

# AFRICAN SWINE FEVER VIRUS

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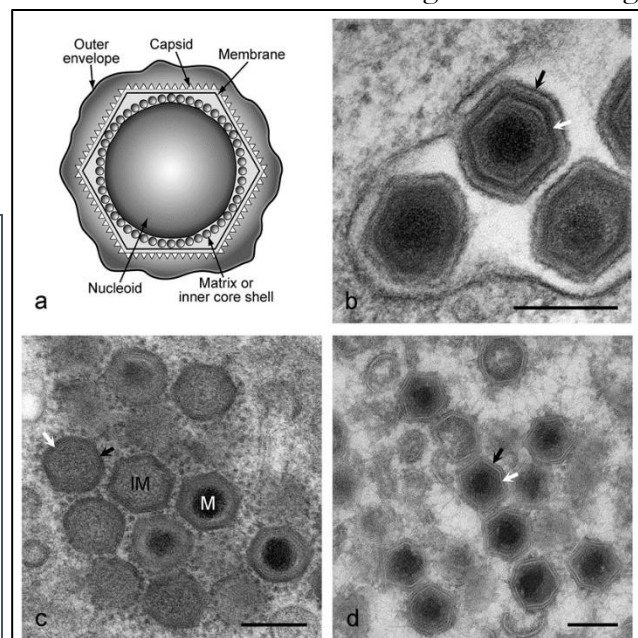
African swine fever (ASF) is one of the most dangerous emerging swine diseases worldwide and has a devastating economic impact on hog farms and the hog industry. The disease was first discovered in Kenya in the 1920s and has since spread to other regions<sup>1</sup>. ASF is a notifiable disease with the World Organization for Animal Health<sup>1</sup>. So far ASF has not been introduced into the United States; however, producers and packers need to be aware and watch for the disease. This handout is to provide a basic overview and increase awareness of ASF for individuals engaged in the pork industry, ranging from live hogs to ready to eat pork.

## What is ASF?

African swine fever is caused by a DNA arbovirus belonging to the *Asfarviridae* family; genus *Asfivirs*<sup>2</sup>. ASF is unique in its nature because it is the only known arthropod-borne DNA virus<sup>1</sup>. Current available molecular data has indicated only one ASF virus variant using standardized genotyping procedures<sup>5</sup>. Researchers are working on identifying additional genome markers to better determine the source and evolution among the circulating virus<sup>5</sup>. Classified as a non-zoonotic disease, ASF is not dangerous to humans and pork products from pigs affected by ASF are safe for human consumption<sup>2</sup>.

Asfarviridae. (a) Diagram of extracellular ASF virus virions showing nucleoid, inner core shell, internal membrane, capsid and outer envelope. (b) EM image of extracellular virions. Black arrow shows the outer envelope, white arrow shows the capsid. Bar = 200 nm (c) EM image of intracellular virions. IM=immature virion, M=mature virion. Black arrow shows capsid protein, white arrow shows virus membrane. Bar=200 nm (d) EM image of intracellular virions. Black arrow shows capsid protein, white arrow shows virus membrane. Bar=200 nm.

\* taken from ICTV Report, *Asfarviridae*



## How is ASF Transmitted?

ASF affects members of the Suidae family; including domesticated swine, Eurasian wild boars, warthogs, bush pigs, and giant forest hogs<sup>3</sup>. Warthogs and bush pigs are considered wildlife reservoirs of the virus and are typically asymptomatic<sup>3</sup>. Soft ticks of the genus *Ornithodoros* are common biological vectors that use transstadial, transovarial, and sexual transmission<sup>2</sup>. An article, released by Iowa State University College of Veterinary Medicine, claims that “other bloodsucking insects such as mosquitoes and biting flies might be able to transmit ASF(V) mechanically” and could transmit the virus 24 hours after feeding on infected pigs under experimental conditions.

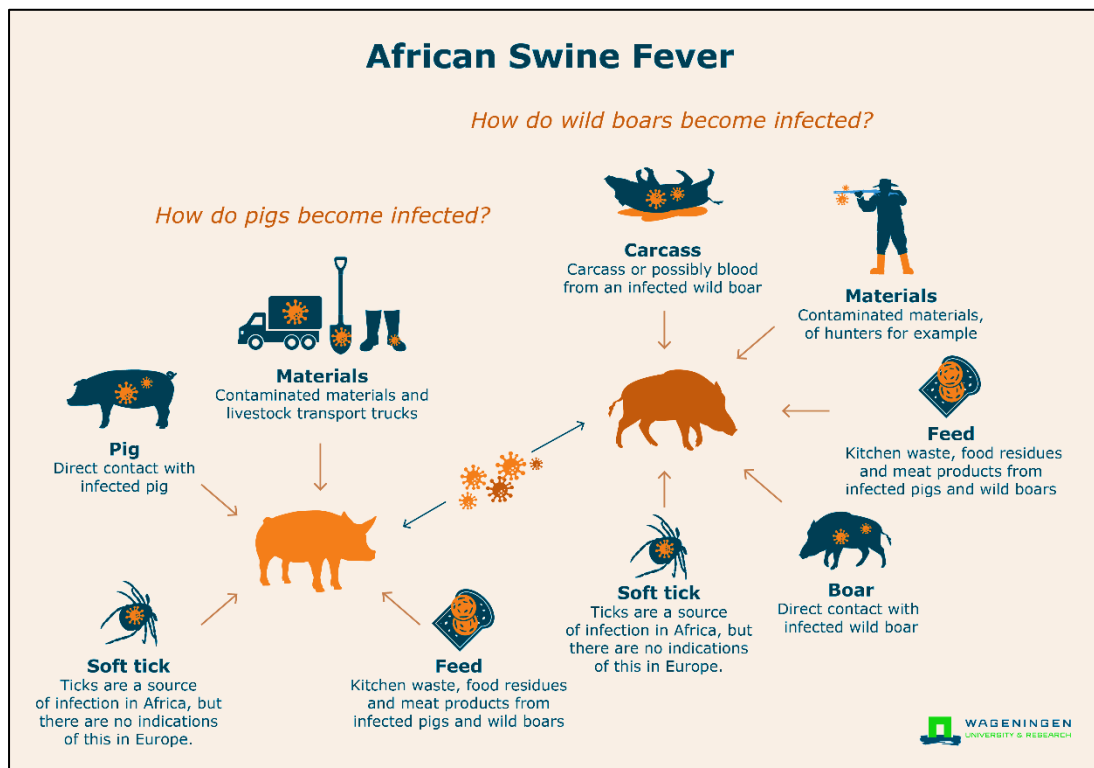


Image taken from Wageningen University & Research, *African Swine Fever (ASF) in Europe*

Pigs can contract ASF from direct contact with other sick or previously sick animals. It is thought to primarily enter the body through the upper respiratory tract from secretions and excretions of sick pigs and over relatively short distances via aerosolized viruses<sup>3</sup>. The virus can be shed and transmitted from the tissues of domesticated pigs for at least 70 days. Other means of transmission include the feeding of swill or garbage to swine containing infected meat. It is reported that ASF can survive in blood for a year and a half, 150 days in boned meat, 140 days in salted, dried hams, and several years in frozen carcasses<sup>3</sup>. Vehicles, implements, clothes, waste, equipment, feed, and workers can also serve as vectors of ASF and spread the disease.

## What are the symptoms?

<b>Peracute (highly virulent virus)</b>
Sudden death with few signs
<b>Acute form (highly virulent virus)</b>
Fever (40.5–42°C)
Early leucopenia 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, diarrhea (sometimes bloody) and eye discharges may exist
Death within 6–13 days, or up to 20 days
Abortion may occur in pregnant sow
Survivors are virus carriers for life
In domestic swine, the mortality rate often approaches 100%
<b>Subacute form (moderately virulent virus)</b>
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)
<b>Chronic form (moderately or low virulent virus)</b>
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



Dead pig with general reddening of the skin (cyanosis)

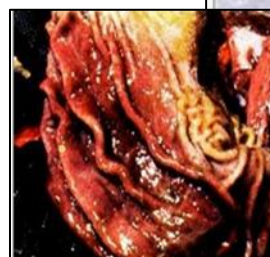


Hyperaemia of the back and tail

<b>Lesions</b>
<b>Acute form (not all lesions are seen; this depends on the isolate)</b>
Pronounced hemorrhages in the gastrohepatic and renal lymph nodes
Petechial hemorrhages 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
Excess of pleural, pericardial and/or peritoneal fluid
Petechiae in the mucous membranes of the larynx and bladder, and on visceral surfaces of
Oedema in the mesenteric structures of the colon and adjacent to the gall bladder; also wall of gall bladder
<b>Chronic form</b>
Focal caseous necrosis and mineralization of the lungs may exist
Lymph nodes enlarged
<i>*all symptoms were retrieved from OIE</i>



Enlarged spleen (top)  
normal spleen (bottom)



Oedema and haemorrhagia of the intestine

All age groups of pigs are susceptible to ASF<sup>9</sup>.

*\*images taken from AHP Disease Manual, Food and Agriculture Organisation of the United Nations Secretariat of the Pacific Community*

## How can I Treat for ASF?

Currently, there are not any treatments or vaccines available for ASF other than supportive care. According to the USDA, “prevention, control, and eradication of the disease are mainly based on the implementation of strict and complex sanitary measures”<sup>9</sup>. There have been several eradications of ASF over the years in multiple countries. The slaughter of infected pigs and in-contact animals, safe carcass disposal, sanitation, disinfection, and quarantine protocols were implemented to control ASF<sup>3</sup>.

## How do I Prevent ASF?

ASF is immune to many common disinfectants. Therefore, care should be taken to use a disinfectant that is effective against the virus. It has been reported that ASF can be inactivated by sodium hypochlorite, citric acid, iodine compounds, and some quaternary ammonium compounds<sup>3</sup>. It is also susceptible to chloroform, chlorine, and ether<sup>2</sup>. ASF is resistant to low temperatures but is disabled by temperatures over 70 degrees Celsius<sup>3</sup>.

## What is the Global Impact?

ASF is endemic to most of sub-Saharan Africa, some countries in West Africa, Madagascar, and Sardinia. Reported ASF outbreaks have also occurred in the Caucasus region of Eurasia, the Republic of Georgia, Lithuania, Latvia, and Poland<sup>3</sup>. In 2017, it was reported that more than 1,000 outbreaks of ASF

The distribution of the disease since 2016 is illustrated in Figure 1.

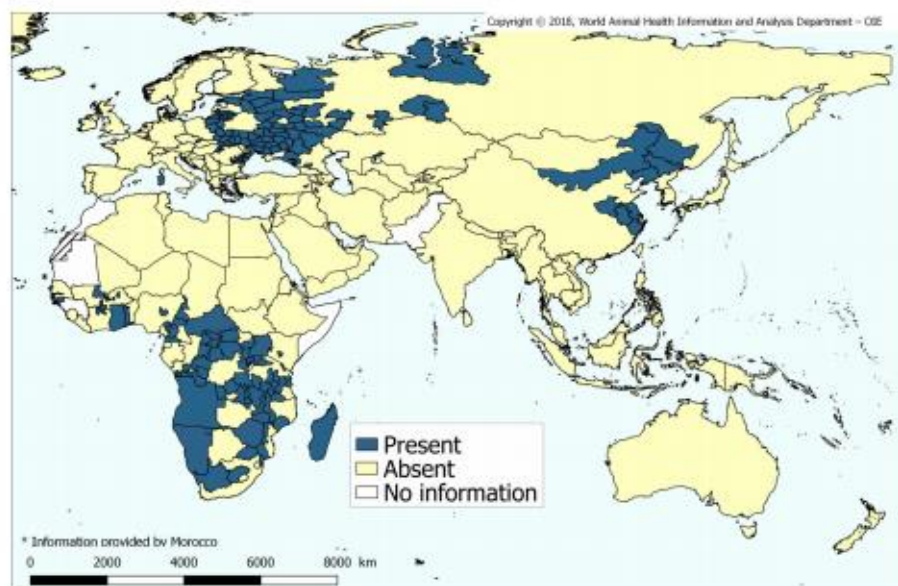


Figure 1. Global situation of ASF (2016-2018)

Figure 1 taken from the OIE, *Global Situation of ASF*

had occurred in 46 regions across Russia from 2007 to 2017 and resulted in the deaths of approximately 800,000 pigs<sup>7</sup>. As of August of 2018, China has reported three outbreaks of ASF<sup>9</sup>. It is believed that the virus came to China via trade with Russia and the concern is that the virus will spread to the eastern-third of China which produces an estimated 433 million pigs, or over half of the global population of domestic swine<sup>9</sup>. This would have a devastating impact for the pork industry. So far ASF has not been reported in the United States, Canada, Australia, or New



Zealand<sup>1</sup>. The World Organization for Animal Health considers ASF to be a “trade limiting foreign animal disease of swine” and there are international trade restrictions for countries with confirmed cases of ASF<sup>4</sup>.

With recent outbreaks, lack of treatment, and high mortality associated with ASF, the virus has become a global economic concern. To maximize scientific knowledge and generate tools and resources of international partners, the Global African Swine Fever Research Alliance (GARA) was established to contribute to the control of ASF<sup>9</sup>. The USDA has developed and is enforcing strict animal health and import requirements to prevent entry of ASF into the United States. A national response plan has also been developed for ASF by USDA veterinary services<sup>4</sup>. Even with these precautions, it is up to the producer, farm manager, packer, and distributor to remain vigilant to protect and prevent against ASF and to report any possible outbreaks.



Image taken from United States Animal Health Association



Image taken from Montana Public Radio

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