Classical Swine Fever (CSF, Hog cholera)

Extended version

Classic case: Pig, severe acute FEVER, incoordination, diarrhea, red skin, internal hemorrhages

Presentation:

- **Reportable Disease** Highly contagious PIGS only
- **Severity varies** with
  - **Age:** Young animals: Most severe, high mortality
  - **Immune status of herd**
  - **Strain**
    - High virulence to low virulence
    - Acutely fatal to asymptomatic
- **Main source of infection**
  - Infected pigs, wild boar
  - Garbage feeding uncooked pork products
- **Clinical Signs**
  - **Acute form (~100% morbidity / mortality)**
    - High fever $>105^\circ F$ ($>41^\circ C$), anorexia
    - Constipation followed by watery diarrhea
    - Cyanosis, erythema, skin hemorrhages
    - Staggering, incoordination, posterior paresis, convulsions
    - Death within 1-3 weeks
    - Necropsy: widespread petechial / ecchymotic hemorrhages
  - **Subacute form**
    - Similar to acute form, LESS severe. Lower morbidity / mortality
    - Can be difficult to detect - Often unnoticed or misdiagnosed = inadvertent spread of disease
  - **Chronic form**
    - ONLY A FEW animals show signs
    - Signs wax and wane for months
    - Almost always fatal
      - Initial acute febrile phase, followed by apparent recovery, then relapse
      - Fever, depression
      - Anorexia, diarrhea, alopecia, stunted growth
  - **Some cases** ASYMPOTOMATIC, inapparent carriers
    - Congenitally infected piglets
    - Adult pigs-persistent viremia, shed virus for months

- **Infected sows (ALL forms of CSF)**
  - Poor reproductive performance
  - Abortions, stillbirths
  - Persistently infected piglets (carriers)
    - Piglets typically die within first year
    - Congenital tremors (cerebellar hypoplasia)
    - Head and leg deformities

"Turkey egg" kidney of CSF w/ cortical petechiae.

Image courtesy of The Pig Site

Image courtesy of Food and Agriculture Organization of the United Nations (FAO.org)
**Classical Swine Fever (CSF, Hog cholera)**

Extended version

**DDX:**

- **African swine fever**, acute porcine reproductive and respiratory syndrome (PRRS), porcine dermatitis and nephropathy syndrome (porcine circovirus), erysipelas, salmonellosis (*Salmonella choleraesuis*), eperythrozoonosis, actinobacillosis, Glasser's disease (*Haemophilus suis*), Aujeszky's disease (pseudorabies), thrombocytopenic purpura, warfarin poisoning, heavy metal toxicity, postweaning multisystemic wasting syndrome, hemolytic disease of the newborn, parvovirus, pasteurellosis, anthrax

**Test(s) of choice:**

- **Field Diagnosis**: Hx, clinical signs, lesions followed by virology
  - **Suspect CSF IF**:
    - Septicemia, **high fever**, diarrhea, incoordination, deaths in youngest
    - History of
      - **Under-cooked garbage/ scrap feeding**
      - New / returning animals to herd
      - Recent international travel (farm personnel, visitors)
    - **NO response** to Rx
    - Cases on nearby farm
    - **IMMEDIATELY notify** State / Federal veterinarians before collecting / sending samples
      - Whole pigs and tonsil preferred
      - Spleen, kidney, distal ileum
      - Lymph nodes- submandibular, maxillary, mesenteric
      - Whole blood in EDTA
    - **Samples ONLY sent to State diagnostic (authorized) lab**, under secure conditions
  
- **Necropsy and Histopathology**:

  - **Acute form**
    - Widespread **petechial / ecchymotic hemorrhages**
    - Splenic infarction
    - Non suppurative encephalitis with vascular cuffing

  - **Chronic form**
    - Commonly complicated by secondary infection
    - Necrotic foci (“button ulcers”)
      - Intestinal mucosa (**ileocecal junction**)
      - Epiglottis
      - Larynx
    - Congenital infection
      - Cerebellar hypoplasia
    - Thymic atrophy, ascites
    - Hemorrhages

[Image courtesy of The Pig Site]
**Test(s) of choice:** (continued)

- **Serology**
  - **ELISA** - commonly used for surveillance,
    - Some ELISA tests distinguish CSF from BVD antibodies
    - Some ELISA tests (DIVA) distinguish “marker vaccines” from natural infection
  - **Virus Neutralization**

- **Antigen detection**
  - Direct immunofluorescence on frozen tissue sections
  - ELISA

- **RT-PCR** - commonly used in CSF surveillance
  - Rapid, highly sensitive
  - Can use for screening pooled blood samples or individual pigs
  - Rapid, highly sensitive
  - Differentiates CSF from BVD and Border disease virus

**Rx of choice:** DO NOT TREAT CSF positive pigs

- **If you suspect CSF, IMMEDIATELY notify**
  - Federal- Area Veterinarian in Charge (AVIC)
  - State Veterinarian (SV)

- **Quarantine farm** until definitive diagnosis determined

- **Isolate** CSF-suspected animals

- **Actions directed by SV or AVIC**
  - Slaughter confirmed CSF cases / in-contact animals
  - **Carcasses buried or incinerated**
  - Protect other pigs in area
    - Follow local disease control regulations
      - Complete herd slaughter with restricted pig movement
      - Vaccination
        - CSF endemic countries
        - Modified live or subunit (marker) vaccines

**Prognosis:** OIE ‘priority’ disease for international trade

- Economically devastating disease
  - All confirmed infected or in-contact pigs culled
  - Import and export bans of pigs and pork products to many countries
  - Major impact on production
    - Excessive morbidity and possibly mortality
    - Infertility
    - Decreased growth
**Classical Swine Fever** (CSF, Hog cholera)

### Prevention:
- **NEVER** feed pigs undercooked garbage (swill) or pork products
  - Many countries have banned swill feeding
- Strict **biosecurity** and **sanitation** protocols
- **Monitor** animals **daily** for signs of illness
- **Quarantine newly purchased, returning animals:** minimum 30 days prior to entering herd
- Keep health records on all animals
  - Provides Hx / trace back
- **Vaccination**
  - Endemic countries **ONLY**
    - Helpful for outbreak control
    - Protects from disease, does not eliminate infection
  - **CSF free countries**
    - **Prophylactic vaccination commonly forbidden (EU, USA, Canada)**
      - May allow vaccination for outbreak control
      - Modified-live lapinized “C” strain or cell culture strain
      - Marker (subunit) vaccine license a few years ago
    - Periodic surveillance confirms CSF free status
  - Wild boar outbreaks
    - Emergency vaccination w/ modified-live vacc. Baits
    - Used successfully in Germany, other Euro. countries

### Pearls: Worldwide economic importance
- Main DDX is African Swine Fever (ASF)
  - **ASF and CSF are clinically indistinguishable.**
  - Different virus families (ASF=Asfarviridae; CSF=Flaviviridae)
- Main source of infection
  - **Live animals:** **Pig, wild boar**
  - **Garbage feeding** (swill)
    - Uncooked pork products
    - Illegally imported contaminated pig products
- Pestivirus, Family Flaviviridae
  - Enveloped, single-stranded RNA virus
  - CSF virus is antigenically related to
    - Bovine viral diarrhea (BVD) virus (cows) and Border disease viruses (sheep, cows, pigs)
    - Complicates Dx of CSF in pigs: False positive serology for CSF
Pearls: (continued)

- Transmission
  - Virus present in blood, saliva, urine, feces, tissues, semen of sick and dead animals
  - Ingestion of virus in contaminated garbage or pork products
  - Direct contact with infected animals: mucous membranes, conjunctiva, skin abrasions
  - Indirect contact (fomites)
  - Least common: Aerosol, semen, insect vectors

- Moderately fragile virus
  - Killed at high temperatures (cooking)
    - 150°F (65.5 °C) for 30 minutes; 160°F (71 °C) 1 minute
  - Does NOT persist in environment for long periods
  - Does survive long periods in moist, protein-rich medium (especially cold, frozen)

- CSF free - US (since 1976), Canada (since 1963), Australia, New Zealand, most of W/Central Europe

- CSF endemic - some eastern European countries, parts of Latin America, some Caribbean islands, pig-producing countries of Asia

Refs: Jackson and Cockcroft, Handbook of Pig Medicine, pp 182-184; The Center for Food Safety and Public Health, Iowa State University; Food and Agriculture Organization of the United Nations (FAO.org); and Merck Veterinary Manual online:

My Notes: