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African Swine Fever: A Silent Threat to Pig Farming

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Introduction:

Domestic pigs are one of the most important livestock animals in many parts of the world, providing meat and income to millions of farmers. However, pigs are affected by several diseases caused by bacteria, viruses, and fungi. Bacterial: Erysipelas, Leptospirosis, Salmonellosis, E. coli diarrhea. Viral: ASF, CSF, PRRS, Swine influenza, PCV2. Fungal: Ringworm, Candidiasis, Aspergillosis, Mycotoxicosis. These diseases can reduce growth, affect reproduction, increase treatment costs, and sometimes lead to heavy economic losses. Among them, viral diseases such as African swine fever and classical swine fever are especially feared, while bacterial infections like erysipelas and E. coli diarrhea are commonly seen in farms. Fungal infections are less common but can still affect the health and productivity of pigs, particularly when feed becomes contaminated. Understanding the common diseases of pigs is the first step toward better prevention, timely treatment, and successful pig farming.

African Swine Fever Virus (ASFV):

It is a viral disease of swine that leads to a high mortality in domestic pigs while being asymptomatic in the natural suid reservoir hosts [1,2,3]. It causes important economic losses that are unavoidable in the absence of an effective vaccine and the available methods of disease control are the quarantine of the affected area and the slaughter of the infected animals [4]. ASF is caused by the ASF virus (ASFV), a double-stranded DNA virus with a complex molecular structure. It is the only member of the Asfarviridae family [5] and the only DNA virus transmitted by arthropods, soft ticks of the Ornithodoros genus [3,6]. Soft ticks (Ornithodoros moubata) are involved in the sylvatic transmission cycle of the virus in Africa and O. erraticus in Europe. The wild boar that suffers an acute disease similar to the domestic pig appears to be relevant in the transmission cycle in Europe.

Due to the absence of vaccines with protective efficacy, ASF represents a serious threat to all

European countries. The epidemiological complexity of ASF has been clearly demonstrated in eastern and southern Africa, where genetic characterization of ASFV based on sequence variation in the C-terminal region of the B646L gene encoding the major capsid protein p72, revealed the presence of 22 genotypes [7,8].

African Swine Fever (ASF) is a highly contagious viral disease of pigs that has become a major concern for pig farmers across the world. According to WOAH (World Organization for Animal Health), the disease affects both domestic and wild pigs and can cause very high mortality during outbreaks. Importantly, ASF does not infect humans and is not a food safety risk.

To prevent the spread of ASF at global level through movement of livestock, countries are advised to follow international standards as outlined by the World Organization for Animal Health OIE (9).

The disease spreads through contact with infected pigs, contaminated feed, pork products, vehicles, equipment, clothing, and footwear. Common signs include high fever, loss of appetite, weakness, skin discoloration, diarrhea, breathing difficulty, and sudden death.

There is no specific treatment for ASF, so prevention is the best protection. Farmers should maintain strict biosecurity, avoid feeding uncooked kitchen waste, quarantine newly purchased pigs, and regularly clean and disinfect pig sheds.

Early reporting of suspected cases and quick veterinary action are essential to prevent the spread of the disease. By following proper biosecurity and awareness measures, farmers can protect their pigs and reduce heavy economic losses caused by African Swine Fever.

Transmission:

Most isolates of ASFV cause an acute haemorrhagic fever in domestic pigs which results in mortality approaching 100 per cent within 8–12 days postinfection. The onset of viraemia is observed from 3 days post-infection and can rise to a peak of over 108 HAD (haemadsorption units)50 ml21. Moderately virulent isolates and low virulent isolates have also been described and recovered pigs can remain persistently infected for periods of 6 months or more (10,11). Recovered pigs may transmit virus to uninfected pigs either directly or through ingestion of infected pork products.

Transmission through direct contact between domestic pigs can occur for up to 30 days after infection, or for eight weeks in the case of contact with blood products, e.g. during fighting or mating (10). The virus can spread through direct contact with infected pigs and through contaminated feed, pork products, clothing, foot wear, vehicles and farm equipment. Wild pigs and contaminated materials can also contribute to its spread. Poor farm hygiene and movement of infected animals can increase the risk of outbreaks. Pig-to-pig transmission is most likely. Bushpigs (red river hogs) are present in endemic areas (12)

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Signs and Symptoms:

In the acute form of the disease caused by highly virulent strains, pigs may develop a high fever, but show no other noticeable symptoms for the first few days. They then gradually lose their appetites and become depressed. The skin of infected pigs, particularly in areas such as the ears, abdomen, and limbs, may exhibit red or purple spots (petechiae), or widespread hemorrhagic lesions across the body. Groups of infected pigs lie huddled together shivering, breathing abnormally, and sometimes coughing. If forced to stand, they appear unsteady on their legs; this is called congenital tremor type A-I in newborn piglets. Within a few days of infection, they enter a comatose state and then die. In pregnant sows, spontaneous abortions may occur. In milder infections, affected pigs lose weight, become thin, and develop signs of pneumonia, skin ulcers, and swollen joints.

Post-mortem Lesions in African Swine Fever:

Infected splenic macrophages fixed to smooth muscle fibres, a distinct cell population of the porcine spleen (20), induce the loss of intercellular junctions and the exposure of the basal lamina, initiating the coagulation cascade, platelet aggregation, and fibrin deposition (19,21). Haemorrhages are also frequent in other organs without the macrophages population fixed to smooth muscle cells, such as the lymph nodes, kidneys, or skin (19).

- ***Enlarged spleen (splenomegaly)***: dark red to black, swollen and friable; this is the most characteristic lesion.
- ***Enlarged hemorrhagic lymph nodes***: especially gastrohepatic, renal and mesenteric lymph nodes; they appear dark red and blood-filled. Petechial and ecchymotic hemorrhages in kidneys, heart, urinary bladder and other organs.
- ***Kidneys***: show multiple pinpoint hemorrhages on the surface ("turkey egg kidney").
- ***Lungs***: may be congested, edematous and sometimes hemorrhagic.
- ***Serous cavities (thorax and abdomen)***: may contain straw-colored or blood-tinged fluid.
- ***Gall bladder***: wall edema may be present.
- Tonsils and gastrointestinal mucosa may show congestion and hemorrhages.
- Skin of ears, abdomen and limbs may show cyanosis or hemorrhagic discoloration.

How Can Farmers Protect Their Pigs?

Farmers should maintain strict biosecurity on their farms. Important measures include:

Measures to prevent African Swine Fever (ASF) in pig farming:

Before ASF enters a pig farm, strict biosecurity measures are the most important protection. Purchase pigs only from healthy, trusted farms, reliable and approved sources. Keep newly purchased pigs in quarantine for 21–30 days. the Philippines implemented an effective policy incorporating quarantine and control of waste food from ships and planes (13). Do not allow visitors, vehicles, or equipment to enter the farm without proper cleaning and disinfection. Provide clean feed and water; avoid feeding kitchen waste or uncooked swill. Avoid feeding pigs potentially contaminated pork products or food waste Control ticks, rodents, and other animals that may spread infection. Use separate footwear and clothing for farm workers. Clean and disinfect pig sheds, feeders, and drinkers regularly. Isolate sick pigs immediately and report unusual fever or sudden deaths to a veterinarian. Monitor pigs daily for unusual illness or deaths. Limit unnecessary visitors and farm entry. Dispose of dead pigs safely by deep burial or incineration. Maintain proper farm records and monitor pig health daily. These preventive measures help reduce the risk of ASF entering and spreading within a pig farm.

The clinical symptoms of ASFV infection are very similar to classical swine fever, and the two diseases normally have to be distinguished by laboratory diagnosis. This diagnosis is usually performed by an ELISA, real time PCR, or isolation of the virus from either the blood, lymph nodes, spleen, or serum of an infected pig.

Confirmative Diagnosis:

Suspected ASF samples such as blood, spleen, lymph nodes, tonsils, and kidney tissues should be collected by a veterinarian and submitted to the nearest Assistant Director, Disease Investigation Laboratory (ADDL)

The ADDL will forward the samples to the designated State Disease Diagnostic Laboratory (SDDL), Tirupati, Andhra Pradesh – has molecular and high-containment diagnostic facilities for animal diseases. Regional Disease Diagnostic Laboratory (RDDL), Gannavaram (Vijayawada region), Andhra Pradesh – regional referral laboratory for animal disease diagnosis and surveillance.

Southern Regional Disease Diagnostic Laboratory (SRDDL), Bidar, Karnataka – provides primary and confirmatory diagnostic services for economically important livestock diseases for southern states.

National Institute of High Security Animal Diseases (NIHSAD), Bhopal, Madhya Pradesh – the premier national reference laboratory for ASF confirmation in India.

Control After Confirmation of ASF:

ASF has a severe socio-economic impact, both in areas where it is newly introduced and where it is endemic. The high impact is most apparent in countries with a significant commercial pig industry. In

Africa, ASF has potentially devastating effects on the commercial and subsistence pig production sectors, but the greatest losses are usually inflicted on the poorer pig producers who are less likely to implement effective prevention and control strategies (14) or basic biosecurity. The farmers also often lack financial resources to restart production in the absence of compensation schemes**.** In an ASF-confirmed pig farm, all infected and in-contact pigs should be humanely stunned and culled as per government veterinary guidelines. People handling sick or dead pigs should use gloves, boots, and protective clothing, wash hands thoroughly, and disinfect equipment and vehicles. Movement of pigs, feed, equipment, and vehicles should be stopped immediately, and the farm should be placed under strict quarantine. Carcasses must be disposed of safely by deep burial with lime or by incineration to avoid environmental contamination. The pig sheds, feeders, drinkers, and surrounding areas should be thoroughly cleaned and disinfected, and the farm should remain free of pigs for the recommended fallow period before restocking. Pork from affected animals should not be sold, transported, or consumed, and carcasses must be disposed of safely by burial or incineration.

Safe Carcass Disposal:

ASFV can persist in tissues for several months and the exposure of domestic pigs to poorly disposed-of carcasses or the feeding of frozen or insufficiently cooked or cured pork products can result in infection (10). ASFV can persist in the environment for several days. For example, contaminated pig pens in the tropics were shown to remain infectious to domestic pigs for 3 days, but not for 5 days (15). The resistance of virus to inactivation (10) means transmission by fomites, such as clothing, equipment and vehicles, is a risk. So Immediate carcass disposal is necessary.

Pigs that die from African Swine Fever should be disposed of safely to prevent spread of the virus. Deep burial is commonly used, and the carcass and burial pit should be covered with quick lime (calcium oxide). Incineration may be used where facilities are available. The disposal area should be protected from dogs, birds, and other scavengers. After disposal, the site, vehicles, and equipment should be disinfected using 1% sodium hypochlorite, 4% formaldehyde, or bleaching powder solution containing about 2–3% available chlorine, as recommended under veterinary biosecurity practices. In contrast, extensive pig production systems with poor biosecurity facilitate the establishment of the disease in the first place, as was seen in Portugal and southwest Spain in 1960 (16).

Cleaning and Disinfection of ASF-Affected Pig Farms:

Due to lack of implementation of a slaughter and compensation policy in the country, and given the widespread occurrence of the disease with potential involvement of sylvatic reservoirs, ASF is likely to become established as an endemic disease (17). As per standard veterinary biosecurity and ASF control SOPs, after culling and safe carcass disposal, all organic material such as dung, feed, bedding, and blood should be completely removed from the pig sheds. The farm should first be washed with water and detergent, followed by disinfection using 1% sodium hypochlorite, 4% formaldehyde, or bleaching powder solution containing 2–3% available chlorine. Floors, walls, pens, drains, equipment, vehicles, and surrounding areas should be thoroughly treated. After drying, formaldehyde fumigation may be carried out in closed sheds using 40 mL formalin and 20 g potassium permanganate per cubic meter of space, and the shed should remain closed for 12–24 hours before ventilation. Disinfection is usually repeated after 5–7 days, and the farm should be kept vacant for at least 40 days before restocking, subject to the directions of the veterinary authorities.

These measures help break the transmission cycle and protect nearby pig farms from ASF. Public awareness, reporting of sudden pig deaths, and cooperation with veterinary authorities are essential to protect the pig population and prevent economic losses.

Treatment and Vaccine:

- No specific treatment is available. Supportive therapy does not stop the disease spread. Vaccine development is progressing globally, but field use is limited and depends on national regulatory approval.
- Vietnam successfully produced the first vaccine against African swine fever on June 1, 2022. Against the Eurasian "Georgia07" isolate, an experimental vaccine attenuated by deletion of the viral *I177L* gene has been in development in the United States since January 22, 2020. This experimental vaccine was licensed as a vaccine candidate as of January 3, 2023 [18].

A Message for Every Pig Farmer:

African Swine Fever is a serious disease, but careful farm management can reduce the risk of introduction and spread. Clean farms, careful animal movement, early detection and immediate reporting are essential to protecting pigs and farmers' livelihoods. ASF can cause high mortality in affected pig populations and can seriously affect farmers' income. Outbreaks may also lead to restrictions on the movement and trade of pigs and pork products. Since effective treatment for infected pigs is not available, prevention is the most important strategy

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