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African swine fever prevention, detection and control in resource-limited settings

FAO ANIMAL PRODUCTION AND HEALTH / **GUIDELINES 35**

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Foreword

In 2021, FAO established a Global Pool of Expertise on African Swine Fever (GPE ASF) to address challenges in ASF prevention, detection and control. Working in six subgroups covering epidemiology, prevention, detection, control, community engagement and socio-economics, the GPE ASF held more than 20 virtual meetings during 2021/22 to develop practical guidelines for ASF. During these meetings it became evident that the main gap was guidance on how to deal with the disease in resource-limited settings. This booklet is a distillation of key points from these meetings relevant to these settings.

Since the emergence of ASF genotype II in Georgia in 2007 and onward spread into Asia in 2018 and to the Caribbean, it was apparent that the methods applied in high-income countries to prevent and control this disease based around mass stamping-out could not be transferred directly to resource-limited settings. Many of the lessons learned from Africa regarding ASF over the past 100 years were not being heeded.

In resource-limited settings, biosecurity is usually weak at farm level and other points of the value chain, pigs are not traceable and move readily within and even across borders, and compensation for culled animals is often not available. Producers in resource-limited settings are often poor and move in and out of pig production as a means of avoiding poverty. As a result of these factors, their pigs are at high risk from ASF, a devastating haemorrhagic viral disease. Yet, despite these issues, some victories have been seen because ASF has some features that make it more easily prevented than some other more transmissible transboundary diseases. Some simple measures and different approaches to disease prevention, including those based on community-level activities, can limit the impact of this disease.

ASF is now endemic in many countries, and others that are currently free from the disease are at high risk of introduction and the devastating impacts of the disease. Cycles of infection in domestic pigs predominate in most places. However, other cycles of infection are also important, especially in places where the virus has spilled over and become established in wild boar. The original sylvatic cycle involving ticks and warthogs still persists in parts of Africa, but is becoming less important as a source of virus compared to other cycles.

This booklet provides a summary of key points distilled from the GPE ASF meetings. It has been used as the basis for developing an interactive FAO virtual learning centre course on ASF prevention and control in resource-limited settings for East Africa, and will also be used for courses in other parts of Africa and Asia. It is being expanded to incorporate more detailed information and case studies as an online resource.

It is hoped that this guide will provide some assistance to those faced with preventing, detecting and controlling ASF in resource-limited settings. It is a useful starting point for this journey.

We would like to thank the experts who contributed through the GPE ASF to the development of these guidelines for their valuable inputs:

We acknowledge Andriy Rozstalnyy, Animal Health Officer, EMPRES-AH; Astrid Tripodi, FAO Technical Coordinator; and Samuel Connell and Casimir Marcel Ndongo, FAO Consultants, for organizing the lively discussions of GPE ASF, and collecting and organizing the vast range of experiences and opinions of experts.

We also express our gratitude to Les Sims, Asia Pacific Veterinary Information Services Pty Ltd, Australia, who led the consolidation of the expert's opinion and preparation of the final draft of the guidelines with support from Mary Louise Penrith, University of Pretoria, South Africa; Erika Chenais, National Veterinary Institute, Sweden; and Nicolas Antoine Moussiaux, University of Liège, Belgium.

The guidelines were peer reviewed by Huaji Qiu, Director of Swine Diseases, Harbin Veterinary Research Institute, Chinese Academy of Agricultural Sciences; Fredrick Kivaria, Regional Epidemiologist, ECTAD Eastern Africa, FAO; and Mark Hovari, Animal Health Expert, Regional Office for Europe and Central Asia, FAO.

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We are grateful to the FAO communication team, especially Cecilia Murguia, for technical and communication support for more than 20 virtual meetings of experts, and Enrico Masci for the production of the guidelines.

Keith Sumption
Chief Veterinary Office
Food and Agriculture Organization of the United Nations

Abbreviations and acronyms

ASF	African swine fever
ASFV	African swine fever virus
FAO	Food and Agriculture Organization of the United Nations
OutCosT	FAO Outbreak Costing Tool
SELIA	Socioeconomic and Livelihood Impact Assessment
WOAH	World Organisation for Animal Health

Is this guide for you?

This booklet provides guidance on prevention, detection and control of African swine fever (ASF) in resource-limited settings.

It is designed for audiences in countries where:

- ASF is endemic in all or part of the country;
- ASF has recently (within the past three years) been introduced; and
- ASF is present or endemic in a neighbouring country, or in a more distant country from which animals, meat, tourists or returning residents arrive.

It is also for those to whom one or more of the following apply:

- Veterinary and other government services in your country have limited financial or human resources.
- Compensation, insurance or similar methods are not available (or are limited) for the culling of animals with ASF or for in-contact animals.
- Your country has a significant small-scale, independent pig producer sector with limited resources.
- Your country has what can be identified as informal production and processing sectors (farms not registered, no traceability of product, no or limited veterinary or para-veterinary support).
- You are a small-scale producer, pig buyer, transporter or slaughterhouse operator, or part of the informal sector in a resource-limited setting.
- You are a veterinarian, animal health service provider or feed supplier in a country with limited resources and a population of pigs.

Many countries have struggled to prevent and control ASF, especially those with limited resources and a large pig sector with many small-scale producers.

The guide is consistent with the Terrestrial Animal Health Code of the World Organisation for Animal Health, including the chapters on prevention and control of transmissible animal diseases and ASF. The recent Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) strategy for ASF has three main goals, which have been considered in producing this guide.

The guide is divided into five sections. The first covers some key aspects of ASF that can be exploited when developing prevention and control programmes. This is followed by sections on prevention, detection and control of ASF using novel methods that can be applied in resource-limited settings. The last section considers ways that communities can work together to manage ASF, as well as public-private partnerships. It provides information on methods that work, and also some of the adverse consequences and difficulties encountered when applying measures designed for high-income countries and places where ASF is not endemic in domestic pigs.

The guide is designed for the situation currently faced by veterinary services and producers in resource-limited settings. Most countries have programmes in place to enhance the performance of veterinary services. However, for most countries, there is a long way to go before these goals are met and countries still must face the threat of ASF with insufficient or limited resources.

Some important facts about African swine fever and African swine fever virus that can be used to aid prevention, detection and control in resource-limited settings

There are several features of African swine fever (ASF) and ASF virus (ASFV) that can be exploited when designing programmes for prevention, detection and control of the disease.

ASF IS NOT AS CONTAGIOUS AS OTHER MAJOR TRANSBOUNDARY DISEASES

ASF differs from other important transboundary diseases of pigs such as foot-and-mouth disease and classical swine fever. Disease outbreaks on individual farms tend to develop slowly, at least initially. Because airborne transmission does not normally occur and transmission by arthropod vectors only occurs in certain situations, the virus may not spread between pens unless direct or indirect contact occurs between pigs. This difference can be exploited for control and prevention of ASF. ASFV originated as a tick-borne virus, and this probably resulted in a reduced ability to transmit by the oral route. Infection by this route does occur, but it is inefficient. This feature is also a likely factor contributing to the relatively slow rate of spread of the virus between pigs.

Preventing contact between farmed pigs and infected animals or contaminated material can be enough to protect pigs, even in small-scale farms, provided measures are applied consistently.

Early interventions on individual farms, when the first signs of disease occur, can also help to control outbreaks without the need for mass culling of animals.

ASFV IS AN ENVELOPED VIRUS SUSCEPTIBLE TO MANY DISINFECTANTS AND RELATIVELY SHORT PERIODS OF HIGH HEAT, AS OCCURS WHEN BOILING FOOD SCRAPS

Even though ASFV can survive for months under the right conditions, especially in tissues from infected animals, it is also readily inactivated by a wide range of disinfectants and other physical and chemical methods, including sunlight and boiling. The virus can be inactivated within minutes when exposed to temperatures at or above 90°C. These features can be exploited when designing ASF risk reduction measures in resource-limited settings.

THERE ARE MULTIPLE BUT LINKED CYCLES OF INFECTION WITH ASFV. THE CYCLE IN DOMESTIC PIGS IS THE MOST IMPORTANT IN MOST RESOURCE-LIMITED SETTINGS

The ASF situation varies from place to place. However, in many resource-limited places, infection persists in the domestic pig population as an independent cycle. This means prevention and control efforts should be focused on domestic pigs and all human activities associated with pig production.

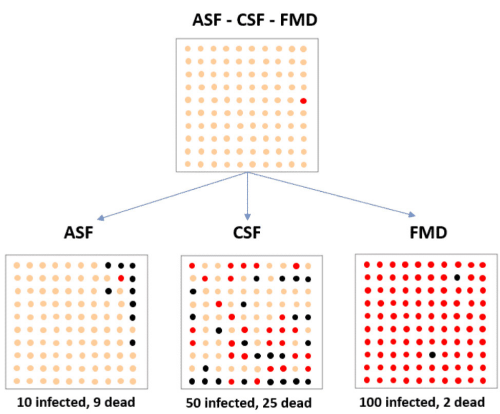
In other places, the virus persists in wild boar and can spread to domestic pigs. Once ASFV is established in wild boar, it has proven extremely challenging to eliminate the virus from this population (two exceptions are Belgium and Czechia where elimination was achieved, although infection returned to Czechia after several years).

In places where the virus is present in wild boar, the risk of spread to domestic pigs remains an ever-present, although sometimes seasonal, threat. In these settings, preventing contact between wild boar and domestic pigs is critical (including contact via hunters).

Some parts of Africa have to contend with sylvatic cycles involving ticks and warthogs (Penrith *et al.*, 2019), but these are relatively minor compared with other cycles. Figures 1 and 2 demonstrate the main cycles of transmission in East Africa and parts of East and Southeast Asia.

FIGURE 1

Progress of infection over a two to four-week period for African swine fever, classical swine fever, and foot-and-mouth disease. African swine fever is less contagious than classical swine fever (CSF) and foot-and-mouth disease virus (FMD) but is usually more lethal



Sources: Busch, F., Haumont, C., Penrith, M.-L., Laddomada, A., Dietze K., Globig, A., Guberti, V., Zani, L. & Depner, K. 2021. Evidence-based African swine fever policies: Do we address virus and host adequately? *Frontiers in Veterinary Science*, 8: 637487. https://doi.org/10.3389/fvets.2021.637487

FIGURE 2
ASF virus on tools used on pig farms will be inactivated after cleaning and exposure to sunlight for one to two days

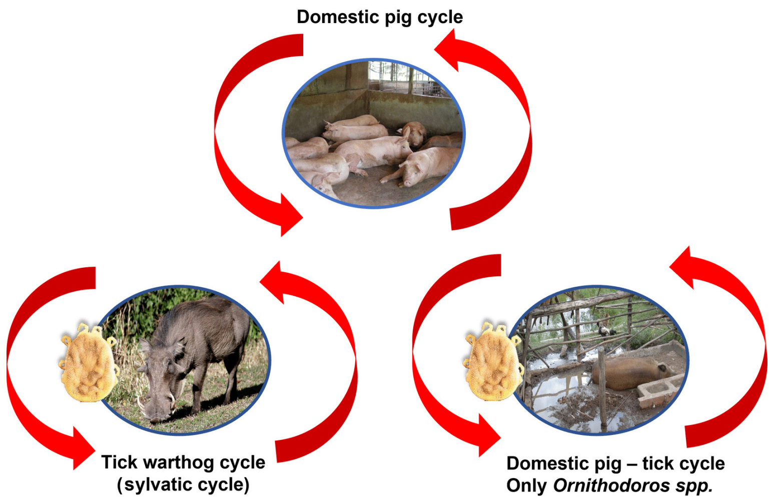
PIGS, PEOPLE, PORK: THE THREE PS OF ASF TRANSMISSION

The main pathways for transmission of ASF are via:

- introduction of infected pigs to farms or allowing contact with infected pigs;
- people (for example, farmers, animal health workers, and traders or middlemen) who have been contaminated with ASFV and who bring contaminated items onto farms, such as tools, equipment, boots and clothing, unwashed hands and vehicles; and
- feeding of food scraps or leftovers that contain uncooked pork derived from infected animals. This might be via kitchen waste, commercial feed waste or a farm worker inadvertently allowing pigs access to food waste brought onto the farm.

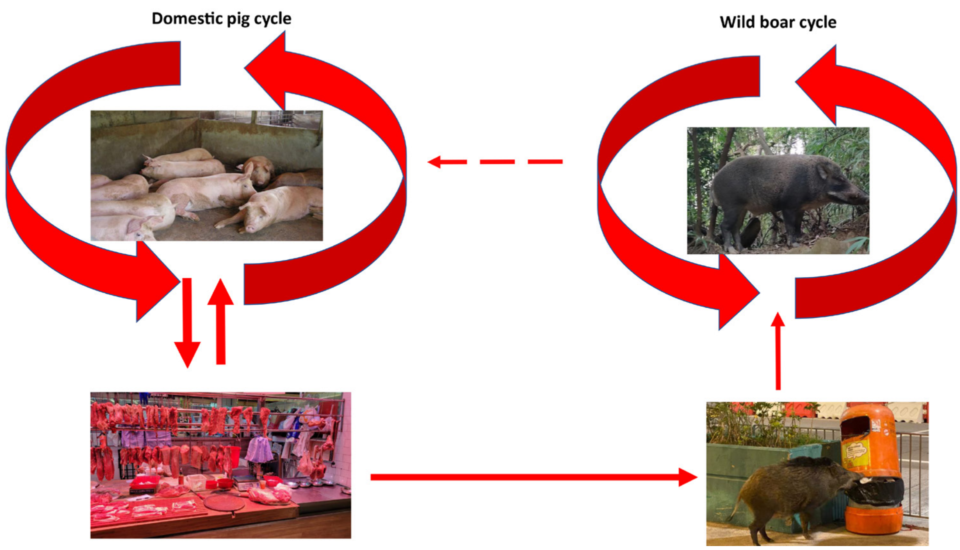
The virus can use other pathways to enter premises, which must never be ignored, but they are usually not as important as the three pathways listed above. Focusing on these three pathways will produce the largest gains.

FIGURE 3
The three interlinked cycles of transmission in East Africa



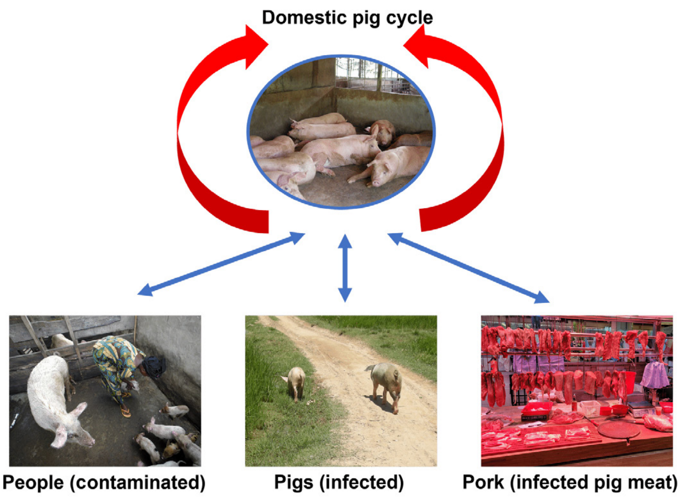
Source: FAO

FIGURE 4
The cycles of transmission in parts of East and Southeast Asia



Note: No sylvatic cycle and no known involvement of ticks. Infection cycles in wild boar have the potential to spill over to domestic pigs. The link between domestic pigs and wild boar is most likely via infected domestic pig meat, and, in some countries, it probably involves feeding on garbage by wild pigs.

FIGURE 5
The major routes of entry of ASF to farms



Source: FAO

Preventing African swine fever in resource-limited settings

This section provides some important points to consider when developing practical programmes for ASF prevention in resource-limited settings. These measures apply even to the many countries that are already battling ASF.

Preventing ASF is more effective and less costly than controlling outbreaks.

Containing ASF, once it occurs, is far more costly and disruptive than prevention. Therefore, very strong efforts should be made to prevent the entry and release of the virus into countries or parts of countries that are free from infection with ASFV.

Resources, where limited, should be directed preferentially to prevention, especially in countries, parts of countries (zones) and farms that remain ASF-free.

Prevention is based on biosecurity measures at multiple points (country and zonal borders, farms, slaughter points and markets) but in resource-limited settings, the capacity to implement these measures is often constrained.

Prevention depends on sound disease intelligence (covering potential sources of virus, trade patterns and other factors related to pig production). There are many readily available sources for this information (including, for disease information, updates by the Food and Agriculture Organization of the United Nations [FAO], World Animal Health Information System [WAHIS] and EMPRES Global Animal Disease Information System [EMPRES-i], and locally available data on legal and illegal imports, tourist movements and disease outbreaks).

When the threat of incursion increases for a country, a zone or individual farms due to outbreaks of the disease in surrounding areas, the level of biosecurity must be increased.

PREVENTING THE INTRODUCTION OF ASF INTO AN ASF-FREE COUNTRY OR PARTS OF A COUNTRY

Measures are needed to reduce the likelihood of introduction of the virus to ASF-free countries or areas/zones.

All countries should have in place systems and measures to minimize the likelihood of ASFV entering the country or to spread from infected to uninfected areas or zones within a country. Most countries have awareness campaigns in place for travellers about the risk of bringing in pork or pork products.

Among the measures at borders that appear to have been successful in higher income countries include trained dogs for detection of pig meat, high-level targeting of international arrivals, especially from places with ASF outbreaks and strict anti-smuggling activities, including high penalties for those found to have brought in pork products.

Standard methods exist, based on World Organisation for Animal Health (WOAH) standards, for safe trade in animals and animal products, but these also require strong anti-smuggling capacity and are challenged in places with porous borders.

Preventing the movement of infected wild boar across borders is extremely challenging, even in high-income countries, based on experiences from Europe and the Korean Peninsula.

Some success stories include the prevention of the spread of ASF to the western islands of the Philippines (until late 2022 when spread occurred) and the prevention of entry of ASFV to Taiwan Province of China.

Despite precautions, transboundary transmission has occurred, in particular, via pork products

Despite the many measures applied (such as awareness campaigns in place for travellers about the risk of bringing in pork or pork products), the probability of success in preventing the import of ASFV and spread to domestic pigs has been low. For example, most Asian countries have now experienced outbreaks of ASF since 2019.

Cross-border movement of animals occurs frequently in some parts of the world with few restrictions in place. Corruption might result in circumvention of inspections, and long-insecure land borders facilitate smuggling and informal trade. The virus has also made its way to island nations that potentially have advantages over countries with land borders.

It is possible to adapt preventive measures to protect local farms if, in fact, it will likely be impossible to prevent the entry of potentially infected pigs. One example of this is China, Hong Kong Special Autonomous Region, which allows import of live pigs direct to slaughter from mainland China, but has measures in place to prevent ASFV from moving from slaughterhouses to local farms.

PREVENTING ENTRY OF ASFV INTO FARMS: BIOSECURITY MEASURES IN RESOURCE-LIMITED SETTINGS

Farm biosecurity remains the most important preventive measure against ASF, especially in preventing the entry of the virus, but also preventing onward transmission within and out of affected farms. It works!

Biosecurity is about managing the pathways for the introduction of the virus, and these depend, in particular, on the three Ps discussed earlier: pigs, people and pork. However, other pathways can be important, especially in places where the virus is widespread and poorly contained. Each entry pathway should be addressed, as multiple layers of biosecurity measures will act cumulatively to reduce the risk of introduction of the virus. The more defences in place, the greater the strength in preventing introductions.

Biosecurity is about repeated, consistent application of simple but effective measures

Biosecurity is as much about management practices on the farm and at the farm boundaries as it is about the physical facilities (fences, pens and so on). Unless everyone in the household or farm, including visitors, applies the agreed measures every time, breakdowns will occur. People are prone to taking shortcuts, especially when in a hurry or tired. Even a single shortcut might be enough to let the virus in. Repeated breaches will eventually be extremely costly. The location of farms also plays an important role (for example, the extent of access by road generally, but not always, increases risk).

Measures that have been adopted include the use of dedicated footwear for production areas, making sure pigs are housed, not free to roam and kept away from other pigs, and not feeding unboiled food scraps that could contain meat from infected pigs.

As a general observation, measures that require significant ongoing expenditure, such as purchase of chemicals for disinfection, have not been adopted or, if so, have not been sustained or applied appropriately.

Lack of knowledge about biosecurity is not necessarily the main factor in determining whether measures are applied or not, even in resource-limited settings

A number of studies have shown that knowledge regarding disease prevention and biosecurity is relatively high, yet this does not necessarily result in changes to practices, usually due to lack of resources for implementation.

There is ample guidance on biosecurity for farms of all sizes for protection against ASF

There is no shortage of guidance on biosecurity for pig producers, but much of this is aimed at large-scale producers and not to resource-limited settings. Although the same principles can be applied by small-scale producers, they often do not have sufficient funds to build sophisticated facilities or the time to implement the necessary measures, especially if pig production is not the main source of income. This means that measures for resource-limited settings must be practical, affordable, cheap and acceptable to producers.

Individual small-scale producers working in isolation will struggle to prevent ASF. Prevention depends on a whole chain approach involving all stakeholders and requires strong community engagement

ASF prevention is not just the role of individual producers or actors. Anyone involved in the production, purchasing, selling, transport and processing of pigs, and those who provide other inputs and services, such as veterinarians and animal health workers, need to be working together (see the section on working together to prevent ASF).

Producers and local communities working together under a common biosecurity framework, who have simple rules in place, such as those to reduce the risk posed by traders, will likely be better protected than those who adopt a less coordinated set of measures. Some ways to develop community engagement are discussed in the section on working together to prevent ASF.

FIGURE 6
Two examples of housing systems that can be used to prevent pigs coming in contact with pigs or contaminated material from outside the farm

Being able to determine the level of threat is important for knowing when to further enhance biosecurity, which in turn relies on early warning of potential disease outbreaks

Early warning of ASF outbreaks allows tighter biosecurity measures to be taken in periods of high risk. If we consider a farm to be like a fortress. this allows the "drawbridge to be raised". However, intelligence on threat levels is often weak, and systems need to be introduced (see section on detection of ASF), including non-traditional methods of gathering intelligence on increased pig sickness and death using social media and messaging applications.

Communities working together can gather and share intelligence about possible outbreaks within and outside the community. This early warning and reporting allows enhanced biosecurity measures to be implemented when the threat of an outbreak increases.

Many of the preventive measures used for ASF also help to prevent other diseases caused by non-airborne pathogens

This point is important when developing biosecurity guidance. Biosecurity is not just about preventing ASF but livestock disease in general. ASF prevention should be linked to broader programmes aimed at improving profitability through enhanced biosecurity and disease prevention. Some of the measures in this guide will not be sufficient to prevent transmission of other pathogens if they are airborne.

CORE BIOSECURITY MEASURES FOR PRODUCERS IN RESOURCE-LIMITED SETTINGS

The main focus for biosecurity is preventing contact between pigs on farms and infected animals or contaminated objects, through housing or fencing

The concept of a farm as a fortress has merit (keeping those inside safe and keeping the "enemy" at bay outside). This concept can also be used for increasing biosecurity when there is evidence of an increased threat from outside.

Allowing pigs to roam is a very high-risk production system in places where ASF is present

Key to prevention is some form of secure housing for pigs and, where feasible, boundary fencing. These need to be constructed so that they prevent contact with pigs from outside the farm. Even in countries that have traditionally relied on scavenging for the feeding of pigs, some farmers are recognizing the importance of housing to prevent ASF and, usually after ASF occurred, have changed their production methods.

Upgrading to confined rearing is the safest option in ASF-endemic and high-risk areas. It has many other advantages that include protecting the pigs from predation, theft, road traffic accidents, and harm from people whose crops or gardens may be raided by free-range pigs. However, many practical issues such as feeding the pigs, maintaining good hygiene in the pens, and controlling internal and external parasites need to be addressed in order to assure the welfare and productivity of the pigs. Provision of water often becomes a particular problem that must be addressed for the pigs to survive and thrive.

FIGURE 7

Owners should consider their farm to be like a fortress which can be made more secure during periods when the threat of disease increases

FIGURE 8

Unconfined pigs pose a severe ASF threat

Pigs from unknown sources should not be introduced, but in the informal sector this is a common yet high-risk practice. If this is done, introduced pigs should be kept well separated from other pigs on the premises. In some countries, it might be possible to obtain pigs from herds or areas certified free from ASF. However, this can only be relied on in places with well-developed veterinary services and laboratory capacity to perform testing.

Sharing of boars is another common high-risk practice and the best way to protect against ASF is to develop an ASF-free community and only use boars from this community.

People (owners, workers, visitors, traders, animal health workers), vehicles and farm machineries entering production areas pose a major threat for the introduction of ASFV

ASFV can be carried on the skin of people exposed to infected animals, on the clothes and shoes they are wearing, the vehicles they are driving and anything they bring with them that is contaminated. This risk is increased if visitors have been to any other place where pigs are kept or slaughtered.

The risk of breakdown in biosecurity is high unless appropriate measures are taken to reduce the risk posed by people entering production areas. This includes ensuring visitors wash their hands before entering, use footwear dedicated to production areas and do not bring any equipment onto the premises. Animal health service providers who have visited an infected farm or village should not make further visits on that day to any facilities where pigs are kept.

Vehicles should always remain outside the production area.

Feeding unboiled pork products to pigs is also a very high-risk practice, especially in places where there is a high probability of ASFV being in the human food chain

Food scraps and leftovers are a cheap source of feed, but only if they do not cause the death or destruction of a farmer's pigs because they contained ASFV. Many outbreaks of ASF have been traced to the feeding of meat from infected pigs. It is a high-risk practice.

In places at high risk of infection where outbreaks are occurring and people are selling sick pigs for slaughter, food scraps containing meat should not be fed back to pigs. In many countries trying to eliminate ASF, swill feeding is banned and, in these places, no swill feeding should occur.

However, in many resource-limited settings, even in places where ASF is endemic, feeding of food scraps and leftovers is an integral part of the production systems. Previous recommendations, based in part on rules for international trade, to boil feed for 30 minutes or longer, are not feasible or followed because fuel is too expensive. In these settings, it is possible to exploit the temperature sensitivity of ASFV described earlier and apply a much shorter boiling time (even a few minutes) to minimize the risk from this practice, provided the following rules are followed:

- Meat, bones, blood and organs from pigs that died of or show signs of disease should never be fed back to pigs.
- No large bones or large chunks of meat should be present in food waste fed back to pigs. Meat thicker than a typical smartphone may require longer boiling times to achieve sufficient temperatures and should not be used, or, if so, should be cut into thinner slices.

FIGURE 9
Provision of feed and water and keeping pens clean are important tasks that must be done if pigs are confined in pens

- Bring swill to the boil with frequent stirring.
- Allow it to boil vigorously for a minimum of three minutes (this provides a margin for error given the virus will generally only survive at 100°C for less than one minute).
- Allow the swill to cool slowly before feeding (this also extends the period during which the virus is exposed to high temperatures sufficient to inactivate it).

The messaging needs to be clear.

No one should feed unboiled food scraps that might contain pig meat back to pigs. This includes preventing inadvertent access to human food waste through discarded partially eaten food or by allowing pigs access to garbage.

If your production system relies on the use of food scraps and leftovers that might contain meat from pigs as a source of feed for pigs, they should only be provided after boiling the product following the rules above. This will not eliminate all risk of infection, but it will, like all the measures proposed in this guidance, reduce the likelihood of exposing pigs to ASFV to a very low level.

Communities can also use the early warning systems discussed in other parts of this document to modify practices, including pauses on the use of food scraps that might contain meat, during periods of higher risk.

FIGURE 10
Any food prepared for pigs that might contain pig meat or offal must be boiled for a few minutes with regular stirring. Any large chunks of meat as shown here should be chopped into smaller pieces before boiling

Uncontrolled low biosecurity and low hygiene, home-based and local slaughtering of pigs by farmers and marketing of pork meat and by-products are risky practices in many areas with prevailing low input production systems

Blood, bone marrow, spleen and lymph nodes are major sources of ASFV.

Home-based or local slaughtering in low hygiene and low biosecurity facilities with the sale of meat at uncontrolled wet markets contribute to the spread of the disease. These practices are found in many parts of the world.

These widely used high-risk practices cannot be banned or controlled easily. However, risk communications and mitigation measures should be provided by central and local governments, supported by community-based ASF disease prevention and control initiatives, including the measures described above, such as the boiling of meat products.

PREVENTING OR MINIMIZING ENVIRONMENTAL CONTAMINATION, WHICH CAN INCREASE EXPONENTIALLY DURING OUTBREAKS

Biosecurity measures that work in "peacetime" can be overwhelmed when outbreaks occur, especially if there is indiscriminate disposal or sale of sick and dead pigs or contaminated pork

When outbreaks occur in pig-dense areas with many independent farms, biosecurity measures that work in "peacetime" to keep out pathogens can fail. Additional pathways for

FIGURE 11
Backyard slaughter operation

virus introduction need to be considered in these situations, such as contaminated water if animal carcasses are dumped in canals or rivers. Biosecurity does not guarantee safety, but multiple layers of protection collectively decrease the risk of a breach in defences.

Many small- and medium-scale producers do not have safe methods for the disposal of sick and dead pigs or even routine mortalities

Methods for handling routine dead pigs are an area of strategy that requires urgent attention. Dead and sick pigs represent a potential biosecurity threat for other farms if not handled in a way that reduces the risk of contamination, especially if there are poorly managed communal facilities for the disposal of dead stock or vehicles that come to collect carcasses. All communities that rear livestock need to have a disposal system in place matched to local resources and values. Systems in place in Europe that involve rendering are not available in many parts of Asia and Africa. See also the section on community engagement and control for more options.

Some societies will not bury sick or dead animals (waste of resources, traditional beliefs), and in other places it is not possible due to climatic or environmental conditions.

FAO has produced several resources on possible methods (see further reading).

FIGURE 12

Pigs laid out on a bed of organic material before being covered in above-ground burial

Vehicle cleaning and disinfection is important, but most smallholders are not able to do it properly

Studies have shown that small-scale producers in resource-limited settings are unlikely to have the resources or facilities to do effective vehicle cleaning and disinfection of vehicles used to transport pigs. It is an important biosecurity measure, but one that is time-consuming, expensive and requires an appropriate site (for example, at or near a slaughterhouse for vehicles after delivering pigs for slaughter). Markets and slaughterhouses might have the appropriate facilities and supplies of water. Vehicle washing centres are present in some countries, offering one potential solution.

Issues have been identified with drying vehicles post-disinfection, especially in the wet season, and problems with contamination of driver's cabs.

When conducting cleaning and disinfection, more attention should be paid to the driver's cab, the underside of the vehicle and areas where pigs are kept on vehicles, rather than on the wheels. In some countries, pigs are transported in bamboo cages that are difficult to clean and disinfect.

FIGURE 13
Vehicles and unwashed cages represent a very high risk for introduction of ASF virus

© LES SIMS

Excessive and inappropriate use of disinfectants occurs despite the expense, potential environmental and health issues, and considerable training and experience in this area (for example, for avian influenza)

Disinfectants have an important role to play in inactivating viruses. However, in many cases, disinfectants are not used correctly.

Among the problems seen are:

- spraying of disinfectants that are inactivated by organic matter on uncleaned surfaces;
- insufficient contact time;
- improper management of disinfectant baths (no cleaning of boots before use, organic matter buildup, and insufficient regular dosing with disinfectant for drive-through disinfection that have to be topped up and not emptied, or for boot disinfection); and
- use of the wrong chemicals or disinfectants.

Some good guidelines are available on the use of disinfectants, including appropriate contact times, dilution rates and methods of application. Health hazards associated with disinfectants are often ignored, but some disinfectants can pose significant hazards to operators.

Environmental impacts of disinfectants also need to be considered carefully.

Improperly used disinfectants can give a false sense of security.

VACCINATION

If suitable, efficacious, safe and affordable vaccines matched to circulating viruses become available, they will be used to assist in the prevention of ASF in some places where the viruses remain endemic

Until vaccines are widely available and used, other methods must be primarily deployed for prevention and control of the virus.

Appropriate commercial vaccines are not yet available for ASF (as of 31 March 2023), but a number of products are currently undergoing evaluation. It is possible that vaccination will become an accepted method of control and prevention, but this requires vaccines that are cost-effective, safe and effective in preventing disease.

Use of vaccines will likely change the approach to the disease away from mass culling as the main management measure in countries, especially where a single strain of the virus matched to the vaccine remains endemic. However, control of disease through vaccination would still require careful considerations and a professionally supervised strategic vaccination plan. Chaotic vaccination efforts may produce issues that can complicate rather than help to resolve the problem.

Even if a vaccine becomes commercially available, many domestic pigs in resource-limited settings are produced under conditions that would make vaccination difficult. The vaccine would have to be highly effective and preferably thermotolerant to thermostable, easy to administer and cheap. The rapid turnover of pigs is also a complication in determining the frequency of vaccination campaigns in countries where the state is responsible for vaccination against controlled diseases like ASF.

Furthermore, previous vaccine research would suggest that cross-protection against multiple genotypes should be considered highly unlikely. Therefore, the role of the vaccine in Africa, where 24 genotypes are in circulation, needs to be studied as the vaccine would be required to provide immunity to a wide spectrum of ASF viruses. In these areas where subsistence farming systems prevail, biosecurity is likely to remain the most practical way to protect pigs from ASF.

Unsanctioned use of illicit and poorly developed vaccines has almost certainly occurred in Asia, complicating the disease situation due to a potential risk of chronic ASF and introduction of a different virus serotype. Pig producers should never use unlicenced vaccines.

Detection of African swine fever or African swine fever virus in resource-limited settings

This section provides information on ways that can be used to detect ASF relevant to small-scale producers and places with limited resources. It covers issues such as specimens to collect, surveillance techniques and methods available for early warning.

DETECTION OF ASF

Early detection of ASF, coupled with early warning systems, is essential to minimize the threat and impact posed by this disease.

Early detection and reporting of outbreaks allow measures to be put in place to prevent transmission of ASF. This applies even in places where ASF is endemic (See Table 1).

Biosecurity measures should always be in place, but as noted in the previous section, when ASF (or other diseases) occurs in an area, it is important for individual producers and communities to increase biosecurity ("raise the drawbridge leading into the fortress"). This might mean temporary suspensions on the use of shared boars and introduction of new pigs to herds. It should also result in restricting visitors to only those who are essential.

These enhanced measures only work if there is a system in place to know that the threat has increased.

Unfortunately, in many places, there are no incentives to report disease and limited or no access to testing (or at least testing that delivers results within 24 hours). The cost of testing can also act as a disincentive, and the effect of a single positive test result on a whole village can be devastating if it means that all animals in that village will be culled.

Lack of reporting means that producers and communities are not aware of the increased danger to their livelihoods.

Community-based measures are essential for protection of small-scale farms from ASF. This also applies to disease intelligence and disease detection. Social media platforms (when in place) and local radio announcements can be used to provide appropriate warnings. Social media platforms can also be sources of information that might indicate the disease is occurring nearby.

In some countries, farmers have formed groups using internet-based messaging applications to share information on ASF. These can also be used to help in the early detection of outbreaks and disease intelligence.

Feed traders and pig buyers can also be valuable sources of intelligence about possible disease outbreaks.

Systems based on reports of increased sick or dead pigs, even without testing, can still provide a warning signal to others in the community and surrounding communities to tighten biosecurity

Any unusual or sudden deaths in pigs can be used as a warning of possible ASF. Many farmers have experienced outbreaks of ASF and understand that the first sign will likely be the unexpected death of one or more older pigs. Initially, there may be very few deaths in an outbreak of ASF (often pigs close to market weight and breeders).

Developing systems for reporting sickness or mortality in pigs provides the simplest way of providing early warning of an increased threat from ASF. These reports need to be shared within and between communities so that appropriate preventive actions can be taken. They should also be shared with local animal health authorities.

Ideally, testing should be done, but even in the absence of reliable test systems, any unusual reports of deaths in older pigs should be taken as a warning of a possible outbreak of ASF.

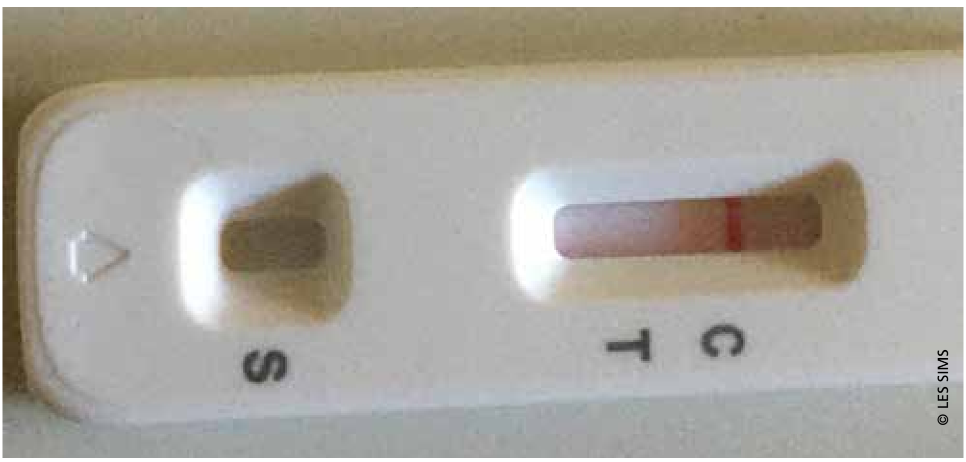
Timely testing of unexpected pig deaths increases the chance of early detection of infection with ASFV.

Early detection of ASF can be aided by the deployment of cheap, sensitive point-of-need testing

A major shift in the acceptance of rapid tests has occurred during the COVID-19 pandemic. Greater availability and application of these tests for the detection of ASFV should be encouraged. The tests need to be sufficiently robust to be performed under harsh conditions, often without electricity, and those using the tests must know how to use them, how to interpret the results and their limitations (a positive result is a strong indicator that the animal has ASF, a negative result does not rule out the disease).

FIGURE 14

A rapid antigen test kit (negative result at point T) with the control (C) testing positive



Deployment of rapid but accurate tests that can be performed onsite or close to suspected outbreaks, rather than relying on results from samples sent to distant laboratories, can help in early warning. Antigen detection techniques work best on pigs that die soon after infection and do not work well on carcasses in more advanced stages of decomposition. Testing of sick or dying pigs should be prioritized for virus detection.

CHARACTERISTICS OF RAPID TESTS USED FOR THE DETECTION OF ASFV

A range of tests (both rapid antigen tests and tests that amplify and detect viral nucleic acid) is available and can be deployed in the field. Information on how they have been deployed and their relative strengths and weaknesses is provided here and in Table 1.

Note that not all tests have equivalent ability to detect ASFV when actually or truly present (sensitivity) and only tests that have been validated should be used.

TABLE 1
Characteristics of tests used for detection of African swine fever virus

Rapid antigen test	• Relatively insensitive after 10 days showing clinical signs, but usually suitable for detecting the virus in pigs that die rapidly (within a week) from ASF, especially if multiple animals are available for testing (not all will necessarily test positive). • Test results in 15 to 30 minutes. • Positive result means very high likelihood of infection (few false positives). • Negative result does not rule out infection. • If high suspicion but negative test, additional other more sensitive tests (below) should be used. • If animals have been sick for more than 10 days, rapid antigen and antibody test could be performed in parallel onsite. • Good for making rapid decisions in the field, provided limitations are well understood. • Greater understanding of use and limitations of rapid tests since COVID-19. • Relatively inexpensive. • Generally, minimal training is needed to conduct these tests. • Need to ensure those doing the test are trained in their use and limitations.
Field-based or near-field-based test using amplification of nucleic acid	• Various methods have been deployed and can provide results almost equivalent to those produced in a laboratory. • More training required than for rapid antigen tests. Some of these have been designed to have a readout like a rapid antigen test. • Examples include loop-mediated isothermal amplification (LAMP), recombinase polymerase amplification (RPA) or insulated isothermal polymerase chain reaction (PCR). • Results can be available in less than two hours. • Higher sensitivity than rapid antigen test although deeper field validation is needed.
Laboratory-based real-time PCR	• The gold standard for virus detection. • Relies on more expensive equipment and proper well designed laboratory facilities (field-deployable systems are available in some countries). • More expensive. • Highly trained staff. • In resource-limited settings, the need to transport specimens to the lab slows down the detection of virus and may result in unacceptable sample quality once received.

Source: FAO

FIGURE 15
Collecting blood from a pig

Before suitable point-of-need tests can be deployed effectively, producers must have reasons to believe that testing is in their interest, that of their animal's and their community. This has not been the case in many places due to fears about the response by authorities to a positive result and an absence of compensation if pigs are destroyed. This, in turn, resulted in panic selling of animals and illicit dumping of carcasses, both of which enhanced the transmission of the virus and prevented testing. The cost of testing must also be considered, given it will also inhibit uptake.

It is important for both the benefits and potential downsides of rapid testing to be considered. Those charged with controlling ASF need to understand how results are or will be used, especially if there is a stamping out policy and reporting requirements in place, once ASF is detected. Some farmers and traders may choose not to report rapid test results.

It needs to be agreed in advance with veterinary authorities how these tests will be used, how test results will be relayed to authorities and the actions that will be taken if a positive test result is detected or reported.

The advantage of using rapid tests is that action can be taken promptly to limit losses from this disease. Point-of-need tests have been deployed on individual farms to allow for partial culling of herds (mainly on large well-resourced farms but there is no reason they cannot be deployed in places with limited resources).

Blood is the preferred sample for testing for ASFV in sick pigs, but a range of other samples can also be used

The best sample for detection of ASFV from a sick or dead pig is an ethylenediamine-tetraacetic acid (EDTA) blood sample. However, blood is not always easy to collect and requires trained personnel to do so. For early detection of ASFV before clinical signs become apparent, some larger herds have been using rope-based saliva samples.

In some places, samples for ASF testing need to be transported over long distances and refrigeration of samples is not possible. The use of Flinders Technology Associates (FTA) cards for sample transport should be considered.

PRE-SALE AND PRE-SLAUGHTER TESTING IN RESOURCE-LIMITED SETTINGS

If pre-sale or pre-movement testing is adopted, the strengths and weaknesses of testing healthy animals and certification need to be considered

Some resource-limited countries have adopted pre-movement testing and certification of animals as part of their control and preventive strategy for ASF. One of the concerns with these systems is that they have relatively low sensitivity if tests are performed on healthy animals. Animals in the early stages of incubating the virus could be missed. Inevitable delays between sample collection, testing and pig transport also create problems, in that animals can get infected after samples are collected. This type of testing is costly, and, if used, it is important to ensure it is providing accurate information about the disease status of animals and the extent of protection expected. If the testing is not providing appropriate assurances that pigs are free from infection, then it should not be done.

Control of African swine fever in resource-limited settings

This section explores methods that can be applied to control ASF when cases occur in resource-limited settings and some of the problems that are encountered when using them. It is of particular relevance to countries where ASF is expected to remain endemic.

PLANNING FOR CONTROL OF ASF IN RESOURCE-LIMITED SETTINGS

When ASF occurs, control interventions should be aligned with veterinary capacity, resource availability, the structure of the pig sector, and the likely behaviour of farmers and other value chain actors.

FIGURE 16
Dead pigs on a farm with ASF

Approaches to the control of ASF have typically been based around stamping out and movement controls. These are still important measures. However, the expansion of ASF across much of Asia, and its endemic infection in Africa, has seen significant changes in the way the disease is or can be managed. Issues with existing emergency management plans and procedures have been identified.

The aim of most national programmes is to eliminate the virus from the country or, at least, from the domestic pig population. However, for some countries this is not a feasible objective due to:

- the structure and nature of the pig sector;
- the involvement of wildlife in the transmission cycle;
- high risk of reintroduction of the virus after elimination;
- late and incomplete detection and reporting of outbreaks;
- the limited capacity of veterinary services, with late or incomplete responses to outbreaks;
- difficulties in obtaining sufficient resources for emergency responses; and
- the absence of compensation or insurance systems.

When developing emergency management and response plans for ASF, these limitations need to be recognized.

It became apparent in Asia that the methods used originally for ASF control, involving wide area culling of pigs, were not sustainable and, in many countries, did not achieve the desired end-point of virus elimination.

Some countries did not deploy stamping out because it would not be acceptable to local producers (in part because authorities could not pay compensation for culled animals) or they did not have sufficient animal health staff, yet they still managed to contain infections.

For many poor farmers, the logical response to a disease outbreak (including ASF) is to sell as many pigs as possible, even if this means receiving a lower price and spreading the disease

Buyers for sick and dead animals exist in many countries (often despite the presence of laws that make this illegal, with high penalties). While these pathways persist, control of ASF and other severe transboundary diseases will be compromised. However, the sale of these animals is a rational coping mechanism for farmers to reduce impacts on their livelihoods.

If it is expected that this behaviour cannot be prevented, then the likelihood of being able to eliminate the virus will be low. This needs to be considered when building response plans. If sick and dead pigs are not being reported, veterinary services are not able to identify all outbreaks, which is a critical factor if the objective is virus elimination.

Compensation or insurance systems can help to overcome these issues, but even when in place, they do not guarantee that all farmers will report disease.

The cost of ASF to producers is not just due to the death and destruction of pigs, but also the extended period in which producers are out of business following the depopulation of their herd, as well as the difficulties faced in buying replacement stock. Downtime in some countries has extended beyond one year. This also adversely affects others in the value chain and can have far-reaching consequences for communities that depend on pig production for livelihoods.

FIGURE 17
Some buyers may be available to buy sick or dead pigs at a discounted price

Trust in government institutions is also needed for state-run control programmes to be effective

Trust in government institutions is low in many places, which also inhibits disease reporting. It is eroded further when outbreaks result in measures that are potentially more costly than the disease for affected producers. For example, if there is a previous history of delayed payment of compensation or no payment, then trust is lost and can be difficult to restore.

Elimination of the virus will not occur if reporting of disease results in (or is seen to result in) producers being disadvantaged, including the absence of reasonable compensation or appropriate insurance if animals are destroyed

At present, if farmers report ASF, they will likely have their pigs culled. This may extend to neighbours or other premises that are linked to the affected farm. In some countries, compensation or insurance is not available. This raises major ethical and legal considerations if a country destroys property but offers no or inadequate compensation. Alternative approaches need to be considered, as has been the case in countries such as Mauritius, Papua New Guinea, Timor-Leste and Zimbabwe, where culling has not been used or used sparingly.

The Philippines provides one example where an insurance scheme linked to farm registration and a minimum set of biosecurity requirements has been used successfully to support farmers. This scheme included small-scale producers who were not required to pay a premium, provided that they met minimum biosecurity requirements. However, this required government resources to support the scheme.

Emergency plans for ASF must be realistic, have clear and achievable goals tailored to local conditions, must be tested via simulations and contain regular progress review points

Most national ASF plans have the objective of eliminating the virus from the country (or part of the country or from domestic pigs), but this may not be a realistic goal, especially if reporting of disease is inadequate or insufficient.

Changing this approach can be difficult if this objective is written into legislation, as is the case in some countries and regions, especially if it is difficult to get political support to make changes to laws.

In some situations, disease control measures can have disproportionate adverse effects on small- and medium-scale producers who have no or few other sources of income or social capital apart from pigs.

When considering plans for individual countries, it is necessary to review the stated objectives of the control programme, as well as how measures used to achieve these objectives are applied. Major gaps exist in some countries between what is proposed in emergency disease response plans and the capacity to implement them. Therefore, control plans should be based on the local context, including availability of resources, farming practices and cultural practices, such as being forbidden to bury dead animals (burial is reserved for human beings).

Plans must balance international and regional demands to contain ASF, national goals and local pro-poor policies, especially if the likelihood of virus elimination from a country or part of a country is low

It can be difficult to get the balance right between doing what is necessary to support global disease control and supporting local producers. Harmonized approaches to disease control in regions are seen as preferable for control of ASF and other transboundary diseases. However, it is also necessary to recognize that a "one-size-fits-all" approach to disease control that does not recognize the unique features of the pig sector and resource constraints in individual countries for disease control activities will be resisted and, if adopted, is likely to fail.

Successful disease control at the regional and global level depends on the collective efforts at the country level.

ASF CONTROL FOLLOWING DETECTION OF AN OUTBREAK IN RESOURCE-LIMITED SETTINGS

Methods that are appropriate for high-income countries are not necessarily applicable in resource-limited settings where virus containment is more feasible or practical.

A number of measures are available, all aimed at minimizing the likelihood of transmission of the virus within and from affected farms and areas. They are based around:

- movement controls;
- culling of infected and high-risk animals for disposal;
- safe slaughter of uninfected at-risk animals for consumption;
- disposal of carcasses (pigs that die from the disease and infected or in-contact animals that are culled); and
- decontamination of affected premises prior to restocking.

All of these have potential adverse consequences or face difficulties in implementation (see below). The adverse consequences might be acceptable if the interventions result in virus elimination, but not if virus elimination from the country is unlikely to be achieved or it will only be a short-term gain because the virus will be re-introduced. The pros and cons of all measures must be weighed up against a realistic assessment of the likely benefits.

Appropriate movement restrictions are important once infection is detected but can have unintended adverse consequences

Restricting movements is often one of the first measures taken when an outbreak of ASF is reported. This can range from national movement standstills to measures that apply to individual farms or communities. However, the adverse consequences of movement restrictions also need to be considered as, in some cases, they can result in significant economic losses and even, potentially, additional disease transmission.

Before introducing draconian restrictions on movement, allowing producers to safely slaughter healthy pigs for local (within community) consumption, done in a way that does not increase the risk of transmission should be considered. For example, in some countries, community feasts have been used in villages subject to movement controls because of outbreaks.

Some farmers are prepared to restrict the movement of their animals voluntarily in the face of outbreaks by ensuring animals are kept in pens once they are made aware of the value of this method.

Large-scale culling is difficult, time-consuming, emotionally distressing and resource-intensive with high potential for adverse animal welfare and environmental implications

Problems associated with mass culling become particularly pertinent when many pigs have to be destroyed or when large numbers of otherwise healthy animals are killed in places where the virus remains endemic.

As a rule, the minimum number of pigs needed to contain the disease should be culled (and this might be zero), especially in places where the virus is endemic and will not be eliminated in the short to medium term.

Partial culling of herds is being applied as a control option for ASF in some countries

Alternatives to mass area-wide destruction need to be considered and have been adopted in China, Mauritius, South Africa and Viet Nam. This includes partial culling or partitioning where only parts of a herd are culled, leaving unaffected animals alive.

It became apparent, in a number of countries with large pig populations in Asia, that culling whole herds, on large multi-house farms and on high-risk, but unaffected, premises was not sustainable, especially given it was not resulting in country-wide virus elimination.

Selective culling has proven successful in controlling outbreaks in areas with both free-roaming pigs and more developed farming practices.

However, selective culling is not always appropriate, and the outcome is dependent on the current local situation (for example, how many pigs are infected at the time of the decision, the extent to which infected and uninfected pigs can be separated) and infrastructure in place to deal with the outbreak. It is possible to start with a limited cull on affected premises and extend it if evidence of infection is detected in the remaining pigs. The slow spread of ASFV gives a chance to avoid mass culling, provided that awareness of risk is high and the rules of basic biosecurity are followed.

Methods for mass carcass disposal are also problematic in resource-limited settings

All the methods used for carcass disposal in outbreaks can have adverse environmental effects with the potential to spread the disease or to contaminate groundwater. Again, it is important to destroy the minimum number of pigs necessary to achieve objectives (this might be zero) and to aim for prevention rather than control. This section highlights the methods that are available, but also the pitfalls associated with their use.

Burial has been the method of choice, but it has been done poorly in many countries, with little regard for ecological impacts. Above-ground burial has been proposed as an option and is now a recommended method in the United States of America for emergency use. It might be difficult to implement for large-scale culling operations in areas with limited land and in places with heavy rainfall and flooding, or where it is difficult to secure the burial site. Furthermore, environmental considerations must be taken into account in places where burial (even above-ground burial) is performed, especially in areas with high water tables.

Burning of carcasses onsite might be suitable for small numbers of pigs, but it is difficult in wet conditions, as seen in countries with intense wet seasons and on very small properties or communal land. The high cost of fuel and environmental consequences also need to be considered.

Rendering and incineration are options that are used widely in high-income countries for carcass disposal and in integrated high-end farms if facilities are available, but these can also have adverse environmental effects. They are generally not available in low-income countries. Moving dead animals by vehicles can potentially spread the virus if care is not taken to prevent leaks or external contamination of vehicles.

An alternative is for large feasts to be held, utilizing healthy animals that would otherwise be destroyed, provided waste from these animals is properly managed and not moved out of affected villages.

Composting is an option that is also being used in some high-end farms. A system developed in South Africa, using either containers or robust bags, may be suitable for relatively small outbreaks and routine mortalities. Composting has not been used widely in Asia for pig carcasses except on very large integrated farms.

FIGURE 18
Burning has been used but may not be permitted in some areas, can cause pollution and requires a source of fuel

Methods are well-documented in the FAO guides on carcass disposal for small- to medium-scale producers (see the section below on further reading). Combinations of measures in these guides can be used, but the limits of these methods need to be recognized.

In some countries with limited formal markets for pigs, culling was not used, but the virus was still contained

Veterinary authorities in some countries chose not to destroy any pigs, yet it was still possible to contain the virus (for example in Papua New Guinea). The focus was on prevention through the housing of pigs. However, it must be noted that significant losses from disease still occurred before housing and other measures were implemented.

Zoning has been used for the containment of the disease, with mixed results

Zoning has been applied in some countries with mixed results. Much depends on whether there are geographical barriers and capacity for preventing the movement of pigs and pig products. Note that in this section, "zoning" is not referring to zones for international trade, but for disease control purposes within a country.

Zoning within a country can work, provided there is full support for all measures by all value chain participants. It is more likely to be successful if there are clear geographical boundaries between zones. However, if pigs or pig products are moved illegally, breakdowns will occur. It is also complicated if the virus is present in the human food chain and pigs gain access to uncooked pig meat from infected animals that is moved to an uninfected zone. This can occur as a result of imports from other countries.

Zoning may require usage of buffer areas between infected areas. This may impact on the freedom to move pigs for those in the buffer area.

Traceability of pigs is very important for disease control

Traceability of pigs is an essential part of ASF control, but one that is missing in many resource-limited settings. It can be as simple as pig slap tattoos, the sealing of vehicles at the point of departure, or even the use of more sophisticated mobile technology adapted for use in lower-middle-income countries. Unless systems are available to trace animals back to their source, containing ASF will be difficult.

Restocking has proven to be difficult in some countries (access to suitable breeders)

A recurring problem in the battle against ASF has been the difficulty faced by producers, including small-scale producers, in sourcing pigs from uninfected herds for restocking after outbreaks. In many countries, the price of replacement breeders increased dramatically after ASF outbreaks, and it was also difficult to confirm that replacement pigs were free from ASF.

Some farmers would prefer to be provided with replacement stock rather than cash compensation and this option should be explored when designing response plans.

Raising awareness about ASF is crucial to counter misinformation and improve control

Programmes aimed at raising awareness about ASF and providing small-scale producers with accurate information on the disease should be in place in all at-risk and affected countries.

Misinformation about ASF not only interferes with the application of sound control measures, it can also have significant social consequences. In Papua New Guinea, pig deaths in some ASF outbreaks were attributed to witchcraft, with serious consequences for women pig keepers.

Traditional beliefs about disease causation need to be recognized.

CONTROL OF ASF IN WILD PIGS (SUS SCROFA) IN RESOURCE-LIMITED SETTINGS

Control of ASF in wild pig populations can be difficult, but measures are available. Keeping domestic pigs away from wild pigs (including areas where wild pigs have died) remains the most important measure

Separation of domestic and potentially infected wild pigs (and free-roaming domestic pigs) through the penning of domestic pigs and, in some cases, fencing, is key to prevention of disease transmission from wild to domestic pigs.

Control of ASF in wild boar populations can help to prevent infection in domestic pigs and has been applied in high-income countries. A number of methods have been used, but these are either unsuitable for use in resource-limited settings or successes have been limited.

SOCIOECONOMICS AND CONTROL OF ASF IN RESOURCE-LIMITED SETTINGS

Some form of compensation or insurance must be available if disease control programmes require seizure and destruction of property

Without some form of support or incentives, pig farmers will likely be reluctant to report disease, especially if it means their pigs and those of their neighbours will be destroyed.

The method most widely used is compensation, but other methods can also be applied, including insurance or supply of replacement breeder pigs.

It has been suggested that (Busch *et al.*, 2021):

> *At best, adequate compensation payments will incentivize farmers to report suspicion of disease and may generally aid in matters of compliance relating to on-farm disease interventions by the responsible authorities. At worst, with little or no compensation, suspicion of disease may not be reported to the responsible authorities and instead farmers choose to hastily slaughter or sell their sick pigs at local markets, or dispose of carcasses illegally. Such circumstances have been recognized as a major cause of disease spread.*

However, some countries cannot afford to pay compensation or are reluctant to do so because of adverse experiences with other compensation schemes.

If some form of support (compensation or other) is not available for animals culled by the government for disease control purposes, this must be recognized when developing preparedness plans, including the likelihood that reporting will be weak and, as a result, virus elimination will be difficult to achieve.

Note that some countries did not use compulsory culling of animals in ASF control programmes, in part because there were no funds available for compensation.

Various socioeconomic impact assessment tools are available and have been used in assessing control and preventive measures for ASF and other diseases

Various methods are available for undertaking economic assessments. Two assessment tools that have been applied to ASF are the FAO Outbreak Costing Tool (OutCosT) and the Socioeconomic and Livelihood Impact Assessment (SELIA).

Both OutCosT and SELIA require a sound understanding of the methodology being used and access to reliable data and information. It is recommended that before these tools are used, time is spent becoming familiar with them, and that the support of FAO or others is also sought in setting up and applying the relevant tool.

OuTCosT is a cost-based financial tool and does not directly consider social aspects. It has been used to assess the costs of ASF outbreaks in one northern province in Viet Nam and for the early stages of the outbreak in the Philippines.

SELIA is a more wide-ranging and complex tool that assesses social and economic impacts. It has been used in ASF outbreaks in the Philippines and Timor-Leste where use of the framework identified issues, including problems in affording pigs for restocking and limited support available from veterinary technicians. This allowed government veterinary services and others to examine ways to overcome these issues.

Working together to prevent and control African swine fever (community engagement and public-private partnerships) in resource-limited settings

This section explores ways to improve prevention, detection and control of ASF (and other diseases) through engaging communities and building other partnerships, especially public or private partnerships, applicable to resource-limited settings.

Producers working with other producers and actors in the supply chain have a much greater chance of preventing, detecting and controlling ASF than those who work alone.

FIGURE 19
Communities working together can improve ASF prevention and control

Individual actions are important for disease prevention but can be overwhelmed when not accompanied by collective actions (including actions by partners other than farmers such as traders, feed sellers, transporters, government officials and so on). Animal health is everyone's responsibility, not just producers.

It is also important, when dealing with small-scale producers and associated services, to use participatory approaches to determine which measures are feasible or infeasible, and why.

COMMUNITY ENGAGEMENT

Every stakeholder has a role to play in animal health. Consider all stakeholders as knowledgeable partners

Perceived lack of engagement of communities often results from inadequate, non-participatory interventions and a tendency to underestimate the insights and inputs of other stakeholders in arriving at a solution. When reaching out to communities and other stakeholders involved in the production, processing, trade and sale of a product, the teams in charge of animal disease control should bear in mind that each stakeholder will hold a piece of the solution.

Invite stakeholders to collaborate and avoid blaming

To effectively control animal disease, all stakeholders need to cooperate. This is possible only when the animal health service providers are not seen as being purely actors of control and law enforcement. No one will feel comfortable cooperating if they are pointed out as the cause of the problem. Therefore, it is important that animal health professionals approach stakeholders as collaborators and invite them to an open dialogue. It is important to avoid blaming anyone for present or past mistakes and focus positively on improvements that can be reached. Stakeholders do what they do for a reason. Understanding the context, constraints and motives driving the practices of all stakeholders is key to building effective collaborations.

Remain open to learn about field practices and their motives

Animal health professionals hold particular knowledge and expertise in disease management. However, they may not be familiar with all the practices or motives of the wide diversity of actors involved. It is a long-drawn process of discovering how the different actors are operating or behaving and understanding their motives. This understanding is acquired with experience and cannot be learned at the very onset of any intervention. Therefore, it is important to remain open to learn from all actors throughout the collaboration. Remaining open to learning means that one cannot take actions based only on pre-established knowledge or information, which cannot be taken for granted before the inception. We need to remain vigilant to new knowledge, insights and experiences.

Agree on the roles and responsibilities of the different stakeholders

Engaging in a collective action requires every contributor to be aware of their roles and responsibilities. These roles and responsibilities will ideally be agreed upon together, with all stakeholders involved. Specified descriptions of the roles and responsibilities of each contributor should be made available to all. Hence, everyone will be aware of their own responsibilities and those of others. All will be able to observe their own share in the whole plan and the interdependence between all contributors in the success of disease control.

Give feedback to and ask for feedback from partners

Once roles and responsibilities are agreed on and understood by all, actors regularly share updates about disease control programme results with all concerned stakeholders and actively collect updates from a sample of diverse stakeholders. Feedback is crucial to allow for continuous improvement of actions. It also sustains the collective engagement of actors through recurrent social contacts. Furthermore, when they receive information from others, concerned stakeholders will be more inclined to share their own information.

Harness the diversity of stakeholders and their perspectives: actively include all stakeholders

Animal health interventions often focus on farmers or producers and neglect other kinds of stakeholders along the value chain such as butchers, traders, and input or service providers. Likewise, within the group of farmers, restricted focus on any economic or social category should be avoided. Due to the nature of infectious diseases, their control has to indiscriminately involve the whole range of actors. Constant effort is needed to consider the range of actors at each step of the programme and appreciate their diversity.

To effectively contribute to the overall well-being of the population, animal disease control has to, in particular, pay attention to the situation of vulnerable actors and to those affected negatively by control measures (for example, through livelihood support or compensation), not forgetting vulnerable workers along the value chain. Hence, animal disease control measures must embrace equity concerns. This is also needed for reasons of effectiveness as neglected stakeholders might play an important role in the epidemiology of the disease at stake.

Build capacity throughout the value chain

To be active contributors to animal health, every stakeholder needs to be empowered. Programmes often focus on capacity building among farmers and concerning disease diagnosis and biosecurity practices. This is important, but not sufficient. What is needed is inclusion of a wider array of stakeholders and a broader scope of training. By understanding practices, motives and constraints of the diverse array of stakeholders along the value chain, one will be able to identify the diversity of the training needs of each actor. Hence, training should focus not only on technical aspects, but should include accountancy and business management, as well as soft skills development such as communication, teamwork and group leadership.

Do not focus only on technical issues, take human dimensions into account: understand the motives, means and constraints of actors

Animal disease control is not only a matter of infectious agents and animals. Humans are central to control, with diverse roles in the value chain or administrations. Each actor will have particular motives, means and constraints. Therefore, to effectively implement a programme for animal disease control, one will need to also consider the human dimensions, such as the social, political and economic stakes that people are facing and the cultural aspects of animal keeping, including beliefs. These aspects may interfere with or help in the management of animal diseases. To correctly account for these dimensions, social workers will have to join the management team to bring such insights and every team member will have to be aware of the motives, means and constraints of the diversity of actors.

Align with the national policy and legislation and comply with institutional arrangements

Animal disease control calls for the deployment of actions at different levels, from the local community to the international scale (especially for transboundary diseases), and a wide set of actors from the public and private sectors. Hence, an equally wide set of policies and legislation have to be taken into account in the formulation of any intervention. Therefore, specialists and authorities (at the appropriate level, from local to national) have to be duly consulted. The compliance with institutional set-up and the involvement of all relevant organizations is essential to ensure the institutional adequacy of the programme and its coherence within a wider set of policies. Identifying the persons able to provide access to different communities and stakeholder groups is also critical and their involvement should be sought.

Start with "low hanging fruits" first

Animal disease control based on community engagement is an incremental process. The motivation of all contributors needs to be gradually reinforced. To do this, it is important to start the collaboration with "low hanging fruits" or "quick wins", which will motivate all contributors to gradually engage in more challenging initiatives. All improvements and successes should be duly publicized to further encourage collective action.

"Low hanging fruits" are aspects that are relatively easy to achieve and for which there is little community resistance. The benefits are readily apparent: they are in line with community expectations and the "cost" of addressing them is minimal (for example, getting agreement to use community feasts for any healthy destroyed pigs rather than burial when there is an ASF outbreak).

Learn about stakeholders and build a mutual trust environment among actors

Engaging stakeholders calls for a sound and thorough understanding of their interest, culture, habits, social and economic conditions, as well as their knowledge of the subject matter (technical aspects, diseases and their economic impacts). Besides ensuring the design of adapted solutions, this mutual understanding and constant respect for actors' particularities, knowledge, habits, needs and constraints will be key in fostering a general trust-building environment for the programme. This trust will be strengthened through the constant use of participatory approaches, allowing for the active sharing of information, opinions and constructive feedback on operations.

PUBLIC-PRIVATE PARTNERSHIPS

Government and the private sector can often achieve more in disease prevention, detection and control if they develop mutual partnerships and trust.

Public-private partnerships may be key to the viability of animal health programmes through the sharing of costs and responsibilities. Such partnerships also help to increase the outreach of health programmes, by mobilizing the means, infrastructures and competences available in the private sector. On a more general note, those partnerships contribute to achieving the needed ownership of the programme by private actors.

The Philippines demonstrated how these can work in ASF control with their Bantay ASF sa Barangay programme. In other cases, the private sector has bought out small-scale farms (for example, in Cambodia and Thailand), and in Cambodia, a large-scale company agreed to sell subsidized pork to local market stall butchers, provided they stopped purchasing pigs from other sources that might be infected with ASFV.

In South Africa, the South African Pork Producers' Organisation has provided support to government prevention and control programmes, including research into outbreaks, support for small-scale farmers where pigs are destroyed and production of relevant extension materials.

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The *FAO Animal Production and Health Guidelines* are available through authorized FAO Sales Agents or directly from Sales and Marketing Group, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

This booklet provides guidance on prevention, detection and control of African swine fever (ASF) in resource-limited settings. It is designed primarily for places where ASF is endemic with few or no prospects of eliminating the disease, and places at high risk of incursion.

The guide is divided into five sections. The first covers key aspects of the disease that can be exploited when developing prevention and control programmes, even when resources are limited. The next three sections provide suggestions on simple, low-cost measures for ASF prevention, early warning and detection, and control that have been shown to work in these settings. The last section considers ways that communities can work together to manage ASF, as well as the role of public-private partnerships in this process.

Animal health is not just the responsibility of government veterinary services or individual producers. It also involves local communities, feed suppliers, pig traders and processors, and animal health workers at community level. By working together, with the help of the knowledge contained in this guide, we can ensure that the devastation caused by ASF can be minimized, even in places where resources to prevent and control the disease are scarce.

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