

Streptococcal Infections in Pigs

Extended version

Classic case:

Streptococcus suis - Important infectious bacterial disease of

- **Nursing** and **recently weaned PIGS** (< 12 weeks old)
 - Septicemia, fever
 - **Meningitis**, polyarthritis
 - Polyseritis, bronchopneumonia
 - **Peracute** form (**Dead** weanlings)

Streptococcus dysgalactiae- Similar to *S. suis*

- **Piglets 1-3 weeks old**
 - Fever, arthritis, meningitis

Streptococcus porcinus-

- **Jowl abscesses** in **growing** pigs

Presentation: Streptococci- Gram positive cocci
Common bacteria present in all animals, including people

- Non-pathogenic and pathogenic strains
 - Many part of normal bacterial flora
- Broadly species specific
 - Some species zoonotic

S. suis - Significant pathogen of swine

- Clinical infections primarily in
 - **Weaned pigs (< 12 weeks old)**
 - Suckling pigs (less frequent)
- **Present in** tonsils, nasal cavity, feces, genital tracts of **healthy pigs**
- Outbreaks most common in intensive pig farming areas
 - 90% infections in diseased pigs are Type 2 (serotype)
 - Co-infection w **porcine reproductive respiratory syndrome** common
- **Predisposing Factors**
 - Stress
 - Temperature fluctuations
 - Poor environmental hygiene
 - High humidity
- **Transmission**
 - Vaginal secretions, milk from sow
 - Fomites (dust, dirt)
 - Flies
 - Contaminated feed
 - Asymptomatic carriers
 - Movement and mixing of healthy carrier pigs post-weaning



Recumbent grower pig w/ streptococcal meningitis
Image courtesy of The Pig Site



Abrasion of legs can lead to *S. suis* infection
Image courtesy of The Natl Animal Dz Svc UK

Streptococcal Infections in Pigs

Extended version

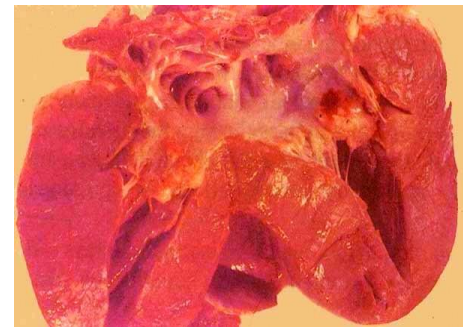
- **Peracute disease**
 - **Sudden death** with no premonitory signs
- **Acute Disease**
 - **Fever (first sign)** accompanied by pronounced septicemia
 - **IF untreated**, persists several days
 - Anorexia
 - Depression
 - **Meningitis** (Classical sign)
 - Depression, incoordination, abnormal stance
 - **Recumbency**, nystagmus, paddling
 - Opisthotonos, convulsions
 - **Endocarditis**
 - Most common in older piglets
 - **Polyarthritis**
 - Swollen joints
 - Shifting leg lameness
 - **+/- Bronchopneumonia**
 - Dyspnea, cyanosis, wasting



Recumbent piglets with Streptococcal meningitis
Image courtesy of [The Pig Site](http://ThePigSite.com)

S. dysgalactiae- Pigs 1-3 weeks old (Most common)

- Tonsils, secretions from nose, throat, genital tract are infectious
- Piglets infected via
 - Vaginal secretions
 - Milk from sows
 - Fomites
 - Skin wounds
- Streptococci enter bloodstream via skin wounds, navel, tonsils
 - Bacteremia / septicemia leads to
 - Septic arthritis, endocarditis, or meningitis
- **Clinical signs**
 - Fever, depression, inappetence
 - Joint swelling, periarticular edema, lameness
 - Roughened hair coat



Vegetative endocarditis in a pig with *S. suis*
Image courtesy of FAO.org

S. porcinus- Growing pigs

- Contagious streptococcal lymphadenitis, jowl abscesses, cervical abscesses
 - Usually a secondary invader
 - Organisms infect pharyngeal / tonsillar mucosa
 - Carried to lymph nodes of head and neck
 - Abscesses form
- Infected via
 - Contact with purulent exudate from abscesses
 - Feces, vaginal mucus (sows), semen /prepuce (boars)
 - Ingestion of contaminated food / water

Streptococcal Infections in Pigs

Extended version

- **In USA**
 - A significant disease in 1960s
 - Currently decreased economic importance / occurrence
- Other countries
 - Not economically important disease

DDX:

- *Haemophilus parasuis* (Glasser's Disease), *Mycoplasma hyorhinis*
- *Erysipelothrix rhusiopathiae*, *Actinobacillus suis*, *Escherichia coli*
- Salt poisoning, Aujeszky's Disease (pseudorabies)
- *Salmonella choleraesuis*, other streptococci, staphylococci
- Other bacterial septicemias, bacterial abscesses

Test of choice:

Field diagnosis Hx, clinical signs, age, gross lesions

Necropsy

S. suis

- Weaned and growing pigs
 - Lymphadenopathy
 - Meningitis
 - Fibrinopurulent exudate in brain
 - Arthritis, swollen joints
 - Endocarditis
 - Valvular vegetations
 - Fibrinous serositis
 - Splenomegaly
 - Petechial hemorrhages (indicates septicemia)
- Suckling piglets
 - Septicemia, meningitis, or polyarthritis



Inability to stand due to 'joint ill' in a 2-week piglet with *S. suis*
Image courtesy of [The National Animal Disease Service UK](#)

S. dysgalactiae

- Hyperemic, swollen synovial membranes
- Turbid synovial fluid
- Articular cartilage necrosis (15–30 days post-infection)
- Periarticular fibrosis, abscesses
- Synovial villi hypertrophy
- Endocarditis
 - Yellow or white vegetations on valves

S. porcinus

- Abscesses and enlarged lymph nodes observed at slaughter

Streptococcal Infections in Pigs

Extended version

Bacterial culture and isolation

S. suis

- α -hemolysis (incomplete hemolysis) on blood agar
- Catalase negative

S. dysgalactiae

- β -hemolytic streptococci, Group C serovars
- Joint fluid – in severe inflammation few or no organisms may be present

S. porcinus β -hemolytic streptococci

Rx of choice:

S. suis

- **Prompt recognition** of early clinical signs
 - Streptococcal meningitis
- **Antibiotic therapy**
 - Immediate parenteral treatment of affected pigs
 - Ampicillin, amoxicillin, ceftiofur, fluoroquinolones
 - Resistance to penicillin reported
 - Medication in drinking water
 - Florfenicol (treatment)
 - Amoxicillin (healthy pigs during outbreak)
 - **Anti-inflammatories**
 - Decreases overall inflammation
 - Pigs with meningitis

S. dysgalactiae

- Antibiotic therapy
 - Early treatment most effective
 - Beta-lactam antibiotics
 - Long-acting antibiotics beneficial

S. porcinus

- Antibiotic therapy
 - Acute infections
 - Early treatment usually effective
 - Penicillins
 - Abscesses, Chronic carriers
 - Antibiotic treatment usually unsuccessful
 - Pulsing tetracyclines in feed at therapeutic level (400 g/ton)
 - Commonly used to control condition
 - Resistance to tetracycline reported

Streptococcal Infections in Pigs

Extended version

Prevention:

- **Strict biosecurity** to prevent introduction
 - Transfer between facilities
 - Humans, vehicles, equipment
 - Quarantine new additions to herd
 - Purchase pigs from meningitis-free herds
- **Strict sanitation** protocols
 - Disinfectants
 - Streptococci susceptible to:
 - Aldehyde, biguanide, hypochlorite
 - Iodine, quaternary ammonium
- **Management of pigs**
 - Minimize stress in piglets
 - Ensure piglets receive adequate colostrum
 - Prevent skin injuries
 - Monitor weanlings frequently on farms where ***S. suis*** is prevalent

S. suis Vaccines, early weaning of nursing pigs ineffective

S. dysgalactiae

- Vaccination
 - Autogenous bacterins
 - Vaccinate sows before farrowing
 - Reduces incidence of arthritis in sows
- Environment
 - Reduce abrasiveness of floor surface in farrowing area
 - Minimize traumatic injuries to feet and legs
- ***S. porcinus***- Vaccination (autogenous) Not widely used b/c not a widespread problem

Pearls:

- Streptococci- Gram positive cocci in family Streptococcaceae
- Orients in pairs or chains, worldwide distribution
- Classified by Lancefield group, capsular type, serotype, and hemolysis on blood agar

S. suis- ZOO NOTIC

- Lancefield group D streptococcus
- α -hemolysis (incomplete hemolysis) on blood agar
- Catalase negative
- 35 serotypes recognized
- Serotypes 1–9 70% of *S suis* isolates in labs
- Serotype 2 most prevalent worldwide
 - Type 2 virulent and avirulent serotypes



Did You Know?

Strep. Suis is Zoonotic – predominance of human cases detected in SE Asia due to eating undercooked pork products (like “blood paste” in Viet Nam, above).

But prevalence of infection in N. America among people who work with pigs is higher than most suspect. Image courtesy, [Saigon Daily](#)

Streptococcal Infections in Pigs

Extended version

- C-substance (Capsular polysaccharide) only proven virulence factor
- Virulence-related proteins may be active in Type 2 infections
 - Muramidase-released protein (MRP)
 - Extracellular factor (EF)

S. dysgalactiae- NOT zoonotic

- Environmental dairy cow mastitis

S. porcinus- NOT considered zoonotic

- Implicated in genitourinary infections, pregnancy complications in women

S. suis- HUMAN infections

- Serotype 2 most implicated in people
- **Transmission**
 - Blood, secretions (infected pigs) via skin wounds, mucous membranes (humans)
 - **Most at risk:** Swine producers, slaughter plant employees, veterinarians
- **Human infection- ~7% mortality**
 - Septicemia
 - Meningitis, permanent hearing loss
 - Endocarditis, arthritis

Images worth a look: [The National Animal Disease Service UK](#)

[The Pig Site](#) [FAO.org](#) [Streptococcosis in Pigs Center for Food Security and Public Health](#)

Refs: Diseases of Swine, Taylor DJ, 8th ed. pp. 562-573, [The National Animal Disease Service UK](#)

[The Pig Site](#) [FAO.org](#) [Streptococcosis in Pigs Center for Food Security and Public Health](#) and Merck Manual, 10th ed (online): [Streptococcal infections in Pigs](#)

Zoonotic infections in humans

Huong VTL, et al. *Epidemiology, clinical manifestations, and outcomes of Streptococcus suis infection in humans*. [Emerg Infect Dis, Vol. 20, Number 7](#), July 2014

Smith T. et al., *Occupational Exposure to Streptococcus suis among US Swine Workers*, [Emerg Infect Dis, Vol. 14, No. 12](#), December 2008

My Notes: