INFECTIOUS CORYZA

SLIDE STUDY SET #10

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INTRODUCTION

Infectious coryza of chickens is an acute respiratory disease caused by Haemophilus paragallinarum. The disease occurs in poultry raising areas throughout the world. Although infectious coryza can be experimentally produced in quail with Haemophilus paragallinarum (1), naturally occurring disease is common only to chickens.

The disease in chickens occurs in both uncomplicated and complicated forms. The uncomplicated form (produced by H. paragallinarum only) results in rapid onset of clinical signs, usually 1 to 3 days after exposure. These signs persist from 7 to 14 days on the average. The complicated disease is usually more severe and may take a chronic course, depending on the complicating agent; Escherichia coli, pasteurellae mycoplasmas, fowl pox virus, infectious bronchitis virus, and laryngotracheitis virus may be complicating agents. Evidence suggests that the chronic complicated coryza produced by H. paragallinarum and M. gallisepticum or M. synoviae is the prevalent form of the disease in most areas outside of the United States.

The Uncomplicated Disease. The uncomplicated disease occurs in both growing chickens and layers, particularly where multiple-age management practices are used. Economic loss is due to increased numbers of culls and lowered egg production. Egg production may decrease 10-40%.

All ages of chicken are susceptible to H. paragallinarum

infection. The disease is more severe in older chickens, especially roosters. Chronically infected or healthy carrier birds are the main source of infection. The causative organism is transmitted by aerosol or through contaminated drinking water. Drinking water is considered the principal means of transmission.

Clinical signs and gross lesions. Uncomplicated infectious coryza is manifested as an acute catarrhal inflammation of the mucous membranes of the nasal passages and sinuses. Catarrhal conjunctivitis and edema of the face and wattles occur frequently (2). Edema may occur on one or both sides of the face and may be so extensive that vision is obscured. Facial edema can be a transient sign lasting only 3 to 4 days and may not occur in chicks 1 to 3 weeks of age. Wattle edema is observed more often in older males and may become chronic.

Slide 1. Sixteen-week-old White Leghorn pullet with facial edema.

Slide 2. Adult male broiler-type chicken with edema of both face and wattle.

Slide 3. Incised wattle of chronically infected adult male broiler type chicken showing yellow caseous exudate.

The chief sign is a serous to mucoid exudate from one or both nostrils. This may be the only sign in many chickens. The nasal exudate from chickens with recent infection is usually clear;

exudate may become cloudy as infection persists. Accumulation of feed on the beak around the nares is a clue to nasal discharge.

Slide 4. Eighteen-week-old White Leghorn pullet with slight facial edema and showing nasal discharge.

Depression may occur and result in a decrease in feed and water consumption.

Slide 5. White Leghorn rooster showing depression caused by H. paragallinarum.

Involvement of the lower respiratory tract sometimes occurs, causing rales and breathing difficulties. Chickens having lower respiratory-tract infection may breath through the mouth and produce "gurgling" noises.

Slide 6. Female broiler-type chicken showing mouth breathing.

Airsacculitis may occur in uncomplicated infectious coryza. Occurrence is probably dependent on the strain of H. paragallinarum. Airsacculitis levels of 60% have been reported in uncomplicated infection (3).

Slide 7. Exudative airsacculitis in 9-week-old White Leghorn pullet caused by H. paragallinarum.

Histopathology. Lesions are most often observed in the upper respiratory tract. Affected areas of epithelium in the nasal cavity, infraorbital sinuses, and trachea undergo loss of cilia, sloughing of cells, and hyperplasia. Edema, hyperemia, and infiltration with inflammatory cells occur in the lamina propria underlying affected epithelium. Fibrino-suppurative exudate commonly occurs in the nasal cavity around the turbinates and nasal septum and in the lumina of the posterior (dorsal) turbinates and infraorbital sinuses.

Slide 8. Transverse section of the posterior nasal cavity of an experimentally infected rooster. Exudate is evident in the nasal cavity around the turbinates and nasal septum and in the lumina of the posterior turbinates and infraorbital sinuses. H&E; 2X.

The Complicated Disease. Although H. paragallinarum produces upper respiratory disease that is not usually fatal, the potential for complicated respiratory disease is present in flocks with infectious coryza. It is not possible to describe all of the complications that might arise in a flock as the result of the introduction of different agents in addition to H. paragallinarum. In turn, it may not be possible to recognize the superimposition of H. paragallinarum infection on another respiratory disease. However, an investigator should be cognizant of the fact that the

potential for complicated disease is present, particularly in flocks having a history of infectious coryza.

The more common form of complicated infectious coryza is the chronic form produced by H. paragallinarum and M. gallisepticum or M. synoviae.

Clinical signs and gross lesions of chronic complicated infectious coryza. Clinical signs in the chronic complicated disease are not markedly different from those of the uncomplicated disease. However, the signs are more persistent. For example, a continuous nasal discharge, which can be quite profuse, may occur and last a month or longer. Caseous plugs in the nasal passages may be found. Respiratory rales are more prominent, as is the incidence of airsacculitis. The airsacculitis is usually more severe than that observed with uncomplicated infection. There is an increase in mortality as well as marked weight loss. Chicken houses experiencing complicated infectious coryza usually have a characteristic odor that can be described as mouse-like.

Slide 9. White Leghorn pullet with facial skin removed showing caseous plug in the sinus.

Slide 10. Caseous exudative airsacculitis produced by H. paragallinarum and M. synoviae in a 9-1/2 week old chicken.

Diagnosis of Infectious Coryza. Clinical signs are not

diagnostic for infectious coryza, because other diseases can produce similar signs, i.e., chronic fowl cholera, fowl pox, and A-avitaminosis (2).

Slide 11. White Leghorn pullet with chronic fowl cholera showing facial swelling.

Infectious coryza is diagnosed by isolation and identification of H. paragallinarum. Serological diagnosis is not now available. Diagnosis of chronic complicated infectious coryza is aided by isolation of M. gallisepticum or M. synoviae as well as by serologic reaction with their antigens (plate-agglutination and hemagglutination-inhibition tests).

Isolation of a Haemophilus species from chickens is not diagnostic for infectious coryza. Two species of Haemophilus are found in chickens: H. avium and H. paragallinarum. H. avium is generally considered nonpathogenic and may constitute part of the normal respiratory tract flora. As with many respiratory diseases in animals, there may be a shift in bacterial populations that make up the normal flora; the H. avium population may increase with respiratory disease of different etiology. It is unknown whether H. avium is synergistic in complex respiratory disease. Regardless of the presence or absence of H. avium, distinction between it and H. paragallinarum must be made.

Isolation of H. paragallinarum. H. paragallinarum is usually isolated by culture of exudate from the infraorbital sinus of

chickens at necropsy. The exudates from the sinuses of several chickens should be cultured to ensure isolation. Generally, isolation is more successful from chickens early in the infection, when they are showing a clear nasal discharge. However, isolation of the organism from chickens showing different clinical signs should be attempted.

Slide 12. To isolate the organism, the area beneath the eye and the corner of the beak is seared with a hot spatula to remove surface contamination.

Slide 13. A cut is made into the infraorbital sinus with a flamed or sterile scalpel in the direction shown here.

Slide 14. Exudate is collected by inserting a bacteriological loop into the sinus. The loop should be directed toward the back of the head to avoid isolation of bacteria that occupy the frontal areas of the respiratory tract.

The exudate is streaked onto a blood or Casman blood agar plate. A culture of Staphylococcus epidermidis is streaked perpendicular to the line of the exudate streak. The agar plates are incubated in a candle jar or CO_2 jar for 24 to 48 hours at 37 C. Moisture is important for growth of Haemophilus species, so a damp sponge can be incorporated into the jar to increase moisture content.

Colonies of Haemophilus sp. are of pinpoint size on blood agar and pinpoint to pinhead size on Casman blood agar after 48 hours of incubation. The colonies grow as satellites to the S. epidermidis streak. Colonies closest to the S. epidermidis streak are generally larger. The satellite phenomena is due to the obligate requirement of a Haemophilus species for nicotinamide adenine dinucleotide (NAD; V-factor). H. paragallinarum does not grow in the absence of NAD.

Slide 15. 48-hr culture of H. paragallinarum on Casman blood agar showing satellite growth of S. epidermidis streak. Note larger colonies are well spaced and are close to the S. epidermidis streak.

Suspect H. paragallinarum colonies are picked onto agar or broth medium for identification. Medium containing 1.0 to 5.0% sterile heat inactivated chicken serum plus 25 ug/ml of reduced NAD have been found to support growth of all avian Haemophilus sp. Colonies on this medium are generally larger.

Slide 16. Forty-eight-hour cultures of H. paragallinarum cultures of H. paragallinarum on Casman blood agar base containing chicken serum and reduced NAD. Colonies on the supplemented medium are 1-2 mm in size.

Description of H. paragallinarum and its Distinction from H. avium. H. paragallinarum forms small, colorless pinpoint-to-pinhead-sized colonies on agar medium. Colony size is dependent on the growth medium; 1-to-2-mm-diameter colonies can be produced on Casman agar medium containing chicken serum and NAD. Growth on agar requires incubation in a moist chamber containing CO_2. Growth in broth is best in a medium that contains chicken serum and reduced NAD; growth in broth does not require incubation under CO_2 tension. The organism does not require hemin (X-factor) for growth.

H. paragallinarum cells are small, gram-negative rods 1-3 um long and 0.4-0.8 um wide. After 48 hours, there is a tendency toward filament formation and pleomorphism.

Slide 17. Gram stain of 24-hour culture of H. paragallinarum showing small gram-negative rods.

Slide 18. Gram stain of 48-hour culture of H. paragallinarum showing gram-negative rods and filaments.

Carbohydrate reactions are determined in phenol red broth with chicken serum and reduced NAD supplements.

Differentiating Characteristics of H. paragallinarum and H. avium.

Characteristic	H. paragallinarum	H. avium
Require NAD	+	+
Pigmented Colonies	-	+ or -
Acid produced in phenol red broth w/o CHO	-	+ or -
Acid produced from galactose	-	-
Acid produced from trehalose	-	+
Catalase	-	+
Pathogenic	+	-

Serology of H. paragallinarum. Three serotypes of H. paragallinarum are found. These are designated types A, B, C and are usually recognized by a rapid slide-agglutination test (3). Some strains, especially fresh isolates, are inagglutinable in typing sera owing to the presence of hyaluronic acid. No differences in lesions or clinical signs of infectious coryza occur between serotypes. After convalescence from infectious coryza produced by one serotype, chickens are refractory to challenge exposure with another serotype (4).

ACKNOWLEDGMENTS

Appreciation is extended to Dr. K. R. Rhoades for his contribution to the histopathology section.

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