It can be acute or chronic disease that affect primarily the respiratory system. Other sites that can be infected are the peritoneum, visceral organs, and systemic infections mainly involving the brain and eye.
- ▶ The main causative agent is *Aspergillus fumigatus* but *A. flatus* can be involved.
- ▶ **Clinical sign**
- ▶ Dyspnea, gasping and rapid hard respiration. No rales in this infection, dry cough. Other symptoms are diarrhea, anorexia, dehydration and thirst.
- ▶ Morbidity is variable and mortality is high in chickens showing the symptoms.
- ▶ When the brain is involved central nervous system signs is seen like ataxia, walking backward, opisthotonos and paralysis.
- ▶ Opacity of one or both eye if eye is infected .



**Nervous signs (torticollis),Dyspnea, gasping, sleepiness of
chicks infected with Aspergillus**

photo from internet

Aspergillosis – Brooder Pneumonia, cont.

Lesions

- ▶ Fungal growth may be seen or pale yellow plaques on air sac, pleura, pericardium and main bronchi of the lung.
 - ▶ In the lungs, air sacs bronchi or trachea pale yellow or gray clear nodules can be found. These nodules may be observed in the brain, eye, heart or other organs.
- 

Aspergillosis – Brooder Pneumonia, cont

▶ Diagnosis

- ▶ Diagnosis commonly based on clinical presentation and gross lesions.
- ▶ Direct wet smear can be prepared from crushing the nodules or plaques on microscope slides and stained with lactophenol cotton blue stain which stain fungal wall, to demonstrate the presence of the Aspergillus.
- ▶ If necessary confirmation is by culture or histopathology , using a special fungal stain reveals granulomas containing Aspergillus mycelia.
- ▶ Should be differentiated from IB,ND and ILT. No effective treatment.



**Yellow pale nodules in the lung of chinks
infected with Aspergillus.**

Source of photo :Avian Disease Manual, AAAP



Yellow pale nodules in the serosal surfaces and the lung of chinks infected with Aspergillus

Source of photo: Internet

Ornithobacterium rhinotracheale

Infection

- ▶ Ornithobacterium rhinotracheale is associated with respiratory disease in poultry.
- ▶ It is frequently isolated with other agents like E.coli Bordetella avium and Mycoplasma and respiratory viruses.
- ▶ The organism is **Gram negative** pleomorphic bacilli. Grow well but slowly on blood agar at 37° C in the presence of 7.5% CO₂ . The colonies are pinpoint in size with no haemolysis.
- ▶ It does not grow on **MacConkey**.

Ornithobacterium rhinotracheale Infection, cont.

Clinical signs:

- ▶ Mild respiratory signs, like coughing and sneezing with slight increase in mortality. More severe signs may be observed in older birds with gasping difficulty in respiration and higher mortality.

Lesions:

- ▶ Mild sinusitis, aircacculitis, tracheitis, unilateral or bilateral lung consolidation with severe serofibrinous pleuropneumonia.



ORT: Serofibrinous pleuropneumonia & Airsacculitis

Source of photo :Avian Disease Manual, AAAP

Example of Bacterial etiology of Airsacculitis

S.N.El-Sukhon et al.

E. coli, ORT and *Bordetella avium* in broiler airsacculitis

Table 1. Number and percentage of bacterial species that were recovered from broiler chicken airsacc in northern and middle Jordan.

| Isolate | Number | % |
|--|---------|------|
| <i>Escherichia coli</i> | 143 | 84.1 |
| <i>Ornithobacterium rhinotracheale</i> | 9 | 5.3 |
| <i>Bordetella avium</i> | 2 | 1.2 |
| <i>Escherichia coli</i> + <i>Ornithobacterium rhinotracheale</i> | 5 + 5 | 5.8 |
| <i>Escherichia coli</i> + <i>Bordetella avium</i> | 2 + 2 | 2.3 |
| <i>Bordetella avium</i> + <i>Ornithobacterium rhinotracheale</i> | 1 + 1 | 1.2 |
| Total | 162 + 8 | 100 |

References

- ▶ Avian Diseases Manual, AAAP.
 - ▶ Isolation, Identification and Characterisation of Avian Pathogens, AAAP.
 - ▶ The Merck Veterinary Manual, MSD.
 - ▶ Arabicpoultryedu.com
 - ▶ Sites of Avian Diseases from Internet.
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