Disease Recognition
African Swine Fever Virus

- Asfavirus genus within the family Asfaviridae
- Virion is 200 nm in diameter and enveloped
- Double-stranded DNA genome varying in length from 170 to 190 kilobases
- Encodes 150 to 167 genes
- An estimated 1/3 to 1/2 of all genes are non-essential for virus replication but play other roles eg. evasion of host defenses
- The only known DNA arbovirus
- No effective vaccine
Viral factory

J. Virology (2011) 85: 8263-8269

Courtesy USDA/APHIS
Virus Survival and Inactivation

- **Resistant** to inactivation.
- **Virus** can **survive** for several weeks or **months** in frozen, fresh or uncooked meat as well as salted dried **meat products**.
- Virus can survive in blood stored at 4°C for 18 months and in putrefied blood for 15 weeks.
- Virus can **survive** in animal **feed** for **30 days** under simulated shipping conditions.
- Inactivated by lipid solvents and commercial disinfectants based on iodide and phenolic compounds, hypochlorites.
- Inactivated at pH < 3.9 and > 11.5.
- **Inactivated** in cooked or canned hams when these products are heated to **70°C**.
- Inactivated in cured Serrano and Iberian hams and shoulders at **122-140 days** of curing.
Susceptible Species

- Phacochoerus africanus
- Photamochoerus larvatus
- Ornithodoros moubata
- Sus scrofa
- Hylochoerus meinertzhageni

Sylvatic Cycle

- Photamochoerus larvatus
- Hylochoerus meinertzhageni
- Sus scrofa
Disease is characterized by a range of syndromes including peracute, acute, chronic and persistently infected carriers.

- The biological basis for persistence of ASFV is still not understood.

For purposes of the Terrestrial Code ASF is defined as an infection of suids (domestic and captive wild pigs, wild and feral pigs, and African wild suid species) with ASFV.

- ASFV has been isolated from samples from a suid.
- ASFV nucleic acid or antigen has been detected in samples from suids showing clinical signs or lesions suggestive of ASF.
- ASFV specific antibodies have been detected in samples from suids showing clinical signs or lesions consistent with ASF.

Disease is characterized by a range of syndromes including peracute, acute, chronic and persistently infected carriers.

- The biological basis for persistence of ASFV is still not understood.
Primary replication in monocyte-macrophage lineage cells

Additional cell types (endothelial cells, kidney, liver) become infected later in the disease

Cytokine-mediated lesions including apoptosis of uninfected lymphocytes and TNFα induced vascular permeability

Activation of endothelial cells and the coagulation system which leads to a consumption coagulopathy

Impairment of host innate immune function eg inflammation associated with the pathological dysregulation of the NF-κB pathway

Viral virulence factors and the mechanisms of disease are incompletely understood
ASFV Transmission

- Oronasal
  - Uncooked contaminated pork scraps (swill feeding)
  - Blood or bloody exudates from infected animals
  - ASFV titers in blood can range from $10^7$ to $10^8$ HAD$_{50}$/mL

- Bite from infected tick
  - Soft (Argasid) ticks
  - *Ornithodorus moubata* – Africa
  - *Ornithodorus erraticus* – Europe
African Swine Fever

How do wild boars become infected?

Materials
Contaminated materials, of hunters for example

Carcase
Carcase or possibly blood from an infected wild boar

Materials
Contaminated materials and livestock transport trucks

Pig
Direct contact with infected pig

Soft tick
Ticks are a source of infection in Africa, but there are no indications of this in Europe.

Feed
Kitchen waste, food residues and meat products from infected pigs and wild boars

Soft tick
Ticks are a source of infection in Africa, but there are no indications of this in Europe.

Boar
Direct contact with infected wild boar

How do pigs become infected?

Carcase
Carcase or possibly blood from an infected wild boar

Materials
Contaminated materials and livestock transport trucks

Pig
Direct contact with infected pig

Soft tick
Ticks are a source of infection in Africa, but there are no indications of this in Europe.

Feed
Kitchen waste, food residues and meat products from infected pigs and wild boars
Compared with CSF, the progression to death in the acute form of ASF tends to be more rapid. Animals can appear mild to moderately ill and then deteriorate rapidly.

### Clinical Signs

<table>
<thead>
<tr>
<th>Highly Virulent</th>
<th>Moderately Virulent</th>
<th>Low Virulent</th>
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<tbody>
<tr>
<td>Fever – 40.1°C to 41.7°C</td>
<td>Fluctuating to continuous fever</td>
<td>Low viremia and fever</td>
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<tr>
<td>Moderate anorexia</td>
<td>Moderate anorexia</td>
<td>Few deaths</td>
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<tr>
<td>Reddened skin</td>
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<td>Chronic skin ulcers</td>
</tr>
<tr>
<td>Leukopenia and thrombocytopenia</td>
<td>Abortions</td>
<td>Arthritis</td>
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<tr>
<td>High viremia</td>
<td>Leukopenia</td>
<td>Virus in tissues</td>
</tr>
<tr>
<td>Death in 5-12 days following first clinical signs</td>
<td>Lower viremia</td>
<td>Persistently infected pigs</td>
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<tr>
<td>~100% mortality</td>
<td>Death in 12-14 days following first clinical signs</td>
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<tr>
<td>DIC and hemorrhage</td>
<td>30-70% mortality</td>
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<td></td>
<td>Survivor pigs can recover and are protected against challenge with a lethal dose of related virulent viruses</td>
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