

# SALMONELLA INFECTIONS

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# Etiology

- *Salmonella enterica* subsp. *enterica*
  - *Salmonella enterica* subsp. *salamae*
  - *Salmonella enterica* subsp. *arizonae*
  - *Salmonella enterica* subsp. *diarizonae*
  - *Salmonella enterica* subsp. *houtenae*
  - *Salmonella enterica* subsp. *bongori*
  - *Salmonella enterica* subsp. *indica*
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- *S. enterica* subsp. *enterica* serovar Dublin: *Salmonella* Dublin
  - *S. enterica* subsp. *enterica* serovar Gallinarum: *Salmonella* Galliarum

# Salmonella : Biology

## Host specific

- *S. Paratyphi*, *S. Typhi*
- *S. Gallinarum*/ *Pullorum*
- *S. Dublin*
- *S. Abortusequi*
- *S. Abortusovis*

## Non-host specific

- *S. Enteritidis*
- *S. Typhimurium*
- *S. Infantis*
- *S. Hadar*
- *S. Wirchow*

# Antigenic Structure

- Kauffmann-White classification is based on both somatic and flagellar antigens.

First: O somatic antigen are identified by numbers

Second: H flagellar antigens are identified by lowercase letters

- ✓ Flagellar antigens sometimes occur in 2 different phases
- ✓ Antigenic structure is written respectively ( *S. Typhi* (9,12(vi):d:- / *S. Gallinarum* 1,9,12:-:- )

# Pathogenicity

- Major Salmonellosis: *S. Typhi* and *S. Paratyphi A*, *S. Paratyphi B*
  - Especially in humans
  - Typhoid fever
- Minor Salmonellosis: All *Salmonella* strains
  - Both human and animals
  - Toxiinfection

# Pullorum disease and Fowl typhoid

- Pullorum disease → S. Pullorum
  - Fowl typhoid → S. Gallinarum
- } Antigenic structure 1,9,12:- :-

- ❖ Pullorum disease (PD) and fowl typhoid (FT) are septicemic diseases affecting primarily chickens and turkeys, but other birds such as quail, pheasants, ducks, peacocks, and guinea fowl are also susceptible
- ❖ Both diseases can be transmitted through the egg by transovarian infection!
- ❖ **Vertical transmission**
- ❖ Contact transmission of infected chicks or pullets are important route of dissemination of the diseases

# Necropsy

- There may be no symptom in per acute infection
- In acute infection liver, spleen and kidneys are hemorrhagic also liver is hypertrophic
- Egg yolk is generally not absorbed in chicks
- The kidneys are pale and full of urate crystals
- Rectum is filled with a whitish liquid because of urate
- Biliary sac is enlarged and filled with intestines
- Peritonitis and pericarditis could be observed
- Cocks have white foci and nodules on testes



# Diagnosis

- Definitive diagnosis of PD or FT requires the isolation and identification of *S. Pullorum* or *S. Gallinarum*, respectively
- Positive serologic findings can be of major value in detecting infection
  - Serologic tests to detect PD and FT include the macroscopic tube agglutination test (TA) , rapid serum test (RS), stained antigen whole blood test (WB) , and the micro agglutination test (MA)
  - *Salmonella* Serotyping method (ISO6579)

# Treatment

- Nalidixic acid
- Enrofloxacin
- Amoxicillin
- Ampicillin
- Gentamicin
- Tetracycline

# Protection and control

- Preventing chicks directly or indirectly from contact with *S. Pullorum* and *S. Gallinarum*
- Chicks and young chicks must be separated from each other
- All poultry animals must be in clean area
- Flocks which are free from disease must be separated from other flocks
- Biosecurity

# Paratyphoid Infections

- The numerous motile members of the bacterial genus *Salmonella* are collectively referred to as paratyphoid (PT) salmonellae
  - **S. Infantis**
  - **S. Virchow**
  - **S. Hadar**
  - S. Heidelberg
  - S. Newport
  - S. Agona
  - S. Stanley
  - S. Derby
  - S. Thomson
- **Mostly S. Enteritidis and S. Typhimurium**

# Epidemiology

- I. PT salmonella are consistently reported to be among the leading international sources of food-borne human disease
- II. Poultry products are often identified as prominent sources of *Salmonella* which cause PT infection
- III. Eggs and egg-containing foods have been implicated as the principal vehicles for the transmission of *S. Enteritidis* infections human illness
- IV. Feeds containing contaminated animal proteins, vegetable proteins, or cereals, or contaminated by vermin or wildlife, are potential sources of *Salmonella* in both chickens and turkeys

# Clinical signs

- Typically cause clinical disease only in very young birds
- *Salmonella* contamination within eggs may lead to embryo mortality or rapid death among newly hatched birds
- Typical signs of PT infection in chicks and poultry include;
  - progressive somnolence with closed eyes,
  - drooping wings,
  - ruffled feathers,
  - shivering and huddling near heat sources,
  - anorexia,
  - emaciation,
  - profuse watery diarrhea

# Necropsy

- Liver and spleen are hypertrophic
- Egg yolk is generally not absorbed in chicks
- Peritonitis and pericarditis could be observed



# Diagnosis

- Although clinical observations may suggest a PT infection, final diagnosis depends on the isolation and identification of causative organisms

# Treatment

- Tetracycline
- Neomycin
- Bacitracin

# Protection and control

- Eggs, chicks or chickens should only be taken from *Salmonella*-free breeding flocks
- Disinfection and sanitation should be conducted
- Biosecurity must be implemented