

## Haemophilus spp

♦ **Haemophilus spp** are assigned to the family Pasteurellaceae and are commensals or parasites of the mucous membranes of humans and animal in stressed or compromised hosts, most commonly of the upper respiratory and lower genital tracts

♦ These species are small (less than 1  $\mu\text{m}$ ), Gram - negative rods, which often appear coccobacillary and may occasionally form short filaments. These motile organisms, which are facultative anaerobes , with variable reactions in catalase and oxidase tests, do not grow on MacConkey agar.

♦ *Haemophilus parasuis* require growth factor V (nicotin amide adenine dinucleotide, NAD). Optimal growth for all these species occurs in an atmosphere of 5 to 10% CO<sub>2</sub> on chocolate agar which supplies both X (haemin) and V factors

♦ *Haemophilus parasuis* , a resident of the normal nasopharynx of swine, can cause septicemic disease or secondary respiratory infections.

♦ *Haemophilus somnus* causes septicemic, respiratory, and genital infections in cattle.

♦ *Haemophilus paragallinarum* causes infectious coryza in chickens .

♦ "*Histophilus ovis*" and "*Haemophilus agni*" causes septicemic, respiratory, and genital infections in sheep.

## Morphology, Staining , growth

◆ Most isolates of these organisms form small, motile, Gram - negative rods coccobacillary, transparent, dewdrop like colonies after incubation for 48 hours and are less than a micrometer wide and 1 to 3  $\mu\text{m}$  long, but sometimes form longer filaments.

Colonies of *H. somni* have a yellowish hue and some isolates are haemolytic on sheep blood agar.

◆ Optimal growth for all these species occurs in an atmosphere of 5 to 10%  $\text{CO}_2$  on chocolate agar.

◆ The cell wall resembles that of other gram-negative bacteria and Capsules consist of polysaccharides.

◆ Heat-labile toxins have been found in *H. paragallinarum*.

◆ turbidity in broth and colonies 1 mm in diameter on agar.

◆ Growth factors may be supplied as hemin and NAD.

◆ A medium naturally containing them is chocolate agar.

## Transmission

Transmission of haemophili and related agents is probably :

- ◆ airborne or by close contact.
- ◆ Indirect transmission is likely during epidemics.

## Pathogenesis

### Mechanisms

- The anti-phagocytic capsules and heat-labile cytotoxic factors of *H. paragallinarum* are suspected virulence factors.
- The lesions of *Haemophilus* infections also suggest endotoxin involvement.
- *Haemophilus somnus* adheres to epithelium and endothelium, is toxic to endothelial cells, is resistant to serum and phagocytic killing, and binds immunoglobulins like staphylococcal protein A.

## Disease

1. Infectious coryza, caused by *H. paragallinarum*, affects the upper respiratory tract and paranasal sinuses of chickens.
  - ◆ The mild form of disease manifests as depression serous nasal discharge and slight facial, swelling.
  - ◆ In severe disease, swelling of one or both infraorbital sinuses is marked and oedema of the surrounding tissues may extend to the wattles.
  - ◆ Tracheitis, bronchitis and airsacculitis may be present also.
2. In Cattle *Histophilus somni* is part of the normal bacterial flora of the male and female bovine genital tracts.
  - ◆ Because septicaemia is commonly associated with *H. somni* infection
  - ◆ Thrombotic meningoencephalitis (TME), a common consequence of septicaemia, is encountered sporadically in young cattle recently introduced to feedlots.

◆ Some animals may be found dead and others may present with high fever and depression, sometimes accompanied by blindness, lameness and ataxia.

3. in sheep *Histophilus somni* in the prepuce or vagina

- ◆ The incubation period is 1 to 5 days. Clinical signs usually develop in conventionally reared pigs 2 to 7 days following exposure to stress factors such as weaning or transportation .
- ◆ Anorexia, pyrexia, lameness, recumbency and convulsions are features of the disease.

## Epidemiology

- All the agents named, except for *H. paragallinarum*, inhabit normal mucous membranes of the respiratory or genital tract. Sources of infection are therefore often endogenous to herds or individuals.
- Respiratory and septicemic " *H. somnus*" infections are similarly related to stress factors, as their predilection for feed lots and the fall and winter months suggests. *Haemophilus spp.* are generally host-specific.

## Diagnostic procedures

1. Specimens for laboratory examination depend on the clinical condition and type of lesions. These bacterial species are fragile and neither refrigeration nor transport media maintain viability. Ideally clinical specimens should be frozen in dry ice and delivered to a laboratory within 24 hours of collection.

2. Either chocolate agar or blood agar inoculated with a streak of *S. aureus*, incubated in 5 to 10% CO<sub>2</sub> at 37°C for 2 to 3 days in a moist atmosphere, is used for isolation

3. Identification criteria for isolates :

♦ Small, dewdrop - like colonies after 1 to 2 days.

◆ Biochemical test.

4. Fowl coryza can be diagnosed by **agglutination, agar gel immunodiffusion, and hemagglutination-inhibition tests.**

5. PCR - based tests have been developed for detection and identification of these pathogens

## **TREATMENT**

Most animal haemophili are susceptible to penicillin G, ceftiofur, and tetracyclines.

