AFRICAN SWINE FEVER

AETIOLOGY

Classification of the causative agent

African swine fever virus (ASFV) is a DNA virus in the *Asfarviridae* Family; genus *Asfivirus.* ASFV is the sole member of its Family. Viral genotypes have been identified by sequence analysis. Virulence of ASFV isolates vary greatly and standard nomenclature of isolates includes City or Country of isolation and last two digits of year of isolation (e.g. Lisbon '60, DR '78). It is the only known DNA arbovirus.

Resistance to physical and chemical action

Temperature:	Highly resistant to low temperatures. Heat inactivated by 56°C/70 minutes; 60°C/20 minutes.
pH:	Inactivated by pH <3.9 or >11.5 in serum-free medium. Serum increases the resistance of the virus, e.g. at pH 13.4 – resistance lasts up to 21 hours without serum, and 7 days with serum.
Chemicals/Disinfectants:	Susceptible to ether and chloroform. Inactivated by 8/1000 sodium hydroxide (30 minutes), hypochlorites – 2.3% chlorine (30 minutes), 3/1000 formalin (30 minutes), 3% ortho-phenylphenol (30 minutes) and iodine compounds.
Survival:	Remains viable for long periods in blood, faeces and tissues; especially infected, uncooked or undercooked pork products. Can multiply in vectors (*Ornithodoros* sp.).

EPIDEMIOLOGY

ASF epidemiology is complex with different epidemiological patterns of infection occurring in Africa, Europe and Asia. ASF occurs through transmission cycles involving domestic pigs, wild boars, wild African suids, and soft ticks

Hosts

- All varieties of **Sus scrofa** (domestic and wild) are susceptible to the pathogenic effects of ASFV
- African wild suid species: warthogs (*Phacochoerus spp.*), bush pigs (*Potamochoerus* spp.), giant forest hogs (*Hylochoerus meinertzhageni*) are usually inapparently infected and act as reservoir hosts of ASFV
- Ticks of the genus *Ornithodoros* are the only known natural arthropod hosts of the virus and act as reservoirs and biological vectors

Transmission

- Direct transmission:
  - contact between sick and healthy animals
- Indirect transmission:
  - feeding on garbage containing infected meat (ASFV can remain infectious for 3–6 months in uncooked pork products)
  - biological vectors – soft ticks of the genus *Ornithodoros*
  - fomites include, premises, vehicles, implements, clothes
- Within tick vector: transstadial, transovarial, and sexual transmission occur

Sources of virus

- Blood, tissues, secretions and excretions of sick and dead animals
- Animals which have recovered from either acute or chronic infections may become persistently infected, acting as virus carriers; especially in African wild swine, and in domestic pigs and wild boar in endemic areas
- Soft ticks of the genus *Ornithodoros*

Occurrence

ASF is present in wild or domestic pigs in regions of Asia, Europe and Africa.

For more recent, detailed information on the occurrence of this disease worldwide, see the OIE World Animal Health Information Database (WAHID) interface [http://www.oie.int/wahis/public.php?page=home] or refer to the latest issues of the World Animal Health and the OIE *Bulletin*.

DIAGNOSIS

Incubation period in nature is usually 4–19 days; acute form 3–4 days. For the purposes of the OIE *Terrestrial Animal Health Code*, the incubation period in *Sus scrofa* shall be 15 days.

Clinical diagnosis

Peracute (highly virulent virus)

- Sudden death with few signs

Acute form (highly virulent virus)

- Fever (40.5–42°C)
- Early leucopoenia and thrombocytopenia (48–72 hours)
- Reddening of the skin (white pigs) – tips of ears, tail, distal extremities, ventral aspects of chest and abdomen
- Anorexia, listlessness, cyanosis and incoordination within 24–48 hours before death
- Increased pulse and respiratory rate
- Vomiting, diarrhoea (sometimes bloody) and eye discharges may occur
- Death within 6–13 days, or up to 20 days
- Abortion may occur in pregnant sow
- In domestic swine, the mortality rate often approaches 100%

Subacute form (moderately virulent virus)

- Less intense signs; slight fever, reduced appetite and depression
- Duration of illness is 5–30 days
- Abortion in pregnant sows
- Death within 15–45 days
- Mortality rate is lower (e.g. 30–70%, varies widely)

Chronic form (moderately or low virulent virus)

- Various signs: loss of weight, irregular peaks of temperature, respiratory signs, necrosis in areas of skin, chronic skin ulcers, arthritis
- Pericarditis, adhesions of lungs, swellings over joints
- Develops over 2–15 months
- Low mortality
- A small number of survivors may become virus carriers for life

Lesions

Acute form (not all lesions are seen; this depends on the isolate)

- Pronounced haemorrhages in the gastrohepatic and renal lymph nodes
- Petechial haemorrhages of the renal cortex, also in medulla and pelvis of kidneys
- Congestive splenomegaly
- Oedematous areas of cyanosis in hairless parts
- Cutaneous ecchymoses on the legs and abdomen
- Excess of pleural, pericardial and/or peritoneal fluid
- Petechiae in the mucous membranes of the larynx and bladder, and on visceral surfaces of organs
- Oedema in the mesenteric structures of the colon and adjacent to the gall bladder; also wall of gall bladder

Chronic form

- Focal caseous necrosis and mineralisation of the lungs may exist
- Lymph nodes enlarged

Differential diagnosis

- Classical swine fever (CSF or hog cholera)
    - not possible to differentiate ASF and CSF by clinical or post-mortem examination; essential to send samples for laboratory examination
- Porcine reproductive and respiratory syndrome (PRRS)
- Erysipelas
- Salmonellosis
- Aujeszky's disease (or pseudorabies) [younger swine]
- Pasteurellosis
- other septicaemic conditions

Laboratory diagnosis

Samples

Identification of the agent

- A complete set of field samples should be submitted and especially:
    - blood collected during the early febrile stage in EDTA (0.5%)
    - spleen, lymph nodes, tonsil, lungs, kidney and bone marrow kept at 4°C

Serological tests

- Serum collected within 8–21 days after infection in convalescent animals

Procedures

Identification of the agent

- Isolation:
    - cell culture inoculation (primary cultures of pig monocytes or bone marrow cells – most isolates produce haemadsorption)
- a) Haemadsorption test (HAD) in primary leukocyte cultures – positive HAD test result is definitive for ASF diagnosis, negative HAD samples should also be tested by PCR to rule out the presence of virus
- b) Antigen detection by fluorescent antibody test (FAT) – positive FAT plus clinical signs and appropriate lesions can provide a presumptive diagnosis of ASF

- c) Detection of virus genome by the polymerase chain reaction – PCR techniques are particularly useful when samples may be unsuitable for virus isolation or antigen detection (putrefaction)d) Pig inoculation is no longer recommended for use

Serological tests

- a) Enzyme-linked immunosorbent assay
- b) Indirect fluorescent antibody (IFA) test – should be used as a confirmatory test for sera from areas that are free from ASF and are positive in the ELISA, and for sera from endemic areas that give an inconclusive result in the ELISA
- c) Immunoblotting test or immunoperoxidase staining – used as an alternative to the IFA test to confirm equivocal results with individual sera

For more detailed information regarding laboratory diagnostic methodologies, please refer to Chapter 2.8.1 African swine fever in the latest edition of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* under the heading "Diagnostic Techniques" .

PREVENTION AND CONTROL

Sanitary prophylaxis

ASFV-recovered carrier swine and persistently infected wild pigs require special consideration in controlling the disease.

Free countries

- Careful import policy for animals and animal products
- Proper disposal of waste food from aircraft or ships coming from infected countries
- Efficient sterilisation of garbage

In outbreaks

- Rapid slaughtering of all pigs and proper disposal of cadavers and litter is essential
- Thorough cleaning and disinfection
- Designation of infected zone, with control of pig movements
- Detailed epidemiological investigation, with tracing of possible sources (up-stream) and possible spread (down-stream) of infection
- Surveillance of infected zone, and surrounding area

Infected countries

- Avoid contact between pigs, wild suids and soft tick vectors or their habitats (Africa) – i.e. prevent pigs from wandering

Medical prophylaxis

- No treatment
- No vaccine to date

For more detailed information regarding safe international trade in terrestrial animals and their products, please refer to the latest edition of the OIE *Terrestrial Animal Health Code*.

REFERENCES AND OTHER INFORMATION

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The OIE will periodically update the OIE Technical Disease Cards. Please send relevant new references and proposed modifications to the OIE Scientific and Technical Department (scientific.dept@oie.int). Last updated October 2018.