African Swine Fever

Pesti Porcine Africaine, Peste Porcina Africana, Maladie de Montgomery

Importance

African swine fever is a serious viral disease of pigs, endemic in Africa. Isolates vary in virulence from highly pathogenic strains that cause near 100% mortality to low-virulence isolates that can be difficult to diagnose. Disease outbreaks have occurred in numerous countries and the cost of eradication has been significant. During outbreaks in Malta and the Dominican Republic, the swine herds of these countries were completely depopulated.

Etiology

African swine fever results from infection by the African swine fever virus (ASFV). Formerly classified as a member of the Iridoviridae, this virus is currently the only member of a family called "Asfarviridae." The ASF virus is the only DNA virus that is transmitted by arthropods. The virulence of virus isolates varies.

Species affected

African swine fever affects domestic pigs and wild pigs, including the warthog, bush pig, and giant forest hog in Africa and the feral pig in the island of Sardinia, Italy. Symptomatic infections occur in domestic pigs and feral pigs; infections are generally asymptomatic in warthogs, bush pigs, and giant forest hogs.

Geographic distribution

African swine fever is endemic in most of sub-Saharan Africa; the highest incidence of disease is seen from the Equator to the northern Transvaal. This disease is also found in feral pigs in Sardinia, Italy.

Transmission

African swine fever can be transmitted by direct contact with infected animals, indirect contact on fomites, and by tick vectors. Transmission during direct contact is usually by oronasal spread. African swine fever virus can be found in all tissues and body fluids, but particularly high levels are found in the blood. Massive environmental contamination may result if blood is shed during necropsies or pig fights, or if a pig develops bloody diarrhea. The virus can also spread on fomites, including vehicles, feed, and equipment. There is evidence that some pigs may become carriers.

African swine fever often spreads to new areas when pigs are fed uncooked scraps that contain ASFV-infected pork. In one outbreak, pigs became infected after being fed the intestines of guinea fowl that had eaten infected ticks. The African swine fever virus is highly resistant to environmental conditions. It can survive for 15 weeks in chilled meat, a year and a half in blood stored at 4º C, 11 days in feces at room temperature, and at least a month in contaminated pig pens. The virus will also remain infectious for 150 days in boned meat stored at 39º F, 140 days in salted dried hams, and several years in frozen carcasses.

African swine fever is also spread through the bite of infected soft ticks *Ornithodoros spp*.ticks. In tick populations, transstadial, transovarial, and sexual transmission occur. In Africa, this disease is thought to cycle between newborn warthogs and the soft ticks that live in their burrows. Infected soft tick colonies can maintain the ASF virus for long periods of time, measured in years.

Incubation period

The incubation period is 5 to 15 days.

Clinical signs

African swine fever can be a peracute, acute, subacute, or chronic disease. More virulent isolates cause a high fever, moderate anorexia, leukopenia, recumbency, and skin reddening that is most apparent in white pigs. Some pigs develop cyanotic skin blotching on the ears, tail, lower legs, or hams. Diarrhea and abortions are sometimes seen, but most pigs infected with this virus remain in good condition. In infections with highly virulent isolates, progressive anorexia and depression develop and are usually followed by death within 7 to 10 days. The death rate is generally lower in animals infected with moderately virulent isolates, but may still be very high in very young animals.

Animals infected with isolates of low virulence may seroconvert without symptoms, abort, or develop chronic African swine fever. The symptoms of chronic disease are a low fever, which may recur, and sometimes pneumonia or painless swelling of the joints, particularly the carpal and tarsal joints. Reddened foci may appear on the skin and become raised and necrotic. In some cases, the only clinical signs may be emaciation and stunting. Chronic African swine fever can be fatal.

Post mortem lesions

The most consistent and characteristic lesions occur in the spleen and lymph nodes. In animals infected with highly virulent isolates, the spleen is usually very large, friable, and dark red to black. In pigs infected with moderately virulent isolates, the spleen is also enlarged, but not friable, and the color is closer to normal. The lymph nodes are often swollen and hemorrhagic and may look like blood clots; the nodes most often affected are the gastrohepatic, renal, and mesenteric lymph nodes. Edema may also be seen in other lymph nodes, and the tonsils are often swollen and reddened.

Less consistent clinical signs include hemorrhages, petechiae, and ecchymoses in other organs. Petechiae may be present on any organ, but most are located on the renal cortex, bladder, lungs, and heart. Ecchymoses and “paint-brush” hemorrhages are often found on the serosa of the stomach and intestines. Edema may be seen in the lungs and gall bladder, and the pleural, pericardial, and peritoneal cavities may contain excess fluid. In some pigs, dark red or purple areas may be found on the skin of the ears, feet, and tail. Aborted fetuses may be anasarcous, have a mottled liver, and contain petechiae in the placenta, skin, and myocardium.

In animals with chronic African swine fever, the most common post-mortem lesions are focal areas of skin necrosis, consolidated lobules in the lung, fibrinous pericarditis, generalized lymphadenopathy, and swollen joints.

Morbidity and Mortality

In domestic pigs, morbidity approaches 100% in herds that have not been previously exposed to the virus. Mortality varies with the virulence of the isolate, and can range from 0% to 100%. Low virulence isolates are more likely to be fatal in pigs with a concurrent disease, pregnant animals, and young animals. Mild or asymptomatic disease is usually seen in warthogs and bush pigs.

No treatment or vaccine exists for this disease.

Diagnosis

Clinical

African swine fever should be suspected in pigs with a fever, when the necropsy findings include a very large, friable, dark red to black spleen and greatly enlarged and hemorrhagic gastrohepatic and renal lymph nodes.

Differential diagnosis

The differential diagnosis includes hog cholera (classical swine fever), erysipelas, salmonellosis, eperythrozoonosis, pasteurellosis, Aujeszky's disease, thrombocytopenic purpura, warfarin poisoning, and heavy metal toxicity.

Laboratory tests

In areas where African swine fever is not endemic, this disease should be diagnosed by virus isolation and the detection of viral antigens. Blood and tissue samples from suspect pigs are inoculated into pig leukocyte or bone marrow cultures for virus isolation. African swine fever virus induces hemadsorption of pig erythrocytes to the surface of infected cells. The virus can also be detected with peripheral blood leukocytes from infected pigs in a hemadsorption "autorosette" test.

African swine fever virus antigens can be found in tissue smears or cryostat sections by the fluorescent antibody test (FAT). Nucleic acids can be detected by a polymerase chain reaction (PCR) assay. PCR is particularly useful in putrefied samples that cannot be used for virus isolation and antigen detection.

Serology is carried out simultaneously with virus isolation. Antibodies to ASFV persist for long periods of time after infection. Serology may also be used for diagnosis in endemic areas. Available serologic tests include the enzyme-linked immunosorbent assay (ELISA), immunoblotting, indirect fluorescent antibody (IFA), and counter immunoelectrophoresis (immunoelectro-osmophoresis) tests. The ELISA is prescribed for international trade.

Samples to collect

Before collecting or sending any samples from animals with a suspected foreign

animal disease, contact the AVIC. These samples should only be sent under secure conditions, by authorized personnel, and to authorized laboratories to prevent the spread of disease.
For virus isolation from live animals, blood should be collected into an anticoagulant and antibiotics should be added. At necropsy, samples of the spleen, lung, liver, kidney, and tonsils, as well as the submandibular, inguinal, and gastrohepatic lymph nodes should be collected aseptically. Samples of the bone marrow should be sent if significant postmortem changes are seen. ASFV is not found in aborted fetuses; in cases of abortion, a blood sample should be collected from the dam. Samples for virus isolation should be transported cold on wet ice or frozen gel packs.

Samples of the same tissues, the brain, and any other grossly abnormal tissues should be submitted for histology. Serum and/ or tissue fluids should be submitted for serology

Recommended actions if African swine fever is suspected

Notification of authorities

African swine fever should be reported to state or federal authorities immediately upon diagnosis or suspicion of the disease. Federal: Area Veterinarians in Charge (AVICS)
http://www.aphis.usda.gov/vs/area_offices.htm
State vets: http://www.aphis.usda.gov/vs/sregs/official.html

Quarantine and Disinfection

To prevent introduction of the African swine fever virus into areas free of the disease, all garbage fed to pigs should be cooked. Unprocessed meat must be heated to at least 70ºC for 30 minutes to inactivate the virus; 30 minutes at 60ºC is sufficient for serum and bodily fluids.

African swine fever is a contagious disease. Eradication is by slaughter of infected and in-contact animals, and disposal of carcasses, often by burying, rendering or burning. Strict quarantine must be imposed, and potential tick vectors should be controlled with acaricides. In cases of ASF outbreaks, there must be a detailed entomological investigation for the possibility of soft tick vectors and their role as long term carriers. In the outbreaks in the Americas, the Ornithodoros ticks never became chronically infected. But in Spain, Portugal and Africa, infected soft ticks can carry the ASFV for many years. Many common disinfectants are ineffective; care should be taken to use a disinfectant specifically approved for African swine fever. Sodium hypochlorite and some iodine and quaternary ammonium compounds are effective.

Public health

Humans are not susceptible to African swine fever virus.

For More Information

World Organization for Animal Health (OIE)
http://www.oie.int

OIE Manual of Standards

http://www.oie.int/eng/normes/mmanual/a_summry.htm

OIE International Animal Health Code
http://www.oie.int/eng/normes/mcode/A_summry.htm

USAHA Foreign Animal Diseases book
http://www.vet.uga.edu/vpp/gray_book/FAD/

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