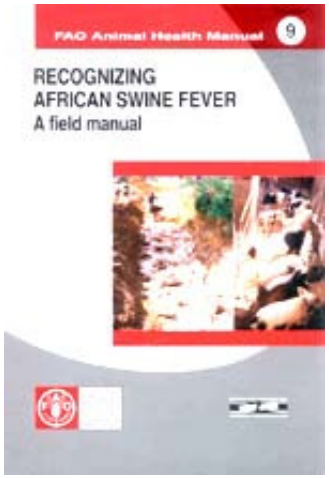
FAO Animal Health Manual *No. 9*



RECOGNIZING AFRICAN SWINE FEVER
A Field manual

Contents

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Foreword

This manual is one of a series prepared by FAO's Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) as an aid to emergency preparedness for major transboundary animal diseases (TADs) of livestock. TADs are defined as diseases of significant economic, trade and/or food security importance for a considerable number of countries, which can easily spread across national borders and reach epidemic proportions and for which control and management, including exclusion, require international cooperation.

For the developing countries, the greatest challenge in the coming years will be to provide enough food for the rapidly increasing urban populations. Short-cycle species have a vital role to play in food security programmes as less land becomes available for livestock production. Pigs are of particular value, owing to their capacity to produce large quantities of high quality protein cheaply. Global meat consumption figures for 1999 show that pig meat, at 88 million tons, ranked first in the world.

In several parts of Africa, pig keeping is a long-standing tradition. Rapid urban growth in recent years has given a strong impetus to pig production in and around cities and larger towns, where pigs have assumed great significance for food security among the less favoured sectors of the population. Pork is one of the cheapest forms of animal protein available, since pigs can be raised successfully on food waste and other inexpensive fodder. Rearing, managing and marketing pigs are activities increasingly undertaken by women and youth.

African swine fever (ASF) is the main threat to the development of the African pig industry. Its

destructive potential was fully appreciated when, in 1957, it made its first appearance outside Africa. Heavy losses were experienced in areas of high pig production in Europe and subsequently the Caribbean and Brazil. Eradication was achieved only at a cost of several billion dollars and, for the Iberian Peninsula, took more than 30 years. ASF remains endemic in Sardinia (Italy). In Africa, re-emergence of the disease in 1994 has devastated pig production in many countries and the situation in others needs to be clarified. Its extremely high potential for transboundary spread has placed all the countries in the region in danger and has raised the spectre of ASF once more escaping from Africa. It is a disease of growing strategic importance for global food security and household income.

The extremely rapid spread of ASF is due to its highly contagious nature and the ability of the virus to persist in a protein environment, including meat products, for long periods. The fact that mortality is nearly 100 percent creates an enormous surplus of dead pigs, which constitute a huge reservoir of virus. Since no vaccine exists, the only means of control is by compulsory slaughter, avoidance of which leads to clandestine movement of potentially infected pigs. The most important factor that has been identified as contributing to the spread of this devastating disease is lack of early detection due to insufficient knowledge/experience on the part of farmers and pig breeders and among technical personnel regarding the manifestation of the disease.

The epidemiology of ASF is complex. Control strategies need to be developed taking into account the cycle in which the virus is maintained, as well as the type and level of pig production in an area. Where the sylvatic cycle (involving the wild suids and argasid ticks) occurs and pig production is of the commercial type, control is maintained by separation between wild suids and domestic pigs. When domestic pigs and their products constitute the source of infection and large populations of free-ranging pigs are kept in traditional systems, a holistic approach to control is required that takes into account socio-economic factors as well as animal health. The golden thread, without which any control strategy is destined to fall apart, is the personal involvement of all operatives in pig production, with the state authorities in the control programme. From their involvement, the factors that reduce the risk of ASF, from better pig-keeping systems to control of imports, can develop. Most important for disease control,

however, is a surveillance system that will ensure early warning and reaction. The foremost prerequisite for this is recognition of the disease.

The purpose of this manual is to enhance recognition of ASF at all levels for early warning and early reaction, so that the disease can be identified and eliminated at the earliest appearance in any area. Special attention has been given to the clinical, anatomical and pathological similarity of African swine fever with classical swine fever, against which an effective vaccine exists.

We hope that the booklet will be useful for veterinary field personnel, farmers and pig breeders in rural and peri-urban areas.

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Acknowledgements

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Introduction

African swine fever (ASF) is a highly contagious and fatal viral disease of domestic pigs. It was first described in Kenya, East Africa, in 1921, and soon afterwards in South Africa and Angola, as a disease that killed settlers' pigs. Contact with warthogs was proven to be important in transmission of the virus. It was soon realized in Angola that free-ranging village pigs of indigenous breeds were also affected, and appeared to play a role in the epidemiology of ASF. When ASF arrived in Europe from Angola in 1957 and again in 1959, the serious impact of the disease was fully appreciated. Its potential for rapid spread was demonstrated by its appearance in not only several European countries, but also the Caribbean (Cuba, Haiti and Dominican Republic) and Brazil. Eradication proved difficult and expensive, and in the Iberian peninsula took more than 30 years to accomplish. Sardinia is the only

area outside Africa where ASF remains endemic. In Africa, ASF was long believed to be restricted mainly to central, southern and eastern Africa but in 1982 Cameroon suffered a severe outbreak. It has subsequently become known that outbreaks occurred in Nigeria in 1973, in Senegal from at least 1978 and Cape Verde probably at least since 1960. Since 1996, ASF has reached serious proportions in West Africa, with outbreaks in C?te d'Ivoire (1996), Benin (1997), Togo (1997), Nigeria (1997) and Ghana (1999). Countries such as Senegal, Gambia, Cameroon and Cape Verde continued to experience outbreaks. In eastern and southern Africa, Kenya in 1994 experienced the first outbreak in 30 years; ASF crossed the Save river and devastated pig production in southern Mozambique in 1994; in 1998 Madagascar reported ASF for the first time. The emergence of the disease in countries with developing pig industries and in which pork is popular and affordable has had serious economic implications, particularly as there is no vaccine and no treatment. The extremely high potential for transboundary spread of ASF poses a real risk to as yet unaffected African countries and to other continents.

The disease

ASF is a highly contagious and fatal disease of domestic pigs. It most commonly appears in the acute form as a haemorrhagic fever. Subacute and chronic forms of the disease also exist. Mortality is usually close to 100 percent and pigs of all ages are affected.

THE CAUSE

ASF is caused by a unique enveloped DNA virus placed in a family of its own. It is not closely related to any other known virus. It is most unusual among DNA viruses in that it replicates in both arthropod and vertebrate hosts, between which transmission occurs. It is therefore a true arbovirus. Genetic characterization of the virus has demonstrated area-related groups of strains, which may offer useful epidemiological information.

ANIMALS AFFECTED

Members of the pig family (Suidae) are susceptible to infection. Clinical disease is seen only in domestic pigs and the closely related European wild boar. Wild African pig species (warthogs, bush pigs, giant forest hogs) can become infected with the virus but do not develop clinical signs of disease. These animals, together with soft-shelled, eyeless argasid ticks (tampans), are the natural hosts of the virus.

GEOGRAPHICAL DISTRIBUTION

ASF is currently confined to the African continent, the Republic of Cape Verde, Madagascar and Sardinia. Recently (1999) an outbreak was reported in Portugal. It has been reported from or is known to occur in all southern, central and eastern African countries south of a line drawn along the northern borders of Congo (Brazzaville), Democratic Republic of Congo, Uganda and Kenya, with the exeception of Swaziland and Lesotho. It is endemic in domestic pigs in several countries, including Angola, Democratic Republic of Congo, Uganda, Zambia, Malawi and Mozambique. In West Africa, ASF appears to be endemic in two islands of the Cape Verde archipelago, Senegal, Gambia, Cameroon and probably Guinea Bissau. Since 1996, epidemics have been experienced in C  te d'Ivoire, Benin, Togo, Nigeria and Ghana. The source of the recent epidemics has not been traced, but molecular studies have shown that the virus isolated from the majority of outbreaks belongs to the West African lineage, which includes viruses isolated from outbreaks in Europe, Brazil and Angola. The introduction of this highly fatal disease into areas where there are large concentrations of pigs is unlikely to pass unnoticed, and the first cases of ASF have almost always been reported in and around large cities. Detection of the disease is problematic in remote areas where herds are small and veterinary personnel are scarce and in countries where serious civil unrest prevents normal activities.

FIGURE 1

Warthog

The warthog (Phacochoerus aethiopicus) is the natural host of ASF virus and is widely distributed throughout the African savanna areas.

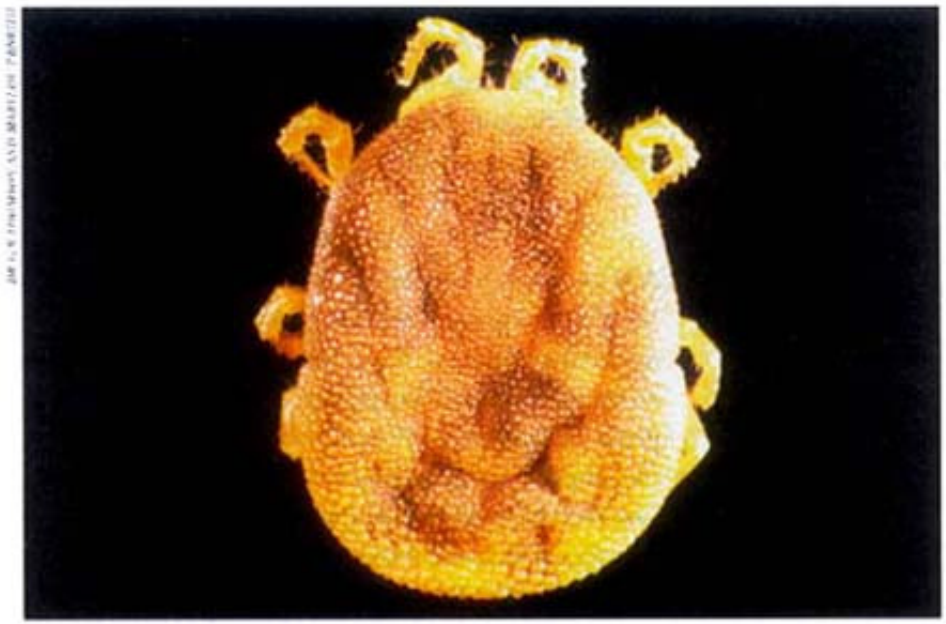


FIGURE 2

Tampan
Soft, eyeless ticks (argasid ticks, tampans) of the Ornithodoros moubata *complex inhabit warthog burrows and are important vectors of ASF virus*.

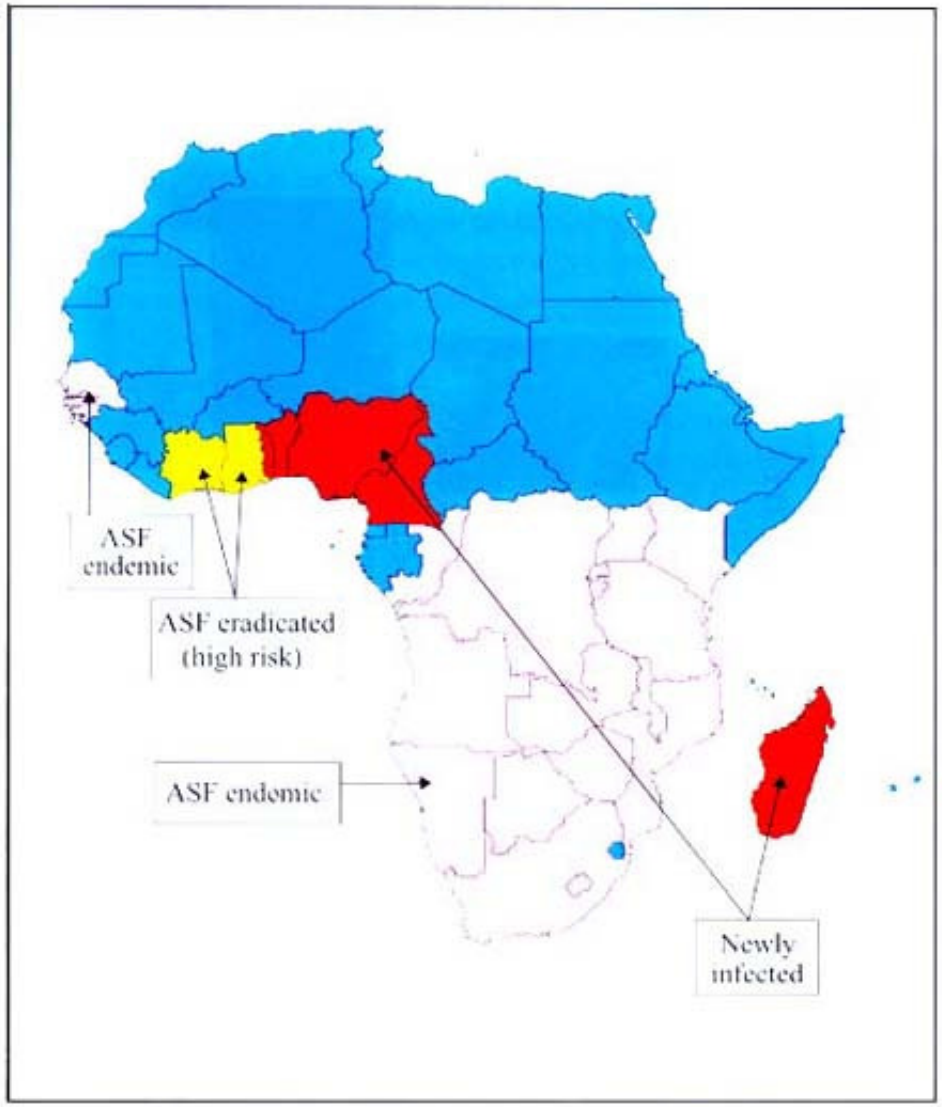


FIGURE 3

Current/recent distribution of ASF; countries affected since 1995
ASF is widely distributed in many countries in sub-Saharan Africa; recently infected countries are coloured red.

Transmission cycle of ASF Virus

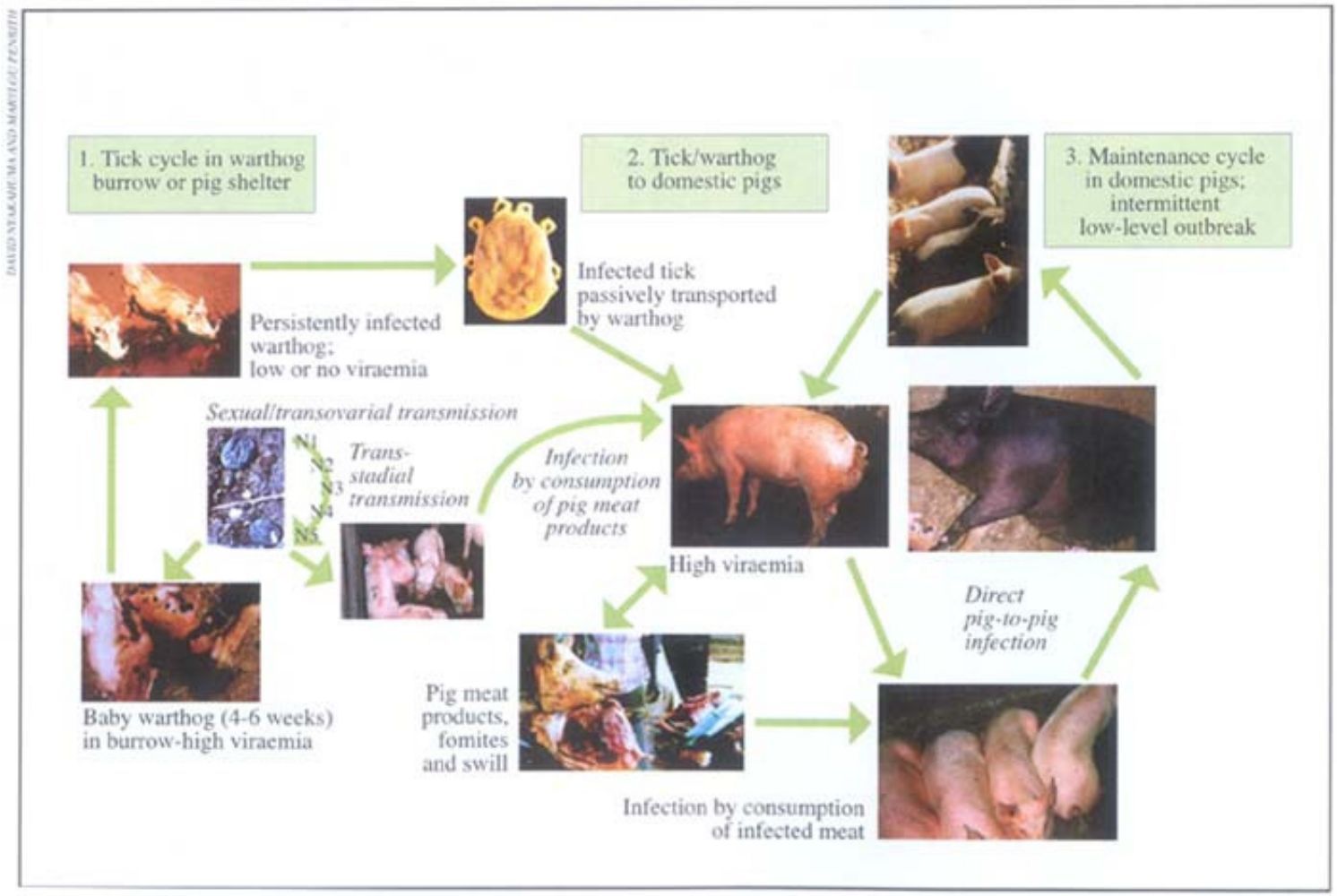


DIAGRAM 1

TRANSMISSION AND SPREAD

Transmission of ASF virus between warthogs and tampans is known as the sylvatic cycle. The tampans live in the burrows and shelters occupied by warthogs and transfer virus when feeding on their

blood. Warthogs spend the first four to six weeks of life in the burrows, where they are fed on by tampans, and have been shown to develop high levels of virus in the blood. Direct transmission of virus from warthogs to domestic pigs by contact has not been demonstrated. It is likely that domestic pigs mainly become infected by bites from infected tampans. In parts of central and West Africa, a so-called domestic cycle occurs, in which the virus is apparently maintained in domestic pigs in the absence of warthogs and, in some areas, in the absence of tampans as well. The role of bush pigs and giant forest hogs is unclear, but contact infection of domestic pigs by bush pigs has been demonstrated experimentally.

Domestic pigs infected with ASF virus shed very large amounts of virus during clinical illness and for at least 24 hours before clinical signs develop. Virus is shed in saliva, tears, nasal secretions, urine, faeces and secretions from the genital tract. Blood contains large amounts of virus. Aerosol transmission has been demonstrated only over short distances between pigs in close contact. During an outbreak, pigs become infected by contact with infected pigs, contaminated feed, drinking water and bedding. Contaminated material may be moved over distances by vehicles and people. ASF virus can persist for long periods in a protein environment (meat, blood, faeces, bone marrow). It is resistant to changes in pH and temperature over a wide range, as well as to autolysis and various disinfectants. Virus can remain viable for many months in frozen and certain types of processed meat. Cooking at 60C for 30 minutes inactivates the virus. Biting flies have been shown to be able to retain and transmit infective quantities of virus for at least 24 hours after feeding on a sick pig. During an outbreak, transfer from pig to pig by the use of the same needle can occur if treatment or vaccination against another disease is attempted.

Transmission via large bodies of water such as lakes and rivers is unlikely, as the virus rapidly becomes diluted and will not be present at infective levels. Waterborne carcasses can, however, be an effective means of spreading the disease.

APPEARANCE OF THE DISEASE IN A HERD

The first appearance of ASF in a country or area is usually characterized by high mortality after a short febrile illness. Pigs become depressed, stop eating, huddle together and, in the peracute form, may die before other clinial signs develop. A swaying gait, recumbency, difficult breathing and flushing of the skin, particularly over the abdomen and extremities in white-skinned pigs, commonly develop in pigs that survive for more than a day.

The appearance of ASF in herds is usually associated with one of the following events:

- close contact between domestic pigs and warthogs that may be harbouring infected tampans;
- introduction of new pigs into a herd, for example through purchase, for ceremonies or boar loan;
- introduction of infected pig meat from neighbouring villages;
- feeding of swill to pigs that contains raw or insufficiently cooked pork and pig remnants or access to such remnants through scavenging;
- movement of vehicles and people between herds during an outbreak.

Pigs of all ages are affected. Animals that are segregated from the rest of the herd, for example sows with young suckling piglets, may be spared.

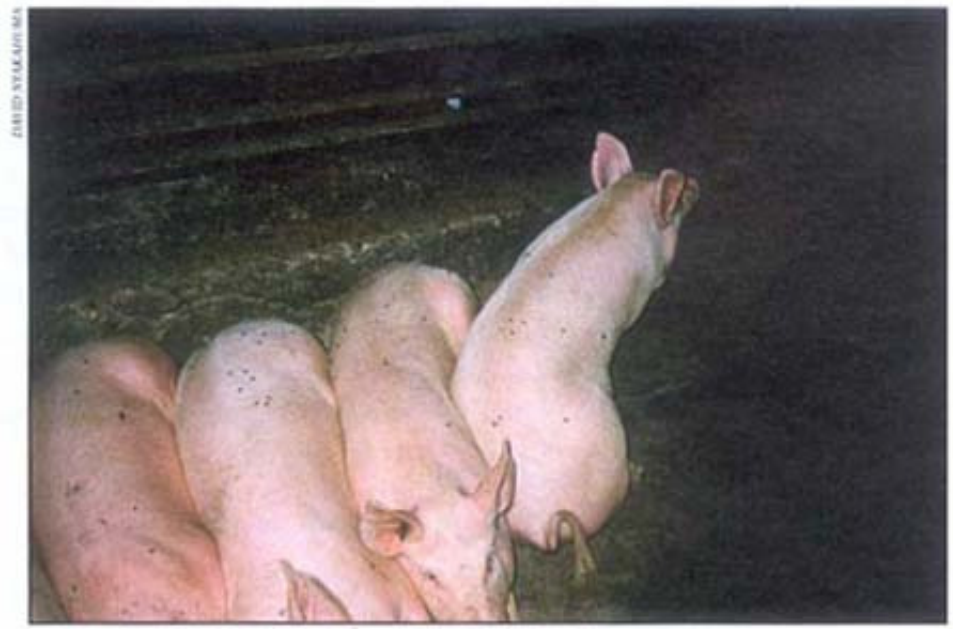


FIGURE 4

ASF in a herd of pigs
They huddle together, are very weak and have a high fever.

Clinical signs

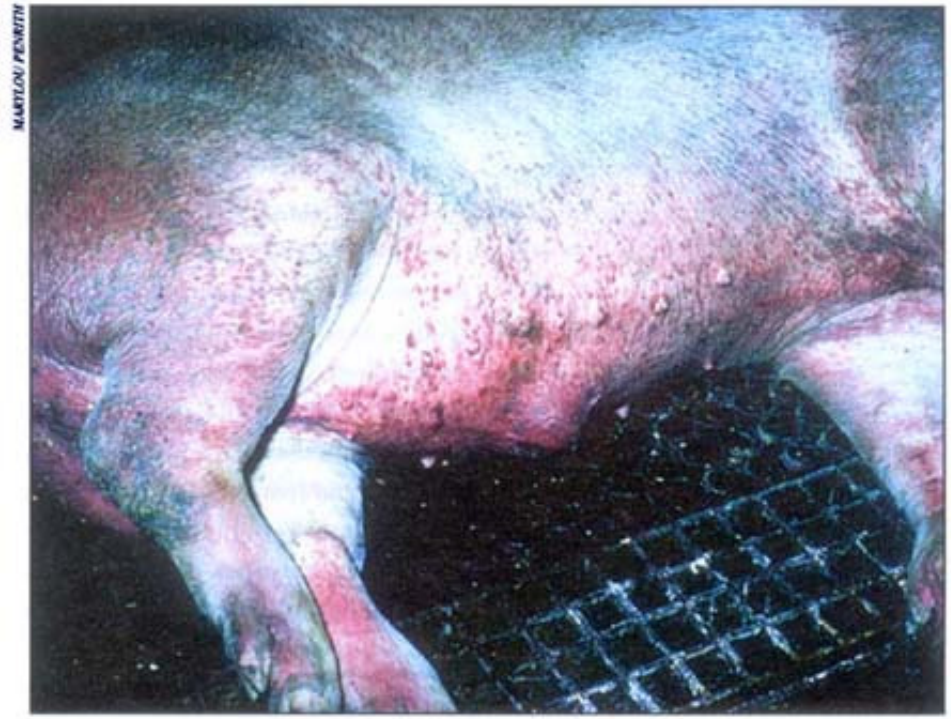
Clinical signs appear approximately 5–15 days after natural infection with ASF virus. The first sign is usually the development of a high fever (41-42C), manifested by depression, loss of appetite, seeking shade, huddling together, rapid breathing and, in white-skinned pigs, flushing of the skin, particularly the extremities and the underparts. Pigs often develop a swaying gait, with the hind legs appearing weak. Thick whitish discharges from the nose and eyes are sometimes seen. Difficult breathing is usual and foam, often blood-tinged, may appear at the nostrils. Pigs may show signs of abdominal pain. Vomiting is common. Some pigs become constipated, while others may develop a bloody diarrhoea. Sows may abort at all stages of pregnancy. The flushing of the skin in white-skinned

pigs may deepen to a bluish-purple colour and there may be bleeding under the skin. Mucous membranes are red and congested. A coma due either to haemorrhagic shock or to excessive fluid in the lungs may develop before death, which usually occurs from one to seven days after development of clinical signs. Pigs that survive for a few days may develop nervous signs.

FIGURE 5

Peracute ASF

In the peracute form of the disease, death may occur before any clinical signs appear.


MARYLOU PENRITH

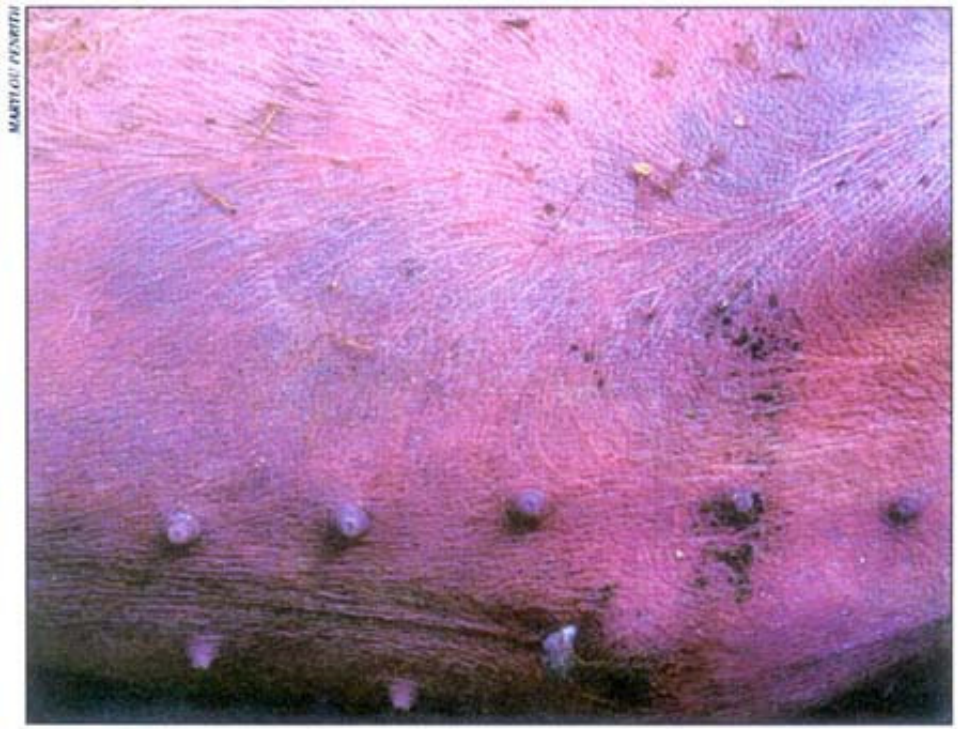


FIGURE 6

Close-up of flushed/cyanotic skin

In white-skinned pigs, the ears, tail, legs and underside appear deeply flushed and may develop a bluish tinge (cyanosis).

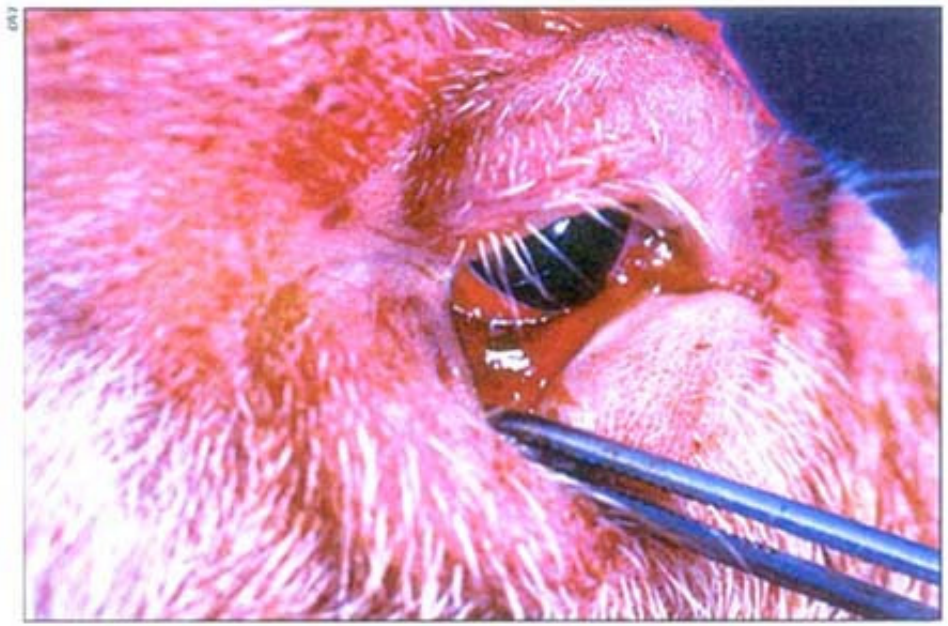


FIGURE 7

Congested ocular mucosa
The mucous membranes of the eyes of this pig are deeply congested, and some of the redness may be due to haemorrhage.

Pigs that survive the acute stage of the disease may progress to the subacute or chronic stage. Subacute disease is characterized by fluctuating fever, accompanied by depression and loss of appetite. Walking may appear painful, with swelling of the joints. There may be signs of pneumonia. Death can be due to heart failure. Before death, signs of heart failure such as swelling of the throat may occur. Chronically sick pigs generally become emaciated, with long, dull hair and may have ulcerative sores over bony points. The pigs may walk stiffly due to arthritis. The survival period of such pigs varies from a few weeks to months. The subacute and chronic forms of ASF have not been seen in natural situations in Africa but were described in Europe and the Caribbean.

Post mortem findings

Carcasses of pigs that die in the acute stage of the disease are often in good condition. In white-skinned pigs, bluish-purple discolouration of the skin of the extremities and the chest and abdomen, sometimes with multiple haemorrhages, may be seen. Bloody froth may issue from the nose and mouth; there may be a discharge of pus from the eyes; the tail and area under the tail may be soiled with bloody faeces. When the carcass is opened, the following may be seen:

- fluids in the chest and abdominal cavities, which may be blood-stained;
- widespread bleeding over organ and body surfaces;
- congestion of organs and carcass;
- enlarged spleen;
- enlarged lymph nodes containing a lot of blood which may resemble blood clots;
- the lungs do not collapse when the chest is opened, appearing heavy and shiny, with prominent divisions between lobules and oozing moisture and froth when cut;
- the trachea is usually filled with froth, which may be blood-stained;
- pinpoint haemorrhages on the surface of the kidneys;
- haemorrhages and sometimes ulcers in the stomach lining;
- the intestines may be congested and the contents may be bloody.

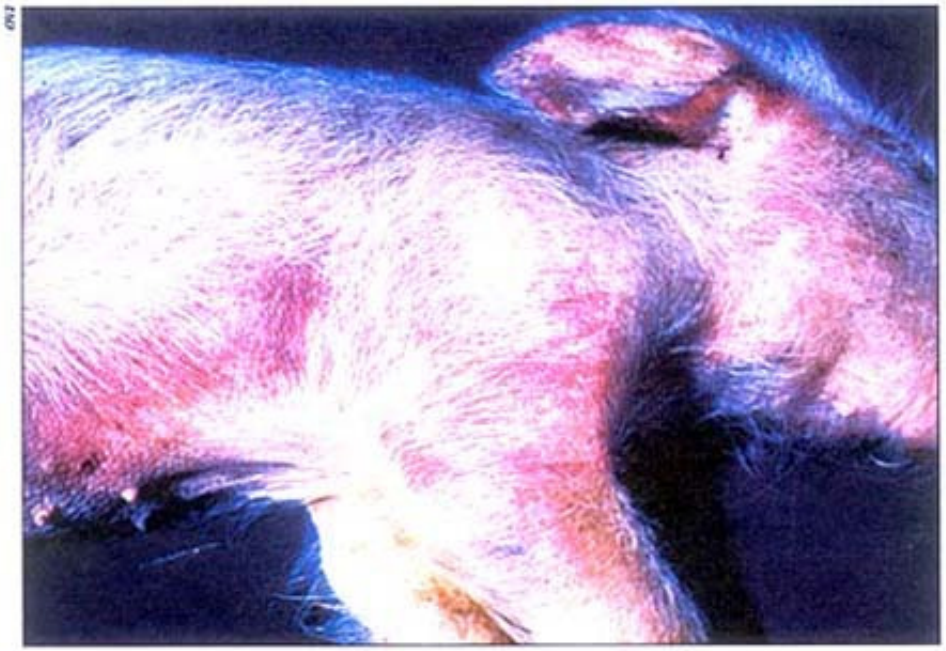


FIGURE 8

Cutaneous haemorrhage
Widespread haemorrhages may occur in the skin.

FIGURE 9

Fluids in body cavities
Blood-tinged fluid often accumulates in the body cavities.

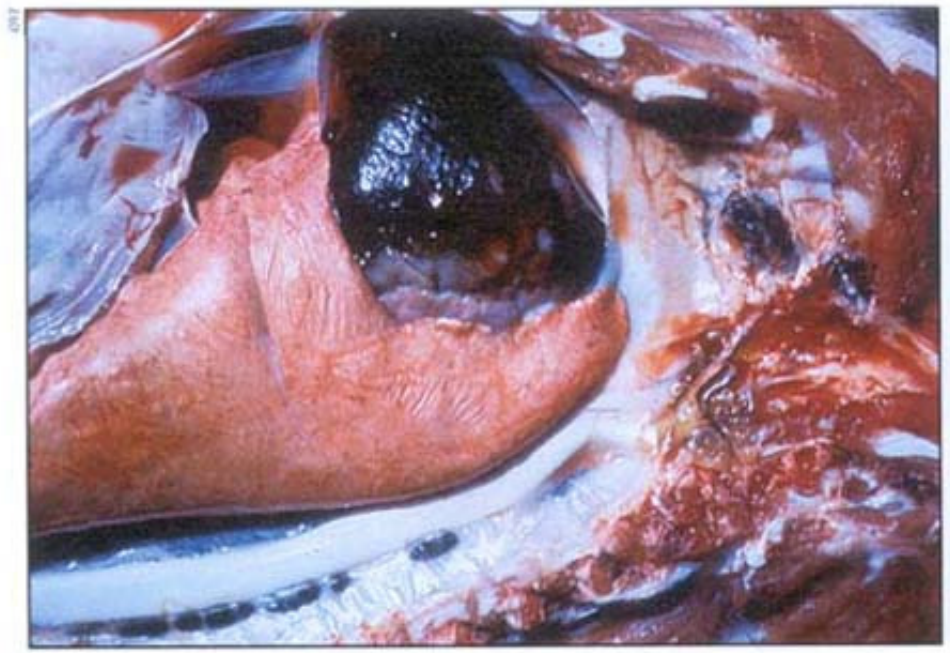


FIGURE 10

Internal haemorrhages

Haemorrhages may be visible in multiple organs and on the serosal linings of the body cavities.

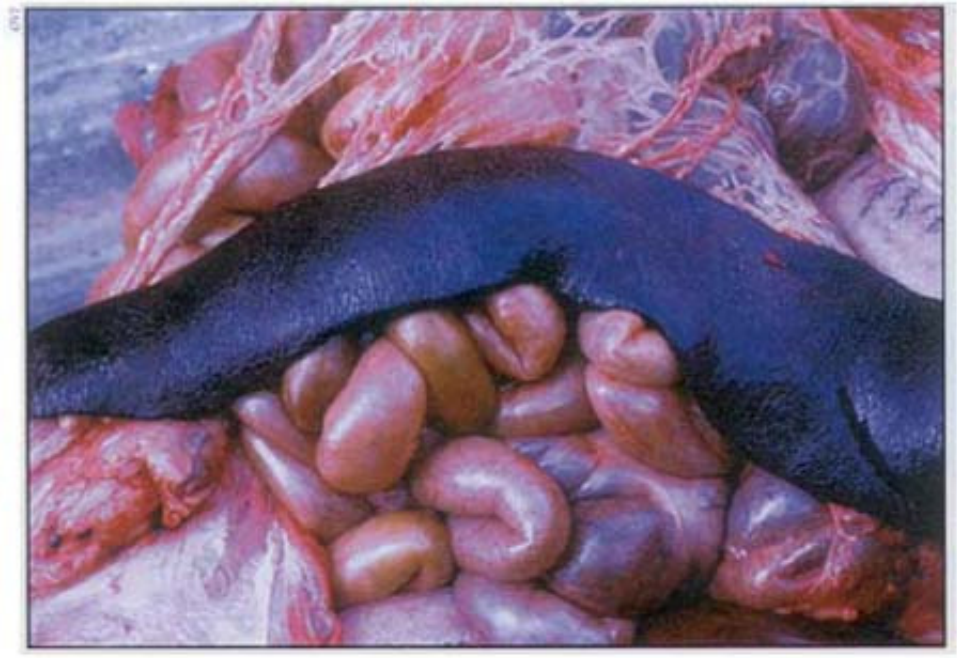


FIGURE 11

Enlarged spleen

The spleen is often markedly enlarged and dark in colour.

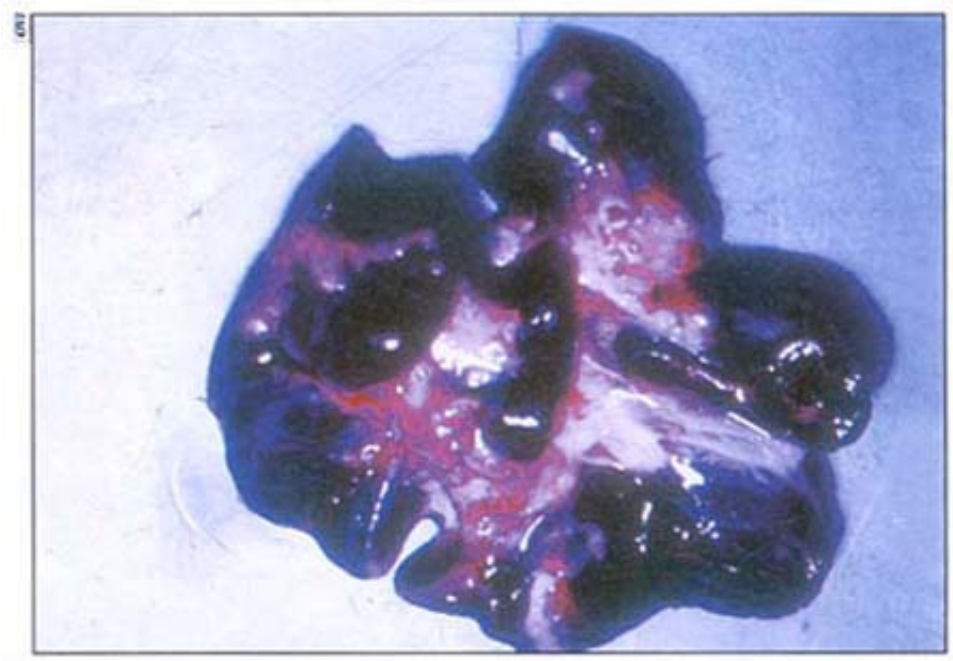


FIGURE 12

Haemorrhagic lymph nodes
Enlarged and haemorrhagic mesenteric lymph nodes.

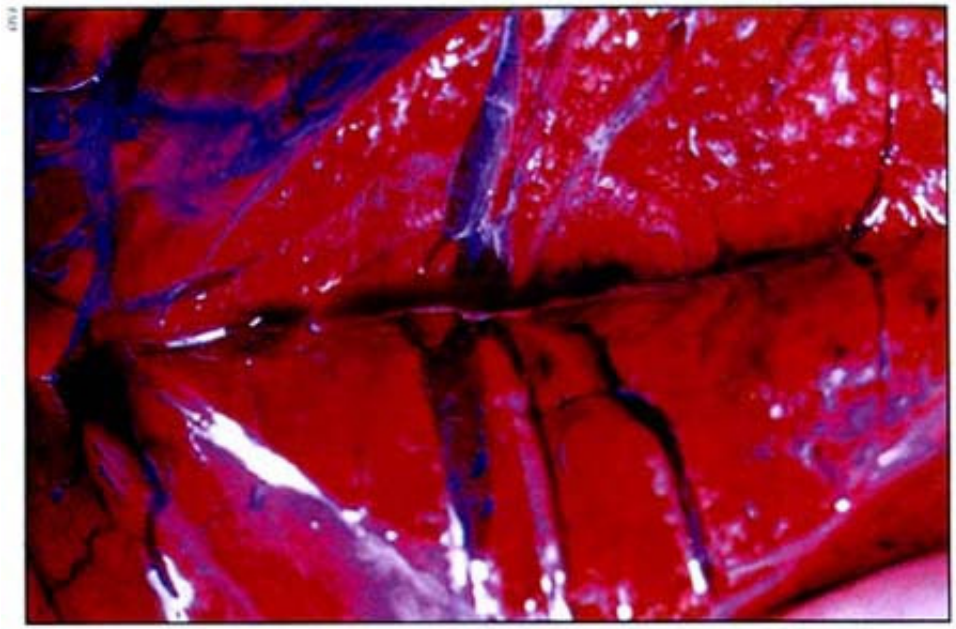


FIGURE 13

Oedematous lungs

Lung oedema is present, indicated by a moist appearance, failure to collapse and a marked lobular pattern owing to accumulation of fluid in the interlobular septa.

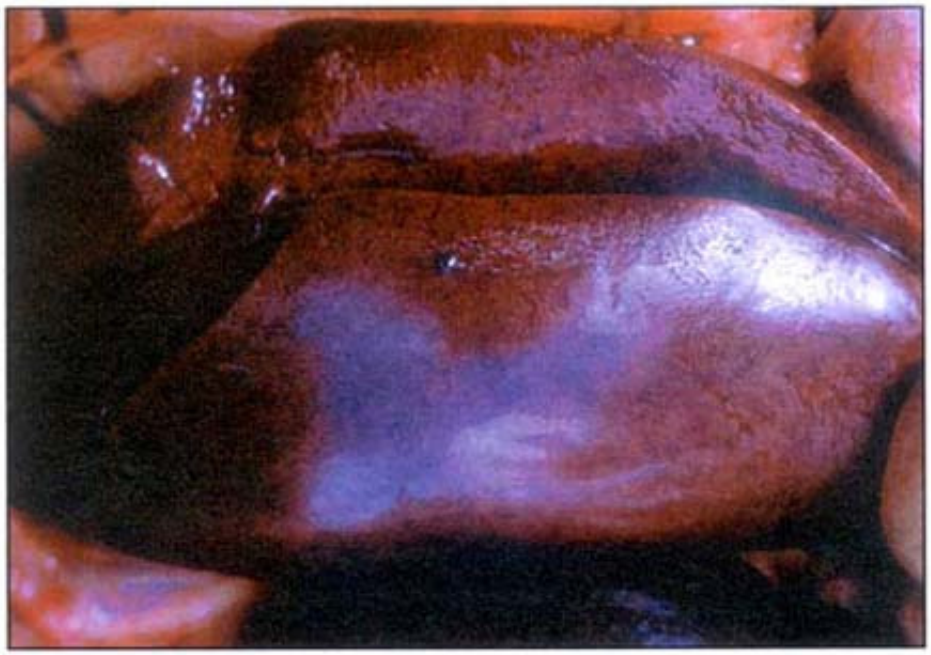


FIGURE 14

Haemorrhages in kidneys
Pinpoint to larger haemorrhages on the kidney capsule.

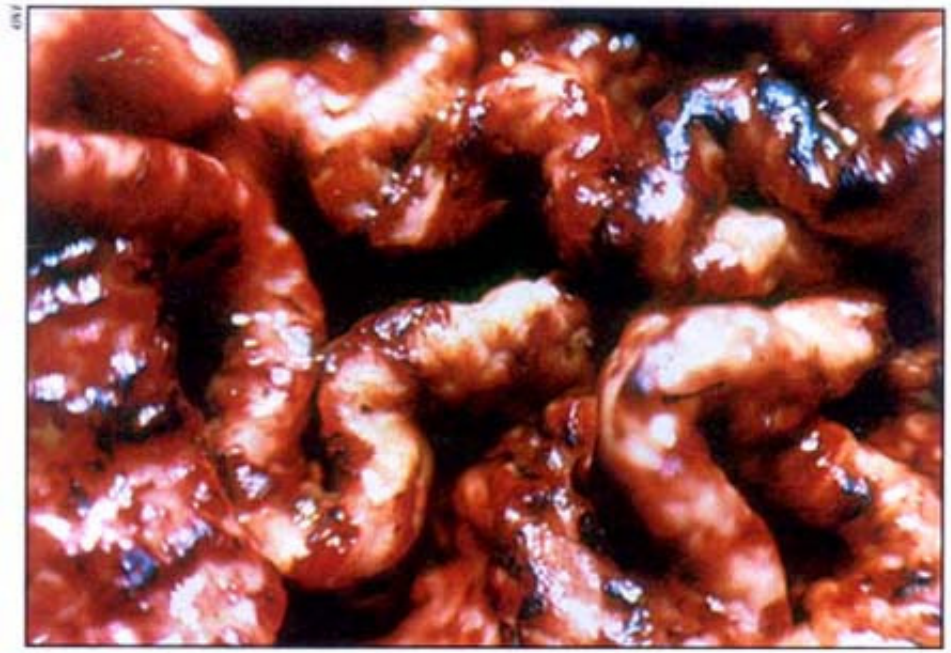


FIGURE 15

Haemorrhages in stomach
Haemorrhages in the fundus of the stomach.

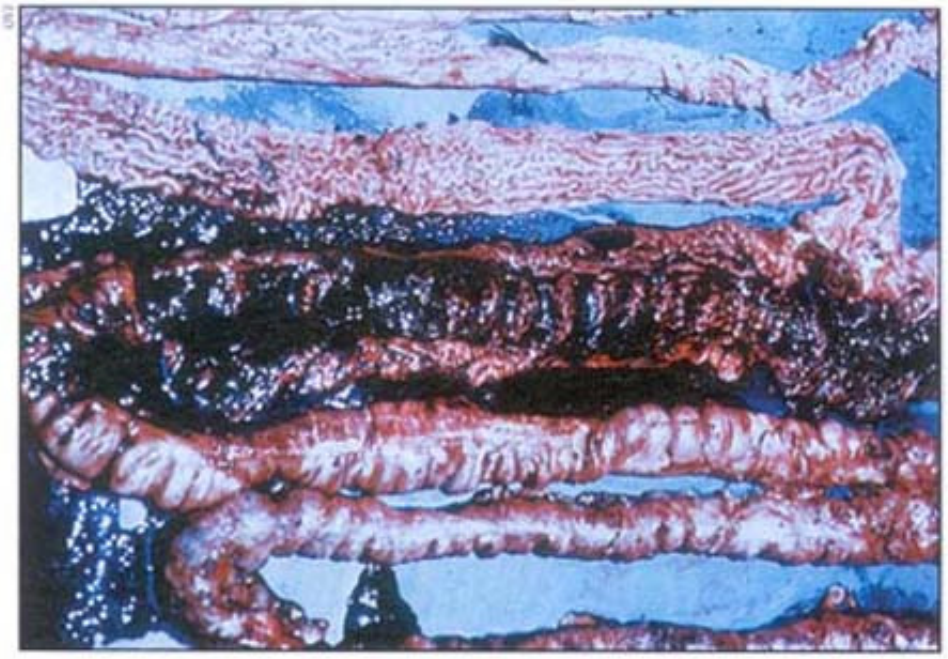


FIGURE 16

Haemorrhagic intestines
Intestines cut open to demonstrate bloody, fluid contents.

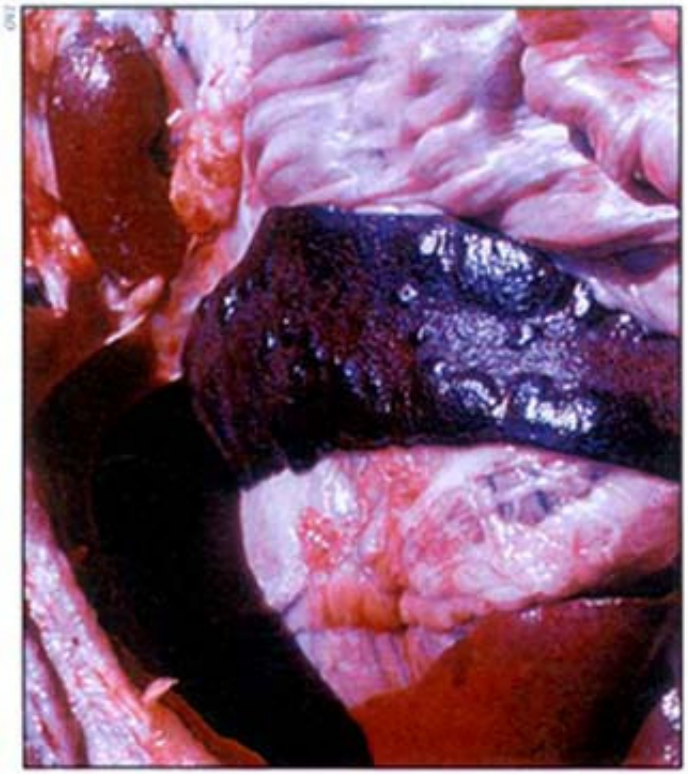


FIGURE 17

Haemorrhagic infarcts in spleen
Multiple infarcts along the edges of the spleen, which is not strikingly enlarged.

Subacute ASF may be characterized by the following changes:

- fluids may be present in body cavities (heart failure);
- lymph nodes are enlarged and often haemorrhagic;
- fibrin may be present on the surfaces of the lungs and the heart;
- lungs may be firm with a mottled appearance, due to pneumonia;
- joints may be swollen with accumulated fluid and fibrin.

Chronic ASF is characterized by:

- emaciation;
- sores and ulcers over bony points;
- lymph nodes are enlarged and firm;
- a layer of fibrin may be present over the lungs and heart;
- swollen joints.

Differential diagnosis

Few diseases of domestic pigs cause mortality at the rate observed in an acute ASF outbreak in newly infected pig herds. The most important differential diagnosis for ASF is classical swine fever (hog cholera), which is caused by a completely different virus but presents almost identical clinical signs and post-mortem lesions. The only way to distinguish reliably between classical swine fever and ASF is by identifying the virus. Post-mortem lesions that have been used to distinguish between the two diseases, such as ulcers in the area where the small and large intestines meet and areas of bleeding and tissue destruction in the spleen, are known as infarcts (Figure 16). These are variably present and not reliable. It is unwise to attempt vaccination against classical swine fever until the diagnosis is confirmed, as ASF can easily be spread during a vaccination campaign.

Excessive mortality may be difficult to judge in small pig herds, where four out of five pigs may die from a variety of causes, including parasitism and malnutrition. When a significant number of pigs in any herd or group die, it is advisable to find out whether any other pig owners in the area have experienced similar recent losses. Other diseases that my be confused with ASF are as follows:

Erysipelas

This is a bacterial disease and is known as one of the “red fevers”. Pigs of all ages may be affected,

and the disease is as likely to affect small-scale and extensive pig farms as commercial, intensive units. Mortality is usually much lower than in ASF and there are usually some pigs that will show the typical diamond-shaped skin lesions. Pigs respond well to treatment with penicillin. Bacterial isolation will confirm the diagnosis. The microscopic changes differ from those typical of ASF.

Salmonellosis, septicaemic pasteurellosis and other bacterial septicaemias

Features in common with ASF include fever, loss of appetite, respiratory or gastro-intestinal disorders and a congested, fevered carcass at slaughter. Pigs of a particular, typically younger, age group are usually affected. Animals treated in time may respond to antimicrobial therapy. Confirmation of the diagnosis is by culture of the bacteria.

Trypanosomosis

Trypanosomosis is caused by blood parasites that are transmitted by tsetse flies. Many deaths among pigs of all ages can occur and the pigs may die too quickly to develop typical signs of anaemia (lack of blood) or icterus (jaundice). This disease is so severe that pigs are seldom produced in areas where it occurs. The parasite is easily demonstrated on blood smears stained with Giemsa or Romanoff stains (e.g. diff quick).

When a large number of pigs die suddenly, the possibility of poisoning should be considered. Few poisons result in the severe bleeding seen in ASF. Coumarin-based rat poisons such as warfarin can cause widespread bleeding but are unlikely to affect more than a few pigs in a herd. Certain fungal poisons found in mouldy feed, such as aflatoxin and stachybotryotoxin, may cause haemorrhage and severe mortality.

Diagnosis of ASF

When large numbers of pigs of all ages die and the clinical signs and post mortem lesions look like

those of ASF, that is the first disease that should be suspected. Confirmation is by demonstration of the virus in samples sent to a laboratory.

LABORATORY CONFIRMATION

Laboratory tests need to be carried out to confirm the diagnosis of ASF, because the drastic control measures are expensive and cause hardship to owners and government alike. These measures should not be put in place unnecessarily. The tests that exist are used to detect the virus itself by growing it, evidence that the virus was present (virus antigen, genetic material) or the reaction of the animal to the virus (antibodies in blood serum). In acute outbreaks of ASF, it may not be possible to detect antibodies, as the pigs die before they have time to produce them. The standard tests therefore involve detection of the virus. Tests to detect antibodies are useful for identifying pigs that have survived infection and for carrying out surveys to determine whether the disease is endemic in a country or area.

Detection of the virus in cell culture

ASF virus grows best in pig macrophages derived from bone marrow or lung washing. With many strains of ASF virus, the presence of virus in cell cultures can be demonstrated by adding red blood cells to the culture. These are attracted to the surface of infected cells, to which they cling and form “rosettes”, a phenomenon known as haemadsorption. The virus may be injected into pigs to demonstrate that it is capable of infecting pigs and causing disease. Some strains of virus do not cause red blood cells to absorb to the surface of cells that they have infected, but dead cells in the culture will become obvious after a few days.

The advantage of culturing the virus is that it can then be characterized to determine the strain.

Detection of virus antigens by immunofluorescence

Impression smears of lymph nodes and spleen on glass slides are treated with antibodies labelled with

a dye that will fluoresce when examined under a special microscope (Figure 17). Positive and negative controls are used to ensure that the slides are interpreted correctly. This test can be carried out fairly rapidly and is used in most African laboratories that have the capacity to diagnose ASF.

Detection of virus antigens by polymerase chain reaction (PCR)

This test requires specialized facilities. It is used most frequently in reference laboratories to obtain a rapid diagnosis, as isolation in cell culture and demonstration of the virus by adsorption of red blood cells or cell damage (cytolysis) usually takes several days. Results are obtainable within 24 hours, and rely less on personal interpretation than immunofluorescence. The test can be carried out on a variety of tissues, but for practical purposes lymph nodes and spleen on ice or in glycerosaline are the samples of choice.

Detection of viral antigen by immunoperoxidase staining

Viral antigen may be detected in cells in histopathological preparations from formalin-fixed material by the immunoperoxidase staining technique. This method, which usually takes 5–7 days, is slower than PCR or immunofluorescence, but is useful if the only tissues available have been preserved in formalin. It is useful as a research tool to determine the distribution of viral antigen.

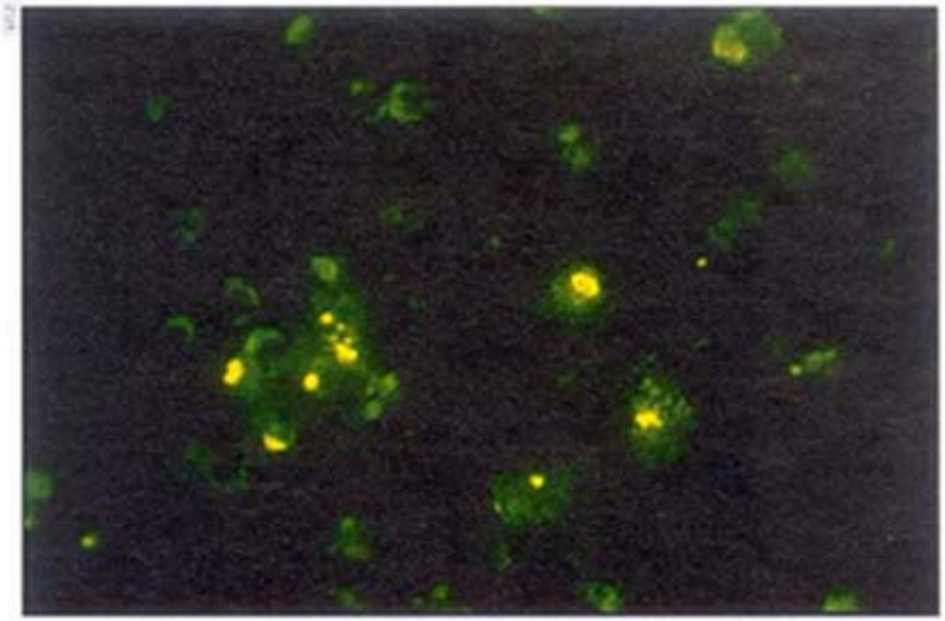


FIGURE 18

Immunofluorescent - positive reaction
Positive fluorescent antibody (FA) test: the ASF antigen is indicated by bright green fluorescence when examined with a special fluorescence microscope.

Detection of antibodies against ASF virus

The enzyme-linked immunosorbent assay (ELISA) is the test most commonly used to detect antibodies to ASF in serum. Other tests that are sometimes used are indirect immunofluorescence and immunoblotting. Antibodies may not be detected in pigs that have died of acute ASF. The test is used to detect animals that have survived infection with ASF and in surveys to determine whether the disease might be endemic in an area.

SAMPLES REQUIRED FOR LABORATORY CONFIRMATION

When submitting samples to a reference laboratory in another country, notify the laboratory so that they can send you an import permit, notify customs and collect the samples promptly. They will need to know the flight number, waybill number and date and time of arrival. A reliable courier service can be used.

All samples should be accompanied by the following information:

- name, address, telephone/fax numbers of sender;
- telephone/fax numbers for official reporting of results, if different from above;
- name, address and contact numbers of owner;
- date of sampling and submission;
- type and number of samples (including whether on ice, preserved, etc.);
- disease suspected and tests required.

And, most important, the samples should be accompanied by a detailed history of the outbreak tht includes:

- age, sex and identification (if any) of each pig sampled;
- number and ages of animals dead;
- number and ages of animals sick;
- herd size;
- any recent movement of animals into or out of herd;
- date of first death;
- date when signs of disease were first observed;
- what signs of disease were observed;
- post mortem findings;
- treatment if any;
- what the animals are fed.

When unusually high numbers of deaths occur, a pig should be presented to the nearest laboratory or field station/official for post mortem examination and sampling. Farmers can also take samples of spleen and lymph nodes and present them, as quickly as possible, to their nearest state veterinarian, animal health technician or agricultural extension officer for transmission to a national diagnostic laboratory.

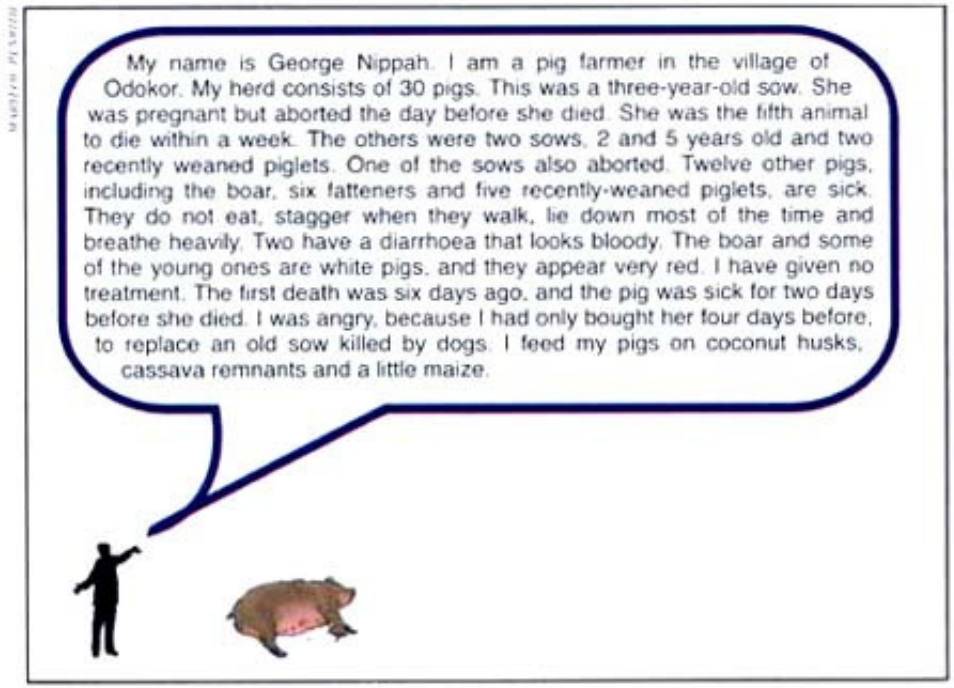


DIAGRAM 2

A full history of the disease in the herd is essential.

It is better not to freeze samples, as freezing at -20C◆ may inactivate the virus. Samples should be kept refrigerated for as long as possible. However, evidence of the presence of the virus (DNA) can still be detected by special laboratory techniques (PCR) and if there is a long delay in transmission it would be better to freeze the samples at an unsuitable temperature than allow them to become badly

autolysed.

DETECTION OF VIRUS

Because they will contain the highest concentrations of virus, lymph nodes, spleen and tonsils are the organs of choice to submit to a laboratory capable of performing the tests. They should be submitted on ice as soon as possible. If ice is not available, the specimens can be preserved in 50 percent glycerosaline, which prevents bacterial activity. If neither ice nor glycerosaline are available or if it is very unlikely that samples on ice will reach the laboratory chilled, samples in 10 percent buffered formalin should also be submitted. This will enable a diagnosis to be made by histopathological examination and the immunoperoxidase method, available at some international reference laboratories that have the capacity to perform histopathological examination.

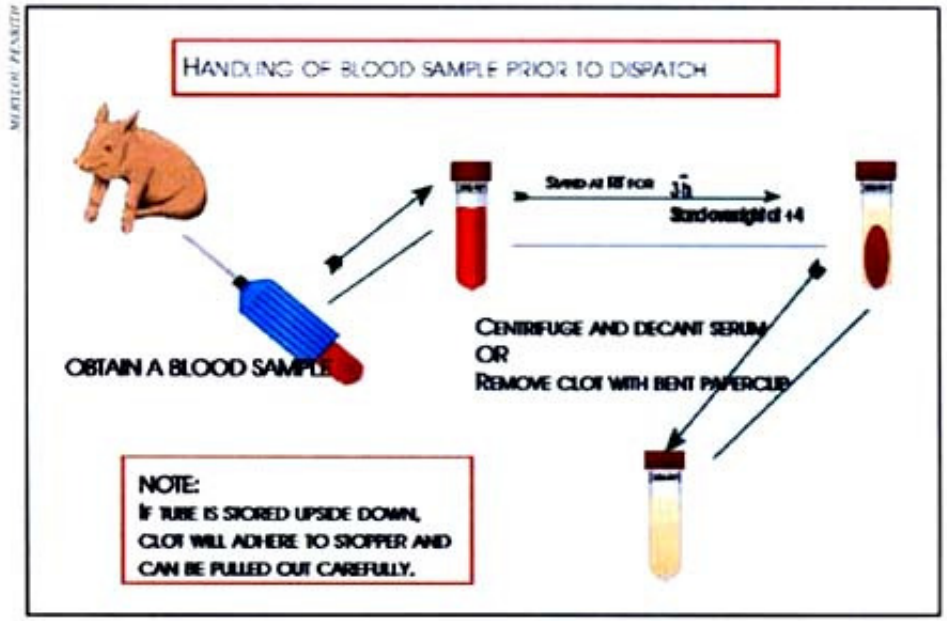


DIAGRAM 3

Handling blood sample prior to dispatch. Stand overnight at about 4 C (not frozen). Centrifuge and decant serum OR remove clot with bent paperclip. Note that if the tube is stored upside down, the clot will adhere to the stopper and can be pulled out carefully.

FIGURE 19

Blood sample collection

Collecting a blood sample from the jugular vein

Sample as many animals as possible, as this increases the chance of a diagnosis. Samples should be taken from animals that have died within 12 hours or that have been slaughtered. ASF virus is resistant

to autolysis but in practice it is easier to culture virus from fresh specimens.

DETECTION OF ANTIBODY

Blood is collected in tubes without an anti-coagulant (red cap) and submitted to the laboratory as soon as possible after collection, on ice. Allow the samples to stand for a few hours at room temperature before refrigerating. Do not freeze the blood, as this results in the red blood cells breaking up and staining the serum. If refrigeration is not possible, remove the clot by centrifugation or by one of the methods shown in the diagram.

Control of ASF

There is no vaccine.

TO PREVENT ASF:

Pig farmers and field personnel should be aware of ASF, able to recognize ASF and know what to do if they suspect ASF.

- Pigs should be kept in well-constructed pig sties under hygienic conditions with controlled entry to the piggery.
- Movement of pigs inside the country and especially across international borders should be controlled.
- Pigs should not be fed swill that might contain remains of pigs. To ensure safety, swill should be boiled for 30 minutes and cooled before feeding.

DURING AN OUTBREAK:

- infected and suspected infected farms must be placed in quarantine;

- no movement of pigs or any products of pig origin should be allowed;
- all infected and in-contact pigs must be slaughtered;
- carcasses must be burnt or buried deeply on site;
- vehicles should be disinfected on entering and leaving farms;
- personnel should ensure that shoes, clothes and equipment are disinfected between farms.

FIGURE 20

Well constructed pig sties

Well constructed pig sties that are designed to keep the herd animals in and any stray animals out; they are also comfortable for the pigs and easy to keep clean.

FIGURE 21

No entry sign at gate

A "No Entry" sign at the gate to a pig farm indicates that sanitary measures are in place and that visitors may only enter the farm with the permission of the owner or manager.

FIGURE 22

Footbath at entrance to piggery

A footbath filled with disinfectant at the entry to a pig farm, to ensure that people do not enter with contaminated material on their shoes.

FIGURE 23

Dead pigs

Pigs shot during a control operation after ASF broke out in a small piggery in the ASF control area in South Africa

Pig carcasses being disposed of during the stamping out exercise in Tema, Ghana; note the deep burial and later covering with a layer of lime

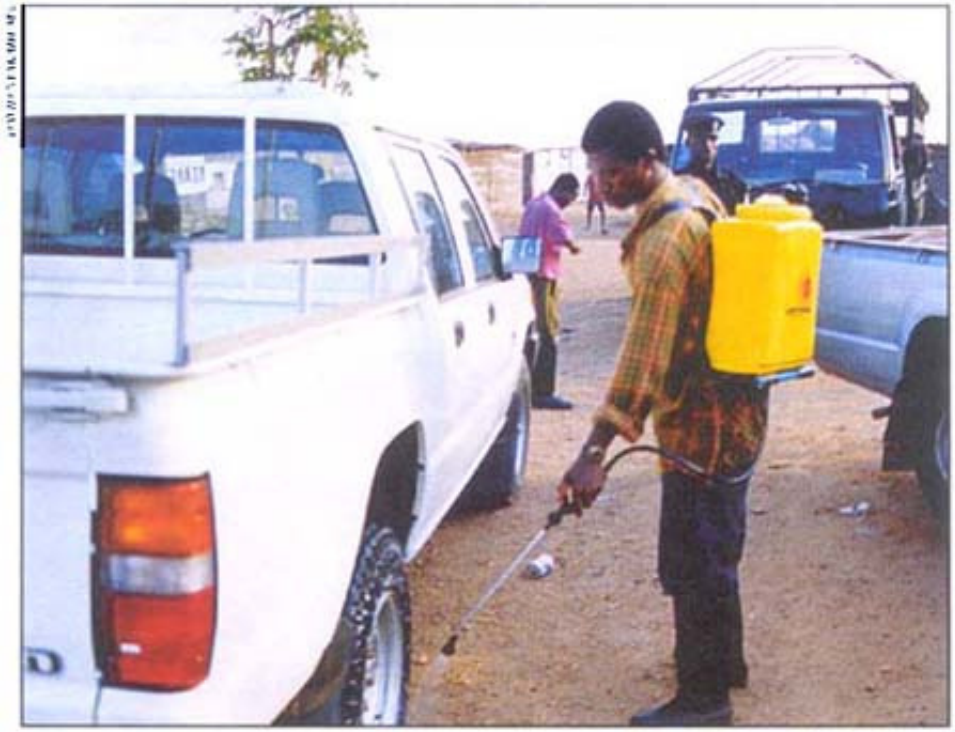


FIGURE 24

Disinfecting a pigsty and a vehicle

A picture showing disinfection of a pigsty during the stamping out exercise in Accra, Ghana.

Disinfection of a vehicle after an exercise of stamping out in Accra, Ghana.

FIGURE 25

Disinfecting People
People being disinfected before entering a pig farm, with particular attention to the soles of the shoes or boots.

FIGURE 26

Enforcing quarantine restrictions
Example of a road barrier where enforcement personnel ensure that quarantine restrictions are adhered to.

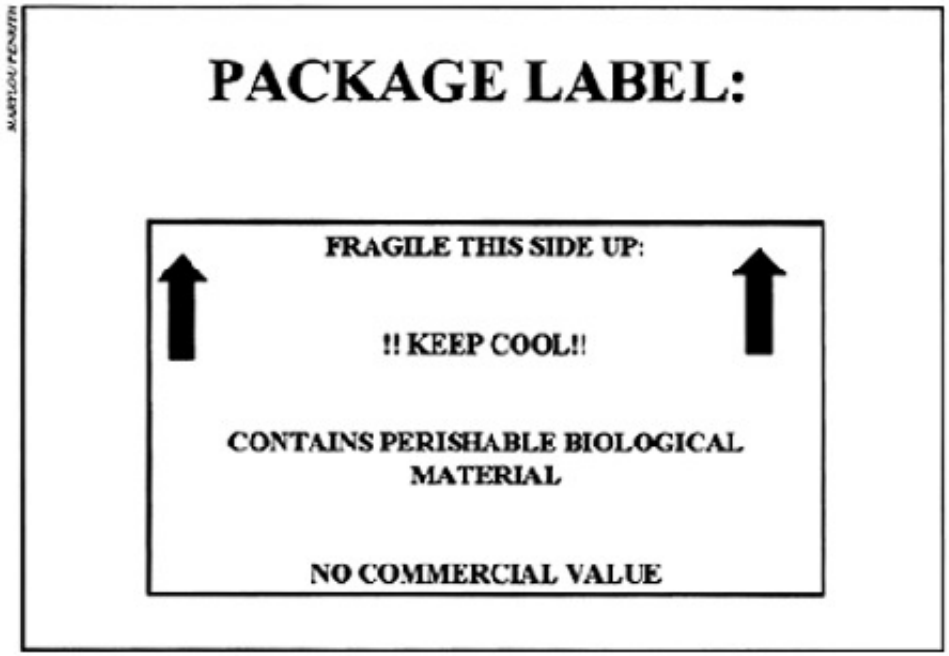


DIAGRAM 5

The package label should specify that the package contains perishable biological material that is fragile, must be kept cool and is not worth stealing! The addressee must be clearly specified.

Sources of assistance

REGIONAL REFERENCE LABORATORY FOR AFRICAN SWINE FEVER FOR AFRICA
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