

# 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°F** (>41°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 **ASYMPTOMATIC**, 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



Classical swine fever (CSF, Hog cholera).  
Cyanosis and hemorrhage of the skin.

Image courtesy of Food and Agriculture Organization of the United Nations ([FAO.org](http://FAO.org))



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

Image courtesy of [The Pig Site](http://The Pig Site)

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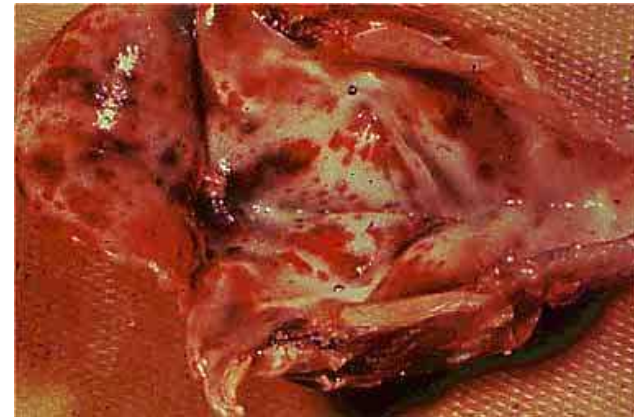
Extended version

## 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
    - Nonsuppurative 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



Laryngeal hemorrhage of CSF

Image courtesy of [The Pig Site](#)

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## 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
    - OR
    - 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



Hemorrhagic bladder of CSF

Image courtesy of [The Pig Site](http://ThePigSite.com)

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## 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



*Pinpoint hemorrhages in chest of pig w/ CSF.*

*Image courtesy of [The Pig Site](#)*

## 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



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## 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: