

# African Swine Fever (ASF)

Extended version

**Classic case:** Endemic in Africa, Sardinia, Madagascar

- Sick domestic pigs **fever**, huddling, difficulty breathing
- **Hemorrhage** and cyanosis of skin, abdomen, extremities
- **Death**
- **Reportable Foreign Animal Disease**
- Key DDX is **Classical Swine Fever**

## Presentation:

### History

- Close contact between domestic pigs and **wart hogs**, infected ticks
- Introduction of new pigs into herd (without quarantine)
- **Swill feeding** domestic pigs containing
  - Contaminated **undercooked pork** / pig remnants
  - Access to remnants through **scavenging**
- Movement of vehicles / people between herds during outbreak

**Clinical Signs:** Several forms based on virulence (0-100% mortality)

- **Peracute form, ASF**
  - Sudden death with no clinical signs
- **Acute form, ASF- Most common (~100% mortality)**
  - **High fever >105°F (>41°C) FIRST SIGN** in herd
  - **Huddling**, shade seeking
  - Depression, anorexia, abdominal pain, vomiting
  - Constipation, +/- bloody diarrhea
  - Red, congested mucous membranes
  - Rapid difficult breathing
  - Blood-tinged foam from nostrils
  - **Conjunctivitis**
  - **Cyanosis**-Abdomen, inner thighs, ears
  - **Skin hemorrhages**, reddened areas, hyperemia
  - Abortion – all stages of pregnancy
  - Swaying gait, weak pelvic limbs
  - Coma; Death within 1-7 days



Beware of wart hogs. **Natural host of African swine fever (ASF).**

Image courtesy. [Hans Hillewaert](#)



Wart hog (*Phacochoerus aethiopicus*)

Image courtesy, [Drex Rockman](#)



**Peracute ASF**  
Death with **NO** clinical signs



Acute ASF: Weak feverish pigs **huddling**

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- **Subacute form, ASF (Uncommon)**
  - Fluctuating fever
  - Depression, anorexia
  - Swelling of joints
    - Painful gait
  - +/- Pneumonia
  - Death due to heart failure
  - Swollen throat common before death
- **Chronic form, ASF (Uncommon)**
  - Emaciation
  - Long dull hair
  - Ulcerative sores over bony points
  - Stiff gait due (arthritis)
  - Survival- weeks to months
- Pigs surviving less virulent strains
  - May shed virus for 1 month
  - Blood infectious for 6 weeks
  - May be persistently infected for life
    - DO NOT excrete OR
    - transmit virus to offspring in-utero



Acute ASF: Ear tip hyperemia  
Image courtesy, USDA



Acute ASF: Skin cyanosis, congestion and hemorrhage of eyes

## DDX: Classical swine fever - Clinically indistinguishable

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, trypanosomiasis, anthrax

**Test of choice:** Reportable Disease to World Organization for Animal Health (OIE)

- **Field Diagnosis:** Hx, clinical signs, lesions followed by lab testing
  - **IF ASF is suspected, IMMEDIATELY** notify:
    - Federal Area Veterinarian in Charge (AVIC)
    - State Veterinarian (SV)
    - Quarantine farm until definitive diagnosis determined - Actions directed by SV or AVIC
- Samples sent **ONLY** to State Diagnostic (authorized) Lab
  - Under secure conditions
    - Prevent spread of disease
  - Tonsil preferred
  - Spleen, kidney
  - Lymph nodes
  - Whole blood in EDTA



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- **Necropsy and Histopathology:**

- **Acute lesions – THINK HEMORRHAGIC**

- **Bluish-purple skin** discoloration / hemorrhages
      - Extremities, chest, abdomen
    - **Bloody froth** from nose and mouth
    - Pus discharge from eyes, nose
    - Perineum soiled with **bloody feces**
    - **Hemorrhagic thoracic and abdominal fluid**
    - Widespread **congestion and hemorrhage of internal organs**
    - Enlarged, friable, dark spleen
    - Hemorrhagic lymphadenomegaly
    - Lungs do not collapse when thorax opened
      - Heavy and shiny, with prominent divisions between lobules
      - Ooze moisture and froth when cut
    - **Blood-stained froth in trachea**
    - Pinpoint hemorrhages on kidney surfaces
    - Hemorrhage and ulceration of stomach lining
    - **Congested, bloody intestinal tract**

- **Subacute lesions**

- Hemorrhagic thoracic and abdominal fluid (heart failure)
    - Hemorrhagic lymphadenomegaly
    - Fibrin on lung and heart surfaces
    - Firm lungs with mottled appearance (pneumonia)
    - Swollen joints with accumulated fluid and fibrin

- **Chronic lesions**

- Emaciation
    - Sores and ulcers over bony points
    - Firm enlarged lymph nodes
    - Fibrin on lung and heart surfaces
    - Swollen joints

- **Serology**

- ASF antibodies persist a long time
    - **Paired serum sample titers, IFA, immunoblotting**
    - **ELISA-** prescribed for international trade

- **Virus isolation**

- Inoculation of blood or tissue sample in primary culture of pig monocytes
  - **Hemadsorption** of pig RBCs to surface of infected cells supports diagnosis (some strains non-hemadsorbing)

- **Antigen detection** -**Direct immunofluorescence** on frozen tissue sections, buffy coat, tissue smears

- **PCR**

- Performed on tonsil scraping
  - Can detect virus before onset of clinical signs



*Markedly enlarged, dark spleen*



*Hemorrhagic kidneys*



*Hemorrhagic intestines*



*Hemorrhagic mesenteric lymph nodes*

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## Rx of choice: NO treatment

- ALL pigs on premises slaughtered
- Carcasses buried or incinerated

## Prognosis: No prognosis-slaughter

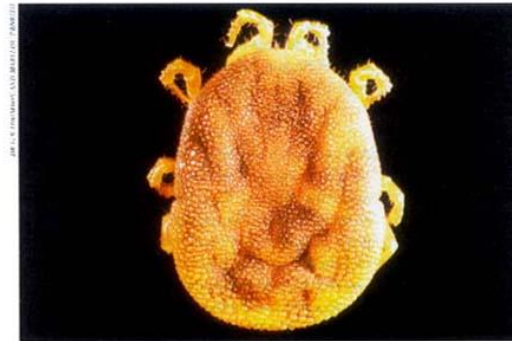
- **OIE 'priority' disease for international trade**
- Economically devastating disease
- **North America is ASF- free** but there is potential for introduction.
- Countries with ASF today
- Import and export bans of pigs and pork products to many countries

## Prevention:

- **NO effective vaccines** available
- Strict **biosecurity** and **sanitation** protocols
- **Importation restrictions** on pigs and pork products
  - Ensure infected live pigs or products do not enter ASF free areas
- **NEVER feed pigs undercooked garbage (swill) or pork products**
  - Many countries have banned swill feeding
- Eradication programs
  - Rapid diagnosis, slaughter and disposal of all animals on infected premises
  - Serologic survey of all pig farms within a specific control zone to identify all infected pigs
- **Africa:** Keep wart hogs and materials contaminated by wart hogs away from herd

## Pearls:

- Highly contagious **hemorrhagic** viral disease of **PIGS**
- **Clinically indistinguishable from Classical Swine Fever**
- Maintained in Africa by natural cycle of transmission
  - Wild African pig species (wart hog, bush pig, giant forest hog)
  - Soft eyeless argasid tick vector, *Ornithodoros moubata* (tampar)
  - Wart hogs become infected but **DO NOT** develop clinical signs
- Clinical disease only in domestic and feral pigs, European wild boar
- Virus spread to domestic pigs by (free-ranging village pigs common)
  - Infected tick bite
  - Ingestion of wart hog tissues
- **Asfivirus- ONLY** member of **Family Asfarviridae**
  - Large enveloped, DNA virus
  - **ONLY** DNA virus transmitted by **arthropods**
  - **Survives long time** in environment
  - Survive long periods in moist, protein-rich medium (especially cold, frozen)
  - Killed at high temperatures
    - Pig meat cooked at 158°F (70°C) for 30 minutes



Soft ticks inhabit wart hog burrows.  
(*Ornithodoros moubata*, tampar).  
Important vector of ASF

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- **Transmission**

- **Primary route** of infection- upper respiratory tract

- **Oronasal**
    - Blood
      - Pig fights
      - Bloody feces
      - Necropsy
    - Tick bites
    - **Ingestion of contaminated pig meat**
    - Fomites
      - Viral replication occurs primarily in tonsils, lymph nodes in head and neck and rapidly spreads via bloodstream
        - Virus present in all body fluids and tissues
        - Severe disruption to blood clotting mechanism major role in hemorrhagic lesions

- **Main method of transmission country to country**

- **Ingestion** of contaminated garbage or pork products
    - **Ships, planes, illegally imported pig meat by tourists**
    - **Outbreaks have occurred in Europe, Caribbean Islands, Brazil, Ukraine (2012)**

## Images worth a look:

- [The Center for Food Safety and Public Health, Iowa State University](#) - a plethora of ASF images
- [FAO.org African Swine Fever](#) – several images of ASF

See also the Merck Manual: [Hyperemia](#) of the skin of the ears; hemorrhagic [gastrohepatic](#) lymph node; generalized [hyperemia](#) of abdomen and legs; [hemadsorption](#) of RBCs to macrophages

**Refs:** [The Pig Site](#); [The Center for Food Safety and Public Health, Iowa State University](#); [FAO.org African Swine Fever](#); Jackson and Cockcroft, Handbook of Pig Medicine pp 184-185; Merck Manual, 10<sup>th</sup> ed (online): [African Swine Fever](#); Images courtesy of [FAO.org African Swine Fever](#) , unless otherwise noted

**My Notes:**