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African swine fever and outdoor farming of pigs

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Abstract

This opinion describes outdoor farming of pigs in the EU, assesses the risk of African swine fewer (ASF) introduction and spread associated with outdoor pig farms and proposes biosecurity and control measures for outdoor pig farms in ASF-affected areas of the EU. Evidence was collected from Member States (MSs) veterinary authorities, farmers' associations, literature and legislative documents. An Expert knowledge elicitation (EKE) was carried out to group outdoor pig farms according to their risk of introduction and spread of ASF, to rank biosecurity measures regarding their effectiveness with regard to ASF and propose improvements of biosecurity for outdoor pig farming and accompanying control measures. Outdoor pig farming is common and various farm types are present throughout the EU. As there is no legislation at European level for categorising outdoor pig farms in the EU, information is limited, not harmonised and needs to be interpreted with care. The baseline risk of outdoor pig farms for ASFV introduction and its spread is high but with considerable uncertainty. The Panel is 66–90% certain that, if single solid or double fences were fully and properly implemented on all outdoor pig farms in areas of the EU where ASF is present in wild boar and in domestic pigs in indoor farms and outdoor farms (worst case scenario not considering different restriction zones or particular situations), without requiring any other outdoor-specific biosecurity measures or control measures, this would reduce the number of new ASF outbreaks occurring in these farms within a year by more than 50% compared to the baseline risk. The Panel concludes that the regular implementation of independent and objective on-farm biosecurity assessments using comprehensive standard protocols and approving outdoor pig farms on the basis of their biosecurity risk in an official system managed by competent authorities will further reduce the risk of ASF introduction and spread related to outdoor pig farms.

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Summary

Following a request from the European Commission, the EFSA Panel on Animal Health and Welfare (AHAW) was asked for a scientific opinion on two terms of reference (TORs) relating to African Swine Fever (ASF) and outdoor pig production (Section 1.1), focusing on:

- TOR1: risk factors for introduction and spread, an evaluation of the sustainability of outdoor farming under different management and risk mitigation measures, the effectiveness of banning outdoor farming in affected or at-risk areas and an assessment of risks linked to possible options for derogation to prohibition of keeping of pigs outdoors in affected areas, and
- TOR2: characterisation and categorisation of current systems for keeping pigs outdoors in the EU, description of application of biosecurity measures for keeping of pigs outdoors, evaluation of the effectiveness of these practices to mitigate the risk of ASF virus (ASFV) introduction in different environments and evaluation of the effectiveness of these practices in different environments on mitigating the risk of ongoing ASF spread.

A number of points were made when interpreting the TORs (**Section 1.2**). The request concerns outdoor farmed pigs (*Sus scrofa*), including farmed wild boar. Outdoor farms are defined as 'holdings in which pigs are kept temporarily or permanently outdoors. This definition does not specify the degree, the type nor the duration of the exposure of the pigs to the outdoor environment. For this assessment, an outdoor pig is defined as a suid animal (*Sus scrofa*) that is kept temporarily or permanently outdoors, not necessarily with means to constrain its movements and with clearly defined ownership. This definition includes kept wild boar (identified and owned) as well as suid animals that are kept for non-commercial purposes. Hunting gardens where wild boars are kept in a fenced area without a clear ownership are not part of this assessment. Further, while ASF can be introduced into and spread from pig farms in many ways, this assessment focusses only on those risk pathways that are specific for outdoor farms. In relation to biosecurity, the assessment focused on bioexclusion (also called external biosecurity) and biocontainment (internal biosecurity) measures that are related to the outdoor component.

A number of methods were used to address different questions within the two TORs (**Section 2**). Characterisation of outdoor pig farms and current biosecurity measures in EU Member States (MSs) was undertaken using data from a questionnaire filled in by MSs, from literature review and internet searches. Similar questions were answered through a literature review. Information from the literature, from presentations to the Standing Committee on Plants, Animals, Food and Feed (the PAFF Committee) and from a review of Animal Disease Notification System (ADNS) were used to identify potential risk factors for introduction and spread linked to outdoor pig farming. Expert knowledge elicitation (EKE) was used to categorise outdoor pig farms on their risk of ASFV introduction and spread, and to identify additional control measures to complement on-farm biosecurity.

The MS questionnaire was developed to collect data from the national Veterinary Authorities, from pig farmer associations and from experts with in-depth knowledge of outdoor pig farming systems, their structures and practices and of biosecurity measures (**Section 2.5**). The literature review, focusing on descriptions of outdoor farming of pigs in the EU (e.g. in terms of farming structures and practices) and biosecurity measures applied on outdoor farms of pigs, was limited to relevant publications over the last 5 years (**Section 2.6**). The EKE was conducted with four scientists who had in-depth expertise in ASF epidemiology, biosecurity and outdoor farming practices and structures, including organic and backyard farming of pigs outdoors, in different regions of the EU. The EKE was used to elicit estimates of the risk of new ASF outbreaks in the areas of interest in the coming year for each of two types of outdoor pig farms specified by EFSA (type I farms, type II farms). In type I farms, pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures, whereas in type II farms, pigs have access to an outdoor area on farm premises (adjacent to farm buildings). Both farm types may include backyard and 'hobby' pigs (kept for personal consumption or as pets) as well as farmed wild boar. A preliminary list of biosecurity measures (BSMs) was also developed, prioritised in terms of expected effectiveness in reducing the ASF risk (introduction or spread) for each farm type, then estimates were elicited of the effectiveness, feasibility and sustainability of each BSM when applied separately. Finally, the EKE experts were asked to consider potential control measures to be used in conjunction with on-farm biosecurity measures (**Section 2.7**).

Categorisation of outdoor pig farms

According to EU and national legislation, all pig farms must be registered in national pig databases with a unique identification number, irrespective of their size, category and commercial activity. However, harmonised categorisation of different types of pig farms, or definitions of these, does not exist in EU legislation, and no standards or guidelines were found either at international level (e.g. OIE, FAO) or in published literature (**Section 3.1**). Classification systems for outdoor pig farms vary substantially between MSs. In those MSs where outdoor pig farms are distinguished, more than one instrument for classification (legislative documents, guidelines, standards, checklists) is generally used (**Section 3.1.1**). Based on the MS questionnaire (**Section 3.4**), a range of different types of outdoor pig farming are present throughout the EU, including fenced and unfenced areas in woodlands and forests, fenced and unfenced areas in pasture or fields, open buildings with unlimited access to fenced yards and closed buildings with controlled access to fenced yards or runs. Each of these outdoor farming types is present in several EU MSs, except unfenced areas in woodland and forests, and unfenced areas in pastures and fields. Further, there are several types of outdoor pig farms that are common across a number of MSs, including backyard farms, kept wild boar (or wild boar-domestic pig hybrids), organic pig farms, specific pig breeds, free ranging, pigs kept as pets and hobby holdings. Outdoor pig farms are not uncommon in the EU, although the percentages vary across MSs, representing a median of 8% (interquartile range of 1.5–24%) of all pig farms in those MSs (17) for which data are available.

Literature on outdoor pig farming systems (**Section 3.5**) revealed that in several Mediterranean countries, domestic pigs may be kept in silvo-pastoral systems, where pigs have outdoor access at least during their finishing period, when they feed on chestnut and/or acorn pastures in autumn and winter. The production of Iberian pigs makes use of outdoor spaces in the finishing period in which fattening takes place between October and April on 'dehesa" woodlands/rangeland ('montanera') or pastures/rangeland (cebo campo). In addition, most Iberian pigs have access to outdoor areas already during breeding, weaning and growing periods. In most cases, Iberian pigs are kept on private land that is usually fenced. In Sardinia, approximately half of the registered pigs are kept in small-scale (< 4 adult pigs), non-industrial farms for subsistence purposes. These small-scale farms are often characterised by little, if any, investment in farm infrastructures and equipment. In Corsica, pig breeding and production are mainly conducted in traditional free-range farming systems. In several MSs, including Bulgaria and Romania, many small-scale, non-commercial pig farms exist which keep pigs mainly for family consumption. These backyard farms often have low levels of biosecurity, and some provide their pigs with outdoor access or do not prevent wild boar incursions. Different autochthonous/native pig breeds exist in several MSs. These pigs are usually given access to outdoor areas, such as woodlands, forests, fields and pastures, at least during specific production/life stages.

Biosecurity on outdoor pig farms

In most MSs, there is a legal requirement to implement biosecurity measures in all pig farms, and there is an official control system to verify implementation and assess the level of compliance (**Section 3.4.4**). Further, most MSs run awareness campaigns about farm biosecurity. Several MSs assess and classify pig farms according to their level of biosecurity. A range of different digital tools for assessment are currently being used, including 'Biocheck.UGent' (reported by Ireland), 'BIOSEGPOR' (reported by Spain), 'ClassyFarm' (reported by Italy) and 'Smittsäkrad Besättning' (reported by Sweden). Examples of MSs best-practice have highlighted the importance of regular assessment of on-farm biosecurity, an 'official' farm categorisation system based on these assessment results, the introduction of farm-level benchmarking (the practice of establishing the relative performance of the farm against either an agreed standard or the performance of other farms; both over time on the same farm and as a means for between-farm comparison (locally, regionally and nationally), and a broadened assessment to consider other key issues such as animal welfare. Collectively, these approaches have contributed to improvements in biosecurity and broader/core animal husbandry issues. A range of biosecurity measures are implemented in outdoor pig farms in the MSs, focusing on general biosecurity and measures to address external and internal biosecurity. Non-compliance with required on-farm biosecurity measures on outdoor pig farms is a common challenge across MSs, with frequent areas of non-compliance relating to fencing, biosecurity relating to clothes and shoes, record keeping, disinfection at the farm entrance and movement and disinfection of vehicles.

Potential risk factors for ASFV introduction and spread linked to outdoor pig farming

Interactions between domestic pigs and wild boar, which belong to the same species (*Sus scrofa*), may facilitate the spread and maintenance of a range of pig pathogens (**Section 3.6.1**). As highlighted in the literature, there is the potential for (often substantial, though mainly indirect) contact between wild boar and domestic pigs in outdoor production settings, sufficient for transmission of ASFV and subsequent infection. In several settings, substantial spatial and temporal overlap of outdoor pigs and wild boar is found. However, direct contacts between pigs and wild boar are less frequent than indirect interactions at focal points such as watering points or feeding sites. Interactions are more frequent during specific periods of the year (e.g. during summer associated with access to water) or due to the local abundance of seasonal food resources such as acorns in autumn. Sexual wild boar-domestic pig interactions may occur where domestic pigs are not neutered. Transmission of pathogens that spread by direct contact has been shown between free-ranging pigs and wild boar that share the same habitat and food and water resources.

In outdoor pig production, it is very difficult to control direct and indirect contact between wild boar and domestic pigs. This is particularly concerning in those situations where ASFV is present in contiguous wild boar populations and the environment of the outdoor farm. Nonetheless, a number of biosecurity measures for outdoor pig farms are identified with a potential to mitigate the risk of ASFV introduction and spread (**Section 3.6.3**). The risk of intrusion of wild boar into outdoor farms has been found to increase with increasing distance between the outdoor pen and the farm and if the pen is poorly protected (e.g. with only a simple electric fence). On outdoor farms, risk factors for introduction include the area of land on which outdoor pigs are reared, the potential for contact (both direct and indirect) with wild boar and the difficulties in adequately fencing large outdoor areas. Further, there are lessons to be learned from the successful eradication of ASF from Spain between 1985 and 1995. These included improvements to the basic sanitation and biosecurity of pig farms, such as the destruction of unsanitary animal production facilities, and the construction of metal fences with a 100-metre radius around animal facilities to avoid contact with wildlife, for which farmers obtained partial funding or low-interest loans.

Categorising outdoor pig farms in EU MSs according to their risk of ASFV introduction and spread

It is not possible to accurately determine the number of ASF outbreaks that have occurred in outdoor pig production in the EU based on a review of the ADNS data (**Section 3.2**) and results from the MS questionnaire (**Section 3.4.5**). Based on available data, there are considerable differences in the percentage of outbreaks that have occurred in outdoor pig farms between MSs. However, the percentage of outbreaks that have occurred in outdoor pig farms may reflect a high proportion of farms keeping pigs outdoors in certain countries, e.g. outdoor keeping of pigs is a common practice in Sardinia (Italy). With the assumption that most backyard farms allow outdoor access, this is also true for Romania, however, to which degree pigs kept in Romanian backyard farms have outdoor access has not been reported.

Based on the EKE results (**Section 3.7.1**), the estimated baseline ASF risk for type I farms was very high, with a median of 87%. That is, an outbreak of ASF is expected in the coming year on 87 of 100 (95% probability interval of 53–99%) currently uninfected type I outdoor farms in areas of the EU where ASF infection is present in domestic pigs in indoor and outdoor farms and/or in wild boar (a scenario that does not consider different restriction zones or particular situations). The baseline ASF risk for type II farms is lower (37–42 of 100 farms) but with considerable uncertainty (95% probability interval of 4–90%). Therefore, the baseline ASF risk appears to be higher in type I farms than type II farms, but with considerable uncertainty.

Effectiveness on outdoor pig farms of biosecurity measures on ASFV introduction and spread

Based on the EKE results (**Section 3.7.2**), the use of wild boar proof fences is the biosecurity measure (BSM) considered most likely to effectively reduce the risk of ASF introduction into outdoor pig farms. These could be single solid or double fences at least 1.5 m high and properly fixed to the ground to prevent the ingression of wild boar under the fence (undercrossing). For double fences, the distance between fence rows should be at least 1.5 m. Other BSMs that seek to avoid attracting wild boar to farm premises or to improve farm hygiene are expected to be less effective, although they may still contribute to reducing the risks. For some pairs of BSMs, the Panel is over 90% certain that

one is more effective than the other (e.g. double fence or single solid fence vs. no access to stored feed, water, etc.); for other pairs of BSMs, the Panel's certainty is 70–80% (e.g. simple single fence vs. double or single solid fence); and for some pairs of BSMs, the Panel considers it about equally likely that either BSM is more effective than the other (e.g. no wild boar baiting vs. no access to water).

Feasibility and sustainability are important considerations for BSMs (**Section 3.7.3**). In the context of this assessment, feasibility has been defined as the proportion of outdoor pig farms that would start implementing this BSM if it was included as a requirement in a strategic approach to the management of ASF in the EU. Sustainability has been defined as the proportion of outdoor farms that would continue implementing a BSM for at least 2 years following initial implementation. In general, the feasibility of BSMs was higher on type II compared to type I outdoor farms. A single solid or double fence (the BSMs that were considered most effective) had medium to high feasibility for farm type II (implemented by 40–80% of farms), but very low to low feasibility for farm type I (0–40%), mainly due to costs incurred by their construction. The sustainability of single solid or double fences was considered better than their feasibility. A simple single fence was judged most likely to have medium to high feasibility (40–80% implementation) on type I farms and medium to very high (40–100%) on type II farms. The Panel highlighted the lack of quantitative, field-based evidence regarding the effectiveness of BSMs to reduce the risk of ASFV introduction and spread on outdoor pig farms, including preventing the contact between domestic pigs and wild boar. This area urgently requires research.

Control measures to complement improved biosecurity of outdoor pig farms

A number of control measures have been identified to complement improved on-farm biosecurity (**Section 4.2.7**). Systems for farm categorisation are needed, clearly distinguishing different types of outdoor pig production. With respect to registration of outdoor pig farms, data should be collected in national electronic databases, including production type (including categories for pet pigs [companion animals], pigs kept for personal consumption, hybrid farms) and number of animals. This information needs to be regularly updated (annually or at least every second year), with the potential to allow BSMs or other control measures to be applied differentially. Further, regular, independent and objective on-farm biosecurity assessments should be implemented, using a standard protocol/tool (Biocheck UGent or similar) designed to promote continuous improvement of biosecurity practices, with these assessment results being used in an official system managed by competent authorities to categorise and approve outdoor pig farms on the basis of their biosecurity risk. The concept of farm-level benchmarking, both to assess changes in biosecurity risk over time and to allow between-farm comparison (at a local, regional and national level), should be introduced to encourage ongoing improvement in on-farm biosecurity. Enhanced passive surveillance is important, requiring notification and investigation of wild boar presence, wild boar carcasses and dead domestic pigs (i.e. factors related to potential ASF identification). Animal movement controls and awareness programmes are also proposed.

Possible options for keeping pigs outdoors in affected areas

Specific quantitative information on the effectiveness of on-farm BSMs to minimise ASF introduction into and spread from pigs kept outdoors is lacking. However, the Panel rates double fences and single solid fences highest in terms of effectiveness for both outdoor farm types and is 66–90% certain that their correct implementation would reduce the baseline risk of outdoor pig farms by more than 50%. The Panel concludes that the regular implementation of independent and objective on-farm biosecurity assessments using comprehensive standard protocols, and approving outdoor pig farms on the basis of their biosecurity risk in an official system managed by competent authorities, will further reduce the risk of ASF introduction and spread related to outdoor pig farms.

Therefore, the Panel recommends that the restriction of outdoor pig farming in ASF-affected areas and any derogations from such a restriction should be made on a case-by-case basis considering the implementation of the measures indicated above.

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1. Introduction

1.1. Background and Terms of Reference as provided by the requestor

1.1.1. Background

African swine fever (ASF) is an infectious lethal disease affecting domestic pigs and wild boar. It can be transmitted via direct animal contact or via dissemination of contaminated food or equipment. This disease has serious economic implications for the pig meat and related sectors, including indirect costs related to trade restrictions. The persistence of the disease in wild boar and the limited number of control measures available represents a challenge for the whole EU agricultural sector, in particular the pig farming industry. There is no vaccine or cure despite active ongoing research.

From the beginning of 2014 up to now, Genotype II of ASF has been notified in Belgium, Bulgaria, the Czech Republic, Estonia, Hungary, Greece, Latvia, Lithuania, Poland, Romania and Slovakia[1] and Genotype I has been present in Italy (Sardinia only) since 1978. The disease has also been reported in Belarus, Moldova, Serbia, Russia and Ukraine, which creates a constant risk for all the Member States that share a border with these third countries.

There is knowledge, legislation, scientific, technical and financial tools in the EU to effectively tackle ASF. In addition, Member States and the Commission are continuously updating the 'Strategic approach to the management of African Swine Fever for the EU' and the related legislation.

Currently the Strategic approach provides for a general recommendation for a prohibition of outdoor keeping of pigs at least in the areas covered by Decision 2014/709/EU[2]. However, in some Member States the outdoor farming is an important socio-economic factor in certain rural areas. Often special breeds of pigs (e.g. Mangalitza pigs, Iberian pigs) are reared in outdoor farms.

Some Member States have proposed to derogate from the ban and to set biosecurity criteria to allow for certain derogations. Many Member States also provided to the Commission examples of best practices and biosecurity measures already implemented to substantially reduce the risk posed by ASF to keeping pigs outdoors. However, to take an informed decision, the Commission needs an EFSA Scientific Opinion on the infection risks associated with keeping of pigs outdoors in ASF-affected areas, specifically on the characterisation and categorisation of keeping of pigs outdoors in the Member States, and the application of efficient biosecurity measures that might allow to minimise African swine fever virus (ASFV) introduction into and ASFV spread from pigs kept outdoors.

It is necessary that EFSA complement its previous Scientific Opinion providing new scientific input to the Commission on keeping of pigs (*Sus scrofa*) outdoors in areas affected by ASF.

1.1.2. Terms of Reference (TOR)

In accordance with Article 29 of Regulation (EC) No. 178/2002, EFSA is requested to provide scientific opinion on:

1) EFSA should verify the risk factors for ASF introduction and spread that are linked to the keeping of pigs outdoors. EFSA should also evaluate the sustainability of such farming under different management and risk mitigation measures and assess the effectiveness of banning outdoor farming in already affected or at-risk areas, and the risks linked to possible options for derogation to restriction of keeping of pigs outdoors in affected areas.
2) EFSA should (i) characterise and categorise the keeping of pigs outdoors; and (ii) describe the application of biosecurity measures for keeping of pigs outdoors (such as effective separation between the pigs kept outdoors and wild boar and other animals, the logistical arrangements for entry of new animals into the herd, control of unauthorised entry into the herd, disinfection, pest control, etc.). Where possible, EFSA should (iii) evaluate the effectiveness of these practices in different environments on mitigating the risk of ASF introduction (in regions of Member States not yet affected) and ongoing spread (in regions of Member states already affected) by this disease.

[1] Update: Genotype II is present in Germany since September 2020, and Belgium was recognized as free in November 2020.
[2] Commission Implementing Decision 2014/709/EU laying down animal health control measures in relation to African swine fever in the Member States applied until 21 April 2021. This Decision was replaced by Commission Implementing Regulation (EU) 2021/605 of 7 April 2021 laying down special control measures for African swine fever.

1.2. Interpretation of the Terms of Reference

According to the background and terms of reference provided by the Commission, the request concerns the population of outdoor farmed pigs (*Sus scrofa*), including kept wild boar, the exposure of concern is any outdoor farming of pigs in EU Member States (MSs), both in ASF-affected areas and ASF-free areas. A suitable comparator would be the population of pigs farmed in indoor systems. The outcomes of interest are the risk of ASFV introduction and spread linked to outdoor farming of pigs.

Outdoor farms are defined as 'holdings in which pigs are kept temporarily or permanently outdoors'.[3] This definition does not specify the degree, type nor the duration of the exposure of the pigs to the outdoor environment.

The Animal Health Law[4] in its Article 4 defines 'kept animals' as animals which are kept by humans, and 'wild animals' as animals which are not kept animals. In line with this definition, for this assessment, an outdoor pig is defined as a suid animal (*Sus scrofa*) that is kept temporarily or permanently outdoors, not necessarily with means to constrain its movements, and with clearly defined ownership. This definition includes kept wild boar (identified and owned) as well as suid animals that are kept for non-commercial purposes. Hunting pens where wild boars are kept in a fenced area without a clear ownership are not part of this assessment.

While ASF can be introduced into and spread from pig farms in many different ways, this assessment focusses on those risk pathways that are specific for outdoor farms. The outdoor-specific risk pathways through which ASFV can be introduced into an outdoor pig farm that have been considered in this assessment are:

- direct contact of an outdoor pig with (i) infected wild boar/suids (live or carcasses), (ii) contaminated wildlife that has been in contact with carcasses of infected wild boar, (iii) infected pigs from other establishments kept outdoors, (iv) humans other than farm personnel (e.g. hunters, people in rural areas and forests for work or recreation) and
- indirect contact of an outdoor pig with (v) infected wild boar/suids through use of the same grazing/feeding/watering/resting/burrowing sites, vi) contaminated wildlife that has been in contact with carcasses of infected wild boar and uses the same grazing/feeding/watering/ resting/burrowing sites as domestic pigs and vii) transport of (pieces of) carcasses of infected wild boar/suids over longer distances by wild carnivores (mammals or birds) or by water (rivers, after rainfall).

Direct contact is considered the direct transfer of virus between individuals (live or dead animals) during contact, and indirect contact the transfer of virus as a consequence of contact with contaminated fomites or other inanimate objects.

The outdoor-specific risk pathways through which ASFV can be spread from an outdoor pig farm that have been considered in this assessment are:

- direct contact of an infected outdoor pig or its carcass with (i) wild boar, (ii) other wildlife, (iii) pigs from other establishments kept outdoors and
- indirect contact of an infected outdoor pig with (iv) wild boar, (v) other wildlife or (vi) kept pigs from other farms through use of the same grazing/feeding/watering/resting/burrowing sites.

OIE and FAO define biosecurity as the implementation of measures that reduce the risk of introduction (bio-exclusion) and spread (bio-containment) of disease agents.[5] Saegerman et al. (2012) differentiate five components of biosecurity measures: (i) Bio-exclusion: limiting the risk of hazard introduction; (ii) Bio-compartmentation: limiting the spread within the same facility; (iii) Bio-containment: limiting the spread to other animal facilities (inter-herd spread); (iv) Bio-prevention: preventing human contamination; and (v) Bio-preservation: preventing environmental biocontamination. This assessment focusses on bio-exclusion (also called external biosecurity) and bio-containment (internal biosecurity) measures that are related to the outdoor component. Optimal biosecurity in indoor systems will be used as a comparator for biosecurity, and the opinion will

[3] SANTE/7113/2015; Rev 12/Feb 2020 WORKING DOCUMENT. Strategic approach to the management of African Swine Fever for the EU.
[4] Regulation (EU) 2016/429 of the european parliament and of the councIL of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law').
[5] OIE/FAO Guide to good farming practices for animal production food safety.

illustrate what needs to be done in outdoor farming to reduce the ASF introduction and spread risk to the level present in indoor farming.

The two ToRs were divided into eight assessment (a–h in Table 1) elements included in the request. These were translated into nine assessment questions (Q1–Q9 in Table 1) and further divided into subquestions (Table 1).

Table 1: Translation of assessment elements included in the ToRs into questions in the order of their assessment

ToR		Assessment element	Questions
2	a	Characterise and categorise the systems for keeping of pigs outdoors	Q1: What are the characteristics of keeping pigs outdoors in terms of farm structures, farming practices, herd size, geographical location? Q2: How can outdoor pig farms in EU MSs be categorised according to their risk of ASFV introduction and spread?
2	b	Describe the application of biosecurity measures for keeping of pigs outdoors	Q3: What biosecurity measures are presently applied in outdoor pig farms in EU MSs?
2	c	Evaluate the effectiveness of these practices in different environments on mitigating the risk of ASF introduction (in regions of MSs already affected)	Q4: What is the effect of biosecurity measures on the risk of ASF introduction into a farm in different environments (considering both ASF-affected MSs and ASF-unaffected MSs)?
2	d	Evaluate the effectiveness of these practices in different environments on mitigating the risk of ongoing spread (in regions of MSs already affected)	Q5: What is the effect of biosecurity measures applied to outdoor pig farms on ASF spread in different environments?
1	a	Verify the risk factors for ASF introduction and spread linked to the keeping of pigs outdoors	Q6: Linked to outdoor farming, what are the potential risk factors for introduction of ASFV into outdoor pig farms and its spread within a region, taking into consideration the different categories established through 2a, b?
1	b	Evaluate the sustainability of outdoor farming under different management and risk mitigation measures	Q7: What would be required to prevent introduction/ spread of ASF into/from outdoor pig farms if outdoor farming was allowed to be maintained in ASF-affected areas, considering the different categories of outdoor farming existing in EU MSs?
1	c	Assess the effectiveness of banning outdoor farming in already affected or at-risk areas for preventing ASF spread	Q8: How does the presence of outdoor farming (considering the different outdoor farming categories) in already affected or at-risk areas influence ASF spread (the regional ASF epidemiology) and measures (national or regional response)?
1	d	Assess the risks linked to possible options for derogation to prohibition of keeping of pigs outdoors in affected areas	Q9: What are the risks of possible options for derogation that EFSA recommends (describe how to handle the residual risk)? Compare two scenarios (no outdoor farming versus outdoor farming with improved/appropriate biosecurity) in terms of their effects on national/regional ASF epidemiology and the success (or otherwise) of national disease control efforts.

In a next step, the data needs, data collection methods and the assessment methods were defined for each question (Table 2).

Table 2: Overview of questions, data needs, data collection methods

Question	Data needed	Data collection methods/ sources
What are the characteristics of keeping pigs outdoors? How can outdoor pig farms in EU MSs be characterised in terms of farm structures, farming practices, herd size, geographical location?	Aggregated information on outdoor pig farming	Questionnaire survey to MSs Literature review (peer-reviewed and grey literature)
	Legislative documents, guidelines or standards on the classification of pig farms existing in EU MSs.	Request to MSs/EC Internet search
	Registration and identification policy of the outdoor farms in EU MSs	Request to MSs/EC Internet search
What biosecurity measures are presently applied in outdoor pig farms in EU MSs?	Legislative documents, guidelines or standards on biosecurity measures to be applied or recommended in (outdoor) pig farming existing at EU level and in EU MSs	Request to MSs/EC Internet search
	Criteria, checklists and scoring systems used in MSs for classification of (outdoor) pig farms into different classes/levels of biosecurity	Request to MSs/EC Internet search
	Biosecurity measures currently applied in or recommended for outdoor pig farming in EU MSs	Request to MSs/EC Internet search Literature review (peer-reviewed and grey literature)
What biosecurity measures are presently applied in outdoor (pig) farms in non-EU countries?	Biosecurity measures currently applied in or recommended for outdoor (pig) farming anywhere	Literature review (peer-reviewed and grey literature)
What are potential risk factors for introduction into farms and spread into the region linked to outdoor pig farming?	Evidence from current (Eastern EU MSs) and past (Spain) ASF outbreaks	Reviewing PAFF Committee presentations, requesting further details from MSs
	Evidence from current (Eastern EU MSs) and past (Spain) ASF outbreaks	Literature review (peer-reviewed and grey literature)
	Epidemiological data/information linked to index outbreaks and secondary outbreaks in ADNS	ADNS review
Categorisation of outdoor pig farms in EU MSs according to their risk of ASFV introduction and spread	Information collected above	Expert knowledge elicitation to group the outdoor farms according to their risk of ASFV introduction and spread
Effect of biosecurity measures on ASFV introduction and spread in a region in different environments	Information collected above	Expert knowledge elicitation to rank the biosecurity measures regarding their impact on reducing the risk of for introduction of ASFV and spread of ASFV
What could be required to maintain outdoor farming of pigs and freedom of ASF, considering the different categories of outdoor farming existing in EU MSs? How does the presence of outdoor farming (considering the different outdoor farming categories) in already affected or at-risk areas influence ASF spread?What are the risks of possible options for derogation that EFSA proposes	Information collected above	Expert knowledge elicitation to propose improvements of biosecurity for outdoor pig farming categories and the control measures that should flank these

2. Data and methodologies

2.1. EU legislation and supportive documents

The following legislative documents have been reviewed in order to identify terms and definitions for outdoor farm and pig, for pig farms categorisation, for biosecurity and for biosecurity measures:

- Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law').
- Council Directive 2002/60/EC of 27 June 2002 laying down specific provisions for the control of African swine fever and amending Directive 92/119/EEC as regards Teschen disease and African swine fever.
- Commission Implementing Regulation (EU) 2015 of 10 August 2015 laying down specific rules on official controls for *Trichinella* in meat.
- Working Document SANTE/7113/2015 (Rev 12/April 2020), Strategic approach to the management of African Swine Fever for the EU.
- Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs.
- Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007.

2.2. Animal Disease Notification System (ADNS)

According to Council Directive 82/894/EEC2[6], it is mandatory for the EU MSs to notify the outbreaks[7] of ASF in domestic pigs and the cases in wild boar to the Animal Disease Notification System (ADNS).[8] The data reported by the Veterinary Authorities of the EU MSs to the ADNS from the ASF outbreaks confirmed in domestic pigs were reviewed. The purpose was to determine the type of farm where the ASF outbreak was confirmed and more specifically whether the outbreaks are linked with farms that may allow pigs to have access to the outdoors. The data concerning all the ASF outbreaks in domestic pigs that have ever been notified by EU MSs, were extracted from the ADNS on 2 October 2020.

2.3. Presentations during PAFF Committee meetings

The presentations of the MSs that are delivered during the Standing Committee on Plants, Animals, Food and Feed (PAFF Committee)[9] meetings uploaded on the relevant webpage of the European Commission's website[10] related to ASF were identified and reviewed one by one, in order to identify information about outdoor pig farms, pig farms categorisation, biosecurity measures and evidence linking the occurrence of ASF outbreaks in pig farms to outdoor access of the pigs.

2.4. Questionnaire survey

A questionnaire was developed to collect relevant information and data aggregated at national level, in a manner that was harmonised, comparable and interpretable. The questionnaire was sent to Central Veterinary Authorities (VAs) of EU MSs, to EU pig farmers' associations[11] (FAs) and to experts with in-depth knowledge of outdoor pig farming systems, their structures and practices and the

[6] Council Directive 82/894/EEC of 21 December 1982 on the notification of animal diseases within the Community http://data.europa.eu/eli/dir/1982/894/oj

[7] Definitions of the terms outbreak and case (Article 4 Directive 82/894): 'outbreak' means the holding or place situated in the territory of the Community where animals are assembled and where one or more cases has or have been officially confirmed. While 'case' means the official confirmation of any of the diseases listed in Annex I of the Directive 82/894 in any animal or carcass.

[8] ADNS, the EU Animal Disease Notification System, see http://ec.europa.eu/food/animals/animal-diseases/not-system_en

[9] General information on the Standing Committees on n Plants, Animals, Food and Feed: https://ec.europa.eu/food/committees/paff_en

[10] https://ec.europa.eu/food/animals/health/regulatory_committee_en

[11] The invitation for the questionnaire was sent to the pig farmers'/producers' associations or organisations that were found on Internet and were provided from colleagues and experts. For the purpose of this Opinion the term farmers' associations is going to be used.

biosecurity measures applied therein. The questionnaire survey was administered through the EUSurvey tool[12] and remained open from 27/7/2020 to 30/9/2020. The CVOs of 27 EU MSs and 68 farmers' associations were invited to participate in the survey. In addition, members of EFSA's AHAW Network were requested to distribute the invitation to participate in the survey to experts in their countries. The questionnaire survey is entitled *'Outdoor pig farming systems in EU Member States'* and it can be accessed through this link.

For the questionnaire survey, the WG provided a categorisation of outdoor pig farms based on information found on the internet, in PAFF Committee presentations and in literature. This was necessary noting that a harmonised categorisation of different types of outdoor pig farms, or definitions of these, does not exist in EU legislation, and no standards or guidelines were found at international level (e.g. OIE, FAO) and in published literature. The definition of outdoor farms in the current Working Document SANTE/7113/2015; Rev 12/Apr 2020 is very broad and includes any kind of outdoor access, irrespective of the degree, type and duration of the exposure of pigs to the outdoor environment.

Three main categories of outdoor farms were outlined in the questionnaire survey, including (1) farms that allow access to forests or woodlands, (2) farms that allow access to pastures or fields and (3) farms that allow access to concrete fenced yards or runs. In addition, the existence of fences that may restrict the animal movements in a controlled area was considered to create further categories:

1) Outdoor farms that allow access to forests or woodlands:
    - 1.1) Unfenced: Pigs can have unlimited access to areas of forests or woodlands that are not fenced, and they are free to move and graze.
    - 1.2) Fenced: Pigs can have access to areas of forests or woodlands, which are fenced, and they are free to move and graze within the fenced area.
2) Outdoor farms that allow access to pastures or fields:
    - 2.1) Unfenced: Pigs can have unlimited access to fields or pastures, without any fence and they are free to move and graze.
    - 2.2) Fenced: Pigs can have access to fields or pastures which are fenced, and they are free to move and graze within the fenced area.
3) Outdoor farms that allow access to concrete fenced yards or runs:
    - 3.1) Open buildings: Pigs are held in permanently open buildings with fenced yards. Pigs have unlimited access to these fenced yards and are all the time exposed to the external environment
    - 3.2) Closed buildings: Pigs are held in permanently closed buildings with controlled access to an outside run/yard, which is fenced.

A data protection note was issued describing the purpose of the survey and clarifying the processing and management of the information and the data received through this questionnaire. It has been also uploaded as *'Background Documents'* to the EUSurvey tool.

The questionnaire was tested by EFSA by sending it to animal health and welfare (AHAW) officers and to two MSs representatives (Bulgaria and Croatia). Their comments were considered, and the relevant amendments were implemented in the final version of the questionnaire.

2.5. Literature review

The literature review had the objectives of identifying i) descriptions of outdoor farming of pigs in the EU (e.g. in terms of farming structures and practices) and ii) biosecurity measures applied on outdoor farms of pigs. Searches were run in the Web of Science Core Collection, limited to the last 5 years. The search included terms describing the population (Pig OR Pigs OR Hog OR Hogs OR Suids OR Suidae OR "sus scrofa" OR Swine OR "wild boar" OR "wild boar" OR "wild pig" OR "wild pigs" OR "Iberian pig" OR Bazna OR Basner OR "Porcul de Banat" OR "Romanian Saddleback" OR Mangalica OR

[12] EUSurvey is the online application, and the European Commission's official survey management tool, launched in 2013. Its main purpose is to create official surveys of public opinion and forms for internal communication and staff management, e.g. staff opinion surveys and forms for evaluation or registration. EUSurvey provides a wide variety of elements used in forms, ranging from the simple (e.g. text questions and multiple-choice questions) to the advanced (e.g. editable spreadsheets and multimedia elements). The application, hosted at the European Commission's Directorate-General for Informatics, is fully open-source (available free of charge) to all EU citizens, and is published under the European Union Public License.

Mangalitsa OR Mangalitza OR "East Balkan Pig" OR "Black Slavonian pig" OR "Turopolje pig" OR "Bania spotted pig") and the intervention (outdoor OR "open air" OR "free range" OR "free ranging" OR brado OR "extensive farming" OR smallholder*). Search results were de-duplicated and checked for relevance. For a reference to be considered relevant, the main text had to be written in English, French, Spanish, Italian, German or Greek, and the reference needed to contain a description of farming structures and/or practices and/or biosecurity with respect to outdoor access/exposure of pigs in the EU MSs. Studies describing experimental outdoor settings were excluded. The review of the full text manuscripts was used to identify additional relevant references. From the references fulfilling the relevance criteria, information was extracted regarding farming (infra)structures with respect to outdoor access/exposure of pigs, farming practices with respect to outdoor access/exposure of pigs, interaction of farmed pigs with wild animals, biosecurity (measures, levels) on outdoor farms and outdoor farms and infectious diseases. Further details on the literature review can be found in Annex C: Literature review protocol.

2.6. Expert Knowledge Elicitation

An Expert Knowledge Elicitation (EKE) was conducted to address the following three tasks: (i) categorise types of outdoor pig farms in EU MSs according to the risk of ASF introduction into these farms and the risk of ASF spread from these farms, (ii) rank biosecurity measures according to their potential to lower the risk of ASF introduction into these farms and the risk of ASF spread from these farms in ASF-affected areas and (iii) propose control measures that should complement the improvements of biosecurity for outdoor pig farming categories in ASF-affected areas.

The EKE was conducted with four scientists who had in-depth expertise in ASF epidemiology, biosecurity and outdoor farming practices and structures, including organic and backyard farming of pigs outdoors, in different regions of the EU.

For the EKE, two types of outdoor pig farms were defined and considered by EKE experts in their assessment. In farm type I, pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures, while in farm type II, pigs have access to an outdoor area on farm premises (adjacent to farm buildings) (Figure 1).

The scenario that was considered by the EKE experts in their assessments was that the outdoor farms are located in areas of the EU where ASF is present in wild boar and in domestic pigs in indoor and outdoor farms, if outdoor farms were to be permitted in such areas.

I	Pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures	
II	Pigs have access to an outdoor area on farm premises (adjacent to farm buildings)	

Image I left: © CSIC (source: http://cultureandhistory.revistas.csic.es/index.php/cultureandhistory/article/download/90/312?inline=1); Image I right: © Jason Thomas (source: https://www.agric.wa.gov.au/livestock-biosecurity/keep-pigs-healthy-follow-biosecurity-checklist); Image II left: © Christian Wucherpfennig (source: https://www.oekolandbau.nrw.de/fachinfo/tierhaltung/schweine/2018/langjaehrig-erfolgreich-mit-bio-mastschweinen); Image II right: © BAT e.V. (source: https://www.oekolandbau.de/landwirtschaft/tier/spezielle-tierhaltung/schweine/mastschweinehaltung/haltung/umbau-eines-herkoemmlichen-mastschweinestalls/)

Figure 1: Types of outdoor pig farms (Type I and Type II) defined for the EKE

The first task was addressed by eliciting estimates for the risk of new ASF outbreaks occurring in the areas of interest in the coming year for each of the two types of outdoor pig farms specified by EFSA. The second task was addressed by EKE experts developing a preliminary list of biosecurity measures (BSMs), prioritising seven BSMs in terms of their expected effectiveness in reducing the ASF

risk (introduction or spread) for each farm type, and then eliciting estimates of their effectiveness, feasibility and sustainability when considered separately.

The effectiveness of each prioritised BSM was assessed in terms of how much the application of the BSM would reduce the number of new ASF outbreaks in the coming year in the respective farm type, if the BSM was implemented fully and properly in all farms of that type and without any of the other prioritised BSMs being implemented. The EKE experts also assessed the relative contribution of each BSM to reducing the risk of introduction and spread of ASF. The feasibility of each BSM was assessed in terms of the proportion of farms that would implement it, if it was included in the Strategic Approach to the management of ASF in the EU. The sustainability of each BSM was assessed in terms of what proportion of farms that implement it would continue to do so for at least 2 years.

The third task was addressed conducting a brainstorming session with the EKE experts regarding potential control measures to be considered in conjunction with improved biosecurity. These were defined as risk management measures that should be undertaken by the competent authorities of EU MSs to further reduce the risk of disease introduction and spread for ASF in addition to improved biosecurity of outdoor farms. The EKE experts developed a list of potential control measures and also presented their feedback on a similar list that had been developed independently by EFSA's Working Group on ASF and outdoor pig farming.

Further details on the approach used for this EKE are available in the EKE report (Hart et al., 2021).

2.7. Uncertainty assessment

An overall uncertainty assessment focussing on the main assessment conclusions was carried out. After selecting the main conclusions and assuring that the conclusions provided the key information needed by the risk manager in a well-defined way, for each conclusion the WG experts made individual judgements of the probability that the conclusion was correct, taking account of all the evidence and uncertainties relevant to that conclusion. The individual judgements were then shared and discussed, leading to a consensus judgement, and the consensus probability expression was incorporated into the conclusion. The results of the overall uncertainty assessment are reported in Section 4.1.

3. Assessment

3.1. EU Legislation and supportive documents

3.1.1. Categorisation of outdoor pig farms

In the EU documentation, the definition of outdoor farms (the current Working Document SANTE/7113/2015; Rev 12/Apr 2020) is very broad and includes any kind of outdoor access, irrespective of the degree, type and duration of the exposure of pigs to the outdoor environment. A harmonised categorisation of different types of pig farms, or definitions of these, does not exist in EU legislation, and no standards or guidelines were found either at international level (e.g. OIE, FAO) or in published literature.

3.1.2. Biosecurity on outdoor pig farms

Currently, EU legislation does not prescribe specific biosecurity measures for outdoor farms.

Further details can be found in Annex A of this document.

3.2. Information from the Animal Disease Notification System (ADNS)

3.2.1. Notified ASF outbreaks

From 1984 to December 31, 2020, 11,258 ASF outbreaks in domestic pigs have been notified to the ADNS by 13 MSs. The registration of the type of farm, the housing and the farming or production system of the farms that are involved in the outbreaks are not requested and therefore are not reported in the ADNS. There is only one field entitled 'Free Text', where the MSs can enter any additional information related to the notified outbreak.

In 6,349 of the 11,258 ASF outbreaks notified, the field 'Free Text' was empty (missing value). In the remaining 4,909 ASF outbreaks, the information reported by the MSs was very variable, and the type of farm involved was reported in some of them. The terms that have been used by the MSs to describe the type of farm involved in the ASF outbreaks in the ADNS are backyard, non-commercial,

non-commercial backyard, domestic farm, family farm type A, commercial, industrial, zoo and type A. The distribution of these among countries is presented in Table 3 below. For additional information on the different types of farms that have been reported in the ADNS see also the replies of the MSs in Tables B.4 and B.5 in Annex B and in Sections 3.4.1 and 3.4.2.

Table 3: ASF outbreaks in domestic pigs notified to the ADNS by the EU MSs (1984–2020) and the terms identified in the field 'Free Text' that are used to describe the types of farms in each outbreak

EU MS	Years of ASF outbreaks	No of ASF outbreaks indomesticpigs	No of outbreaks with information in `Free Text'	Backyard	Non -commercial (backyard)	Non -commercial	Domesticfarm	FamilyfarmtypeA	Commercial	EastBalkanpigs	Industrial	Zoo	TypeA
Historic outbreaks													
Belgium	1985	12	0	–	–	–	–	–	–	–	–	–	–
Netherlands	1986	2	0	–	–	–	–	–	–	–	–	–	–
Spain	1986–1994	2,574	0	–	–	–	–	–	–	–	–	–	–
Portugal	1986–1999	2,335	0	–	–	–	–	–	–	–	–	–	–
Current genotype II outbreak													
Bulgaria	2018–2020	64	64	27	–	–	–	1	5	22	6		1
Estonia	2015–2017	27	27	5	–	–	–	–	7	–	–	–	–
Greece	2020	1	1	1	–	–	–	–	–	–	–	–	–
Latvia	2014–2020	67	67	8	–	–	–	–	–	–	–	–	–
Lithuania	2014–2020	141	141	38*	56*	16*	1	–	11	–	–	–	–
Poland	2014–2020	364	364	–	–	–	–	–	–	–	–	–	–
Romania	2017–2020	3,954	3,954	3,633	–	1	–	–	48	–	–	2	20
Slovakia	2019–2020	28	20	3	–	6	–	–	–	–	–	–	–
Genotype I outbreak													
Italy (Sardinia)	1984–2019	1,689	271	–	–	–	–	–	–	–	–	–	–

*: Comment by Lithuania: in Lithuania there are two types of pig farms: Commercial and Non-commercial. The ASF outbreaks are reported to the ADNS by different persons and in some cases different terms are used in English language which have the same meaning. As a result, non-commercial = backyard = non-commercial (backyard).

3.3. Information presented to the PAFF Committee

3.3.1. Types of outdoor pig farms and biosecurity measures

During the meetings of the PAFF Committee on Animal Health and Welfare from 2010 to July 2020, 249 presentations[13] on ASF have been delivered by 16 EU MSs (Figure 2).

[13] https://ec.europa.eu/food/animals/health/regulatory_committee/presentations_en

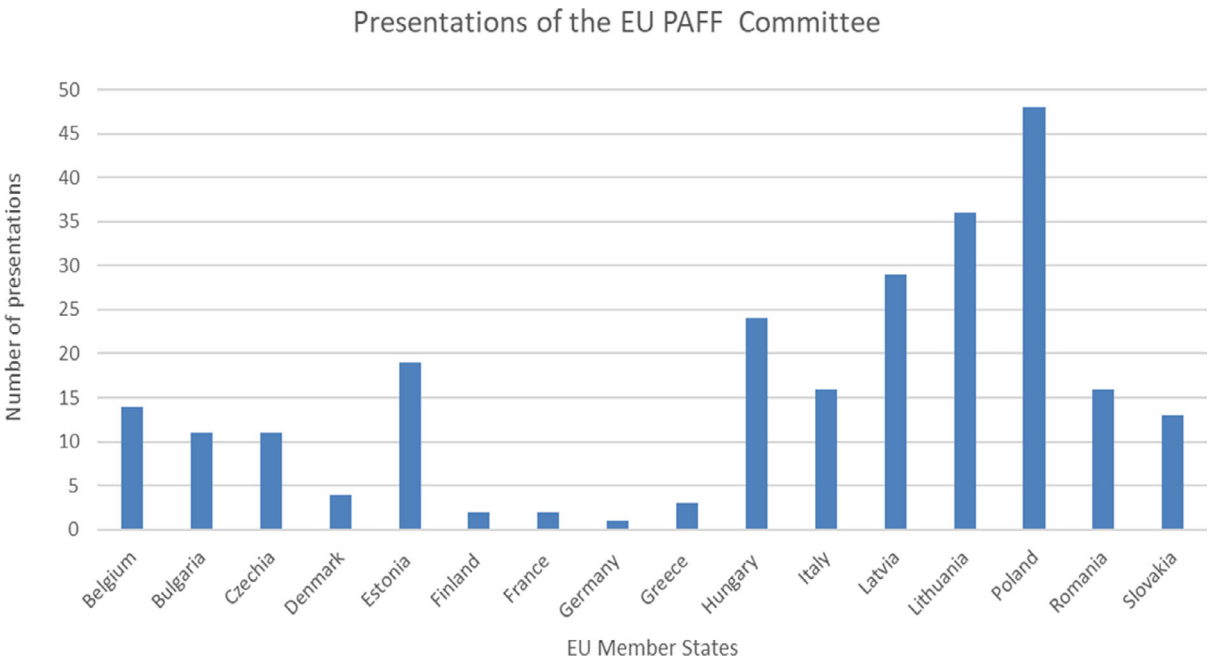

Figure 2: Presentations on ASF in PAFF Committee meetings per MS

A summary of references to different types of pig farms made in MSs' ASF presentations is presented in the Table 4. Table 4 includes types of outdoor pig farms and biosecurity measures that were mentioned in presentations in PAFF Committee meetings on measures for ASF.

For additional information on the different types of farms that have been reported in the PAFF presentations see also the replies of the MSs in Tables B.4 and B.5 in Annex B and in Sections 3.4.1 and 3.4.2.

Table 4: Types of pig farms reported in PAFF Committee presentations related to ASF. The information in the table has been presented as shown in the presentations without interpretation

MSs	Types of pig farms as reported in the presentations					Presentation Reference
Bulgaria	Commercial				Non-commercial	ASF_Bulgaria_2020_Jan ASF_Bulgaria_2018_Jul
	Industrial farms	Type A pig farms	Type B pig farms	Eastern Balkan pig farms	Backyards	
Czechia	Free range (eco-farms)	Backyards				ASF_Czechia_2017_Jul ASF_Czechia_2018_Jan
Denmark	Free-range pigs fenced by double fence with electricity	Backyard herds				ASF_Denmark_2019_Oct ASF_Denmark_2018_Sep
Estonia	Commercial	Non-commercial	Outdoor farms (banned since 2014)	Backyards		ASF_Estonia_2015_Mar ASF_Estonia_2014_Dec
Greece	Intensive farming	Backyards				ASF_Greece_2019_Nov

MSs	Types of pig farms as reported in the presentations					Presentation Reference
Hungary	Commercial		Non-commercial			ASF_Hungary_2017_Mar
	Large scale holdings	Small-scale holdings	Small-scale holdings			
Italy	Intensive	Confined/free ranging	Free ranging	Backyard		ASF_Italy_2010_Apr
Latvia	Commercial	Non-commercial	Outdoor farms	Backyards		ASF_Latvia_2015_Mar
Lithuania	Commercial	Non-commercial				ASF_Lithuania_2017_Mar
Romania	Commercial	A type commercial holding	Non-commercial backyard holdings			ASF_Romania_2017_Sept
Slovakia	Commercial	Non-commercial (Backyards)				ASF_Slovakia_2019_Sept1 ASF_Slovakia_2019_Sept2

Table 5: Type of outdoor pig farms and biosecurity measures as reported in PAFF Committee presentations related to measures for ASF. The data are presented as reported in the presentations without any interpretation

MSs	Outdoor farms	Measures	Presentation Reference
Belgium	Outdoor farms	Effective double fencing	ASF_Belgium_2019_May
Bulgaria	East Balkan Pigs		ASF_Bulgaria_2020_Jan ASF_Bulgaria_2018_Sept
Czechia	Free range (eco-farms)	Monitor, control home slaughter	ASF_Czechia_2017_Jul ASF_Czechia_2018_Jan
Denmark	Free-range pigs	Double fencing with electricity	ASF_Denmark_2019_Apr
Estonia	Keeping domestic pigs and farmed wild boar outside	Banned since 2014	ASF_Estonia_2014_Dec
Finland	Outdoor farms	Double fence with electricity for outdoor pigs	ASF_Finland_2018_Jan
Greece	Free ranged		ASF_Greece_2019_Nov
Hungary	Outdoor holdings	Double fencing	ASF_Hungary_2018_Jun
Romania	Bazna and Manganita	Double fencing	ASF_Romania_2019_Feb

3.4. Results of the MS questionnaire survey

Up until the end of September 2020, the Central Veterinary Authorities of 26 MSs (96%) and 12 farmers' associations (18% of the total number of associations that received the survey) from 9 MSs (covering 33% of MSs) had replied to the questionnaire (see Table B.1 in Annex B).

The results presented in this section summarise replies to the questionnaire and any clarifications or additional information requested by EFSA. The Veterinary Authorities (VAs) from all EU MSs except Malta responded, therefore, the data are considered representative of the EU. The replies from the farmers' associations (FAs) have been used complementarily to provide explanatory information to supplement those from the VAs. All replies are presented in the tables of Annex B as originally provided without any interpretation or amendments except for some minor text editing. The MS VAs have reviewed and approved the presentation and analysis of their data in this document prior to its publication.

The participation to this questionnaire survey was voluntary and the level of detail in the replies was at the discretion of the VAs and the FAs. Limited or missing information or even absence of replies should not be interpreted as weaknesses and limitations in individual MSs.

3.4.1. Types of outdoor pig farms

3.4.1.1. Types of outdoor pig farms in EU MSs based on EFSA's categorisation

Based on the replies of the 26 MSs, each of the six main categories of outdoor farms that were tentatively defined by the EFSA Working Group (see Section 2.4) have been identified in the EU. The variation between the different categories in different countries is presented in detail in Table B.2 of Annex B.

Table 6 below summarises the results of the Table B.2 of Annex B and provides the distribution of the different types of outdoor farms in EU MSs.

Different types of outdoor pig farms have been identified in 23 MSs (see Table 6, Figures 3 and 4).

Outdoor farms that allow access to forests or woodlands exist in 62% of responding MSs. In these 16 MSs, access is allowed to fenced areas in forests or woodlands and the pigs are free to move and graze within these fenced areas. Pigs may stay there for their entire life during all the production stages or partially for specific production stages or for specific periods of the year. Mobile/temporary shelters are available for pigs within these areas and, in some cases, pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night. In two MSs (Bulgaria and Italy), there are farms where the pigs may have unlimited access to unfenced areas in woodlands or forests for specific production stages or for some periods of the year. Bulgaria clarified that this practice is usually temporary and concerns East Balkan pigs, which have unlimited daily access to unfenced areas in woodlands or forests but spend the nights in permanent buildings in a fenced area (farm). In this area, they are kept in periods of snow, they are fed in case of need and it is the place for the birth of piglets. This type of outdoor keeping is currently not allowed.

Outdoor farms that allow access to pastures or fields exist in 73% of responding MSs. In these 19 MSs, there are farms that allow access to fenced areas in pastures or fields and the pigs are free to move and graze within these fenced areas. Pigs may stay there for their entire life during all production stages or partially for specific production stages, or for specific periods of the year. Mobile/ temporary shelters are available for pigs within these areas, and, in some cases, pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night. In Italy, pigs may also have unlimited access to unfenced areas in pastures or fields, for specific production stages or for specific periods of the year.

Outdoor farms that allow access to concrete fenced yards or runs exist in 88% of responding MSs (n = 23). Farms with permanent open buildings with fenced yards, where pigs can have unlimited access to these fenced yards and are all the time exposed to the external environment, exist in 69% of the MSs (n = 18). Farms with permanent, closed buildings where pigs can have controlled access to a limited concrete outside fenced run/yard, exist in 88% of MSs (n = 23). In these cases, pigs may stay there for their entire life during all production stages or for specific production stages or for specific periods of the year.

Table 6: The presence of different types of outdoor pig farms (EFSA's categorisation) reported by EU MSs in the questionnaire survey. The percentages have been calculated out of the total number (n = 26) of MSs that have replied to the questionnaire. It was possible to select more than one option per category. More details can be found in Table B.2 in Annex B

Outdoor pig farms categories (EFSA's categorisation)	Number (%) of EU MS
Farms that allow access to forests or woodlands	**16 (62)**
1) Unfenced areas in woodlands or forests	**2 (8)**
Pigs stay there for their entire life, during all production stages	0 (0)
Pigs stay there partially for specific production stages or for some periods of the year	2 (8)
Mobile/temporary shelters within the woodlands or forests are available for pigs	0 (0)
Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night	1 (4)
2. Fenced areas in woodlands or forests	**16 (62)**
Pigs stay there for their entire life, during all production stages	12 (46)
Pigs stay there partially for specific production stages or for some periods of the year	14 (54)
Mobile/temporary shelters within the woodlands or forests are available for pigs	6 (23)

Outdoor pig farms categories (EFSA's categorisation)	Number (%) of EU MS
Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night	5 (19)
Farms that allow access to pastures or fields	**19 (73)**
3. Unfenced areas in pastures or fields	**1 (4)**
Pigs stay there for their entire life, during all production stages	0 (0)
Pigs stay there partially for specific production stages or for some periods of the year	1 (4)
Mobile/temporary shelters within the pastures or fields available for pigs	0 (0)
Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night	0 (0)
4. Fenced areas in pastures or fields	**19 (73)**
Pigs stay there for their entire life, during all production stages	11 (42)
Pigs stay there partially for specific production stages or for some periods of the year	18 (69)
Mobile/temporary shelters within the pastures or fields available for pigs	11 (42)
Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night	12 (46)
Farms that allow access to concrete fenced yards or runs	**23 (88)**
5. Open buildings with unlimited access to fenced yards	**18 (69)**
Pigs stay there for their entire life, during all production stages	12 (46)
Pigs stay there partially for specific production stages or for some periods of the year	15 (58)
6. Closed building with controlled access to fenced yards or runs	**23 (88)**
Pigs stay there for their entire life, during all production stages	17 (65)
Pigs stay there partially for specific production stages or for some periods of the year	16 (62)

The geographical distribution at country level of different types of outdoor pig farms in EU MSs, based on the replies to the questionnaire provided by 26 MSs (only Malta is missing), is presented in Figure 3. The level of detail in the data did not allow assessment of the within-country geographical distribution of the different farm types. Therefore, although some farm types exist only in a limited geographical area within a MS, this is not reflected in Figure 3 and the entire country has been coloured.

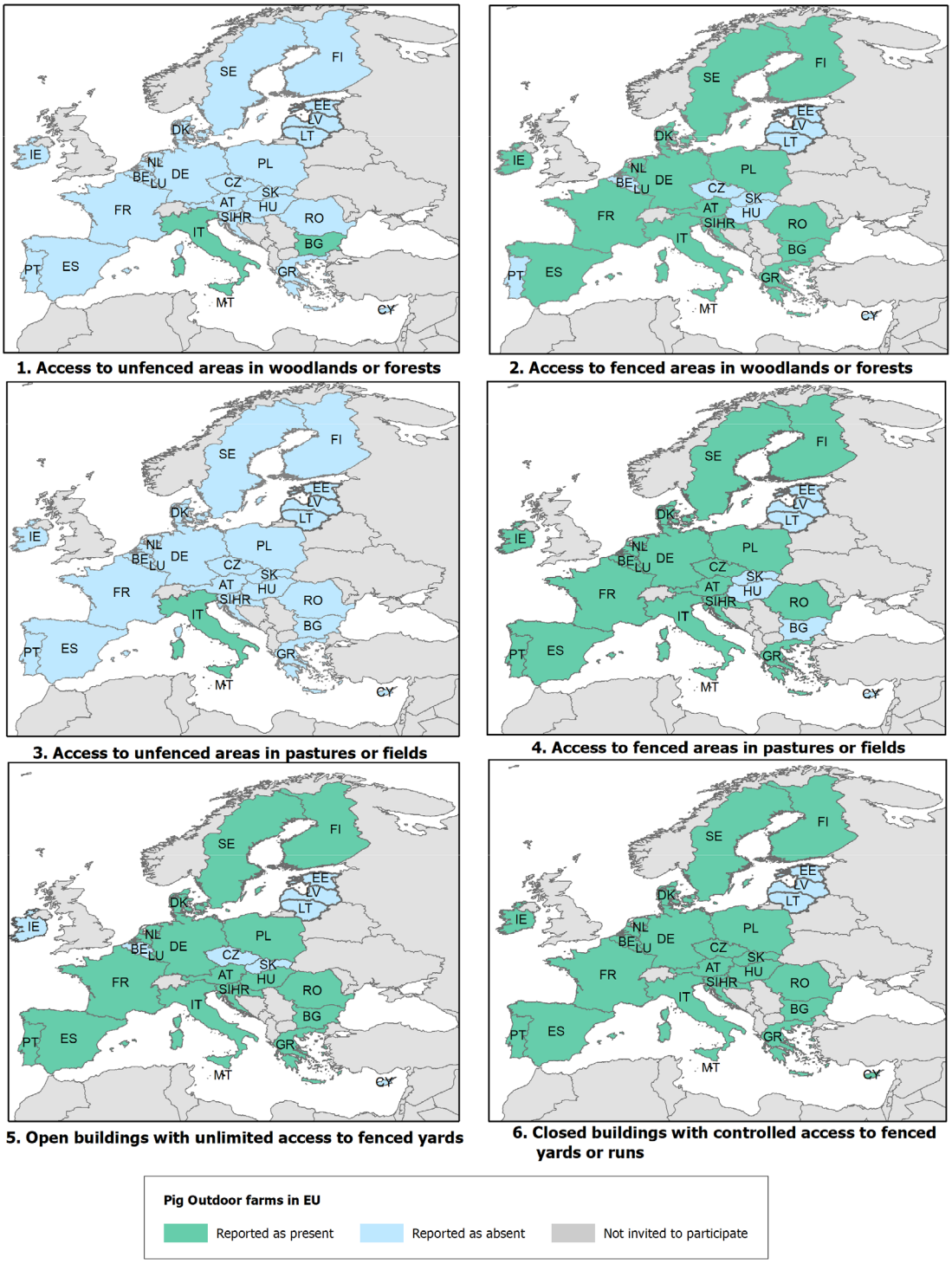

Figure 3: The presence of different types of outdoor pig farms in EU: 1) farms where pigs can have access to unfenced areas in woodlands or forests, 2) farms where pigs can have access to fenced areas in woodlands or forests, 3) farms where pigs can have access to unfenced areas in pastures or fields, 4) farms were pigs can have access to fenced areas in pastures or fields, 5) farms where pigs are held in open buildings with unlimited access to fenced yards and 6) farms where pigs are held in closed buildings with controlled access to fenced yards or runs. In each case, presence and absence are illustrated using green and light blue colour, respectively, and grey for those countries that have not been invited to participate to EU Survey. Source: Table B.2 in Annex B

3.4.1.2. Types of outdoor pig farms in EU MSs based on their national categorisation system

The replies received from the Veterinary Authorities of 26 MSs and the 12 FAs on the categorisation of the outdoor pig farms at national level, according to their national legislation or standards, are provided in Tables B.4 and B.5 in Annex B.

Three MSs (Estonia, Latvia and Lithuania) have no outdoor farms since keeping pigs outdoors is forbidden due to the ASF situation, and four MSs (France, Greece, Hungary, Slovakia and Slovenia) do not differentiate outdoor pig farms according to the outdoor environment and the type of access to the outdoor area, and therefore do not have relevant definitions and registered information.

Based on the variety of definitions and descriptions provided, a level of categorisation exists in MSs and different categories of outdoor pig farms have been identified (see Tables 7, B.4 and B.5 in Annex B). However, in some MSs the national categorisation system for pig farms does not always include detailed criteria to specify the outdoor area (e.g. forests, pastures, yards), the housing system (e.g. permanent buildings, mobile shelters), the duration of the access to the outdoors or the existence of fences.

This situation is the result of the fact that there is no legislation or guidelines at European level for the categorisation of pig farms, and consequently, any categorisation at national level is not harmonised and optimised and any comparison amongst MSs cannot be fully implemented.

Table 7: Categories of outdoor pig farms as defined in national categorisation systems reported by EU MSs (selected from the replies provided by Veterinary Authorities and farmers' associations, see Tables B.4 and B.5 in Annex B). The data are presented as reported in the survey without any interpretation

Country	Outdoor pig farms categories: Description and characteristics based on national classification systems or standards.
Austria (AT)	**Free-range holding**: Keeping pigs outdoors without a permanent barn only with protective devices
	Outdoor holding: Keeping pigs in stalls that have indoor and outdoor areas
Bulgaria (BG)	**East Balkan Pig Farms:** Outdoor access to pastures/fields without fences. Because of the current ASF situation, the pigs are kept within limited fenced spaces.
	Pig farms with outdoor access to yards with fences: Outdoor access to yards with fences. No official statistics. Those type of farms are not clearly defined by local legislation. They are part of the registered industrial or Family Type pig holdings.
	Industrial farms with outside yards: Permanent closed building farms with controlled access to a limited concrete outside run/yard, which is fenced. No official statistics. They are part of the registered industrial pig holdings.
	Industrial farms without open space areas: No official statistics. They are part of the registered industrial pig holdings.
	Backyards: Non-commercial pig breeding farms – for personal consumption of the owner only. No official statistics. Usually pigs have outdoor access to yards with fences.
Croatia (HR)	**Outdoor farms - Category 4:** Farms with approval for outdoor farming
	Farms with fenced yards: Pigs are kept in buildings, but have temporary access to open fenced yard, mainly small backyard farms out of which 3,761 farms keep only one pig.
	Outdoor farms - Category 1 or 2: Farms pending approval for outdoor farming
Czechia (CZ)	**Type II:** Pig farms with pigs in permanently closed buildings with controlled access to a limited outside fenced run/yard. (Type I pig farms with pigs in permanently closed buildings without any access to the outdoor area for their whole life, for all the production stages)
Denmark (DK)	**Fenced wild boar:** Wild boar kept under the same regulation as free ranging pigs, with regard to rules on fencing and prohibition of swill feeding.
	Free ranging pig production A: In free ranging pig production, the pregnant sows are either kept in outdoor fenced fields/pastures or indoor loose housing systems. The lactating sows and piglets are kept on fields/pastures from farrowing to weaning. Fattening pigs are kept in stables with access to outdoor fenced areas or concrete outside runs/yards.

Country	Outdoor pig farms categories: Description and characteristics based on national classification systems or standards.
	Free ranging pig production B: Sows, piglets and fattening pigs are kept in fenced pastures, fields, woodlands for their entire life.
	Hobby holdings: can be outdoors or indoors, it is not known. (Data retrieved from Danish CHR-register on August 11, 2020) Source: SEGES-DANISH Pig Research Center
Finland (FI)	**Commercial pig farms with outdoor access**: There may be outdoor access for e.g. sows. In commercial pig farms, it is very uncommon that animals would get outdoors at all. We do not register information of outdoor access.
	Organic pig farms: According to requirements of organic farming pigs have to have outdoor access. All organic pigs have outdoor access at least from May to October
	Farmed wild boar: Farmed wild boar are kept outdoors. Farmed wild boar are kept in fenced areas in forests year-round. **Mini pigs:** Mini pigs are kept as pets by private persons. Usually they have outdoor access, either in fenced area or on a leash. Private persons have usually one or a few animals.
	Mangalica pig farms: Mangalica pigs are kept outdoors year-round except during farrowing time. We do not register the breed of pigs, so the official number of Mangalica pigs is not available. We estimate the number of farms to be about 10.
	Domestic animal parks: Domestic animal parks serve as local small-scale tourist attractions. There may be mini pigs and/or other pigs. No official data available
Germany (DE)	**Outdoor husbandry system:** A system where pigs are kept outdoors with shelters only and no permanent housing. The competent authority has to approve the holding. The approval has to be refused if the holding is in an area at risk of swine fever (ASF/CSF).
	Outdoor access: A system where pigs are kept in a housing and allowed to spend some time outdoors
Ireland (IE)	**Organic pig farms:** The Organic Food and Farming Standards in Ireland prohibits permanent housing for pigs and stipulates that the pig enterprise should be free-range which allows the pigs direct access to soil and green food (2.08.03 & 4.05.14)
	Small numbers of pigs are kept with restricted outdoor access: Ireland does not have a feral pig population. Any domestic pigs with outdoor access must be kept in a manner that prevents them from straying from the land or premises where they are kept under national legislation (Part 2 Section 8 Animal Health and Welfare Act 2013). Ireland has very few pig farms where small numbers of pigs are kept with restricted outdoor access.
	Hobby domestic pig keepers: Small numbers kept (1 to 2 pigs each) source: Irish Farmers' Association
	Specialist artistic pork & bacon producers: Greater scale than above (hobby domestic pig keepers) but still quite small and localised in Ireland. source: Irish Farmers' Association
	Commercial outdoor producers: very small number source: Irish Farmers' Association
Italy	**Farms with only pigs:** Semi-wild and wild farms. The animals, especially in spring-summer, go to pastures during the day and then return to closed/covered structures for night shelters. Food supplementation is provided.
	Farms with only wild boar: Semi-wild and wild farms. The animals, especially in spring-summer, go to pastures during the day and then return to closed/covered structures for night shelters. Food supplementation is provided.
Netherlands (NL)	**Organic** : commercial, for meat; partially kept outdoors often are farms with closed buildings, with outdoor access (for finishers often concrete, but sometimes other type or even soil).
	Hobby: Non-commercial: There is no definition of hobby pig; when a location has 4 or fewer pigs, it is registered as RE/hobby farm. Possibly they keep the pigs as pet, maybe they will slaughter pigs for own consumption.
Portugal (PT)	**Extensive:** System that uses grazing in its production process, with a lower number of heads per hectare below 1.4 CN (Normal number of heads[(a)])/ha or that develops livestock activity with low productive intensity or low animal density.

Country	Outdoor pig farms categories: Description and characteristics based on national classification systems or standards.
	Intensive outdoors: Developed system in open space, with reduced resource of fixed installations.
Romania (RO)	**Extensive:** System that uses grazing in its production process, with a lower head 1.4 CN/ha or that develops livestock activity with low productive intensity or low animal density.
	Game farm: fenced farm where wild pigs are produced for hunting or for the population of other hunting funds
	Farm with a semi-open raising system for native pig breeds Mangalita and Bazna: pig holdings where local/autochthonous breeds are raised
	Semi-intensive breeding farm for the native pig breeds Mangalita and Bazna: pig holdings where local/autochthonous breeds are bred
Sweden (SE)	**Fenced wild boar:** kept permanently outdoors
	EU organic domestic pigs
	Open-air buildings: No outdoor access but can have contact through fences.
	Organic farms: Organic farms according to special requirements (KRAV standards) where pigs must have access to pastures during summertime.
	Other farms with outdoor access: other fenced outdoor farms
	Hobby farms: Non-commercial small farms
	Miniature pigs: Small non-commercial pigs, pets

(a): The term Normal head - CN (Livestock Unit - LU) means an equivalence unit was used to compare animals of different species or categories, according to their dietary needs and levels of nitrogen excretion.

Some of the pig farm types reported by several MSs allow access to the outdoors and are considered as outdoor farms (see Tables 7, 16 and 17), such as: backyards, organic farms, farms with kept 'wild boar' (fenced or farmed wild boar) and free range farms. In addition, the pigs that are kept as pets or for hobby may have access to the outdoors as well. Based on the definitions and the descriptions, the described farms appear to share similar features across MSs:

Backyards or back yards: In six MSs, *backyards* are considered as one of the pig farm categories and may be linked with outdoor access. Luxembourg considers backyards as outdoor farms without providing any additional information. In Cyprus, backyards are very small outdoor, non-commercial farms, where pigs are kept for self-consumption and do not have access to fields. In Croatia, backyard farms are small farms, where pigs are kept in buildings, but with or without temporary access to open fenced yards. In Spain, backyards are non-commercial, small pig farms (maximum allowed number of five finishers per year based on National legislation), with temporal or permanent access to outdoors and intended for self-consumption only. In Slovakia, a classical backyard holding is a holding, where the pigs are bred in separated buildings/places and do not have access to the fields, pastures and forests but only to structures that belong to a landowner. These can be either closed or covered by a roof that allows fresh air to flow in. In Lithuania, backyard or non-commercial farms are totally closed farms, according to national legislation, and a backyard farm or non-commercial farm is considered a farm where the pigs are kept just for self-consumption, and the maximum number of kept pigs is 10 fattening pigs. In Bulgaria, backyards are non-commercial pig breeding farms keeping pigs for self-consumption only, where pigs usually have access to yards.

Kept wild boar (or wild boar-domestic pig hybrids): Five MSs (Finland, Denmark, Italy, Poland and Sweden) classified kept wild boar, so called *farmed or fenced wild boar,* as one of the categories of outdoor farms. In Finland, *farmed wild boar* are kept outdoors in fenced areas in forests year-round. In Denmark *fenced wild boar* are kept under the same regulation as free ranging pigs, with regard to the requirement of being fenced and prohibition of swill feeding.[14] In Italy, mixed farms with *wild boar and domestic pigs* and *farms with only wild boar* are characterised as *semi-wild and wild farms* and the animals, especially in spring-summer go to pastures during the day and then return to closed/covered structures for night shelters. Feed supplementation is provided. In Poland, in the *hybrid wild boar farms,* the animals are kept in an open space system. In Sweden, in the *fenced wild boar farms,* the animals are kept permanently outdoors.

[14] This prohibition reflects the EU-wide prohibition of swill feeding.

Organic pig farms: In four MSs (Finland, Ireland, Netherlands and Sweden), *Organic pig farms* are characterised as outdoor farms and constitute an independent category of pig farms. In Finland according to the requirements of organic farming, pigs must have outdoor access at least from May to October. In Ireland, the *Organic Food and Farming Standards* prohibits the permanent housing for pigs and stipulates that the pig enterprise should be free-range allowing the pigs' direct access to soil and green food. In the Netherlands, organic farms are commercial farms for meat production, with buildings where the pigs have 24/7 access to outdoor areas. In Sweden, there are two types of organic farms with outdoor access: the EU organic domestic pig farms and the organic farms according to the Swedish KRAV standards. The *KRAV standard* requires outdoor access all year, while during summer pigs must be kept on pastures.

Specific pig breeds: In four MSs (Bulgaria, Finland, Romania and Spain), one farm type relates to the keeping of specific native pig breeds which need outdoor access (for details see Section 3.4.1.2 and Table B.2). In Bulgaria, the East Balkan pig is a Bulgarian breed with very few herds left due to the emergence of ASF in 2018. In Finland, there are very few farms, around 10, where *Mangalica* pigs are kept outdoors year-round except during farrowing time. In Romania, there are farms with a semi-open raising system and semi-intensive breeding farms where local/autochthonous native breeds Mangalita and Bazna are raised. In Spain, *commercial Iberian pig production* is an important production sector where most farms are highly industrialised and applying strict biosecurity measures. It is an extensive production system based on the exploitation of natural resources. In some farms, pigs may be reared outdoors with fences (not always impermeable to wild boar) on the *dehesa*[15] (see also Table 9) for their whole life (non-permanent structures are occasionally used on breeders' farms). It is called a tent or camping system, where the tents are non-permanent tent-shaped metal structures. These farms are obliged to have an external fence, which is usually permeable for wild boar, among other biosecurity measures compulsory by specific outdoor-farms legal frame (Real Decreto (RD) 1221/2009). In some other farms, the pigs are reared for part of their life under outdoor conditions, again behind fences that normally are permeable to wild boar (outdoor fattening farms). In many extensive farms, pigs receive additional feed/compound feed at the end of the production cycle, and they have outdoor access during some periods, to take advantage of natural resources (acorns) when available (fattening units). This is the most common type of fattening farm nowadays in the Iberian pig production sector.

Free ranging/range: In two MSs (Austria and Denmark), free ranging/range farms constitute one category of outdoor farms. In Austria, pigs in free ranging holdings are kept outdoors without a permanent barn only with protective devices In Denmark, there are two different types of free ranging farms: (i) the *free ranging pig production A,* where pregnant sows are either kept in outdoor fenced fields/pastures or in indoor loose housing systems; lactating sows and piglets are kept on fields/ pastures from farrowing to weaning, and fattening pigs are kept in stables with access to outdoor fenced areas or concrete outside runs/yards and (ii) the *free ranging pig production B*, where sows, piglets and fattening pigs are kept in fenced pastures, fields, woodlands for their entire life.

Pigs kept as pets: In four MSs (Finland, Luxemburg, Belgium and Sweden), pigs that are kept as pets are described as having access to the outdoors. In Finland, mini pigs are kept as pets and usually have outdoor access, either in fenced area or on a leash. Sweden includes miniature pig pets in the category of *small non-commercial pets*.

Hobby holdings: In four MSs (Denmark, Ireland, Netherlands, Sweden), the hobby holdings or the hobby domestic pig keepers allow pigs access to the outdoors.

The categorisation of outdoor pig farms at national level in MSs is based on legislative documents, guidelines or standards and check lists. Most of the MSs use more than one tool to categorise the outdoor pig farms into different types (Tables B.4 and B.5 in Annex B). Legislative documents are used by 50% of MSs, guidelines or standards by 35% of MSs and checklists by 27% of MSs.

The Bulgarian Association for breeding and preserving of the East Balkan Swine mentioned the lack of clear legal definitions of 'outdoor pig farming', 'outdoor pigs', 'pasture pigs', etc. and underlined the need for such definitions both at the European and the local level. They referred to an example, where the Bulgarian legislation limits the term 'pasture pig breeding' to the East Balkan Swine only, without giving a definition for 'pasture pig breeding'. Legally, therefore, other forms of commercial outdoor pig breeding are marketed as 'pasture pig breeding'.

[15] oak forests with ground cover of herbaceous species and sparse evergreen or cork oak trees.

3.4.2. Specific pig breeds that should have outdoor access

Veterinary Authorities and the Farmers' Associations from twelve MSs reported twenty-one autochthonous/native pig breeds that exist in their territory and they should have access to outdoor areas. Such areas can be woodlands, forests, fields and pastures that are fenced to avoid the contact with wild boar. Outdoor access is provided throughout the entire life or only during specific production stages of the pigs.

The requirement for access to the outdoors is not always a legislative provision but is often based on traditional farming practices and on the behavioural and physiological needs of the breed to reach its maximum productivity.

Some of these breeds belong to endangered or traditional breeds; in other cases, they constitute an important production sector. Further information about these breeds per MS and their characteristics is provided in Table 8. Italy reported eight different native breeds.

Table 8: Specific pig breeds in EU MSs that need outdoor access as provided by the responding Veterinary Authorities of the MSs and the Farmers' Associations. The data are presented as reported without any interpretation. The name of the same breed may differ between countries

Country	Breeds that should have outdoor access*
Austria (AT)	For some breeds kept in Austria (e.g. **Mangaliza**, **Turupolje**) keeping in a stable without access to fields/pastures is difficult or impossible. Source: VA
Bulgaria (BG)	***'East Balkan Swine (EBS)':*** Bulgarian breed**.** In the areas with ASF, they are kept closed now. Before ASF they were grazed during the day and collected back during the night in closed shelter. Access to woodland/forest areas in Eastern Bulgaria. The climate in this region is suitable and there are enough resources of different types of Oak trees, which give the pigs their main food - acorns. The optimal breeding of East Balkan Swine requires woodland/forest areas rich in acorns in Eastern Bulgaria of at least (0.25 ha) per pig. Access to woodland/forest areas should be permanent (all year). If the owner of the land (currently State and municipalities only) allow permanent fencing of big areas about 20–50 hectares per EBS pig holding, fenced type of breeding will be also possible and more effective. Source: VAs, Association for Breeding and Preserving of the East Balkan Swine
Croatia (HR)	**Indigenous pig breeds** in Croatia are mainly kept in outdoor farms however the veterinary authorities are not aware of any legislative provisions for special breed status. **Turopolje pig:** For the Turopolje pig it is recommended to keep it in an open forest area. **Black Slavonian pig** Source: VAs, Plemenita opčina turopoljska, Black Slavonian pig breeders' association
Finland (FI)	***'Mangalica'*:** there are a few farms keeping Mangalica pigs outdoors. Mangalica pigs are kept outdoors year-round except during farrowing time. As the breed of pigs is not registered, the official number of Mangalica pigs is not available; the estimated number of Finnish farms keeping Mangalica pigs is around 10. Source: VAs
France (FR)	***'KINTOA'*:** The pig herd held by the authorised producer is made up only of *Pie noir* breed pigs from the Basque county. Their breeding includes the following phases: Lactating: until the age of at least 4 weeks and at most 8 weeks, the piglets are raised under the mother, in the shelter; they can have access to an outdoor enclosure. Post-weaning: up to three months, piglets are reared under cover; they can have access to an outdoor enclosure. Pre-fattening: the animals are reared under cover; they can have access to an outdoor enclosure or to the identified course. Fattening: at the age of 5 months maximum and until their slaughter, the animals are placed on an identified route. Source: VAs
Greece (EL)	***'Greek pig' (Greek black pig)*** Source: VAs
Hungary (HU)	***'Mangalica'***: they are usually kept in outdoor farms, meaning that they have access to open-air yards. It is not a 'breed' requirement but based on the behaviour and physiological needs of the breed they must be kept this way to reach their maximum productivity. Source: VAs

Country	Breeds that should have outdoor access*
Italy (IT)	***'Apulo Calabrese'*:** Autochthonous breed. Animals reared at least for finishing outdoor in wooded and pastures fenced areas. Bred in small farms of Central South Italy (from Lazio to Calabria and Apulia). There are some organic farms. Source: VAs
	'Casertana': Endangered autochthonous breed. Animals reared at least for finishing outdoor in wooded and pastures fenced areas. Bred in small farms of Lazio, Campania and Molise regions. There are some organic farms. Source: VAs
	'Cinta senese': Autochthonous breed. Animals reared at least for finishing outdoor in wooded and pastures fenced areas. Bred mainly in Tuscany but also in Umbria and North Lazio. In Tuscany, this type of production has PDO[(b)] recognition and in this case, outdoor breeding is mandatory. There are some organic farms. Source: VAs
	'Mora romagnola': Endangered autochthonous breed. Animals reared at least for finishing outdoor in wooded and pastures fenced areas. Bred mainly in Emilia Romagna region. There are some organic farms. Source: VAs
	'Nero siciliano': Autochthonous hardy breed. Animals reared outdoor in wooded and pastures fenced areas. Bred in Sicily. There are some organic farms. Source: VAs
	'Sarda': Endangered autochthonous hardy breed. Animals reared outdoor in wooded and pastures fenced areas. Bred in small farms of Sardinia. Source: VAs
	'Nero di Parma': Reconstructed old breed. Animals reared as indoor and at least for finishing they held outdoor in wooded and pastures fenced areas. Bred mainly in few small farms of the province of Parma. There are some organic farms. Source: VAs
	'Nero di Lomellina': New hardy breed. Animals reared as indoor and at least for finishing they held outdoor in wooded and pastures fenced areas. Bred in farms of West Lombardy and Piedmont. There are some organic farms. Source: VAs
Poland (PL)	***'Mangalita'*:** needs permanent access to outdoors Source: VAs
	Hybrid pigs and WB: needs permanent access to outdoors Source: VAs
	Polish extensive breeds: they need permanent access to outdoors Source: VAs
Portugal (PT)	***'Alentejano Swine'*** Must eat acorns (Winter) to ensure that meat receives PDO recognition. Pigs can live all their life inside or outside until they reach at least 12 months old. In winter, they move outside (fenced yards) to eat the acorns from the soil. To achieve the *PDOs* of Alentejano meat, pigs must be 100% Alentejano breed and must have same stage of their life, living outside. Source: VAs, Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)
	'Bísaro Swine' Source: VAs
Romania (RO)	***'Bazna' and 'Mangalita':*** local/autochthonous breeds in holdings that include agricultural land, pastures or unproductive land, well demarcated with double fences on clearly defined property, which do not allow animals to come into contact with other animals outside the farm. Respecting the specific requirements of growth/exploitation, the semi-open system guarantees obtaining production/reproduction indices, the healthy and harmonious development of the autochthonous breeds, which are on the verge of extinction or in danger of abandonment. The Mangalita and Bazna breeds are closely monitored in the farms registered by the accredited association for the management and maintenance of the genealogical register of these breeds, which has implemented an in situ and ex situ genetic conservation program. This semi-open nature-friendly system promotes animal welfare and environmental sustainability, with a small capital investment. Native breeds raised in a semi-open system not only comply with the requirements of EU rules but are also the only breeds that do not practice tail docking cutting fangs, forced fattening or overpopulation of areas where they are bred, complying with Directive 2008/120/EC of 18.12. 2008 para. (8), (9),

Country	Breeds that should have outdoor access*
	(10), (11), (12), (13) and the EC Recommendations on welfare for pigs from 2018. Source: VAs, Asociatia crescatorilor de suine autohtone Mangalita si Bazna
Spain (ES)	**'*Iberian' breed* (Cerdo Ibérico):** Production of Iberian pigs may be done outdoors on the *dehesa* ecosystem, with natural feeding on holm and evergreen oak acorns and pastures, they are in outdoor conditions from April to October for adaptation, and from early November to late February, taking advantage of natural resources, when they are finished before slaughter. In Spain, extensive production system of Iberian-breed pigs can be classified in different groups according to different criteria: • In relation to the breed of progenitors: – Iberian: both progenitors are 100% pure Iberian-breed pigs – Mixed: Industrial breeding between Iberian-breed sow and Duroc-breed or mixed-breed boar (75% Iberian; 50% Iberian) • In relation to their feeding: – Acorn: production of Iberian pigs is done outdoors on the *dehesa* ecosystem, with natural feeding of holm oak acorns and pastures, they are in outdoor conditions from April to October for adaptation, and from early November to late February, taking advantage of natural resources, when they are finished before slaughter. – Fattening with feedstuff in fenced outdoors conditions: the final part of the cycle of production is done in outdoors fenced areas. This high value production constitutes an important amount of the extensive production (around 700.000 pigs a year). – Fattening with feedstuff indoors: the pigs have temporal access to outdoor conditions and then stay for the last 4–6 months of their life indoors on compounds until they reach a final weight of 160 kg. These farms produce most of the commercial Iberian products, with an extension of animal welfare parameters (included in the quality standard). The *dehesa* agroforestry ecosystem is characterised by a combination of grazing, woodland and cropping land where many times different livestock species are raised to make a complementary use of the natural resources. These *dehesa* are the most representative grasslands for the southwest quadrant of the Iberian Peninsula, occupying an area of 5.8 million hectares in Spain and 0.5 million hectares in Portugal. In mixed systems, different breeds of cattle, Iberian pig in their several varieties (main breed used for extensive pig farming) and sheep simultaneously graze pasture and wood resources of this ecosystem for meat production. Official authorisation and classification as an extensive farm or mixed. In the montanera or field bait the type of animals fattening in extensive regime is regulated by the DDOOPP(a) and RD(b) 4/2014. The extensive and outdoor production of the Iberian pig is a guarantee of conservation of the dehesa ecosystem and this indigenous pig breed. Despite this productive system, individual control over the animals is permanent for sanitary and productive reasons. Source: VAs, Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)

*: The names of the breeds that are listed here are provided by the MSs.
(a): PDO: Protected designation of origin.
(b): DDOOPP: Denominaciones de origen protegidas (Protected designation of origin).
(c): RD: Real Decreto (Royal Decree).

3.4.3. Number of outdoor farms and pigs

Data on pig population and on outdoor pig farms as received from the Veterinary Authorities and the farmers' associations are presented in Tables B.7 and B.8, respectively, in Annex B. For the purpose of this assessment, the population data used were those provided by VAs. There was a limited response rate from farmers' associations on this topic, and their data reflect practices of association members rather than of the whole country.

The number of outdoor farms was available at national level in 20 MSs (77%), while the number of pigs in these outdoor farms was available in 18 (69%) (see Table B.8). In addition, three MSs provided data on outdoor farms only for specific types of outdoor farms and not for the total number of outdoor farms existing in the country (e.g. free range, organic farms).

In relation to the commercial activity of the outdoor farms, the number of commercial outdoor farms was available at national level in 12 MSs (46% of responding MSs), while the number of pigs in these commercial outdoor farms was available in 11 MSs (42% of responding MSs).

The VAs explained that information related to outdoor access of the farms, the different types of outdoor environments, the commercial or non-commercial activity, the breed of the animals, the housing system are not registered per each farm in their national databases, because there is no legal requirement at European or national level. As a result, this information is not retrievable at national level. They clarified that this information is available at local authorities.

In the national databases for pig population, the type of outdoor farms is registered in 9 out of 26 MSs, the housing system of the pig farms in 12 MSs and the level of biosecurity of pig farms (if existing) is registered in 7 MSs.

Based on the data that were available and included in Table B.8 in Annex B, relevant distributions and proportions have been calculated and presented (Tables 9 and 10). Considering the limited availability of these data in several MSs, the number of the outdoor farms and the pig population in these farms shown is probably an underestimation of the real values.

Table 9: EU overall pig population data, based on the replies that the VAs of the MSs have provided and presented in Table B.8 in Annex B. The data are presented as reported without any interpretation

	EU total	Median (interquartile range)	Min–max	Number of MSs that provided data*
All pig farms				
Number of farms	1,102,086	7,670 (1,991–26,029)	119–500,000	26
Number of pigs	140,095,515	1,547,060 (515,530–8,447,774)	80,000–30,939,971	26
Outdoor pig farms*				
Number of farms	49,070	244.5 (34.25–1,329)	0–14,672	20
Number of pigs	2,682,466	19,425 (1,046–150,794)	0–1,567,895	18
Outdoor commercial pig farms*				
Number of farms	34,445	581 (205.5–3,361.8)	7–13,549	12
Number of pigs	2,651,550	144,891 (31,688–191,594)	179–1,566,419	11

*: In several MSs, the number of outdoor farms, the number of commercial outdoor farms and the number of pigs in these farms were not available at national level and therefore not provided. The EU total has been calculated based on those MSs that they have provided the data. For more details, please see Table B.8 in Annex B.

Table 10: Distribution of outdoor pig farms and pigs in the EU, based on data that the VAs of the MSs have provided and presented in Table B.8 in Annex B. The data are presented as reported without any interpretation

	Median % (interquartile range)	Min-max	No of MSs that provided data*
Outdoor pig farms out of all types of pig farms*	7.7% (1.5–24%)	0.03–55%	17
Pigs in outdoor farms out of pigs in all types of pig farms*	0.77% (0.3–6.6%)	0.2–12%	15
Outdoor commercial pig farms out of outdoor pig farms*	76% (42–95%)	12–100%	12
Pigs in commercial outdoor farms out of pigs in outdoor pig farms*	99% (97–100%)	7–100%	11

*: In several MSs, the number of outdoor farms, the number of commercial outdoor farms and the number of pigs in these farms, respectively, were not available at national level and therefore not provided. The proportions have been calculated using the number of MSs that have provided data. For more details please see Table B.8 in Annex B.

Based on the data from 26 MSs the total number of pig farms in the EU including all types, is 1,102,086 with a median number of farms per MS of 7,670 (1,991–26,029 interquartile range). Based on the data reported from 20 MSs, the total number of outdoor pig farms in the EU is 49,070, with a median number of outdoor pig farms per MS of 244.5 (34.5–1,329 interquartile range).

3.4.3.1. Key points

- In the EU, all pig farms are registered in national pig databases with a unique identification number, irrespective of their size, category and commercial activity. This complies with European and national legislation.
- There is no legislation or guideline at EU level for the categorisation of pig farms. This is reflected at MS level, where categorisation systems for outdoor pig farms vary substantially. In several MSs, there are no relevant definitions or registered information to categorise outdoor pig farms. In those MSs where outdoor pig farms are distinguished, more than one instrument for categorisation (legislative documents, guidelines, standards, checklists) is generally used.
- Although comparison of outdoor farming between MSs using data from national databases is not feasible, certain insights were obtained through the MS survey, including the following:
    - A range of different types of outdoor pig farming are present throughout the EU, including fenced and unfenced areas in woodlands and forests, fenced and unfenced areas in pasture or fields, open buildings with unlimited access to fenced yards and closed buildings with controlled access to fenced yards or runs. Each of these outdoor farming types is common, except unfenced areas in woodland and forests and unfenced areas in pastures and fields.
    - There are several types of outdoor pig farms that are common across a number of MSs, including backyard farms, kept wild boar (or wild boar-domestic pig hybrids), organic pig farms, specific pig breeds, free ranging, pigs kept as pets and hobby holdings.
        - Backyard pig farms are frequently (but not always) provided with outdoor access. Generally, these animals are kept for self-consumption;
        - In several MSs, wild boar (or wild boar-domestic pig hybrids) are kept, invariably with substantial outdoor access. It remains challenging to differentiate owned, kept wild boar from non-owned wild boar, which may inhabit fenced hunting grounds;
        - Outdoor access is an important requirement of organic pig farms;
        - Across many MSs, there are a number pig breeds (including autochthonous/native pig breeds) that require outdoor access (examples include the East Balkan pig and the Mangalica pig). Commercial Iberian pig production is an extensive production system that relies on outdoor access for much of the year;
        - In several MSs, free ranging farms constitute one category of outdoor farms;
        - Pigs kept as pets can have outdoor access;
        - Pigs in hobby holdings, with are present in several MSs, can have outdoor access.
    - Outdoor pig farms are not uncommon in the EU, although the percentages vary across MSs, representing a median 7.7% (interquartile range of 1.4–24%) of all pig farms in those MSs (17) for which data are available.

3.4.4. Biosecurity Measures

3.4.4.1. Policies on Biosecurity Measures in EU MSs

An overview on the general policy of EU MSs in relation to biosecurity measures in pig farms is provided in Tables B.12 and B.13 in Annex B, according to the replies from the Veterinary Authorities and the Farmers' Associations, respectively.

The implementation of the biosecurity measures in all pig farms is a legal requirement in the national legislation of 22 out of 26 MSs (85%), making it compulsory for farmers. In 22 out of 26 MSs (85%), there is an official control system to verify the implementation of biosecurity measures on pig farms and to assess the level of compliance.

Awareness campaigns are carried out in all 26 MSs (100%) that replied, and training activities that include biosecurity measures implementation take place in 20 out of 26 MSs (77%).

Specific or additional biosecurity measures for outdoor pig farms have been developed in 15 of 26 MSs (58%). In addition, 14 of 26 MSs (54%) have a system in place that classifies pig farms based on their level of biosecurity. Guidelines, checklists and online tools are used to assess the level of compliance with biosecurity measures and support the classification of pig farms into different levels of biosecurity. The online tools that have been mentioned by the VAs include *'ClassyFarm'* in Italy, the '*Smittsäkrad Besättning in Sweden*', the *'BIOSEGPOR'* in Spain and the '*Biochek.UGent in Ireland*' (see Section 3.4.4.2 for more details).

3.4.4.2. Pig farms classification based on the level of biosecurity

The replies from the VAs and FAs are presented in the Tables B.14 and B.16 in Annex B. Several MSs have developed biosecurity measures for different categories of pig farms, some have classified pig farms according to their level of biosecurity using predefined criteria, some are reviewing their classification systems and some are starting to develop these systems. Several examples of good practices as described by the VAs and selected from Table B.13 are presented here.

Examples of good practice

Italy: The *'ClassyFarm'*[16] is a Ministry of Health tool to categorise farms according to their potential risk in terms of biosecurity. The categorisation system is based on the collection of a set of parameters. In addition to biosecurity, it considers animal welfare, the use of veterinary antimicrobials (AMU), inspections at slaughter (both ante- and post-mortem) and AMR. The development of farm categories, using an integrated approach that incorporates all these areas, should provide a powerful tool not only to improve biosecurity, but also to address core issues in animal husbandry and to increase collaboration with farmers and veterinarians. Biosecurity is characterised using specific surveys and two checklists based on national legislation (a national survey performed by official veterinarians) or inspired by other international standards (Biocheck.UGent[17] scoring system performed by the farm veterinarians). The *'ClassyFarm'* system provides a final biosecurity score, allowing comparison of farm results with average results at national, regional, local level. It can therefore be used as a farm-level benchmarking system.

Spain: A biosecurity assessment of farms is conducted in the frame of the National Biosecurity Plan for pig farms that was approved in Spain in 2015. The biosecurity level of each holding is based on the results of biosecurity surveys performed by inspectors (mainly) during inspections of pig holdings. The surveys consist of a questionnaire with approximately 40 questions (using the central application '*BIOSEGPOR'*) that consider relevant biosecurity conditions of the farm, assigning a score to each condition. A final summary score is used to assign a final level of biosecurity to each farm. Most extensive and intensive farms have been surveyed twice in recent years. Between 2016 and 2018, around 90% of all pig farms were surveyed. At the second round in 2019, farms targeted were those with at least some level of non-compliance in the first period, farms that were not surveyed in the first period and, due to the risk of ASF, farms receiving pigs from other MSs. In this second period, farms with deficiencies were obliged to correct all deficiencies identified. Since the first application of the National Biosecurity Plan for pig holdings in 2015, awareness of farmers has increased, with an increase in farm biosecurity measure implementation.

Biosecurity in the Spanish extensive production pig sector

In Spain, there are 3,132 (of a total of 13,549 holdings) commercial extensive small farms (defined as farms housing a maximum number of 5 breeding animals and no more than 25 fattening pigs). The balance (10,417 holdings) corresponds to larger farms, which reflects the high level of professionalisation in the Spanish extensive pig sector. It is important to note that the term 'commercial' refers to all farms in which there can be movements to and from other farms with the same or different zootechnical classification, or with the same or higher health status. Therefore, the Spanish extensive pig sector clearly differs from outdoor pig production systems found in other countries of Europe. On the other hand, good levels of biosecurity in the Spanish extensive pig sector were observed even in farms with lower pig numbers (for example, during the biosecurity inspections carried out by official veterinarians in 2019, out of a total of 3,127 extensive farms inspected, 3,101 reached the qualification of 'high or very high biosecurity'). This probably reflects the high awareness of farmers of the importance of maintaining high biosecurity standards in their farms.

Croatia: All pig farms are categorised according to a farm-level biosecurity level score, which is determined based on the results of a questionnaire survey. The questionnaire for categorisation of pig holdings according to biosecurity measures in the survey application tool is only available in Croatian.

Sweden: For the control of infectious diseases, a government supported voluntary biosecurity program (in Swedish 'Smittsäkrad Besättning', SSB[18]) has been developed within the animal health services and is approved and supported by the Swedish Board of Agriculture. SSB includes recommendations on a range of measures to ensure biosecurity in the herds. The program includes regular

[16] ClassyFarm link: https://www.classyfarm.it
[17] *Biochek.UGent* link https://biocheck.ugent.be/en
[18] Biosecurity program *"Smittsäkrad Besättning"* (SSB), http://www.smittsakra.se

audits and assessments. A checklist to identify risk factors for direct or indirect contacts with wild boar is part of the program. Most pigs slaughtered in Sweden (> 80%) come from herds participating in the SSB.

Ireland: Under the current Rural Development Programme (2013–2020), funding is available through a mechanism called the Targeted Advisory Service for Animal Health (TASAH) for commercial pig farmers to have a free comprehensive biosecurity review (based on Biocheck.UGent), which is carried out on their farms by a trained private veterinary practitioner. The Department of Agriculture, Food and the Marine also produces tailored biosecurity advice for both commercial and non-intensive pig farmers for the prevention of diseases such as ASF.

Poland: On a voluntary basis, commercial farms have established additional rules of biosecurity,[19] which constitute a much more sophisticated system than the basic rules already implemented. Currently the additional requirements are tested in some large pig farms.

3.4.4.3. Biosecurity measures implemented specifically or additionally to outdoor farms as reported by responding MS

Additional or specific biosecurity measures are implemented in outdoor pig farms irrespective of the biosecurity measures that are applied to all types of pig farms, in 15 EU MSs (58%). The replies from the VAs and FAs are presented in Tables B.14 and B.17 in Annex B. Several of the reported biosecurity measures are also applicable to indoor pig farms, but are still listed here as they have been reported by the responding MS.

Some VAs and FAs did not reply to the question or provided very limited information, whereas others highlighted the most important measures and/or uploaded documents, from which relevant information was extracted. As participation to this survey was voluntary and the level of detail in submissions was at the discretion of the MSs, limited or missing information in Tables B.14 and B.17 should not be interpreted as an indicator for limited implementation of biosecurity measures in individual MSs.

Based on the information provided, the main biosecurity measures that have been reported by some of the responding MSs to be implemented in outdoor farms include the following:

a) General

Approval by Veterinary Authority: The operation of an outdoor pig farm requires approval by the VAs, mainly to ensure the implementation of the biosecurity measures and fencing.

Biosecurity evaluation: The biosecurity evaluation is linked to the approval by veterinary authorities. An annual biosecurity evaluation should be performed. The annual assessment/audit includes a checklist to identify the main risk factors for direct or indirect contacts with wild boar.

b) Primarily relating to external biosecurity (bio-exclusion)

Fencing: Double fencing or an equivalent system, which prevents any uncontrolled transit of animals, people of vehicles and any contact with wild boar, is a compulsory measure for the outdoor farms. The fencing must be regularly checked and maintained. Different rules on fencing have been described: (i) the double fencing should be electric, or another fencing structure with similar security, (ii) the two fences must be at least 1 metre apart, (iii) in case of double fencing, the inside shall be built from appropriate material which cannot be folded nor lifted, at least 120 cm high, and the outside shall be electrical fence with at least two wires: the lower wire 30 cm from the ground and the higher wire 80 cm from the ground; the outside fence shall be placed at least 30 cm from the inner fence, but not more than 50 cm, (iv) if mesh (iron or similar material) is used, the openings should be small enough to prevent pigs of the smallest size to transit), the height of the double fences should be 1.5 m at least, (v) a double-fencing system or similar (non-permeable to wild boars) preventing direct contact between production pigs and wild boar, and minimising the possibilities of entrance of other mammals that may act as vectors of infectious diseases.

Distances from potential sources of risks: The farm location must comply with the legal minimum distances from sources of risk (farms, slaughterhouses, rendering plants, etc.).

Buildings to keep pigs indoors in case of animal diseases: Outdoor farms should have available buildings adequate to the size of the farm capacity to keep the pigs indoors in case of animal diseases in the area.

Feed and litter: Farms must have appropriate facilities for secure storage of the feed and litter (including dung), to avoid access to wild boar. Silos, pipes and feeding systems must be in good condition and prevent spillage of feed in areas where there are no pigs. Ban of feeding fresh grass or

[19] in addition to requirements laid down in Working document SANTE/7113/2015/rev 12

grains to pigs unless treated to inactivate ASF virus or stored (out of reach of wild boar) for at least 30 days before feeding.

Management of the carcasses and the animal by-products: Outdoor farms should have a system to collect and store fallen animals and other animal by-products in compliance with regulation 1069/2009. The closed containers or other suitable facilities should not be accessed by wild boar or other animals. Updated records of dead and disposed pigs should be kept. Adoption of suitable procedures for the disposal of animal by-products.

Isolation area/places to keep pigs in quarantine: Areas in outdoor farms for keeping the pigs isolated (from other pigs on the farm) have been proposed under the following circumstances: i) newly introduced pigs should be kept isolated in quarantine for a period of 3 weeks as it has been defined in some cases, ii) outdoor farms should have areas to isolate sick pigs and iii) pigs leaving the farm for another destination may be isolated before leaving the farm of origin.

Controlled entrances secured against unauthorised access: Entries into the outdoor farm must be secured against unauthorised access of people, vehicles and animals. Biosecurity measures relating to the entry and exit of pigs should be in place. No access to unauthorised people. Entrance area must be equipped to allow biohygienic measures for people (cloth/footwear changing, washing and disinfection of hands and footwear), and facilities for disinfection of vehicle wheels and any equipment used for handling/transport of pigs should exist. No unauthorised persons/transport may enter the pig holding (stable). The entry of people and vehicles into the farm must be documented.

Defined slaughterhouses for slaughter pigs from outdoor farms: Some outdoor farms can slaughter pigs for commercial purposes in defined slaughterhouses in the areas where these farms are located. In some cases, on-farm slaughtering is allowed only under veterinary supervision.

Routine within-farm biosecurity: The owner (or the person in charge of the management of the pigs) should take appropriate bio-hygienic measures such as change of clothes and boots on entering the stable and leaving the stable. Disinfection should be performed at the entrance of the holding and the stable. The need for farms to apply internal biosecurity measures to reduce the risk of spread of infectious agents within the farm such as foot-washers or specific clothing between production units, has been mentioned among others. Further, personnel should not work in more than one pig farm and there must be no contact with pigs within 48 h after hunting activities.

Some Vas have expressed the view that biosecurity is the most important tool for ASF prevention. Official controls and awareness campaigns must be performed in high-risk areas; nevertheless, it is a long-time strategy to change the attitude of the farmers regarding the implementation of biosecurity measures.

Other VAs highlighted that ASF is not an airborne disease, in many cases human-mediated and usually persists in wild boar in extended regions for a long period of time. Therefore, biosecurity measures should ensure the strict epidemiological separation of pigs kept in outdoor systems from wild boar. They emphasised that it is important to avoid conclusions like (i) farming systems paying special attention to animal welfare and the biological/organic pig production systems that give pigs access to open-air represent a (non-tolerable) risk per se, regardless of the biosecurity management measures taken, and (ii) only strict indoor keeping of pigs in completely closed premises, as in industrial production systems, may be considered as sufficiently safe in regions affected with ASF.

3.4.4.4. Non-compliances related to the implementation of biosecurity measures

Information on the main areas of non-compliance related to the implementation of the biosecurity measures that were identified during official controls of outdoor pig farms, was provided by the VAs of 14 MSs and by 4 FAs of 4 MSs. A summary non-compliances, each collected at national level, is presented in Table 11. The most frequently mentioned non-compliances are related to fencing, biosecurity relating to clothes and shoes, record keeping, disinfection at the farm (or housing) entrance and the movement and disinfection of vehicles.

Table 11: Main areas of non-compliance with respect to the implementation of biosecurity measures on outdoor pig farms that have been reported by VA and FA of the MSs in questionnaire survey. The data are presented as reported without any interpretation

Area of non-compliance	Description of the non-compliance
Fences (7/14 VA and 2/4 FA)	Damaged, not well maintained, single fences when double fencing is required (high risk areas, free range areas), the design of the fences do not prevent the direct contact with wild boar.
Biosecurity relating to clothes and shoes (5/14 VA)	Not optimal area for changing of clothing, in the changing room there is no footbath with disinfectant for the cleaning and disinfection of boots, no changing clothes and boots on entering and leaving the stable, non-existence of locker rooms, locker rooms without the minimum hygiene facilities for workers and visitors, no specific clothing nor shoes available for visitors, no use of protective equipment and shoes disinfectants.
Keeping records (4/14 VA)	No records of visitors, administrative weakness
Disinfection at the farm (or housing) entrance (3/14 VA and 1/4 FA)	No 'sanitary lock' at the entrance to the area, where the pigs are located. Lack of proper disinfection at the entrance of the holding and the stable. No informative indications on personal-hygiene operations before entering the holding, non-existence of disinfection area or similar system to ensure a proper cleaning and disinfection of vehicles before entry, absence of disinfection baths.
Movement and disinfection of vehicles (3/14 VA)	Uncontrolled movement of vehicles, vehicles parking inside the perimeter of the holding, non-existence of disinfection arc or similar system to ensure a proper cleaning and disinfection of vehicles before entry, vehicle to load slurry enters the perimeter of the holding, no decontamination of means of transport
Identification and registration (2/14 VA) (1/4 FA)	Missing signage, non-compliances on identification and registration system
Feeding materials (fresh grass, grain and straw) (2/14 VA)	Feeding fresh grass or grains to pigs without treatment or storage for at least 30 days before feeding Using straw for bedding of pigs without storage for at least 90 days before use
General hygiene (2/14 VA)	General non-compliances in hygiene measures or provisions
People (2/14 VA)	Access of non-farm staff to the holding, professional activities of staff at other holdings with pigs
Contract with vets (1/14 VA)	The absence of an animal health contract with a veterinarian
Feeding equipment (1/14 VA)	Feeding systems in bad condition and feed spilling out on floor surfaces (pest attraction)
Hunting (1/14 VA)	Contact with pigs within 48 h after hunting activity
Management of carcasses (1/14 VA)	Inadequate storage of carcasses
Sharing animals (1/14 VA)	The sharing of pigs (for natural mating) with other farms
Structure of the buildings (1/14 VA)	The stables are not built in a way that prevents feral pigs/wild boar from entering or having contact with the pigs of their farm.
Backyards (1/4 FA)	Non-compliance with the limitations regarding the number of pigs and illegal trade.

3.4.4.5. Key points

- In most MSs, there is a legal requirement to implement biosecurity measures in all pig farms, and there is an official control system to verify implementation and assess the level of compliance. Further, most MSs run awareness campaigns about farm biosecurity.
- A number of MSs assess and classify pig farms according to their level of biosecurity. A range of different tools for objective assessment of biosecurity are used, including 'Biocheck.UGent' (reported by Ireland), 'BIOSEGPOR' (reported by Spain), 'ClassyFarm' (reported by Italy) and 'Smittsäkrad Besättning' (reported by Sweden).
- Examples of MS best-practice have highlighted the importance of regular assessment of on-farm biosecurity, an 'official' farm categorisation system based on these assessment results, the introduction of farm-level benchmarking (both over time on the same farm and as a means for between-farm comparison (locally, regionally and nationally) and a broadened assessment to consider other key issues such as animal welfare. Collectively, these approaches have contributed to improvements in biosecurity and broader/core animal husbandry issues.

- A range of biosecurity measures are implemented in outdoor pig farms in the MSs, focusing on general biosecurity and measures to address external and internal biosecurity.
- Non-compliance with required on-farm biosecurity measures on outdoor pig farms is a common challenge across MSs, with frequent areas of non-compliance relating to fencing, biosecurity relating to clothes and shoes, record keeping, disinfection at the farm entrance and movement and disinfection of vehicles.

3.4.5. ASF outbreaks and associated epidemiological information

The VAs of MSs affected by ASF were requested to reply to additional questions related to epidemiological information on ASF outbreaks. The replies are presented in Tables B.18 and B.19 in Annex B.

During the 6-year period between 2014 and 2019, 3,562 ASF outbreaks in domestic pigs were confirmed and notified to the ADNS by eight EU MSs.

According to the replies received by the VAs in question (see Table B.17), information relating to the level of outdoor access on affected farms was not available for 2,894 (81%) ASF outbreaks. Information on outdoor access was available for the remaining 669 (19%) ASF outbreaks of which 63 (9.4%) outbreaks (in 8 MSs) occurred in outdoor farms. The relative frequency of ASF outbreaks with outdoor farms involvement varied across affected MSs, from 0% to 40%.

In Poland, none of the 261 ASF outbreaks that occurred from 2014 to 2019 were reported to be related to farms with outdoor access. The first outbreak reported in an outdoor farm was in 2020.

In Sardinia, the only region of Italy affected by ASF, 40% of ASF outbreaks in domestic pigs occurred in outdoor pig farms and, more specifically, in illegally kept free-ranging pigs. Based on the explanation provided by the VAs of Italy, the persistence of ASFV in Sardinia was linked to illegal pig breeding in open range conditions and their contact with wild boar. In the last 3 years, under an eradication plan carried out in collaboration between national, regional and local VAs, with the launch of a campaign to cull pigs raised illegally (4,315 culled pigs), there has been a drastic reduction in the number of affected pig farms and a clear reduction in ASF seroprevalence in the wild boar population.

In Romania, where 2,894 ASF outbreaks have been confirmed in domestic pigs (2017–2019), there was no available information for any of these outbreaks in relation to outdoor access in affected farms. From 2014 to 2019, and based on the review of the notifications in the ADNS (see Section 3.2), 2,773 ASF outbreaks (78%) in domestic pigs occurred in backyard farms. Given the high proportion of the domestic pig ASF outbreaks in Romania that affects backyard farms, further information about the level of outdoor access would be valuable.

Based on a list of risk factors defined by EFSA for the questionnaire survey that might have contributed to the introduction of ASF into outdoor farms, the following were considered relevant by the eight EU MSs where ASF has been confirmed in outdoor farms: (1) lack of fence (3 out of 8 MSs), (2) damaged, not well-maintained fences (3 out of 8 MSs), (3) contact with wild boar (5 out of 8 MSs), (4) uncontrolled access of people (4 out of 8 MSs), (5) grazing directly on the ground (4 out of 8 MSs), (6) providing fresh grass for feed (2 out of 8 MSs), (7) illegal movement of animals (1 out of 8 MSs), (8) swill feeding (in spite of being prohibited in the EU) (3 out of 8 MSs) and (9) sharing males during breeding period (1 out of 8 MSs). In addition, some MSs mentioned the following risk factors: illegal wild pig breeding, lack of hygiene measures, contact with pigs within 48 h after hunting activity, professional activities of staff in other pig holdings, feeding fresh grass or grains to pigs collected less than 30 days before feeding, using straw for bedding of pigs stored less than 90 days before use, access of people from outside the holding not using protective equipment, shoe disinfectants and decontamination of means of transport.

According to the Italian VAs, the extent of the land in which pigs are reared, possible contact with wild boar and the impossibility of adequately fencing large areas are considered as the main factors that may introduce ASF into an outdoor farm, rather than the number of pigs reared outdoors.

It should be noted that the associations between the listed risk factors and ASF outbreaks in outdoor pig farms reported here have not been confirmed by epidemiological studies.

3.5. Description of outdoor farming of pigs in peer-reviewed literature

The literature review identified 38 references that fulfilled the relevance criteria. The information extracted from these references is presented below.

A number of different farming systems relevant to outdoor farming are described in the literature. Delsart et al. (2020) speaks of 'alternative systems' which they define as 'any farming system different

from the predominant contemporary structures', i.e. not raising all pigs in closed buildings and on slatted and/or concrete floors.

Delsart et al. (2020) note the difficulties in implementing strict biosecurity measures in these farms given the outdoor access that animals have, which increases the likelihood of exposure to pathogens circulating in wildlife. This likelihood is especially high when pigs graze in natural forests, such as in the Mediterranean silvo-pastoral system, or when pigs have access to pastures shared by different pig herds and wild boar. The risk of intrusion of wild boar into outdoor farms has been found to increase if the distance between the outdoor pen and the farm is greater than 500 m and if the pen is protected only by a simple electric fence, or any other fence less than 60 cm high. To prevent nose-to-nose contact between domestic pigs in outdoor pens and wild boar and intrusions of wild boar, fencing is necessary. However, installation and maintenance of appropriate fences is cost- and labour-intensive (Delsart et al., 2020).

In the following section, it is important to note that some production systems may equally apply under several headings, for example Mediterranean silvo-pastoral and organic pig production systems.

3.5.1. Mediterranean silvo-pastoral pig production systems

3.5.1.1. Iberian pig outdoor farming

The Iberian pig is an autochthonous porcine breed traditionally raised in the southwest of the Iberian Peninsula (Spain and Portugal). The traditional finishing system of the Iberian pig is linked to the use of oak forests with ground cover of herbaceous species and sparse evergreen or cork oak trees ('dehesa'), where pigs forage mainly on grass and fallen acorns ('montanera'). The acorn supply has been quantified as 8–14 kg per tree, and autumnal grass production has been estimated at around 200–500 kg dry matter/ha (Rodríguez-Estévez et al., 2010). The 'montanera' finishing phase takes place from early November to late February, for pigs that are at least 10 months old and weighing between 80.5 and 115 kg (Rodríguez-Estévez et al., 2010, 2011). In the traditional production system for the Iberian pig, both males and females are neutered to prevent boar taint after slaughter and also to avoid wild boar being attracted to the outdoor enclosure by entire females in heat (Martinez-Macipe et al., 2020).

The stocking rate for certified acorn-fed pigs must be lower than 2 pigs/ha and pigs are not allowed to receive any kind of feed or alimentary supplement, while they need to gain a minimum of 46 kg of weight in at least 2 months (MAPA, 2007).

The appearance of ASF in Spain in 1960 almost wiped out the breed and this production system. In the decades following the ASF introduction, Iberian pig production underwent both diversification and intensification. Currently, during the breeding phase of the Iberian pig, most small and medium-sized farms tend to use outdoor production systems. These are diverse regarding the number and type of huts used, with big farms using breeding pens and slats similar to those of intensive pig rearing. Most of the food needed by the breeding pigs is provided in the form of concentrated feed with limited access to grazing resources. During the fattening phase, a considerable number of Iberian pigs put on their last 50–60 kg whilst grazing on pastures. These pigs are slaughtered at 150–160 kg at the age of 16–20 months (Aparicio Tovar and Vargas Giraldo, 2006).

3.5.1.2. Outdoor farming of pigs in Sardinia

There are essentially two farming systems in Sardinia that provide outdoor access to pigs.

In the 'Brado' free-range system (which has been forbidden since 2012), pigs were held in free-range systems all year-round. They had access to non-cultivated communal lands that were used traditionally by neighbours for rearing their livestock, where the pigs grazed on acorns and chestnuts and other natural resources present. Animals were usually kept in herds ranging from a few individuals to hundreds (e.g. 2–300 pigs). They remained restricted to certain areas that the owner frequently visited to supplement their feed. This farming was mainly practised in the remote areas of Central-Eastern Sardinia, but was also found in other isolated, mountainous regions of the island. Often, these pigs were neither registered nor controlled by an official veterinarian (Mannelli et al., 1997; Mur et al., 2016).

The other system relevant to outdoor access concerns different types of small-scale, non-industrial farms. Approximately half (51%) of the registered Sardinian pigs are found on these farms, which are widely distributed over the whole territory. The purpose of this pig farming system is subsistence, with typically less than 4 adult pigs. Small-scale farms for reproduction or fattening exist in semi-free-range situations, where pigs are kept on fenced land (Mur et al., 2016) or on public areas in autumn where

they graze on acorns and are kept indoors for the rest of the year (Mannelli et al., 1997). For most non-industrial pig producers in Sardinia (~ 70%), pig production is a secondary activity. Most farmers raise more than one animal species on the same land, especially on pasture areas at an altitude higher than 500 m, where pigs usually share pastures with sheep, goats or bovines. Many of these small producers make no investments to build holdings or purchase equipment such as water supplies or disinfection devices, etc. While the administrative rules required that all holdings have fencing, pigs of small-scale farms often had free access to pastures (Mur et al., 2016).

3.5.1.3. Farming of the Cinta Senese pig

Cinta Senese is an Italian breed native from Tuscany. Its fattening is usually carried out in Mediterranean silvo-pastoral rearing systems, feeding on chestnut and acorn, which are very poor in protein and rich in starch and unsaturated fatty acids (Aquilani et al., 2019).

3.5.1.4. Farming of the Sicilian black pig

The Sicilian black pig is an autochthonous variety of *Sus scrofa* characterised by hardiness, disease resistance, a strong maternal instinct and the ability to survive food scarcity and subsist with food of low nutritional value, which allow it to thrive also under difficult environmental conditions. Approximately 2,500 Sicilian black pig herds with a medium density of 20.6 black pigs/ha are reared under free or semi-free roaming conditions in Sicily, mostly in the Nebrodi and Madonie Natural Parks, where the pigs frequently share pastures with cattle, and forage for plant material, such as roots, bulbs, tubers, mushrooms, fruit and berries. Their diet is sometimes supplemented with small amounts of grain and bran, usually before slaughter, which normally occurs before adulthood. Its meat, in high demand, is used to produce specialty products (Di Marco et al., 2012).

3.5.1.5. Traditional pig farming in Corsica

In Corsica, pig breeding and production are mainly conducted in traditional free-range farming systems. This traditional extensive large-scale pig production system is characterised by large areas of pasture of more than 100 ha, with heterogeneous vegetation of Mediterranean shrubs/bushes, chestnut, oak, beech and a varied landscape in terms of altitude, sun exposure and slopes. The distribution of pig groups in this territory varies; during the winter months, pigs tend to remain close to the farm for supplementary feeding and reproduction, during autumn and early winter (i.e. the chestnut harvesting period), free-ranging pigs are left in the mountain plains (Barth et al., 2018). In summer, pigs are traditionally kept in often-unfenced grass pastures and beech forests found at higher altitudes (Jori et al., 2017).

A cross-sectional study carried out in 2013 in the seven main pig-production areas of Corsica (68 of 271 registered farmers participated) showed that 97% of the interviewed farmers kept their pigs outdoors throughout the year. Pigs were reared on pastures of a median size of 60 ha with a median density of 4.5 pigs per ha. 75.8% of the pastures were not completely fenced; when they were fenced, the fence consisted of a simple mesh fence with 3 rows of barbed wire or a simple electric fence. 16.7% of farmers moved their pigs to mountain pastures in summer, and all finishing pigs were fed on chestnut and/or acorn pastures in autumn and winter. Most farmers complemented the natural forage with industrial feed. Some farmers (15.2%) allowed their pigs to mate freely while on outdoor pastures and 33% spayed their female pigs not intended for breeding (Relun et al., 2015).

Jori et al. (2017) interviewed 65 farmers from 56 different municipalities about their farming structures and practices in a cross-sectional study conducted between March and October 2013 in the 14 main extensive pig production areas of Corsica. Most farms included in the study were farrow-to-finisher farms, with a median herd size of 115 pigs (range 89–159 pigs). All interviewed farmers kept their pigs outdoors, and 49% mixed their herds in grazing areas. Only 23% of the farms were completely fenced, with 86% of these (13/15) using a simple fence. Only two farms used a double fence or an electric fence, respectively. 17% of the farmers moved their pigs to high altitude pastures in summer where they were left free ranging for several weeks. Supplementary feed was offered to the pigs all year-round by 52% farmers; 45% provided supplementary feed only in summer, while three farms never supplemented feed. On 15% of the farms, mating of sows occurred under free ranging natural conditions, while on 85% of the farms reproductive females were kept in fenced outdoor specific paddocks for monitored reproduction, with farrowing occurring mainly from April to August. On 47 farms, sows farrowed once a year, mostly in spring and summer (39%) and in autumn and winter (8%). Synchronised mating was practiced by 42% of farmers so that farrowing could occur twice a year, in spring–summer and in autumn–winter. In 11% of farms, farrowing was spread over the

year. All farmers castrated their fattening males, when they were weaned at 3 months of age, and 34% of farmers also spayed reproductive sows destined for fattening between 4 and 48 weeks of age, to avoid undesired mating. Thirteen farmers reported keeping domestic boar together with the sows on pasture, to cover the sows and thus avoid attracting wild boar when sows are in heat. Offal from domestic pig carcasses were discarded in the environment by 43% of farmers, mainly during the period when pigs were slaughtered (November–April). Of the farmers slaughtering their animals on the farm (17%), 81% reported leaving carcass offal in nature without disposal. Five farmers reported feeding carcass leftovers to their pigs.

3.5.2. Organic pig husbandry systems

Leeb et al. (2019) characterised the different organic pig husbandry systems common in Europe by collecting data from 74 pig farms in eight European countries (Austria (16), Switzerland (9), Czech Republic (1), Germany (16), Denmark (11), France (4), Italy (9) and United Kingdom (8) during summer/autumn 2012 (all countries) and winter 2012/13 (Denmark, UK, Germany). In Germany, Switzerland and Austria, the predominant organic pig husbandry system was the one where all age categories of organic pigs live in buildings with permanent access to an outdoor run with concrete or soil flooring. Italy and the United Kingdom mainly had an organic pig husbandry system in which all age groups of all categories of pigs live permanently outdoors in paddocks with shelter (temporary hut or permanent building) and have access to soil all year-round. The paddock is usually integrated in a crop rotation. Farms in which a part of the pig production cycle is indoors and another part outdoors (i.e. at least one of the age categories is being housed indoors with permanent access to an outside run while the rest of the herd is outdoors or where pigs spend part of the year indoors and the rest outdoors) were present in all countries, but particularly in Denmark and France. These farms were mostly farrow-to-finishing farms in which sows are commonly kept on pasture, while weaners and fatteners are in indoor systems with outside runs.

In Sweden, organic pigs produced according to the rules of the Swedish organic association (KRAV) must have access to outdoor grazing for at least 4 months during summer and to an outdoor area with concrete flooring (1.0 m^2 per pig) for the remaining 8 months of the year. The pigs need to have the opportunity to root and access to rooting material. Deep litter straw bedding is often used indoors, while hay or silage is sometimes provided in the outdoor concrete area; there are no rules on how the outdoor area should be enriched (Olsson et al., 2016).

3.5.3. Small-scale, non-industrial farming of pigs

According to Alexandrov et al. (2011), 250,000 pigs (36%) in Bulgaria are kept in 60,000 non-industrial pig farms, while 450,000 pigs are kept in 61 industrial pig farms. The small-scale backyard farms are characterised by a low number of pigs (on average less than five pigs/farm), which are kept for self-consumption and do not enter the national trade cycle; most of them are fed kitchen waste.[20]

In their matched case–control study investigating possible risk factors for ASF incursion in 655 commercial and backyard Romanian pig farms during May to September 2019, Boklund et al. (2020) identified that the risk of ASF incursion increased with an increasing number of pigs on the farm, the numbers of outbreaks in domestic pig farms within 2 km, wild boar abundance and the number of professional visitors on the farm; whereas the risk of ASF occurrence decreased with increasing distance to the nearest ASF outbreak in domestic pigs/case in wild boar. Further risk factors for ASF-incursion in Romanian backyard farms included growing crops attractive for wild boar around the farm and the use of forage from ASF-affected areas. The Romanian herd register defines backyard farms as 'small farms with low levels of biosecurity and production for own consumption only'. Whether this includes providing pigs with access to outdoor areas is not specified in this definition, but at least some backyard farms do, as evidenced by having crossbred pigs, e.g. striped piglets, as a result of a wild boar mating a domestic sow on some farms.

3.5.4. Farming of traditional autochthonous pig breeds

Purebred Gascon pigs are raised in South West France in the Noir de Bigorre system. The fattening pigs are kept outdoors from at least 6 months of age, feeding on grasslands with or without additional

[20] As reported by the Bulgarian VAs to the PAFF committee on 15/3/2021, the majority of the East Balkan pig farms have ceased operations in the meantime.

woodlands at a maximum stocking rate of 20 pigs/ha. Gestating sows are reared on grasslands with a maximum stocking rate of 12 sows/ha. For the farrowing and lactating periods, sows and piglets, which are not weaned before 33 days of age, can be kept outdoors on pastures with sheds or indoors on straw (Garcia-Launay et al., 2018).

Crna Slavonska pig is an autochthonous, fatty-lean pig breed from the eastern region of Croatia that is traditionally raised outdoors on grasslands or in silvo-pastoral systems to approximately 18 months of age or up to the 130–150 kg live weight (Kusec et al., 2017).

3.5.5. Key points

A number of different farming systems relevant to outdoor farming in the EU are described in the literature.

Strict biosecurity measures are more difficult to implement in outdoor farms given the outdoor access that animals have. This increases the likelihood of exposure to pathogens circulating in wildlife.

In several Mediterranean countries, domestic pigs are kept in silvo-pastoral systems, where pigs have outdoor access at least during their finishing period, when they feed on chestnut and/or acorn pastures in autumn and winter.

The production of Iberian pigs makes use of outdoor spaces in the finishing period in which fattening takes place between October and April on 'dehesa' woodlands/rangeland ('montanera') or pastures/rangeland (*cebo campo*). In addition, most Iberian pigs have access to outdoor areas already during breeding, weaning and growing periods. In most cases, Iberian pigs are kept on private land that is usually fenced.

In Sardinia, approximately half of the registered pigs are kept in small-scale (< 4 adult pigs), non-industrial farms for subsistence purposes. These small-scale farms are often characterised by little, if any, investment in farm infrastructures and equipment. In Corsica, pig breeding and production are mainly conducted in traditional free-range farming systems.

Across EU MSs, different organic pig husbandry systems exist, which all provide pigs access to outdoor areas. Outdoor access is usually provided in the form of outdoor runs connected to stable buildings or in paddocks on pasture (often with shelter).

In several MSs, including Bulgaria and Romania, many small-scale, non-commercial pig farms exist which keep pigs mainly for self-consumption. These backyard farms often have low levels of biosecurity, and some provide their pigs with outdoor access or do not prevent wild boar incursions.

Different autochthonous/native pig breeds exist in several MSs. These pigs are usually given access to outdoor areas, such as forest, woodlands, fields and pastures, at least during specific production/life stages.

3.6. Biosecurity considerations on outdoor pig farms (results from peer-reviewed literature)

Domestic pigs and wild boar belong to the same species (*Sus scrofa*). When populations of wild boar, feral pigs and domestic pigs share the same environment, interactions between these animals are suspected to facilitate the spread and maintenance of a range of pig pathogens, which may have an impact both on public health and the health of domestic pig populations (Jori et al., 2017).

3.6.1. Contact between wild boar or other wildlife and domestic pigs in outdoor farms

In their study assessing the spatial interactions between wild boar and free-ranging pigs in Sardinia, Bosch et al. (2020) showed that free-ranging pigs used bare areas, tree areas such as broadleaved deciduous forest and areas with higher annual temperature ranges, to a significantly greater extent than wild boar. They showed that free-ranging pigs had a weaker preference than wild boar for areas with higher elevation, areas with higher proportions of slopes, areas with higher proportions of geographic positions (areas with higher proportions of elevated or depressed areas), areas with more heterogeneous areas of precipitation seasonality and areas with smaller averaged normalised difference vegetation index (NDVI, a measure for the quantity, quality and development of vegetation). In the area studied, the spatial distribution of free-ranging pigs and wild boar overlapped by 66.2% overall, with both free-ranging pigs and wild boar preferring heterogeneous habitats offering shelter and natural food (e.g. acorns, chestnuts or hazelnuts), and concurrently using areas close to pig farms.

A camera-trapping study of free-ranging pigs and wild boar by Cadenas-Fernandez et al. (2019) carried out over 375 trapping days in wooded, mountainous areas of two ASF-affected provinces of Sardinia (Ogliastra and Nuoro) showed that free-ranging pigs had a diurnal activity peaking between 15 and 20 h, while wild boar activity was mainly crepuscular or nocturnal. The rate of direct interactions (simultaneous presence) between free-ranging pigs and wild boar per day was 0.31, taking place mainly between 14 and 21 h and involving mainly juvenile animals. The rate of indirect interactions (consecutive presence) between free-ranging pigs and wild boar per day was 1.31 when considering ASFV survival in the environment for 1 day, and 6.47 when considering ASFV survival in the environment for 7 days (spring) or 5 days (summer). Most indirect interactions involved movements, which has been interpreted as an indication that free-ranging pigs and wild boar do not share resting sites. 78% of the wild boar and 63% of free-ranging pig observations occurred in summer, which might indicate a reduction of the home range around the fewer natural feed and water resources during that season in this habitat.

Jori et al. (2017) conducted a cross-sectional questionnaire survey with 85 farmers and/or hunters to gain an understanding of the occurrence, nature and factors facilitating interactions between domestic and wild suids (IDWS) in Corsica. All farmers reported having seen wild boar less than 500 m from their farm area and more than ¾ reported having seen wild boar within the premises of their pig farms. Non-specific IDWS were observed by 69% of interviewed persons, either 1–3 times per year (40%), 4–6 times per year (10%) or more than 7 times per year (12%). Specific IDWS that were most reported were sexual (61%, 52/85 interviewees), followed by trophic (47%, 40/85) and agonistic (43%, 37/85) IDWS. Sexual IDWS occurred mostly (70%) in autumn (September–December) and 30% in winter (January–March) and mainly involved domestic sows and wild boar or feral pigs and occurred in the farm paddocks (63%) or in unfenced areas (32%). 57% of the farmers interviewed reported births of hybrid litters in their premises. Wild and domestic suids were reported to share foraging sites by 47% of the persons interviewed, and most of the interactions occurred in autumn with a peak in November. Fights between domestic pigs and wild boar were reported to occur mostly in November, coinciding with the period of oestrus of sows. Trophic interaction was reported to occur at different periods of the year and depended on the availability of different berries and fruits, with most interactions reported to occur from October to April (oak fruits), from October to January (chestnuts), from May to August (summer berries) and from August to October (beech nuts). Higher levels of IDWS occurred in municipalities with higher altitudes (Jori et al., 2017).

Carrasco-Garcia et al. (2016) studied five of 82 extensive pig farms in the southwest of the Ciudad Real province (Spain), where the average size was 59 heads (excluding piglets) per farm (maximum 512). The five pig farms included in the study averaged 127 ha (range 40–185), including an average of 42% woodland (range 15–65%). Herd size ranged from 10 to 100 pigs (average 50) and stocking rate varied between 0.06 and 0.87 individuals per ha (average 0.43). Distance to woodlands was on average 262 m and the number of days that wild boar were caught by camera traps placed on farm premises ranged from 0 of 33 days monitored to 18 of 35 days monitored (present on an average of 24.4% of all monitored days).

One study, using contact loggers placed on wildlife, livestock and specific sites such as waterers and feeders, evidenced that close, direct wild boar-domestic pig interactions were extremely rare on an open-air Iberian pig pasture, while indirect interactions at waterers or feeders were much more likely. Interactions were influenced by the seasonal and spatial distribution of key resources. The efficiency of management strategies that reduce shared wildlife and livestock space use could be enhanced by concentrating effort during seasons when low water availability or high food availability (acorns) causes aggregation of multiple species (Cowie et al., 2016).

Wu et al. (2012) studied the interactions between wild boar and outdoor pigs in Switzerland. Significantly more contacts were reported from piggeries with access to pastures and piggeries with mixed outdoor runs (concrete and pasture) than from piggeries with concrete outdoor runs ($p < 0.001$ and $p = 0.011$, respectively). An average of five mating events per year were reported for a total of 85 farms with pure pasture or mixed outdoor runs, which corresponded to an estimated rate of 0.06 mating/farm/year (95% CI 0.02–0.13). The risk for indirect contacts with wild boar roaming around the piggery (2–500 m) was highest for pigs in enclosures separated from the farm building (> 5 m), for pigs in enclosures located away from other houses (> 500 m) and for pigs in enclosures close to a forest (< 500 m). Pigs in enclosures separated from the farm building (> 5 m) and pigs protected with an electric fence were most at risk for closer indirect contacts with wild boar (< 2 m from the fence). Pigs in enclosures located far from the piggery building (> 500 m), pigs protected by an electric fence or by any fence ≤ 60 cm were most at risk for a wild boar intrusion. The risk for the occurrence of

crossbreeding (i.e. for mating with wild boar) was highest on outdoor pig farms holding Mangalitza and on farms with a flexible (electric) fence.

Fleming et al. (2016) studied fox predation of piglets on an outdoor pork operation in south-western Australia keeping sows on outdoor farrowing paddocks with huts. Using remote sensor cameras, they showed that foxes appeared in the farrowing paddocks soon after staff left, tracked and took live piglets (despite the presence of sows) and removed dead carcasses from the farm's mortality pit.

3.6.1.1. Key points

Interactions between domestic pigs and wild boar, which belong to the same species (*Sus scrofa*), may facilitate the spread and maintenance of a range of pig pathogens.

In several settings, substantial spatial and temporal overlap of open-air pigs and wild boar has been found. However, close-direct contacts between pigs and wild boar are less frequent than indirect interactions at focal points such as water or feeding sites. Interactions are more frequent in limiting seasons (e.g. summer for water) or due to local abundance of seasonal food resources such as acorns in autumn. Sexual wild boar-domestic pig interactions occur where pigs are not neutered.

3.6.2. Infectious diseases associated with outdoor farms

A study of the monthly dynamics of ASF notifications in Sardinia during the period from 2012 to May 2014 (Iglesias et al., 2017) showed different temporal and spatial patterns in domestic pigs and wild boar. 2013 saw a peak of outbreak reports, with outbreaks in wild boar peaking between October 2013 and February 2014, i.e. during the hunting season, while the peak of domestic outbreak reports was seen from May and early summer 2013. The delayed reporting peak in wild boar could be explained by a spill-over of ASF from infected domestic pigs to wild boar in open grazing areas, or by increased wild boar contacts caused by supplementary feed provided to wild boar by hunters. In addition, the spatial patterns of the outbreaks reported in domestic pigs and wild boar were different and tended to be clustered around a particular point. Local disease transmission as represented by spatio-temporal clusters was only detected in domestic pigs. The cluster radii ranged from 2.87 to 9.35 km and lasted between 6 to 55 days. All domestic pig outbreak clusters occurred in May–August. No wild boar notification overlapped in either space or time with these clusters. The absence of wild boar outbreak report clusters in the study period demonstrates an absence of significant disease transmission between wild boar. The wild boar notifications were mainly located at altitudes over 500 m (76% of notifications) which could indicate that they were caused by spill-over from outbreaks in illegally farmed pigs present in these areas.

When analysing the weight of biological and socio-economic risk factors in outbreaks of ASF in domestic pigs in Sardinia from 2011 to 2016 using the Negative Binomial Regression Model, Cappai et al. (2018) found that the presence of illegal pigs in the municipality was strongly associated with serologically or virologically positive domestic pigs (odds ratio (OR) 6.87, range 5.52–8.56). Another important factor was a high degree of economic deprivation of the municipality (OR 4.33, range 1.55–12.06).

The analysis of data from epidemiological investigations of ASF outbreaks occurring in Sardinia during 2010–2016 (Jurado et al., 2018a) showed that a high density of medium sized farms (5–30 animals), a high estimated density of wild boar at higher altitudes, the presence of free-ranging or brado pigs (noting that the latter has been forbidden since 2012) and the number of semi-extensive farms were associated with ASF persistence. Semi-intensive farms provide outdoor access to their pigs, thus facilitating direct contact with wild boar, other domestic pig herds and brado pigs.

During the culling of 2,281 free-ranging ('brado') pigs in depopulation actions carried out in 13 Sardinian municipalities between December 2017 and June 2018, Laddomada et al. (2019) tested 1,218 free-ranging pigs (53.4%) for ASF antibody presence and 1,416 (62.1%) for ASF virus presence. A total of 651 pigs were seropositive, with a mean seroprevalence of 53.4% (CI 95% 50.6–56.3). In eight of the 29 culling actions, negative results were found, mostly during the last culling period of May–June 2018. The mean virus prevalence in the 1461 pigs tested using real-time polymerase chain reaction (PCR) was 2.6% (CI 95% 2.1–3.0). The highest seroprevalence (72.3%) was detected in Orgosolo (CI 95% 68.9–76.1); the highest virus prevalence (17.1%) was found in Desulo (CI 95% 15.5–18.8), both municipalities are in the central province of Nuoro. These values are higher than the prevalence of ASFV found in wild boar and domestic pigs in the period of 2011–2016 and shows that

in Sardinia, where ASF has been present in the last 40 years, free-range pigs were probably the reservoir for ASFV and the link between domestic pigs in backyard farms and wild boar populations.

Loi et al. (2019) carried out a retrospective study analysing data on domestic pigs, free-range pigs and wild boar from 2011 to 2018 to estimate the risk of ASF sero- or virus-positive domestic pigs (SVDP) for each Sardinian municipality (n=377). A higher SVDP-risk was associated with the number of farms and pigs per municipality, with the number of wild boar and with the number of ASF-positive wild boar, especially ASF-positive young (0–6 months) wild boar and male wild boar, in the municipality. Compliance to measures foreseen in the ASF eradication plan regarding domestic pigs and wild boar/hunting was associated with a lower risk of SVDP. The presence of free-ranging pigs (brado) in the same municipality increased the SVDP-risk five-fold, as well as an asphalted road area of more than 70,000 m^2, high forest surface coverage and a human population of < 5,000 people.

In their investigation of the dynamics and characteristics of ASF infections in the registered pig domestic compartment in Sardinia, Mur et al. (2018) categorised pig farms with 1,000 or more registered pigs as industrial farms (0.07% of all Sardinian pig farms), farms with a maximum of four registered pigs with no permitted outdoor access as family farms (39.46% of all Sardinian pig farms), farms with 5 to 999 pigs kept in permanent confinement as closed farms (34.89% of all Sardinian pig farms) and holdings allowing pigs to graze in a fenced terrain within the property, with no census restrictions as semi-free holdings (25.57% of all Sardinian pig farms). Using disease spread models and regression methods, density of wild boar and density of brado pigs were identified as significant for ASF occurrence (OR 2.1 and 2.23, respectively). Local spread by indirect transmission through fomites associated to geographical proximity (< 2 km) was identified as the main route of ASFV transmission in Sardinia. The authors concluded that improving the biosecurity of pig farms would be key to mitigate ASF introduction and spread into/from pig holdings in Sardinia.

Charrier et al. (2018) studied Aujeszky's Disease (AD) and Hepatitis E (HEV) in domestic pigs (n = 293, from 32 farms in 11 microregions of Corsica) and wild boar (n = 297 from 7 locations in 1 microregion of Corsica) in Corsica. HEV is spread by direct contact or indirectly through a contaminated environment, while AD is spread by direct contact, including mating; both diseases are considered to be endemic in Corsica. The farms studied kept their pigs either in closed piggeries, on fenced pasture or free ranging. The authors found that domestic pigs kept in traditional free-range farms had a higher proportion of seropositivity for both HEV and AD than closed farms, for HEV also fenced pastures posed a higher risk than closed farms. For AD, reproductive domestic pigs were shown to have a higher risk for seropositivity than non-reproductive pigs, and reproduction management had a protective effect. For HEV, the risk for seropositivity was higher for domestic pig farms using pastures or forests permanently compared to farms using them only in autumn. In the 274 wild boar samples analysed, the average seroprevalence was 45.1 for AD and 38.7 for HEV. Wild boar in hunting areas with permanent pig presence showed the highest HEV seroprevalence (OR = 3.63, 95% CI 1.12–11.71), wild boar in areas with seasonal use of pasture did not show higher seroprevalence compared to areas with no pig presence. No additional risks were observed in areas where free ranging pigs shared natural pastures and forests with wild boar, an indication that the domestic and sylvatic cycles are mostly independent. However, the fact that unmanaged domestic sows had a higher risk of becoming infected than other individuals indicates that the sylvatic and domestic cycles are partly connected.

Another indication of transmission of pathogens between sympatric free-ranging pigs and wild boar sharing the same habitat and food and water resources was reported by Dashti et al. (2020). The authors examined 186 extensively farmed, free-ranging Iberian pigs and 142 wild boar sharing the same feeding areas in Cordoba province in Spain for *Enterocytozoon bieneusi* by PCR. 22.6% of domestic pigs were found to be positive versus 2.1% of wild boar. Of the six genotypes of *E. bieneusi* found in the sampled free-ranging pigs, two were also found in the wild boar tested.

Investigating the role of farming type and various risk factors for the seroprevalence of *Toxoplasma gondii* in Iberian pig sows, Pablos-Tanarro et al. (2018) found that the seroprevalence was higher in traditional extensive outdoor farms rearing sows, piglets and fattening pigs outdoor on pasture (11.7%) than in intensive holdings rearing all pig production phases indoor on slatted floors (3.2%) and intensive holdings rearing sows and piglets indoor on slatted floors and pregnant sows and fattening pigs outdoor on pasture (1.1%). The authors also identified that the absence of periodical rodenticide treatments (prevalence ratio 1.84), of bird-proof nets in farm windows (prevalence ratio 1.84) and of fences around the farms (prevalence ratio 2.66) increased the risk of seropositivity for *T. gondii*.

In 2007, 2 outbreaks of Classical swine fever were detected in free-range pig herds in East Bulgaria (Alexandrov et al., 2011).

3.6.2.1. Key points

For diseases that are spread by direct contact, transmission of pathogens between sympatric free-ranging pigs and wild boar or other wildlife hosts sharing the same habitat and food and water resources has been shown. Infection risks of traditional extensive outdoor farms rearing pigs outdoor on pasture are usually higher than for farms keeping pigs indoors.

In Sardinia, illegal free-range pigs were probably the reservoir for ASFV and the link between domestic pigs in backyard farms and wild boar.

3.6.3. Specific biosecurity or control measures for outdoor pig farms preventing ASF introduction and spread

In Spain, specific minimal biosecurity requirements have been laid down in a decree concerning extensive pig production (Anonymous, 2009). The decree defines the maximum number of pigs per farm and density of pigs/ha as well as the minimum size of extensive pig farms. All production categories (boar, reproductive females, piglets until weaning, weaned and rearing pigs up to 100 kg of live weight as well as fatteners) should have free access to pastures and the farm's natural resources, supplemented with additional feed as needed. Regarding infrastructures, the decree foresees closed perimeters with a fence or an equivalent system. Farms should operate systems of rotation ensuring a rational use of their natural resources and be at a minimum distance of 100 m from neighbouring pig farms.

Jurado et al. (2018b) compiled biosecurity measures from literature and had them assessed by experts regarding their relevance for preventing ASF introduction and spread. For outdoor farms, in addition to generally applicable measures, it was considered important that areas where animals are allowed to range outdoors be fenced (ideally double fenced) to avoid direct contact with wild boar, domestic pigs from other herds, people and vehicles. Such fences should be at least 1.5 m high and be wild boar proof. In addition, it was considered important that outdoor farms are separated and sufficiently distanced (at least 1 km) from each other to avoid direct and indirect contact between herds. In addition, improved access to veterinarians and health services was considered an important preventive measure for outdoor and non-commercial farms.

When modelling the epidemiological consequences of a potential ASF into the French pig production sector, Andraud et al. (2019) found that transmission from free-range herds to contact herds occurred only in 12.5% of simulations. Local transmission was the most frequent transmission pathway from free-range farms (81% of the simulations). The model simulations showed that infection of smaller pig production sites, which often are free-range systems in France, were difficult to detect, therefore screening protocols specific for small pig farms could improve the ASF detection rate and enable rapid implementation of control measures.

3.6.3.1. Key points

In addition to generally applicable measures, areas where animals can range outdoors should be fenced (ideally double fenced) to avoid direct contact with wild boar, domestic pigs from other herds, people and vehicles. Such fences should be at least 1.5 m high and be wild boar proof.

Outdoor farms should be separated and sufficiently distanced (at least 1 km) from each other to avoid direct and indirect contact between herds.

Improved access to veterinarians and health services is another important preventive measure for outdoor and non-commercial farms.

Based on recent modelling results, it was recommended that screening protocols specific for small (generally outdoor) pig farms may be needed, to improve the ASF detection rate and enable rapid implementation of control measures.

3.6.4. A case study: ASF eradication from Spain 1985–1995

Under the National Coordinated Program for the eradication of ASF carried out in Spain between 1985 until achieving freedom from ASF in 1995, a wide range of measures was implemented (Arias and Sanchez-Vizcaino, 2002). Among others, a census of pig holdings was carried out and the registry of pig producers was improved. Farm sanitary barriers preventing the introduction of pathogens into animal holdings were enhanced by building fences and sanitary enclosures, measures for which

farmers obtained partial funding or low-interest loans. Factors associated with ASF persistence in the areas with ASF outbreaks up until 1993 (Huelva province and parts of the provinces of Cordoba and Sevilla) included lack of basic sanitation and biosecurity, the presence of *Ornithodoros* tick vectors and an absence of wild boar population control (which applied to other areas of Spain as well). As a consequence, in the final phase of the eradication programme, unsanitary animal production facilities that could harbour *Ornithodoros* ticks were destroyed, and metal fences were constructed with a 100-metre radius around animal facilities with historic value or good sanitary conditions to avoid contact with feral animals. In areas of Spain where pigs were produced in confined systems (about 96% of Spanish territory) in the absence of tick vectors and direct contact with wild boar, no ASF outbreaks occurred after 1987.

After the eradication of ASF from Spain, Mur et al. (2012) analysed 158 wild boar samples collected at Doñana National Park during the hunting seasons from 2006 to 2010 for the presence of ASFV and anti-ASFV antibodies. Doñana National Park had an estimated population of 1,700 wild boar in 2011 and is located in Huelva province where the last outbreak of ASF in Spain occurred in 1994. None of the samples were found positive and taking into account the population size, the sample size and the sensitivity and specificity of the test used, the population was considered to be free from ASF at the 99.21% confidence level. These results suggested that, in the 1980s and 1990s, wild boar alone were unable to maintain ASFV and did not interfere significantly with ASF control efforts, as long as their contact with domestic pig populations was restricted. It is noteworthy that the Spanish wild boar hunting harvest, an indicator of wild boar population trends, has multiplied by ten between 1980 and 2018 (Garrido et al., 2019). Thus, the current potential of wild boar for ASF maintenance could be higher than 30 or 40 years ago.

3.6.4.1. Key points

There are lessons to be learned from the successful eradication of ASF from Spain in 1995. These included improvements to the basic sanitation and biosecurity of pig farms, including the destruction of unsanitary animal production facilities that could harbour *Ornithodoros* ticks, and the construction of metal fences with a 100-metre radius around animal facilities to avoid contact with wild animals, for which farmers obtained partial funding or low-interest loans.

3.7. Expert knowledge elicitation on outdoor pig farming

In this section, the results of the EKE are summarised. The EKE aimed to provide insights in (i) a categorisation of outdoor pig farm types in EU MSs according to the risk of ASF introduction into these farms and the risk of ASF spread from these farms, (ii) a ranking of biosecurity measures according to their potential to lower the risk of ASF introduction into these farms and the risk of ASF spread from these farms in ASF-affected areas and (iii) proposed control measures that should flank the improvements of biosecurity for outdoor pig farming categories in ASF-affected countries. For further details, the reader is referred to the external scientific report on the EKE (Hart et al., 2021).

The outdoor pig farm types to be assessed in the EKE were defined as follows: In farm type I, pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures, while in farm type II, pigs have access to an outdoor area on farm premises (adjacent to farm buildings). In their assessment, the EKE experts considered the scenario that the outdoor farms are in areas of the EU, where ASF is present:

- in wild boar AND
- in domestic pigs in indoor farms AND
- if outdoor farms were to be permitted in such areas, also in domestic pigs in outdoor farms.

For the assessment of the baseline ASF risk of the outdoor farm types, it was assumed that the farms are not applying outdoor-specific biosecurity measures against ASF introduction/spread.

3.7.1. Risk of ASF in two categories of outdoor farm types (Type I and Type II)

The baseline ASF risk was assessed for both farm types in terms of the number of new ASF outbreaks that would occur per 100 farms in the coming year.

For type I outdoor pig farms, the experts' individual judgements showed median values between 70 and 85 new outbreaks per 100 farms, with the probability interval that quantifies the scientific uncertainty of the experts' assessment being rather large for two experts (Figure 4). Following the group discussions, the experts' consensus distribution for the number of new outbreaks per 100 type I

outdoor pig farms had a median of 87 new outbreaks per 100 farms and 95% probability interval of 53–99 new outbreaks per 100 farms (figure not shown here (see Hart et al., 2021).

For type II outdoor pig farms, all experts' median values were lower than for type I farms, ranging from 30 to 65 new outbreaks per 100 farms (Figure 4). In the group discussion, the experts agreed on two distributions to express their uncertainty about the number of new outbreaks per 100 farms. The medians for these distributions were much lower than their median for type I outdoor pig farms (37 and 42 new outbreaks per 100 farms, respectively) and the uncertainty was greater, with 95% probability intervals of 4–90 and 8–90 new outbreaks per 100 farms (Hart et al., 2021).

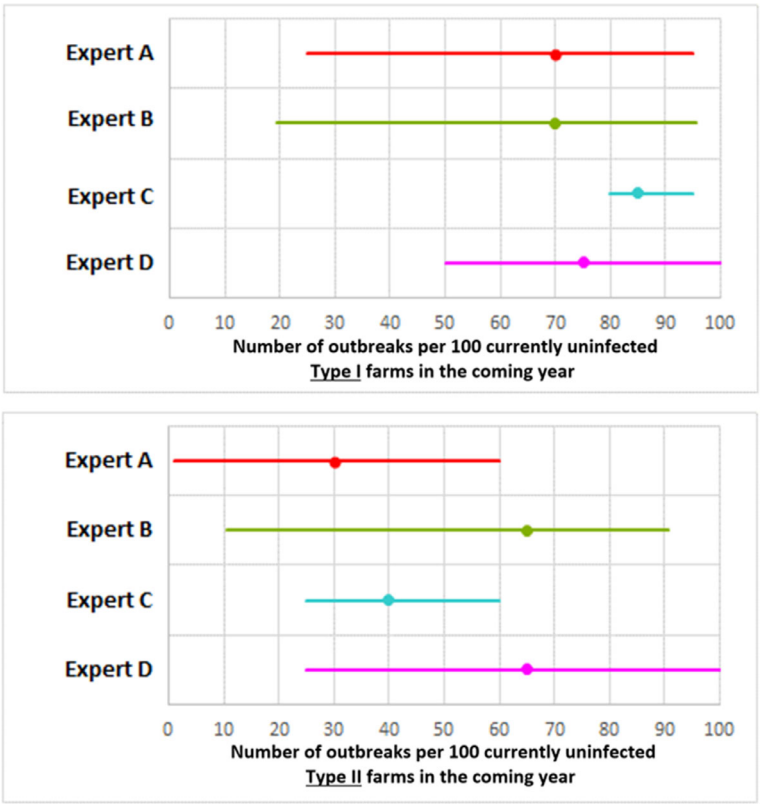

Figure 4: Experts' individual judgements for the risk of new outbreaks on Type I and Type II outdoor pig farms in the coming year (circle = median; bar = 80% probability interval)

3.7.2. Identification and prioritisation of biosecurity measures

The EKE experts were asked to propose biosecurity measures, which they considered useful for reducing the ASF risk for outdoor pig farms. The proposed biosecurity measures were integrated with a similar list drafted by EFSA's Working Group, removing duplicates and rewording for clarity where needed. This resulted in a list of 12 potential BSMs (Table 12).[21] The EKE experts were then asked to rank these in terms of their effectiveness for reducing the ASF risk in each type of outdoor pig farms and then to prioritise which BSMs should be considered further in the second part of the EKE (Table 13). Further assessment was made once these individual rankings were collated. Initially, four BSMs were selected for both farm types: double fence, single solid fence, single fence and no access to stored feed. A further 3 BSMs were then selected only for farm type I (removal of uneaten feed, no wild boar baiting and no access to water) and 3 BSMs were chosen only for farm type II (daily inspection, cleaning/disinfection facilities and protective clothing). Two potential BSMs were considered less effective for both farm types and not considered further (closed carcass storage and absence of crops/trees) (Table 14).

[21] 'Moving pigs into closed housing in ASF-affected areas' was not assessed as a BSM in this document as it represents a ban of outdoor keeping of pigs.

Table 12: Initial list of potential BSMs and definitions proposed by the EKE experts

Title	Definition
Double fence	Double row of fencing made from metal net or wire or electric wires around the perimeter of the outdoor area of a minimum height of 1.5 m and with a minimum distance of 1.5 m between fence rows, and weekly inspections of the fence by the farm personnel, to identify rooting and fence damages, especially after strong wind, rainfall or snowfall
Single solid fence	Single row solid fence made from metal, masonry or other solid material around the perimeter of the outdoor area of a minimum height of 1.5 m, with measures to prevent rooting, e.g. mesh skirt buried underground or cement underground
Single fence	Single row of fencing made from metal net or wire or electric wires around the perimeter of the outdoor area of a minimum height of 1.5 m without measures to prevent rooting
No wild boar baiting	No baiting or similar activities that might attract wild boar should be done within 500 m of the outdoor area
Removal of uneaten feed	No uneaten feed should be left in the outdoor area after feeding
No access to water	Access of wild boar and other animals to water including ponds and streams on the farm should be prevented
No access to stored feed	*No access to stored feed* in the outdoor area for wild boar and other mammals and birds
Absence of crops/trees	No trees or cultivated plants attractive as feed for wild boar should be present on and around the farm (at least up to a distance of 500 m)
Closed carcass storage	*Closed carcass storage* in/next to the outdoor area to avoid attraction of scavenging birds and small mammals
Daily inspection	*Daily inspection* of the outdoor area by the farm personnel, to identify carcasses or parts of carcasses, especially after strong rainfall, including checks in all areas close to the boundary
Cleaning/disinfection facilities	Facilities for cleaning and disinfection of footwear, protective equipment and vehicle wheels (easily accessible and ready for use at any time) must be used upon entering and leaving the outdoor area
Protective clothing	Requirement to enter outdoor area either with *protective clothing* belonging to the farm or with disposable clothing, which must be removed before leaving the outdoor area

Table 13: Comparison of experts' individual rankings of BSMs for Farm Type I and Farm Type II[(a)]

Rank based on average score Farm Type I	Expert				Average	Rank based on average score Farm Type II	Expert				Average
	A	B	C	D			A	B	C	D	
Double fence	1	1	2	2	1.5	**Double fence**	1	1	2	1	1.25
Single solid fence	2	2	1	1	1.5	**Single solid fence**	2	2	1	2	1.75
No access to stored feed	7	6	5	7	6.25	**Cleaning/disinfection facilities**	3	4	4	6	4.25
No access to water	4	7	7	8	6.5	**Protective clothing**	4	5	5	4	4.50
Daily inspection	11	3	9	3	6.5	**Daily inspection**	7	3	8	5	5.75
Cleaning/disinfection facilities	3	4	10	11	7	**Closed carcass storage**	6	9	12	3	7.50
Removal of uneaten feed	9	8	6	6	7.25	**No access to stored feed**	5	6	10	10	7.75
No wild boar baiting	10	11	4	5	7.5	**No access to water**	8	7	9	11	8.75
Protective clothing	5	5	11	9	7.5	**No wild boar baiting**	11	11	6	8	9.00
Closed carcass storage	6	9	12	4	7.75	**Removal of uneaten feed**	10	8	11	7	9.00
Absence of crops/trees	8	12	8	10	8.7	**Absence of crops/trees**	9	12	7	9	9.25
Single fence	12	10	3	12	9.25	**Single fence**	12	10	3	12	9.25

X:1 not considered a relevant BSM by this expert.
(a): 1 was the highest rank, i.e. the expert considered it most important to include this BSM in the assessment.

Table 14: Experts' consensus prioritisation of BSMs for outdoor pig farms of Type I and II to be considered regarding their effectiveness, feasibility and sustainability in the second part of the EKE

	Farm Type I	**Farm Type II**
Accept (or 'uncertain')	*Double fence*	*Double fence*
	Single solid fence	*Single solid fence*
	Single fence	*Single fence*
	No access to stored feed	*Cleaning/disinfection facilities*
	Removal of uneaten feed	*Protective clothing*
	No access to water	*Daily inspection Removal of uneaten feed*
Reject	*Closed carcass storage*	*Closed carcass storage*
	Daily inspection	
	Protective clothing	*No wild boar baiting*
	Cleaning/disinfection facilities	*No access to water*
	Absence of crops/trees	*Absence of crops/trees*

3.7.3. Effectiveness, feasibility and sustainability of prioritised biosecurity measures

Due to the limited time available for each combination of BSM and farm type, it was not feasible to elicit consensus judgements. Instead, the facilitator led a structured discussion of the individual judgements and then invited the experts and observers to reconsider and, if they wished, adjust their individual judgements in the light of the discussion.

3.7.3.1. Effectiveness of the BSMs in reducing the number of new ASF outbreaks

The effectiveness of each prioritised BSM was assessed in terms of how much it would reduce the number of new ASF outbreaks in the coming year in the respective farm type, if the BSM was implemented fully and properly in all farms of that type and without any of the other prioritised BSMs being implemented.

The experts rated the effectiveness of a double fence and a single solid fence highest, with most experts at least 90% certain this would reduce the number of new outbreaks by 40% or more in both farm types. The median estimates of the reduction ranged from 55% to 90% (Figure 5).

For type I outdoor pig farms a single fence was considered to be less effective by the EKE experts than double or solid fences (median estimates 10–60%), but more effective than all the other BSMs (i.e. no wild boar baiting and no access to stored feed, uneaten feed and water). All experts were at least 90% certain that these measures would reduce ASF outbreaks by less than 40% (Figure 5).

For farm type II, most experts were at least 90% certain that daily inspection and no access to stored feed would reduce ASF outbreaks by less than 40%. The effectiveness of protective clothing and cleaning/disinfection facilities was rated higher than that of daily inspection and no access to stored feed and approached the effectiveness of a single fence for farm type II, yet with very wide uncertainty (Figure 5).

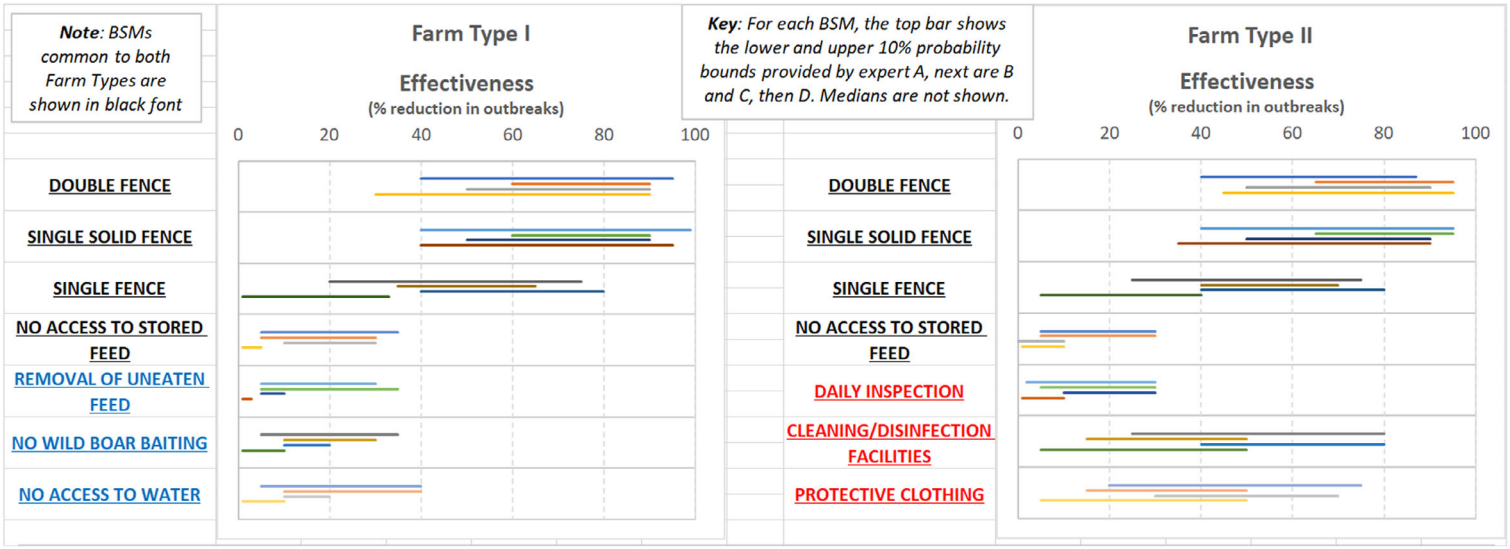

Figure 5: Effectiveness of BSMs for reducing the number of new ASF outbreaks in the coming year. The graphs show the 80% probability interval provided by each expert for each combination of farm type and BSM. The colouring of the bars is arbitrary and serves only to distinguish bars within each section of the graph

3.7.3.2. Relative impact of the BSMs on introduction and spread of ASF

For each BSM, its relative contribution to reducing introduction and spread of ASF was also assessed.

Most experts considered that a double fence and a single solid fence would contribute more to reducing introduction than spread in both farm types. A single fence was considered to have similar impacts on introduction and spread for farm type I, but similar or more impact on spread for farm type II. For both farm types, no access to stored feed was judged to have similar impacts on introduction and spread or more on introduction (Figure 6).

The same result was obtained for no access to water in farm type I, while removing uneaten food was judged to have similar impacts on introduction and spread or more impact on spread (Figure 6).

There was least agreement between experts regarding wild boar baiting for farm type I. One expert considered it to have similar impacts on introduction and spread, two more impact on introduction and one more on spread (Figure 6).

All four experts judged that protective clothing would have similar impacts on introduction and spread in farm type II, and three experts made the same judgement for cleaning/disinfection facilities. The experts were evenly split on whether daily inspection on farm type II would have more impact on introduction or spread (Figure 6).

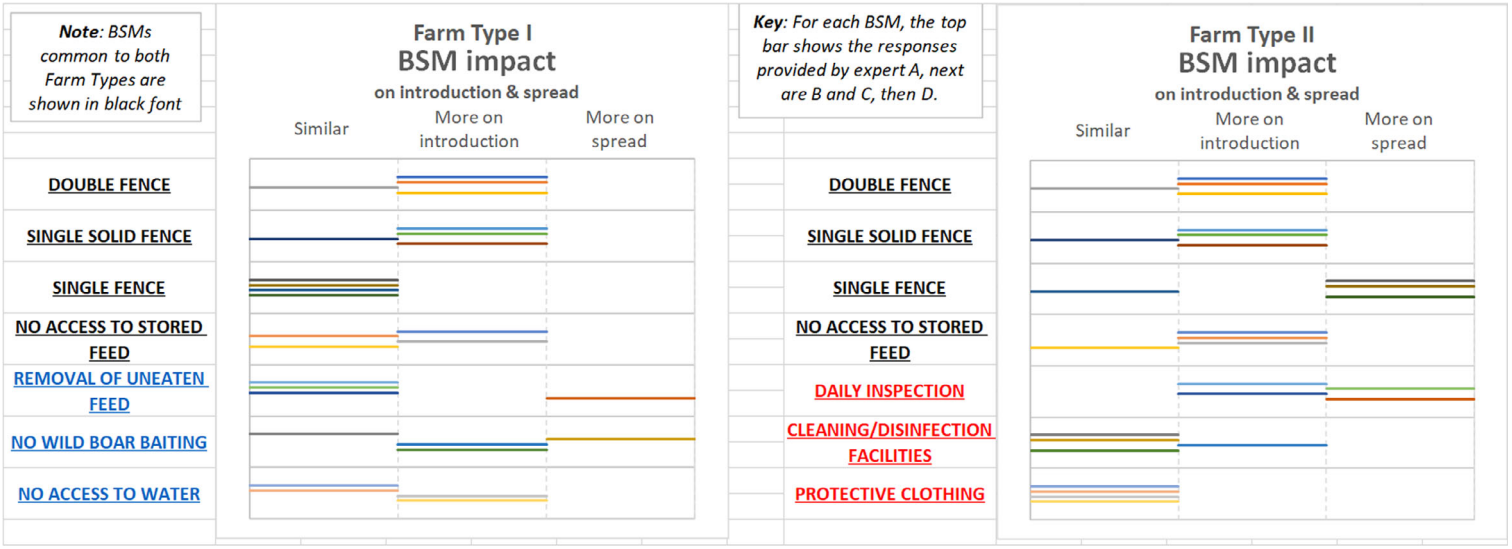

Figure 6: Relative impact of BSMs for on the introduction and spread of ASF. The graphs show the 80% probability interval selected as most likely by each expert for each combination of farm type and BSM. The colouring of the bars is arbitrary and serves only to distinguish bars within each section of the graph

3.7.3.3. Feasibility of the BSMs

The feasibility of each BSM was assessed in terms of what proportion of farms would implement it, if it was included in the Strategic Approach to the management of ASF in the EU. Overall, the EKE experts expected the implementation of BSMs to be higher on type II farms than on type I outdoor pig farms. Most EKE experts judged that a double fence and a single solid fence would have medium to high feasibility for farm type II (implemented by 40–80% of farms), but very low to low feasibility for farm type I (0–40%). A single fence was judged to have medium to high feasibility (40–80% implementation) on farm type I and medium to very high (40–100%) on farm type II (Figure 7).

No access to stored feed was judged by most experts to have medium to high feasibility (40–80% implementation) for both farm types, with similar results for wild boar baiting on farm type I and daily inspection on farm type II. For farm type I, removal of uneaten feed was judged most likely to be of low to medium feasibility (20–60% of farms) and no access to water was assessed as very low to low feasibility (0–40%). For farm type II, most experts considered cleaning/disinfection facilities and protective clothing to have low to high feasibility (40–80%) (Figure 7).

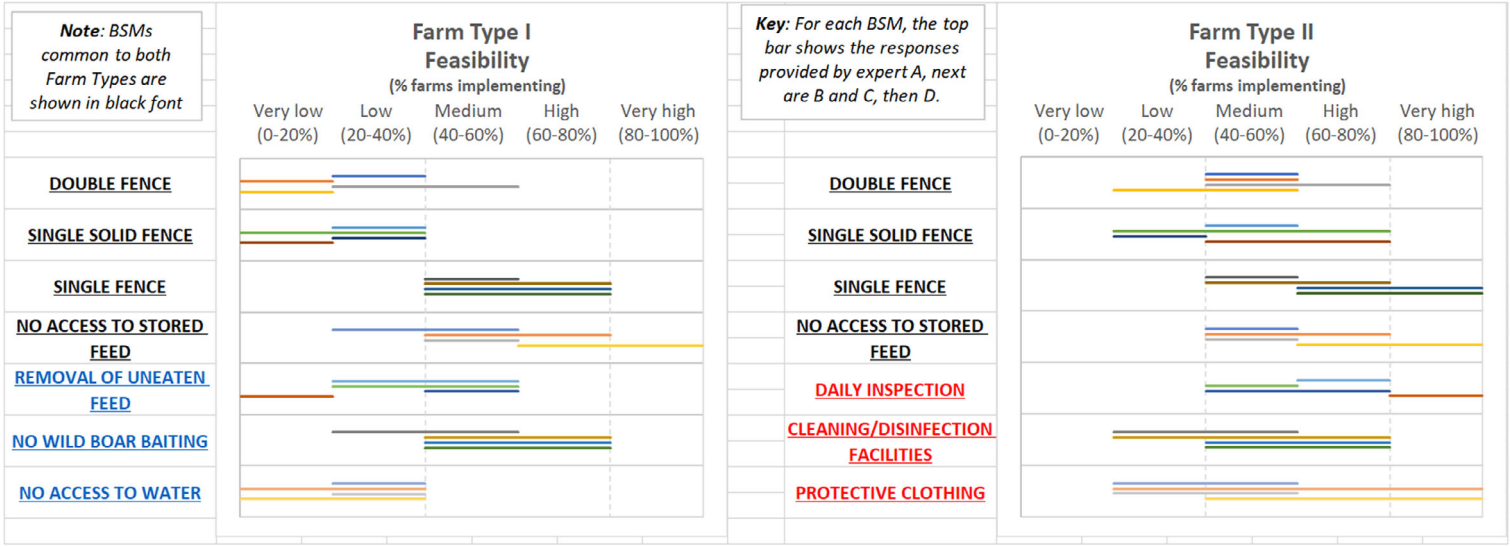

Figure 7: Feasibility of BSMs for ASF, in terms of the proportion of farms that would implement them if they were included in the Strategic approach for management of ASF in the EU. The graphs show the 80% probability interval selected as most likely by each expert for each combination of farm type and BSM. The colouring of the bars is arbitrary and serves only to distinguish bars within each section of the graph

3.7.3.4. Sustainability of the BSMs

The sustainability of each BSM was assessed in terms of what proportion of farms that implement it would continue to do so for at least 2 years. In general, the experts expected that sustainability would be higher than feasibility, i.e. the proportion of farms sustaining a BSM after having started to implement it would be greater than the proportion that initially implement it.

All experts judged that a double fence and a single solid fence have high to very high sustainability for both farm types (sustained by 60–100% of farms). The sustainability of a single fence was judged by most experts as similar to double and single solid fence for farm type II (high to very high, 60–100% of farms) but medium to high (40–80% of farms) for farm type I. Most experts judged that no access to stored feed has a medium to high feasibility (40–80% implementation) for both farm types (Figure 8). These first four BSMs all involve creating or improving structures.

The BSMs relying on behaviour change tended to be judged less sustainable, with more uncertainty and more variation between experts. For farm type I, removal of uneaten feed and no access to water were judged to be of very low to medium sustainability (0–60% of farms), while no wild boar baiting was rated from low to very high (20–100% of farms). For farm type II, the experts' judgements ranged from very low to high (0–80% of farms) for daily inspection and cleaning/disinfection facilities and very low to very high (0–100% of farms) for protective clothing (Figure 8).

Figure 8: Sustainability of BSMs for ASF, in terms of the proportion of farms that implement them would continue to do so for at least 2 years. The graphs show the 80% probability interval selected as most likely by each expert for each combination of farm type and BSM. The colouring of the bars is arbitrary and serves only to distinguish bars within each section of the graph

3.7.4. Control measures to supplement improved biosecurity of outdoor farms

The EKE concluded with a brainstorming session on potential control measures, i.e. risk management measures, that could be undertaken by the competent authorities of EU MSs to further reduce the risk of disease introduction and spread for ASF related to outdoor pig farms, in addition to improved biosecurity of these farms. The experts developed a list of 14 potential control measures shown in Table 15.

Table 15: Control measures identified by the EKE experts

Register and define/classify/characterise types of outdoor farms including categories for 'pet pigs' (companion animals), pigs kept for personal consumption and 'hybrid' farms; and including the numbers of animals in each farm – a measure necessary to establish the nature of farms to inform other measures (and allow for potentially applying measures differentially)
Individual animal registration
Movement control, requiring authorisation/paperwork to move pigs between farms (with no movement in ASF-infected areas without relevant testing, including appropriate laboratory/clinical examinations and quarantine where/if necessary)
Active surveillance through a regular (e.g. annual) schedule of laboratory (serological and virological) examinations of a sample of pigs from outdoor farms (different frequency and/or checks according to epidemiological context)
Increased passive surveillance requiring notification of wild boar presence, wild boar carcasses and dead pigs (i.e. factors related to potential ASF identification) to VA
A series of training/awareness campaigns to improve compliance with BSMs (e.g. on carcass detection, clothing, cleaning)
Evaluation/quantification of biosecurity levels (with all farmers completing relevant pro forma on factors related to risk of ASF and implementation of BSMs, for assessment by relevant authority e.g. veterinarian)
Ban on selling pigs in non-specialised (unregulated) markets (e.g. local markets)
Strengthen the control of online traded pigs to prevent illegal movements of non-registered pigs.
Highly restricted on-farm/home slaughtering (with control through veterinarian supervision)
Restrictions (light to severe) on movement/importation of wild boar (for hunting)
Training on biosecurity issues for hunters with special attention to those that are also farmers
Ban of unfenced outdoor pig farming

3.8. Overall Assessment

3.8.1. Outdoor pig production in the EU

Currently, there are no legislation or guidelines at European level for the categorisation of pig farms. Although a broad range of national categorisation systems relevant to outdoor pig production are in place, these systems are not harmonised between MSs and comparison between MSs is not feasible. Consequently, information about outdoor pig production in the EU is limited and needs to be interpreted with care.

Outdoor pig production is common across MSs. Specific outdoor pig population data are not available, as there is no legal requirement to collect such information, either at EU or national level. Based on available data, an estimated 4.5% of all pig farms in the EU are outdoor pig farms. At MS level, this figure varies substantially, with a median MS value of 7.7%. Further, of the estimated 49,070 outdoor pig farms in the EU, 70% are deemed commercial in nature. Outdoor pig production has been banned in Estonia, Latvia and Lithuania as a consequence of the ASF epidemic.

There are a range of pig production systems where outdoor access is possible, including backyard pig production, the keeping of wild boar (or wild boar-domestic pig hybrids), organic pig farming, the keeping of specific pig breeds (including East Balkan pigs, Mangalica pigs and Iberian pig production), free-ranging pig production, the keeping of pigs as pets and hobby holdings. In the literature, a range of different outdoor pig production systems are recognised, including the Mediterranean silvo-pastoral pig production systems (France [Corsica], Italy [Tuscany, Sardinia, Sicily] and Spain and Portugal), alternative farming (organic pig husbandry systems), small-scale non-industrial farming (Bulgaria, Romania) and the farming of traditional autochthonous pig breeds. In total, 21 autochthonous/native pig breeds have been reported that should have access to outdoor areas, in large part due to traditional farming practices and the behavioural and physiological needs of the breed.

Outdoor pig production is most commonly conducted within fenced areas in woodland/forests (62% of responding MSs) or pasture/fields (73%) or outdoor farms that allow access to concrete fenced yards or runs (88%). Unfenced areas in woodland/forests or pasture/fields are very uncommon, but present in Bulgaria (but only on a temporary basis and specifically for East Balkan pigs) and previously also in Sardinia and Corsica.

Three conclusions about outdoor pig production in the EU can be drawn from the information gathered in this opinion:

- There is currently no definition for outdoor pig production in EU legislation, or a legal requirement to collect data specific to this sector. Categorisation of and the collection of information on EU outdoor pig production is currently not harmonised, and, consequently, information on EU outdoor pig production is incomplete and needs to be interpreted with care.
- Outdoor pig production is common throughout EU MSs, and present in most EU MSs. An estimated 4.5% of all pig farms in the EU are outdoor pig farms, and 1.9% of all EU pigs are raised in outdoor pig farms.
- There is a range of pig production systems, where outdoor access is provided, with most conducted within fenced areas in woodland/forests or pasture/fields or outdoor farms that allow access to fenced yards or runs.

3.8.2. The baseline ASF risks associated with outdoor pig farming

It is not possible to accurately determine the number of ASF outbreaks that have occurred in outdoor pig farms during the current epidemic. As highlighted previously, there is no legislation or guidelines at European level for the categorisation of pig farms, and national classification systems are not harmonised. ADNS does not distinguish ASF outbreaks by farm type, housing or production system. It is possible to gain some information from presentations given during PAFF Committee where MS mention their different farm types, including outdoor farms (Estonia, Latvia), small-scale holdings (Hungary), backyard holdings (Estonia, Italy, Latvia, Romania) and East Balkan pig farms (Bulgaria). In further information gathered from MSs using a questionnaire, information about the level of outdoor access was missing from 81% of ASF outbreaks. For those 669 outbreaks where this information is available, 9.4% of outbreaks (but varying between 0 and 40% across MSs) occurred on outdoor farms. More detailed information is available from two areas with many ASF outbreaks in outdoor pig production: in Sardinia, most outbreaks in past years have been confined to illegally keep free-ranging pigs with contact to wild boar. Similarly, in Romania, almost 80% of ASF outbreaks among domestic pigs occurred in backyard farms. However, to which degree pigs kept in Romanian backyard farms have outdoor access has not been reported.

Based on the data available, it is not possible to calculate robust measures of association by farm type (e.g. attack rates, relative risks). Nonetheless, there is a number of factors that are known to place outdoor pig farms at heightened risk of ASF outbreaks compared to indoor farms:

- Direct or indirect contact between infected wild boar and domestic pigs are recognised as a potentially important transmission route for ASF to domestic pigs. These transmission routes can be difficult to control in outdoor pig production systems, and specifically in those situations where the virus is constantly present in contiguous wild boar populations and the environment of the outdoor farm.
- Linked to this and as highlighted in the literature, there is the potential for contact between wild boar and domestic pigs in outdoor production settings. There is detailed scientific evidence, including studies on the spatio-temporal distribution of wild boar and domestic pigs, differing – but overlapping – species preferences, evidence of transmission of pathogens and farmer and hunter reporting. Further, a range of factors have been shown to increase the risk for indirect contact with wild boar, including increasing distance from farm buildings, pastures compared to outdoor runs in the proximity of farm buildings, and fences that are less than 60 cm high.
- MSs have identified a range of putative risk factors that could each contribute to the introduction of ASF into outdoor farms. These relate to biosecurity concerns, particularly the potential for direct or indirect contact with wild boar. Examples of particular concern on outdoor pig farms include problems with fencing (the absence of a fence, damaged or poorly maintained fences) and uncontrolled access by people.

Collectively, these findings highlight the inherent biosecurity risks for outdoor pig production, particularly in the context of ASF and wild boar.

The EKE provides insights into the baseline ASF risk posed to outdoor pig farms. This methodology is particularly valuable in the absence of robust quantitative data. In this EKE assessment, it was assumed that ASF was present in wild boar and domestic pigs in the region, with farms not applying outdoor-specific biosecurity measures against the introduction of ASF.

- The results highlight differing levels of baseline risk between type I and type II farms, which is consistent with knowledge of factors shown to increase the risk of direct and indirect contact with wild boar (above). In farm type I, pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures, while in farm type II, pigs have access to an outdoor area on farm premises (adjacent to farm buildings). The experts highlighted the greater opportunity for control on Type II compared to Type I farms, both by the farmer and the veterinary services, as the main reason for this difference.
- The baseline risk of ASF for type I farms was very high, with a consensus distribution providing a median of 87 new outbreaks per 100 type I outdoor pig farms in the coming year, and a 95% probability interval of 53–99%. The supporting reasoning was consistent with the points raised previously, with particular focus on the potential for either direct or indirect contact between wild boar and domestic pigs.
- The baseline risk of ASF for type II farms was high, with a consensus distribution providing two potential distributions, a median of 37 or 42 (depending on the distribution used) new outbreaks per 100 type II farms in the coming year (95% probability distribution of 4–90%). Experts considered that type II farms had the potential for less direct contact with wild boar and less opportunity for indirect contact, for example through shared grazing of natural resources. The uncertainty in the estimates of ASF risk in type II farms is particularly notable.

A number of conclusions can be drawn from the information gathered in this opinion with respect to outdoor pig production in the EU:

- It is not possible to accurately determine the number and proportion of ASF outbreaks that have occurred in outdoor pig production. Based on available data, there are considerable differences in the percentage of outbreaks that have occurred on outdoor pig farms between MSs. These percentages have been particularly high in Sardinia. However, this may reflect the high proportion of farms keeping pigs outdoors in Sardinia. Assuming that most backyard farms allow outdoor access, this is also true for Romania. However, to which degree pigs kept in Romanian backyard farms have outdoor access has not been reported.
- Based on the data available, it is not possible to determine ASF risk by farm type. However, there is a number of factors that can be used as a basis to place outdoor pig farms at heightened risk of ASF outbreaks compared to indoor farms.

3.8.3. The effectiveness of different on-farm biosecurity measures

As stated above, specific or additional biosecurity measures for outdoor pig farms have been developed in 15 of 26 (58%) MSs, and 14 of 26 (54%) MSs have an additional system in place that classifies pig farms based on their level of biosecurity. Typical measures include:

- General BSMs: approval by the veterinary authority, record keeping and biosecurity evaluation.
- Bio-exclusion BSMs: fencing, avoiding contact with other pig farms and with wild boar, the potential for housing if required, distances to risk sources, availability of indoor space, secure feed and litter storage, appropriate carcass and by-product management, isolation area, controlled farm entrances.
- Other BSMs: slaughter at defined slaughterhouses, routine farm biosecurity.

One survey compiled biosecurity measures from literature and had them assessed by experts regarding their relevance for preventing ASF introduction and spread (Jurado et al., 2018b). BSMs identified for outdoor farms included fencing (ideally double) and a distance between farms of at least 1 km to avoid direct and indirect contact between herds. In addition, improved access to veterinarians and health services was considered an important preventive measure for outdoor and non-commercial farms. Model simulations have shown that screening protocols specifically targeting small pig farms could improve the ASF detection rate and enable rapid implementation of control measures (Andraud

et al., 2019). However, specific quantitative information on the effectiveness of these or other on-farm BSMs is lacking.

The EKE provides insights into the identification and prioritisation of biosecurity measures in outdoor pig farms, and is particularly valuable in the absence of robust quantitative data:

- The results highlight different BSMs and different expected results of BSMs, depending on farm type. In type I farms, pigs have access to outdoor areas in forests, woodlands, on agricultural land or pastures, whereas in farm type II, pigs have access to outdoor areas on farm premises adjacent to farm buildings.
- The EKE results suggest a lower baseline risk in type II farms as compared to type I ones, but with some uncertainty. As an explanation for this, type II farms may have improvements to farm biosecurity, either temporary or permanent.
- Regarding effectiveness, feasibility and sustainability, the EKE experts assessed 4 BSMs for both farm types: double fence, single solid fence, single fence and no access to stored feed. For each farm type, three additional BSMs were assessed: removal of uneaten feed, no wild boar baiting and no access to water) for farm type I, and daily inspection, cleaning/disinfection facilities and protective clothing for farm type II. Two potential BSMs were considered less effective for both farm types and were not considered further (closed carcass storage and absence of crops/trees).
- Double fences and single solid fences were rated highest by the experts in terms of effectiveness for both farm types. However, the feasibility of these fencing types was rated by the experts as very low or low on type I farms and low to high (but predominantly medium) on farm type II farms. Once established, the sustainability of these fence types was considered high on type I farms and high or very high on type II farms.
- In type I farms, the EKE experts rated simple single fences less effective than double or single solid fences. Compared with these other fencing types, the feasibility of a single fence was generally considered more feasible for both farm types and either similar or slightly less sustainable.
- A number of BSMs that seek to limit the attractiveness of farm premises (no access to stored feed, no access to water, removal of uneaten feed, no wild boar baiting) were considered (far) less effective than the three fencing types. Estimates of the feasibility of these BSMs varied, but frequently encompassed a medium to high rating. On type I farms, the feasibility of implementing no access to stored feed was low to very high (with sustainability of medium to very high), removal of uneaten feed from very low to medium (sustainability from very low to medium) and no wild boar baiting from low to high (sustainability from low to very high). In contrast, no access to water was seen as having lower feasibility (very low to low) and sustainability (very low to medium). On type II farm, no access to stored feed was rated as medium to very high in terms of both feasibility and sustainability.
- In type II farms only, the experts also considered BSMs that relate to hygiene in a broad sense, including daily inspection, cleaning/disinfection and protective clothing. These BSMs seek to limit both indirect and direct contact. These BSMs were assessed by the experts to be of lower effectiveness than fencing, with cleaning/disinfection and protective clothing being considered more effective than daily inspection. Estimates of the feasibility and sustainability of these methods varied substantially.
- For each of the BSMs, there were some differences between experts with respect to relative impact on introduction and spread. For both farm types, at least one expert suggested a similar impact on introduction and spread for all BSMs. When impact was not seen as equal, there was generally an emphasis on introduction, except for single fence on type II farms.

Tables 16 and 17 show which of the risk pathways described in Section 1.2 the Panel considers likely to be mitigated by the different biosecurity measures considered in this assessment.

The following conclusions can be drawn from the information gathered in this opinion with respect to the effectiveness of different on-farm biosecurity measures:

Table 16: Effectiveness of BSMs in mitigating the risk pathways for ASF introduction and spread - Farm type I

BSM	Pathways				
	Direct contact of between outdoor pigs with wild boar/suids and other wildlife	**Direct contact between outdoor pigs and kept pigs from other establishments**	**Direct contact between outdoor pigs and humans other than farm personnel (e.g. hunters, people using rural areas and forests for work or recreation)**	**Indirect contact between outdoor pigs and wild boar/ suids or other wildlife (through use of the same grazing/ feeding/ watering/ resting/rooting sites)**	**Indirect contact with carcasses of infected suids transported over longer distances by wild carnivores (mammals or birds) or by water (rivers, after rainfall)**
Single Solid Fence	Likely	Likely	Likely	Likely	Likely
Double Fence	Likely	Likely	Likely	Likely	Not likely
Absence of crops/trees	Likely	Not likely	Not likely	Likely	Not likely
No access to stored feed	Likely	Not likely	Not likely	Likely	Not likely
No access to water	Likely	Not likely	Not likely	Likely	Not likely
Removal of uneaten feed	Likely	Not likely	Not likely	Likely	Not likely
No wild boar baiting	Likely	Not likely	Not likely	Likely	Not likely
No fresh local forage for pigs	Not likely	Not likely	Not likely	Likely	Not likely
Closed carcass storage	Not likely	Not likely	Not likely	Likely	Not likely
Simple single Fence	Not likely	Not likely	Not likely	Not likely	Not likely
Daily Inspection	Not likely	Not likely	Not likely	Not likely	Not likely
Cleaning and Disinfection	Not likely	Not likely	Not likely	Not likely	Not likely
Protective Clothing	Not likely	Not likely	Not likely	Not likely	Not likely

Likely: it is likely that the BSM effectively mitigates this pathway.
Not likely: it is not likely that the BSM effectively mitigates this pathway.

Table 17: Effectiveness of BSMs in mitigating the risk pathways for ASF introduction and spread - Farm type II

Pathways BSM	Pathways				
	Direct contact of between outdoor pigs with wild boar/suids and other wildlife	**Direct contact between outdoor pig and kept pigs from other establishments**	**Direct contact between outdoor pigs and humans other than farm personnel (e.g. hunters, people using rural areas and forests for work or recreation)**	**Indirect contact between outdoor pigs and wild boar/ suids or other wildlife (through use of the same grazing/ feeding/ watering/ resting/rooting sites)**	**Indirect contact with carcasses of infected suids transported over longer distances by wild carnivores (mammals or birds) or by water (rivers, after rainfall)**
Single Solid Fence	Likely	Likely	Likely	Likely	Likely
Double Fence	Likely	Likely	Likely	Likely	Not likely
Absence of crops/trees	Likely	Not likely	Not likely	Likely	Not likely
No access to stored feed	Likely	Not likely	Not likely	Likely	Not likely
No access to water	Likely	Not likely	Not likely	Likely	Not likely
Removal of uneaten feed	Not likely	Not likely	Not likely	Likely	Not likely
No wild boar baiting	Not likely	Not likely	Not likely	Likely	Not likely
No fresh local forage for pigs	Not likely	Not likely	Not likely	Likely	Not likely
Closed carcass storage	Not likely	Not likely	Not likely	Likely	Not likely
Simple single Fence	Not likely	Not likely	Not likely	Not likely	Not likely
Daily Inspection	Not likely	Not likely	Not likely	Not likely	Not likely
Cleaning and Disinfection	Not likely	Not likely	Not likely	Not likely	Not likely
Protective Clothing	Not likely	Not likely	Not likely	Not likely	Not likely

Likely: it is likely that the BSM effectively mitigates this pathway.
Not likely: it is not likely that the BSM effectively mitigates this pathway.

- According to the EKE, robust fencing (a single solid or double fence) is the BSM that is most likely to reduce the risk of ASF introduction into outdoor pig farms.
- Other BSMs which seek to limit wild boar attractiveness or improve farm hygiene are expected to be less effective, although they may still contribute to a reduction in ASF risk.
- For some pairs of BSMs, the Panel is over 90% certain that one is more effective than the other (e.g. double fence or single solid fence vs. no access to stored feed, water, etc.); for other pairs of BSMs, the Panel's certainty is 70–80% (e.g. simple single fence vs. double or single solid fence); and for some pairs of BSMs, the Panel considers it about equally likely that each BSM is more effective than the other (e.g. no wild boar baiting vs. no access to water).

- There is a lack of field-based quantitative evidence regarding the effectiveness of BSMs applied on-farm for reducing the risk of ASF introduction and spread, including preventing contact between domestic pigs and wild boar. This is an area where research is urgently needed.

3.8.4. The effectiveness of additional control measures

Additional control measures were defined as risk management measures undertaken by the competent authorities of EU MSs to reduce the risk of ASF introduction and spread, such as the registration of outdoor farms or regular farm visits by official veterinarians.

In the current opinion, three different sources have been used to identify additional control measures that could usefully contribute to risk mitigation in outdoor pig farming, including lessons from the successful ASF eradication programme in Spain in 1985–1995, and control measures that were independently identified by the EKE experts and by the EFSA working group. The following is a distillation of those control measures that featured prominently in these sources:

Farm categorisation

- Development of a system for categorisation of pig farms, to clearly distinguish different types of outdoor pig production. System to be incorporated into legislation and guidelines at European level, including data collection requirements.

Farm registration

- Pig farm registration in national electronic databases to include details of outdoor access, production type (including categories for pet pigs [companion animals], pigs kept for personal consumption, hybrid farms) and number of animals. It is important that this information is regularly updated (annually or at least every second year), with the potential to allow BSMs or other control measures to be applied differentially.
- Approval of outdoor farms by veterinary authorities after inspection and following assessment of farm biosecurity level using a standard protocol/tool (e.g. *Biocheck UGent*).

Surveillance

- Enhanced passive surveillance requiring notification and detailed investigation of wild boar presence, wild boar carcasses and dead domestic pigs (i.e. factors related to potential ASF identification).

Animal movement and other controls (but noting that some are already foreseen in ASF affected areas under current legislation)

- Controls on the movement of animals from outdoor farms. Requiring authorisation to move pigs between farms (with no movement in ASF-infected areas without relevant prior testing, including appropriate laboratory/clinical examinations and quarantine where/if necessary).
- Controls on the movement of animals directly to slaughter for commercial purposes. Restricting this to the closest slaughterhouse.
- Ban on the sale of pigs in non-specialised (unregulated) markets (e.g. local markets).
- Strengthen the control of online traded pigs to prevent illegal movements of non-registered pigs.
- Restrictions on on-farm/home slaughtering.
- Restrictions/ban on the movement/importation of wild boar (for hunting).
- Ban on unfenced outdoor pig production.

Awareness programmes

- Awareness campaigns on ASF with different messages tailored to different stakeholders (farmers, other people who keep pigs, hunters, people who access the outdoors for recreational purposes, etc.).

4. Conclusions

4.1. Main conclusions and related certainty

Outdoor pig farms are common and present throughout the EU.

The baseline risk for ASF introduction and spread related to outdoor pig farms is substantial but with considerable uncertainty. To explain, the Panel is 66–90% certain that if outdoor pig farms were

permitted in ASF-affected areas of the EU, where ASF is present in wild boar and in domestic pigs (both in indoor and outdoor farms) (i.e. a worst-case scenario that does not consider different restriction zones or particular situations), and no outdoor-specific biosecurity measures and control measures are implemented, more than 20% of those outdoor farms would experience new ASF outbreaks within a year ('baseline risk').

The Panel is 66–90% certain that if single solid[22] or double fences[23] were fully and properly implemented on all outdoor pig farms in ASF-affected areas of the EU, where ASF is present in wild boar and in domestic pigs (both in indoor and outdoor farms) (i.e. a worst case scenario that does not consider different restriction zones or particular situations), without requiring any other outdoor-specific biosecurity measures or control measures, this would reduce the number of new ASF outbreaks occurring in these farms within a year by more than 50% compared to the baseline risk.

The Panel is 80–95% certain that if simple single fences[24] were fully and properly implemented in all outdoor pig farms in ASF-affected areas of the EU, where ASF is present in wild boar and in domestic pigs (both in indoor and outdoor farms), without requiring any other outdoor-specific biosecurity measures or control measures, this would reduce the number of new ASF outbreaks occurring in these farms within a year by up to a maximum of 30% compared to the baseline risk.

The Panel concludes that the implementation of regular, independent and objective on-farm biosecurity assessments using a standard protocol/tool (e.g. Biocheck UGent or similar) and farm-level benchmarking, designed to promote continuous improvement of biosecurity practices, and using these assessment results in an official system managed by competent authorities to categorise and approve outdoor pig farms on the basis of their biosecurity risk, will reduce the risk of ASF introduction and spread related to outdoor pig farms. The Panel is 75–90% certain, that if these measures and controls were implemented fully and properly on all outdoor farms in ASF-affected areas of the EU, in addition to single solid or double fences, this would reduce the number of new ASF outbreaks by an additional 30 or more farms per hundred compared to single solid or double fences alone.

It is important to consider the impact of feasibility, sustainability, compliance and human error and how these vary across the EU MSs and farm types, which could reduce the probabilities for the effectiveness of the above-mentioned measures.

4.2. Further conclusions

4.2.1. Characterisation of outdoor pig farms in EU MSs in terms of farm structures, farming practices, herd size, geographical location

A harmonised system to categorise different types of pig farms, or definitions of these, does not exist in EU legislation. Further, no standards or guidelines were found either at international level (e.g. OIE, FAO) or in published literature. This is reflected at MS level, where classification systems for outdoor pig farms vary substantially. In several MSs, there are no relevant definitions or registered information to differentiate pig farm types (and to identify outdoor pig farms). In those MSs where outdoor pig farms can be identified, more than one instrument for classification (legislative documents, guidelines, standards, checklists) is generally used.

According to European and national legislation, all pig farms are registered in the national pig database of each MS with a unique identification number, irrespective of their size, category and commercial activity. However, no harmonised data are currently available at EU level to determine whether farms provide outdoor access, the different types of outdoor access provided, the number of outdoor farms, the number of pigs per outdoor farm, the commercial or non-commercial nature of the pig keeping activity or the breed of the pigs kept.

Based on the questionnaire survey (Annex B: Questionnaire Survey Results), a range of different types of outdoor pig farming are present throughout the EU, including fenced and unfenced areas in woodlands and forests, fenced and unfenced areas in pasture or fields, open buildings with unlimited access to fenced yards and closed buildings with controlled access to fenced yards or runs. Each of

[22] Single row solid fence made from metal, masonry or other solid material around the perimeter of the outdoor area of a minimum height of 1.5 m, properly fixed to the ground to prevent the ingression of wild boar under the fence (undercrossing).

[23] Double row of fencing made from metal net or wire or electric wires around the perimeter of the outdoor area of a minimum height of 1.5 m and with a minimum distance of 1.5 m between fence rows, properly fixed to the ground to prevent undercrossing.

[24] Single row of fencing made from metal net or wire or electric wires around the perimeter of the outdoor area of a minimum height of 1.5 m without measures to prevent undercrossing.

these outdoor farming types is common, except unfenced areas in woodland and forests, and unfenced areas in pastures and fields.

Backyard pig farms frequently (but not always) provide outdoor access. Generally, these animals are kept for household consumption. These backyard farms often have low levels of biosecurity, and some provide their pigs with outdoor access or do not prevent wild boar incursions.

In several MSs, owned wild boar (or wild boar-domestic pig hybrids) are kept on farm establishments, almost invariably with substantial outdoor access. Although beyond the remit of this opinion, it is important to note that there is a range of different approaches to the keeping of wild boar, from farm establishments of clearly owned and identified wild boar through to fenced hunting areas with wildlife (not owned and not identified).

Outdoor access is a requirement of organic pig farms. Outdoor access is usually provided in the form of outdoor runs connected to stable buildings or in paddocks on pasture (often with shelter).

Across many MSs, there are a number of pig breeds (including autochthonous/native pig breeds) with access to outdoor areas, such as woodlands, forests, fields and pastures, at least during specific production/life stages.

Pigs kept in hobby holdings or for exhibition purposes, which are present in several MSs, or pigs that are kept as companions may have outdoor access and are thus at risk of becoming infected with ASFV with further transmission to other pigs, especially in rural areas.

In several Mediterranean countries, some domestic pigs are kept in silvo-pastoral systems, where pigs have outdoor access at least during their finishing period.

4.2.2. Biosecurity measures currently implemented in EU MSs

While current EU legislation prescribes biosecurity measures for pig farms in general, there are no biosecurity measures specifically prescribed for outdoor pig farms.

In most MSs, there is a legal requirement to implement biosecurity measures in all pig farms and a range of biosecurity measures are implemented in outdoor pig farms, focusing on general biosecurity, and measures to address external and internal biosecurity. There is a system of official controls to verify implementation and assess the level of compliance. Further, most MSs run awareness campaigns about farm biosecurity.

Complete bioexclusion is difficult to achieve in outdoor farms and the likelihood of exposure to pathogens circulating in wildlife is increased, compared to indoor pig farms.

A number of MSs assess and classify pig farms according to their level of biosecurity risk. A range of different objective assessment tools are used, including 'Biocheck.UGent' (reported by Ireland), 'BIOSEGPOR' (reported by Spain), 'ClassyFarm' (reported by Italy) and 'Smittsäkrad Besättning' (reported by Sweden).

Examples of MS best-practice has highlighted the importance of:

- regular assessment of on-farm biosecurity,
- an 'official' farm categorisation system based on these assessment results,
- the introduction of farm-level benchmarking (assessing change on a particular farm over time, and as a means to allow between-farm comparison), conducted locally, regionally and at a national level and,
- a broadened assessment to consider other key issues such as animal welfare.

Collectively, these approaches have contributed to ongoing improvements in biosecurity and broader/core animal husbandry issues.

Non-compliance with required on-farm biosecurity measures on outdoor pig farms is a common challenge across MSs. Frequent areas of non-compliance relate to fencing, biosecurity relating to clothes and shoes, record keeping, disinfection at the farm entrance and movement and disinfection of vehicles.

4.2.3. Potential risk factors for ASFV introduction into farms and spread into the region linked to outdoor pig farming

On outdoor farms, risk factors for ASFV introduction include the area of land on which outdoor pigs are reared, the potential for contact (both direct and indirect) with wild boar and the difficulties in adequately fencing large outdoor areas.

The risk of intrusion of wild boar into outdoor farms has been found to increase with increasing distance between the outdoor pen and the farm and if the pen is poorly protected (e.g. with only a simple electric fence).

There are multiple examples of interaction between wild boar and outdoor domestic pigs, sufficient for transmission of infection. In several settings, a spatial and temporal overlap of outdoor pigs and wild boar is found. Direct contacts between pigs and wild boar are less frequent than indirect interactions at focal points such as watering points or feeding sites. Interactions are more frequent at specific times of the year, associated with access to water, local abundance of seasonal food resources and sexual wild boar-domestic pig interactions when pigs are not neutered. Transmission of pathogens has been shown between sympatric free-ranging pigs and wild boar that share the same habitat and food and water resources.

Socio-economic drivers have been shown to contribute to ASF introduction and persistence and to affect biosecurity levels of pig farms.

4.2.4. Categorisation of outdoor pig farms in EU MSs according to their risk of ASFV introduction and spread

It is not possible to accurately determine the number of ASF outbreaks that have occurred in outdoor pig production in the EU, due to lack of data.

Based on the EKE results, the baseline ASF risk appears to be higher in type I[25] farms than type II[26] farms, but with considerable uncertainty:

- The estimated baseline ASF risk for type I farms was very high, with a median of 87% and a 95% probability interval of 53–99%. (*That is, an outbreak of ASF is expected in the coming year in 87 of 100 currently uninfected type I outdoor farms in areas of the EU, where ASF infection is present in domestic pigs in indoor farms and domestic pigs in outdoor farms and in wild boar)*.
- The baseline ASF risk for type II farms was high (median either 37 or 42% depending on the distribution used), but with considerable uncertainty (95% probability interval 4–90% or 8–90%).

4.2.5. Effectiveness of biosecurity measures on ASF introduction and spread

The use of wild boar proof fences is the biosecurity measures considered most likely to effectively reduce the risk of ASF introduction into outdoor pig farms. These could be single solid or double fences at least 1.5 m high and properly fixed to the ground to prevent the ingress of wild boar under the fence (undercrossing). For double fences, the distance between fence rows should be at least 1.5 m.

Other biosecurity measures that seek to avoid attracting wild boar to farm premises or to improve farm hygiene are expected to be less effective, although they may still contribute to reducing the risks.

For some pairs of biosecurity measures, the Panel is over 90% certain that one is more effective than the other (e.g. double fence or single solid fence vs. no access to stored feed, water, etc.); for other pairs of biosecurity measures the Panel's certainty is 70–80% (e.g. simple single fence vs. double or single solid fence); and for some pairs of biosecurity measures the Panel considers it about equally likely that each BSM is more effective than the other (e.g. no wild boar baiting vs. no access to water).

Feasibility and sustainability are importance considerations for biosecurity measures. In this context, feasibility reflects the proportion of outdoor pig farms that would start implementing this BSM if it were included as a requirement in a strategic approach to the management of ASF in the EU, whereas sustainability reflects the proportion of outdoor farms that would continue implementing a BSM for at least 2 years following initial implementation.

In general, the feasibility of biosecurity measures was higher on type II compared to type I outdoor farms. A single solid or double fence (the biosecurity measures that were considered most effective) had medium to high feasibility for farm type II (implemented by 40–80% of farms), but very low to low feasibility for farm type I (0–40%), mainly due to costs incurred by their construction. The sustainability of single solid or double fences was considered to be better than their feasibility. A simple single fence was judged most likely to have medium to high feasibility (40–80% implementation) on type I farms and medium to very high (40–100%) on type II farms.

[25] Type I outdoor pig farm: pigs have access to an outdoor area in forest, woodlands, on agricultural land or pastures.
[26] Type II outdoor pig farm: pigs have access to an outdoor area on farm premised (adjacent to farm buildings).

There is a lack of quantitative, field-based evidence regarding the effectiveness of biosecurity measures to reduce the risk of ASF introduction and spread on outdoor pig farms, including preventing the contact between domestic pigs and wild boar. This is an area that urgently requires research.

4.2.6. Improvements of biosecurity of the different outdoor pig farm types that could be demanded to maintain outdoor farming of pigs in ASF-affected areas

The biosecurity improvements of the different outdoor pig farm types that could be demanded to maintain outdoor farming of pigs in ASF-affected areas are part of the main conclusions of this assessment and have been listed in Section 4.1.

4.2.7. Control measures to complement improved biosecurity of outdoor pig farms

Control measures are used to complement improved biosecurity of outdoor pig farms. A number of priority control measures have been identified, in addition to the on-farm biosecurity assessments mentioned in Section 4.1, including each of the following:

- Relating to farm categorisation
    - Systems for categorisation of pig farms, clearly distinguishing different types of outdoor pig production, incorporated into legislation and guidelines at European level, and including data collection requirements, are needed to categorise pig farms according to their ASF introduction and spread risk levels.
- Relating to farm registration
    - The registration of outdoor pig farms in national electronic databases should include information that would allow outdoor farms to be categorised and ASF introduction and spread risks to be assessed (i.e. the type of outdoor access for the outdoor pig farms (free range in pastures/forests, open buildings with unlimited outdoor access to yards, indoor buildings with controlled access to yards/runs), the production type (including categories for pigs considered by their owners as companion animals, pigs kept for self-consumption (backyards), mixed farms and whether the farm is commercial/non-commercial). This information should be regularly updated (e.g. annually or at least every second year).
    - Approval of outdoor pig farms by veterinary authorities only after inspection and following assessment of farm biosecurity level using a standard protocol/tool (e.g. Biocheck UGent or similar tools).
    - Some countries have specific requirements for establishments keeping fenced wild boar for breeding or commercial hunting purposes (such as game gardens and game farms). Hungary for example has made it compulsory that these establishments must sign a written contract with a veterinarian and set up a biosecurity plan; this plan must specify the maximum number of wild boar, which can be kept in the establishment, establish rules for all in and outward traffic and foresee a depopulation protocol in case of ASF positivity.
- Relating to surveillance
    - Increased passive surveillance by hunting authorities will lead to early detection of disease incursions and may limit the spread. Passive surveillance relies on the notification of wild boar presence, wild boar carcasses and mortalities in domestic pigs.
- Relating to awareness programmes
    - Awareness campaigns on ASF with different messages tailored to different stakeholders (farmers, other people who keep pigs, hunters, people who access the outdoors for recreational purposes, etc.) will gradually lead to improved farm biosecurity and reduce behavioural risks for ASF introduction and spread.

5. Recommendations

5.1. Main recommendation

Specific quantitative information on the effectiveness of on-farm BSMs to minimise ASF introduction into, and spread from, pigs kept outdoors is lacking. However, the Panel rates double fences and single solid fences highest in terms of effectiveness for both outdoor farm types and is 66–90% certain that their correct implementation would reduce the baseline risk of outdoor pig farms by more than 50%. The Panel concludes that the regular implementation of independent and objective on-farm biosecurity assessments using comprehensive standard protocols and approving outdoor pig farms based on their biosecurity risk in an official system managed by competent authorities will further reduce the risk of ASF introduction and spread related to outdoor pig farms.

Therefore, the Panel recommends that derogations from the current restriction of outdoor pig farming in ASF-affected areas can be considered on a case-by-case basis if the appropriate biosecurity measures indicated above are implemented in ASF-affected MSs.

5.2. Characterisation of outdoor pig farms in EU MSs

A harmonised registration system should be developed at EU level for the categorisation of pig farms regarding their outdoor access and the different types thereof, the number of outdoor farms, the number of pigs per outdoor farm, the commercial or non-commercial nature of the pig keeping activity or the breed of the pigs kept. The registration of this information in national databases for pig population would allow the collection of harmonised and comparable data for further analysis.

In several MSs, wild boar (or wild boar-domestic pig hybrids) are kept on farm establishments, invariably with substantial outdoor access. Although beyond the remit of this opinion, there is a range of different approaches to keeping wild boar, from clearly owned and identified wild boar on farm establishments through to wildlife maintained in fenced hunting areas. Kept wild boar populations in MSs should be registered and their biosafety, particularly regarding fencing, feeding, animal movements among facilities, etc. should be assessed.

The Panel acknowledges that pigs are not legally considered as pets. However, pigs in hobby holdings or kept as companions are at risk of becoming infected with ASFV and transmitting it to other pigs, especially in rural areas. More information is needed related to their registration and movements.

5.3. Biosecurity measures currently implemented in EU MSs

EU legislation should prescribe specific biosecurity measures for outdoor pig farms.

5.4. Potential risk factors for introduction into farms and spread into the region linked to outdoor pig farming

A high proportion of ASF outbreaks has occurred in domestic pigs kept in backyard farms in parts of the EU. While this percentage may reflect a high proportion of farms keeping pigs outdoors in certain countries (e.g. outdoor keeping of pigs is a common practice in Sardinia, Italy), the specific risk factors/biosecurity breaches leading to these outbreaks should be determined. Information about outdoor access and BSMs applied in backyard farms would be needed, as part of this work.

5.5. Categorisation of outdoor pig farms in EU MSs according to their risk of ASFV introduction and spread

When reporting ASF outbreaks to ADNS, the presence/absence and type of outdoor access provided by the affected farms should be recorded, to allow farm types at highest risk of ASF introduction and spread to be identified.

5.6. Effectiveness of biosecurity measures on ASF introduction and spread

Research should be undertaken to obtain quantitative, field-based evidence about the effectiveness of on-farm biosecurity measures to reduce the risk of ASF introduction and spread, including preventing contact between domestic pigs and wild boar.

5.7. Improvements of biosecurity of the different outdoor pig farm that could be demanded to maintain outdoor farming of pigs in ASF-affected areas

Regular, independent and objective assessment of on-farm biosecurity using a standard protocol/tool (Biocheck UGent or similar) and incorporating farm-level benchmarking should be implemented, with the aim to promote continuous improvement of biosecurity practices, with these assessment results being used in an official system managed by competent authorities to categorise and approve outdoor pig farms on the basis of their biosecurity risk. The concept of farm-level benchmarking, both to assess change on a particular farm over time and as a means to allow between-farm comparison (locally, regionally and at a national level), should be introduced to encourage ongoing improvement of on-farm biosecurity.

Where the non-compliance related to fencing/incomplete fencing reported frequently by MSs is due to legal constraints on fencing, e.g. for environmental reasons, these constraints should be addressed to enable biosecurity improvements.

5.8. Control measures to complement improved biosecurity of outdoor pig farms

It is recommended that, in addition to improved biosecurity (including regular biosecurity assessment), the following control measures are considered:

- Relating to farm categorisation
    - Development of a system for categorisation of pig farms, to clearly distinguish different types of outdoor pig production. It is recommended that the system be incorporated into legislation and guidelines at European level.
- Relating to farm registration
    - Registration of information on the type of outdoor access for the outdoor pig farms in national electronic databases (free range in pastures/forests, open buildings with unlimited outdoor access to yards, indoor buildings with controlled access to yards/runs), of the production type (including categories for pet pigs [companion animals], pigs kept for personal consumption [backyards], mixed farms), of the commercial/non-commercial activity. This information needs to be regularly updated (e.g. annually or at least every second year), with the potential to allow BSMs or other control measures to be applied differentially.
    - Registry of all fenced wild boar populations, even those containing only wildlife and not registered as farm establishments.
- Relating to surveillance
    - Enhanced passive surveillance requiring notification and investigation of wild boar presence, wild boar carcasses and dead domestic pigs (i.e. factors related to potential ASF identification).
- Relating to awareness programmes
    - Awareness campaigns on ASF with different messages tailored to different stakeholders (farmers, other people who keep pigs, hunters, people who access the outdoors for recreational purposes, etc.).

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Glossary

Outdoor farm — Holdings in which pigs are kept temporarily or permanently outdoors
Outdoor pig

A suid animal (Sus scrofa) that is kept temporarily or permanently outdoors, not necessarily with means to constrain its movements, and with clearly defined ownership. This definition includes kept wild boar (identified and owned) as well as suid animals that are kept for non-commercial purposes. Hunting pens where wild boars are kept in a fenced area without a clear ownership are not part of this assessment.

Abbreviations

AD	Aujeszky's Disease
ADNS	Animal Disease Notification System
AHAW	Animal Health and Welfare
ASF	African swine fewer
BSM	biosecurity measures
EBS	East Balkan Swine
EKE	Expert knowledge elicitation
FAs	farmers' associations
HEV	Hepatitis E
MSs	Member States
NCF	non-commercial pig farms
NDB	National Database
NDVI	normalised difference vegetation index
PAFF	Standing Committee on Plants, Animals, Food and Feed
SVDP	sero- or virus-positive domestic pigs
TASAH	Targeted Advisory Service for Animal Health
TORs	terms of reference
VAs	Veterinary Authorities

Annex A – Categorisation of and biosecurity measures in outdoor pig farms in EU legislation and supportive documents

Categorisation of outdoor pig farms

The Working Document SANTE/7113/2015 (Rev 12/April 2020) on the Strategic approach to the management of African Swine Fever for the EU, is the only document where a definition for the outdoor farm was found. In this document, an outdoor farm is defined as a 'holding in which pigs are kept temporarily or permanently outdoors'.

As a holding in article 2(c) of the Council Directive 2002/60/EC is defined 'any agricultural or other premises located in the territory of a MS where pigs are being bred or kept on a permanent or temporary basis. This definition does not include slaughterhouses, means of transport and fenced areas where feral pigs are kept and may be hunted.'

According to the article 2(a) of the Council Directive 2002/60/EC pig shall mean any animal of the Suidae family, including feral while in article 2(b) of the same Directive, feral pig is defined as 'a pig which is not kept or bred on a holding'.

For the purposes of the new Animal Health Law, Regulation 2016/429 as explained in whereas (19) the term 'wild animals' covers all animals that are not kept by humans, including stray and feral animals, even if they are of species that are normally domesticated and the following definitions are provided accordingly:

a) 'kept animals' means animals which are kept by humans, including, in the case of aquatic animals, aquaculture animals (AHL 2016/429 article 4(5)),
b) b)'wild animals' means animals which are not kept animals (AHL 2016/429 article 4(8)).

In addition, in the Regulation 2016/429, the term holding is not included and it seems that it has been replaced by the term 'establishment' which is defined in article 4(27) as 'any premises, structure or, in the case of open-air farming, any environment or place, where animals or germinal products are kept, on a temporary or permanent basis, except for: (a) households where pet animals are kept; (b) veterinary practices or clinics'.

The term outdoor farm is not included in the Regulation 2016/429 as well; an alternative term open-air farming has been identified but without any definition.

In article 1 of the Commission Implementing Regulation (EU) 2015/1375, the term controlled housing conditions has been identified, as 'a type of animal husbandry where swine are kept at all times under conditions controlled by the food business operator with regard to feeding and housing'.

Biosecurity measures in outdoor pig farms

In the article 4(23) of the Regulation 2016/429, ***'biosecurity'*** is defined as *'the sum of management and physical measures designed to reduce the risk of the introduction, development and spread of diseases to, from and within: (a) an animal population, or (b) an establishment, zone, compartment, means of transport or any other facilities, premises or location'.*

In the (43) of the same Regulation, more explanations are provided, according to which '***Biosecurity*** *is one of the key prevention tools at the disposal of operators and others working with animals to prevent the introduction, development and spread of transmissible animal diseases to, from and within an animal population. The* ***role of biosecurity*** *is also recognised in the impact assessment for the adoption of this Regulation, in which possible impacts are specifically assessed. The* ***biosecurity measures*** *adopted should be sufficiently flexible, suit the type of production and the species or categories of animals involved and take account of the local circumstances and technical developments. Implementing powers should be conferred on the Commission to lay down minimum requirements necessary for the uniform application of biosecurity measures in the Member States. Nevertheless, it should always remain within the power of operators, Member States or the Commission to promote prevention of transmissible diseases through higher biosecurity standards by developing their own guides to good practice. While biosecurity may require some upfront investment, the resulting reduction in animal disease should be a positive incentive for operators.'*

The basic framework of the biosecurity measures is provided in the article 10 of the regulation the Regulation 2016/429 according to which: '***The biosecurity measures*** *referred to in point (b) of paragraph 1 shall be implemented, as appropriate, through:*

a) ***physical protection measures****, which may include: (i) enclosing, fencing, roofing, netting, as appropriate; (ii) cleaning, disinfection and control of insects and rodents; (iii) in the case*

of aquatic animals, where appropriate: — measures concerning the water supply and discharge; — natural or artificial barriers to surrounding water courses that prevent aquatic animals from entering or leaving the establishment concerned, including measures against flooding or infiltration of water from surrounding water courses; and

b) ***management measures**, which may include: (i) procedures for entering and exiting the establishment for animals, products, vehicles and Procedures for the vehicles entering and exiting the establishment; (ii) procedures for using equipment; (iii) conditions for movement based on the risks involved; (iv) conditions for introducing animals or products into the establishment; (v) quarantine, isolation or separation of newly introduced or sick animals; (vi) a system for safe disposal of dead animals and other animal by–products.'*

The Working Document SANTE/7113/2015 (Rev 12/April 2020) describes the minimum biosecurity requirements (named criteria) for the non-commercial pig farms (NCF) and the commercial pig farms (CF) while for the outdoor farms the only *biosecurity criterion i*ncluded is that *the outdoor keeping of pigs is banned.*

In addition, general hygiene provisions for primary production and associated operations are laid down in part A of Annex I in Regulation (EC) No 853/2004:

'4. Food business operators rearing, harvesting or hunting animals or producing primary products of animal origin are to take adequate measures, as appropriate:

a) to keep any facilities used in connection with primary production and associated operations, including facilities used to store and handle feed, clean and, where necessary after cleaning, to disinfect them in an appropriate manner;
b) to keep clean and, where necessary after cleaning, to disinfect, in an appropriate manner, equipment, containers, crates, vehicles and vessels;
c) as far as possible to ensure the cleanliness of animals going to slaughter and, where necessary, production animals;
d) to use potable water, or clean water, whenever necessary to prevent contamination;
e) to ensure that staff handling foodstuffs are in good health and undergo training on health risks;
f) as far as possible to prevent animals and pests from causing contamination;
g) to store and handle waste and hazardous substances so as to prevent contamination;
h) to prevent the introduction and spread of contagious diseases transmissible to humans through food, including by taking precautionary measures when introducing new animals and reporting suspected outbreaks of such diseases to the competent authority;
i) *to take account of the results of any relevant analyses carried out on samples taken from animals or other samples that have importance to human health; and*
j) *to use feed additives and veterinary medicinal products correctly, as required by the relevant legislation.'*

In the Part II in point 1.9.3.2 of the Regulation (EU) 2018/848 on organic production, there are rules that shall apply for the housing and husbandry practices for porcine animals:

'With regard to housing and husbandry practices, the following rules shall apply:

a) *the housing shall have smooth, but not slippery floors;*
b) *the housing shall be provided with a comfortable, clean and dry laying or rest area of sufficient size, consisting of a solid construction which is not slatted. Ample dry bedding strewn with litter material shall be provided in the rest area. The litter shall comprise straw or other suitable natural material. The litter may be improved and enriched with any mineral product authorised pursuant to Article 24 as a fertiliser or soil conditioner for use in organic production;*
c) *there shall always be a bed made of straw or other suitable material large enough to ensure that all pigs in a pen can lie down at the same time in the most space-consuming way;*
d) *sows shall be kept in groups, except in the last stages of pregnancy and during the suckling period, during which time the sow must be able to move freely in her pen and her movement shall only be restricted for short periods;*
e) *without prejudice to any additional requirements for straw, a few days before expected farrowing, sows shall be provided with a quantity of straw or other suitable natural material sufficient to enable them to build nests;*
f) *exercise areas shall permit dunging and rooting by porcine animals. For the purposes of rooting, different substrates may be used.'*

Annex B – Questionnaire Survey Results

Contribution to the questionnaire survey

Table B.1: Contribution to the questionnaire survey of the Veterinary Authorities and the Farmers' Associations per MS

Member States	Replied by the VAs yes/no	Replied by the farmer's associations yes/no (No)	Associations
Austria (AT)	Yes	Yes (1)	Animal Health Organisation
Belgium (BE)	Yes	No	–
Bulgaria (BG)	Yes	Yes (1)	Association for Breeding and Preserving of the East Balkan Swine
Croatia (HR)	Yes	Yes (2)	Turopolje pig - Plemenita općina turopoljska
			Black Slavonian pig breeder's association
Cyprus (CY)	Yes	No	–
Czechia (CZ)	Yes	No	–
Denmark (DK)	Yes	Yes (1)	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre
Estonia (EE)	Yes	No	–
Finland (FI)	Yes	Yes (2)	A_Farmers Ltd_Atria Finland Ltd
			Animal Health ETT
France (FR)	Yes	No	–
Germany (DE)	Yes	No	–
Greece (EL)	Yes	No	–
Hungary (HU)	Yes	No	–
Ireland (IE)	Yes	Yes (1)	Irish Farmers' Association
Italy (IT)	Yes	No	–
Latvia (LV)	Yes	No	–
Lithuania (LT)	Yes	No	–
Luxembourg (LU)	Yes	No	–
Malta (MT)	No	No	–
Netherlands (NL)	Yes	No	–
Poland (PL)	Yes	No	–
Portugal (PT)	Yes	Yes (1)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)
Romania (RO)	Yes	Yes (1)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna
Slovakia (SK)	Yes	No	–
Slovenia (SI)	Yes	No	–
Spain (ES)	Yes	Yes (2)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)
			ARAPORC
Sweden (SE)	Yes	No	–
Total	**26**	**12**	

Types of Outdoor pig farms in EU MSs based on EFSA's categorisation (Question 2.1).

Table B.2: Detailed table with the different types of outdoor pig farms (EFSA's categorisation) existing in each EU MSs based on the replies received from the Veterinary Authorities of 26 MSs (Question 2.1)

Country	Outdoor farms that allow access to forests or woodlands								Outdoor farms that allow access to pastures or fields								Outdoor farms that allow access to concrete fenced yards and runs				Totals
	Unfenced areas in woodlands or forests				Fenced areas in woodlands or forests				Unfenced areas in pastures or fields				Fenced areas in pastures or fields				Open buildings with fenced yards		Closed building with controlled access to fenced yards or runs		
	Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the woodlands or forests are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night.	Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the woodlands or forests are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night.	Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the pastures or fields available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night.	Pigs stay there for their entire life, during all production stages.	Pigsstaytherepartiallyforspecific production stages or for some periods oftheyear.	Mobile/temporary shelters within the pastures or fields are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night	Pigs stay there for their entire life, during all production stages	Pigs stay there partially for specific production stages or for some periods of the year	Pigs stay there for their entire life, during all production stages	Pigs stay there partially for specific production stages or for some periods of the year	
Austria (AT)	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**12**
Belgium (BE)	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	**5**

Bulgaria (BG)	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	**8**
Croatia (HR)	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**12**
Cyprus (CY)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	**1**
Czechia (CZ)	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No	**2**
Denmark (DK)	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**11**
Estonia (EE)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**0**
Finland (FI)	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes	Yes	Yes	No	**6**
France (FR)	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**12**
Germany (DE)	No	No	No	No	No	Yes	No	No	No	No	No	No	No	Yes	No	No	No	Yes	Yes	No	**4**
Greece (EL)	No	No	No	No	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	**5**
Hungary (HU)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	**2**
Ireland (IE)	No	No	No	No	No	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	**7**
Italy (IT)	No	Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	**6**
Latvia (LV)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**0**
Lithuania (LT)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**0**
Luxembourg (LU)	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No	Yes	No	Yes	**4**
Malta (MT)									No reply received												
Netherlands (NL)	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	**9**
Poland (PL)	No	No	No	No	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	**7**
Portugal (PT)	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	**6**
Romania (RO)	No	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	No	Yes	No	Yes	No	**6**
Slovakia (SK)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	**1**
Slovenia (SI)	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	Yes	No	Yes	No	Yes	**8**
Spain (ES)	No	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**10**
Sweden (SE)	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**9**
Totals	**0**	**2**	**0**	**1**	**12**	**14**	**6**	**5**	**0**	**1**	**0**	**0**	**11**	**18**	**11**	**12**	**12**	**15**	**17**	**16**	**15**

Table B.3: Detailed table with the different types of pig outdoor farms (EFSA's categorisation) existing in each EU MSs based on the replies received from 12 Farmers' Associations of 9 EU MSs (Question 2.1)

Country	Association	Outdoor farms that allow access to forests or woodlands								Outdoor farms that allow access to pastures or fields								Outdoor farms that allow access to concrete fenced yards and runs				Totals
		Unfenced areas in woodlands or forests				Fenced areas in woodlands or forests				Unfenced areas in pastures or fields				Fenced areas in pastures or fields				Open buildings with fenced yards		Closed building with controlled access to fenced yards or runs		
		Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the woodlands or forests are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night.	Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the woodlands or forests are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the woodlands or forests for the night.	Pigs stay there for their entire life, during all production stages.	Pigs stay there partially for specific production stages or for some periods of the year.	Mobile/temporary shelters within the pastures or fields available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night.	Pigs stay there for their entire life, during all production stages.	Pigsstaytherepartiallyforspecific production stages or for some periods oftheyear.	Mobile/temporary shelters within the pastures or fields are available for pigs.	Pigs are moved to permanent buildings or mobile shelters located outside the pastures or fields for the night	Pigs stay there for their entire life, during all production stages	Pigs stay there partially for specific production stages or for some periods of the year	Pigs stay there for their entire life, during all production stages	Pigs stay there partially for specific production stages or for some periods of the year	
Austria (AT)	Animal Health Organisation	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	9

Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Swine	Yes	No	Yes	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	9
Croatia (HR)	Turopolje pig - Plemenita opčina turopoljska	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	1
	Black Slavonian pig breeder's association	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	18
Denmark (DK)	Danish Agriculture & Food Council/ SEGES - Danish Pig Research Centre	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	8
Finland (FI)	A_Farmers Ltd_Atria Finland Ltd	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	0
	Animal Health ETT	No	No	No	No	Yes	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	8
Ireland (IE)	Irish Farmers' Association	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	6
Portugal (PT)	ANCPA Associaçao Nacional dos Criadores do Porco Alentejano	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	9
Romania (RO)	Asociatia crescatorilor de suine autochtone Mangalita si Bazna	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No	3

	ASOCIACIÓN ESPAÑOLA DE CRIADORES DE CERDO IBÉRICO (AECERIBER)	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes	7
	ARAPORC	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	6
Totals		2	1	2	1	4	5	6	3	1	1	1	1	4	9	9	7	5	8	7	7	20

Types of outdoor pig farms in EU MSs based on their national categorisation system (Question 2.2 and 2.3)

Table B.4: Different types of outdoor pig farms at national level according to national legislation or standards, based on the replies from the Veterinary Authorities of the MSs (Question 2.2 and 2.3)

Country	Category	Description and characteristics	Number of farms	Number of animals
Austria (AT)	Free-range holding	Keeping pigs outdoors without a permanent barn only with protective devices	321	8,201
	Outdoor holding	Keeping pigs in stalls that have indoor and outdoor areas	NA	NA
Belgium (BE)	Commercial farms with outdoors	Pig farms with more than 3 pigs, and having outdoor access – these pigs are destined for commercial trade	318	28,398
	Non-commercial farms with outdoors	These are farms with max 3 pigs – these could be pigs for own consumption only or 'pet pigs'	750	2,250 (max.3 × 750)
Bulgaria (BG)	East-Balkan pigs herds	Bulgarian breed. Due to ASF very few herds are left.	20	896
Croatia (HR)	Outdoor farms - Category 4	Farms with approval for outdoor farming	101	8,731
	Farms with fenced yards	Pigs are kept in buildings, but have temporary access to open fenced yard, mainly small backyard farms out of which 3,761 farms keep only one pig.	12,756	133,052
	Outdoor farms - Category 1 or 2	Farms pending approval for outdoor farming	203	6,842
Cyprus (CY)	Backyard farms	In 2019, 1496 animals were kept in the 81 backyard farms.	81	1,496
Czechia (CZ)	Type I	I. Pig farms with pigs in permanently closed buildings without any access to the outdoor area for their whole life, for all the production stages.	NA	NA
	Type II	II. Pig farms with pigs in permanently closed buildings with controlled access to a limited outside run/yard which is fenced (as mentioned in the 2.1.3. Part). Unfortunately, the national database does not differentiate pig farms according to this criterion, so we do not know the number of farms type II and I.	NA	NA

Country	Category	Description and characteristics	Number of farms	Number of animals
Denmark (DK)	Fenced wild boar	Wild boar kept under the same regulation as free ranging pigs, with regard to rules fence and prohibition of swill feeding.	50	1,270
	Free ranging pig production A	In free ranging pig production, the pregnant sows are either kept in outdoor fenced field/ pastures or indoor loose housing systems. The lactating sows and piglets are kept on fields/pastures from farrowing to weaning. Fattening pigs are kept in stables with access to outdoor fenced areas or concrete outside run/yards. Total number of production A and B	494	197,414
	Free ranging pig production B	Sows, piglets and fattening pigs are kept in fenced pastures/fields/woodlands for their entire life.		
Estonia (EE)		Keeping of pigs outdoor is prohibited in Estonia.	0	0
Finland (FI)	Commercial pig farms with outdoor access	There may be outdoor access for e.g. sows. In commercial pig farms it is very uncommon that animals would get outdoors at all. We do not register information of outdoor access.	NA	NA
	Organic pig farms	According to requirements of organic farming pigs have to have outdoor access. All organic pigs have outdoor access at least from May to October	15	5,229
	Farmed wild boar	Farmed wild boar are kept outdoors. Farmed wild boar are kept in fenced areas in forests year-round.	Estimate 20	Estimate 589
	Mini pigs	Mini pigs are kept as pets by private persons. Usually they have outdoor access, either in fenced area or on a leash. Private persons have usually one or a few animals.	348	NA
	Mangalica pig farms	Mangalica pigs are kept outdoors year-round except during farrowing time. We do not register the breed of pigs, so the official number of Mangalica pigs is not available. We estimate the number of farms to be about 10.	Estimate 10	NA
	Domestic animal parks	Domestic animal parks serve as local small-scale tourist attractions. There may be mini pigs and/or other pigs. No official data available	Estimate 25	Estimate 150
France (FR)	All types of outdoor farms	No definition of types, no registration	5,777	NA
Germany (DE)	Outdoor husbandry system	A system where pigs are kept outdoors with shelters only and no permanent housing. The competent authority has to approve the holding. The approval has to be refused if the holding is in an area at risk of swine fever (ASF/CSF). At the moment no numbers of farms/animal are available.	At present no data of outdoor holdings are available	
	Outdoor access	A system where pigs are kept in a housing and allowed to spend some time outdoors		
Greece (EL)	NA	NA	NA	NA
Hungary (HU)	Outdoor farm	Pigs have access to open-air yards/runs (even a small one). Any type of holdings (large-scale, small-scale commercial and small-scale non-commercial) can be outdoor if pigs have any access to open-air areas.	1,015	251,535

Country	Category	Description and characteristics	Number of farms	Number of animals
Ireland (IE)	Organic pig farms	The Organic Food and Farming Standards in Ireland prohibits permanent housing for pigs and also stipulates that the pig enterprise should be free-range which allows the pigs direct access to soil and green food (2.08.03 & 4.05.14)	NA	NA
		Small numbers of pigs are kept with restricted outdoor access. Ireland does not have a feral pig population. Any domestic pigs with outdoor access must be kept in a manner that prevents them from straying from the land or premises where they are kept under national legislation (Part 2 Section 8 Animal Health and Welfare Act 2013). Ireland has very few pig farms where small numbers of pigs are kept with restricted outdoor access. According to the Annual Pig Census 2019 there are only 1,631 active pig herds in total registered in Ireland and 96.7% of all pigs are kept in commercial herds of 1,000 pigs or more.	1,631	NA
Italy (IT)	Total Wild boar and pig farms	Semi-wild and wild farms. The animals, especially in spring-summer, go to pasture during the day and then return to closed/covered structures for night shelters. Food supplementation is provided.	9,433	144,134
	Farms with only pigs	Semi-wild and wild farms. The animals, especially in spring-summer, go to pasture during the day and then return to closed/covered structures for night shelters. Food supplementation is provided.	9,088	139,981
	Farms with only wild boar	Semi-wild and wild farms. The animals, especially in spring-summer, go to pasture during the day and then return to closed/covered structures for night shelters. Food supplementation is provided.	345	4,153
Latvia (LV)		No outdoor pig farms	0	0
Lithuania (LT)		The outdoor farms are forbidden in entire country since 2013. According to national biosecurity requirements it is forbidden to keep pigs outside. Commercial- holdings which sell or supplies pigs, send pigs to a slaughterhouse or move pig products off the holding. Non-commercial- holdings where pigs are kept only for fattening (not more than 10) for own consumption or are otherwise permanently resident and pigs are not traded or leave the holding and none of their products enter the food chain.	0	0
Luxembourg (LU)	Commercial		7	179
	Pet pigs		20	42
	Back yard (private slaughter)		12	29
Malta (MT)		No reply received		
Netherlands (NL)	Organic	Commercial, for meat; partially kept outdoors often are farms with closed buildings, with outdoor access (for finishers often concrete, but sometimes other type or even soil).	168	93,210

Country	Category	Description and characteristics	Number of farms	Number of animals
	Hobby	Non-commercial: There is no definition of hobby pig, when a location has 4 or fewer pigs, it is registered as RE/hobby farm. Possibly they keep the pigs as pet, maybe they will slaughter pigs for own consumption.	5040	5,000–20,000
Poland (PL)	Hybrid wild boar open space	Open space system	67	NA
	Pigs	Open space system		
Portugal (PT)	Extensive	System that uses grazing in its production process, with a lower head 1.4 CN/ha or that develops livestock activity with low productive intensity or low animal density.	1,547	156,182
	Intensive outdoors	Developed system on the ground, in open space, with reduced resource of fixed installations	266	28,561
Romania (RO)	Hunting complex	Fenced farm where wild pigs are raised for hunting	NA	NA
	Game farm	Fenced farm where wild pigs are produced for hunting or for the population of other hunting funds	NA	NA
	Farm with a semi-open raising system for native pig breeds Mangalita and Bazna	Pig holdings where local/autochthonous breeds are raised	160	3,500
	Semi-intensive breeding farm for the native pig breeds Mangalita and Bazna	Pig holdings where local/autochthonous breeds are bred	25	1000
Slovakia (SK)	NA			
Slovenia (SI)	There are different types of outdoor pig farms but there is no definition for each.	Registration in Central register of pigs is obligatory for each farm with at least one pig but the information on the type of housing (indoor, outdoor) is not included in the register. Therefore, it is not able to provide the number of farms and pigs in different types of outdoor farms.	NA	NA
Spain (ES)	Commercial Iberian pig production in Spain. This is an important production sector in Spain. Most farms are highly industrialised and applying strict biosecurity measures.	Extensive production system based on the exploitation of natural resources. Pigs may be rear outdoor with fences (normally non-impermeable to wild boar) on the dehesa for their whole life (tent/camping system occasionally used by breeders' farms). There are other farms where pigs are reared a part of their life in outdoor conditions also with non-impermeable fences (outdoor fattening farms). Finally, there are many extensive farms where pigs are reared by compounds at the end of the cycle and with temporal access to outdoor conditions in some periods to take advantages of natural resources when they are available (fattening units), this is the most common fattening farms nowadays. Mostly located in dehesa agroforestry ecosystems, mainly on the south-west area of Spain (Salamanca, Extremadura, west of Andalucía and some areas of Castilla la Mancha)	13,549	1,566,419
	Non-commercial farms for own consumption	Small backyard pig farms with temporal or permanent access to outdoor. They are intended for self-consumption only.	1,123	1,476

Country	Category	Description and characteristics	Number of farms	Number of animals
Sweden (SE)	Fenced wild boar	Wild boar are kept permanently outdoors	135	NA
	EU organic domestic pigs		NA	NA
	Open air buildings	No outdoor access but can have contact with wind boars through fences	NA	NA
	Organic farms	Animals must have access to pastures during summertime.Organic farms according to special requirements (KRAV standard).	30 approx.	30, 000 approx.
	Other farms with outdoor access	Other fenced outdoor farms	NA	NA
	Hobby farms	Non-commercial small farms	NA	NA
	Miniature pigs	Small non-commercial, pets.	127	NA

Table B.5: Different types of outdoor pig farms at national level according to national legislation or standards, based on the replies received from 10 Farmers' Associations of 8 EU MSs (Question 2.2 and 2.3)

Country	Association	Outdoor Category: Description and characteristics	Number of farms	Number of pigs
Austria (AT)	Animal Health Organisation	**Outdoor farming:** Protected against wild boar by double fence. Pigs are farmed outdoors	NA	NA
		Keeping of pigs in building with access to outdoor run. Bio area required.	NA	NA
Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Swine	**East Balkan Pig Farms:** Outdoor access to pastures/fields without fences. During ASF the pigs are kept within limited fenced spaces.	40–50 (prior to ASF) 5 (currently)	3,000–4,000 (prior to ASF) 400 (currently)
		Pig farms with outdoor access to yards with fences: Outdoor access to pastures/fields with fences. No official statistics. Those type of farms are not clearly defined by local legislation. They are part of the registered industrial or Family Type pig holdings.	15–20	300–400
		Industrial farms with outside yards: Permanent closed building farms with controlled access to a limited concrete outside run/yard which is fenced. No official statistics. They are part of the registered industrial pig holdings.	NA	NA
		Industrial farms without open space areas: No official statistics. They are part of the registered industrial pig holdings.	NA	NA
		Back yards: Non-commercial pig breeding farms – for personal consumption of the owner only. Back yards usually are with outdoor yards. No official statistics.	NA	NA

Country	Association	Outdoor Category: Description and characteristics	Number of farms	Number of pigs
Croatia (HR)	Turopolje pig - Plemenita opčina turopoljska	NA	NA	NA
	Black Slavonian pig breeder's association	NA	NA	NA
Denmark (DK)	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre	**Wild boar farm:** wild boar, outside. (Data retrieved from Danish CHR-register on 11 August 2020)	49	1,284
		Free-range: organic or non-organic farms. (Data retrieved from Danish CHR-register on 11 August 2020)	441	194,020
		Hobby holdings: can be outdoors or indoors, it is not known. (Data retrieved from Danish CHR-register on 11 August 2020)	1,260	5,576
Ireland (IE)	Irish Farmers' Association	**Hobby domestic pig keepers:** Small numbers kept. 1–2 pigs each	1,050 (estimated)	2,000 (estimated)
		Specialist artistic pork & bacon producers. Greater scale than above but still quite small and localised in Ireland	150	35,000
		Commercial outdoor producers: very small number	30	4,500
Portugal (PT)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)	**Outside fenced yards with mobile/temporary shelters:** Shelters for held the breeders and piglets. (Most of Portuguese production).	NA	NA
Romania (RO)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	Farm with a semi-open breeding system for Mangalita and Bazna local pig breeds: raising animals in restricted conditions, with the compliance of breeding rules in accordance with the breeding requirements specific to each breed and with the obligation like animals to be confined in a certain space fenced and doubled with electric fence inside the fenced surface. It is an alternative characterised by combining the essential principles of free growth and industrial ones. The semi-open system offers a low-cost alternative, pretending to use the 'force of nature' to ensure animal welfare but respecting its own biosecurity plan adapted to the needs of the animals as well as reducing the risk of diseases.	160	3500
		Semi-intensive breeding farm for native pig breeds Mangalita and Bazna.	25	1,000
Spain (ES)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)	**Piglet Breeding:** using cabins or camping in fences or with individual enclosure. Each time less extended.	NA	NA
		Rearing: closed outdoor fences with mobile guard facilities	NA	NA
		Fattening: in Montanera (acorn fed) or extensive field bait in fences and at very low loads (maximum 15 heads per hectare).	NA	NA
	ARAPORC	NA	NA	NA

Supportive Material for the National Categorisation

Table B.6: Supportive material used by MSs for the categorisation of outdoor pig farms based on the replies received from the Veterinary Authorities of the 26 MSs (Question 2.3)

Member States	National Legislation	Guidelines or Standards	Check lists
Austria (AT)	**Yes**	**Yes**	**No**
Belgium (BE)	**No**	**Yes**	**No**
Bulgaria (BG)	**Yes**	**Yes**	**Yes**
Croatia (HR)	**Yes**	**Yes**	**Yes**
Cyprus (CY)	**No**	**No**	**No**
Czechia (CZ)	**Yes**	**No**	**Yes**
Denmark (DK)	**Yes**	**Yes**	**Yes**
Estonia (EE)	**Yes**	**No**	**No**
Finland (FI)	**No**	**No**	**No**
France (FR)	**No**	**No**	**No**
Germany (DE)	**Yes**	**No**	**No**
Greece (EL)	**No**	**No**	**No**
Hungary (HU)	**Yes**	**Yes**	**Yes**
Ireland (IE)	**No**	**Yes**	**No**
Italy (IT)	**Yes**	**No**	**No**
Latvia (LV)	**No**	**No**	**No**
Lithuania (LT)	**No**	**No**	**No**
Luxembourg (LU)	**No**	**Yes**	**No**
Malta (MT)	No reply	No reply	No reply
Netherlands (NL)	**Yes**	**No**	**No**
Poland (PL)	**No**	**Yes**	**No**
Portugal (PT)	**Yes**	**No**	**No**
Romania (RO)	**No**	**No**	**No**
Slovakia (SK)	**Yes**	**No**	**Yes**
Slovenia (SI)	**No**	**No**	**Yes**
Spain (ES)	**Yes**	**Yes**	**Yes**
Sweden (SE)	**No**	**Yes**	**No**
EU Total	**13**	**11**	**8**

Table B.7: Supportive material used by MSs for the categorisation of outdoor pig farms based on the replies received from 12 Farmers' Associations of 9 MSs (Question 2.3)

Country	Association	National Legislation	Guidelines or Standards	Check lists
Austria (AT)	Animal Health Organisation	Yes	Yes	Yes
Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Sw	No	No	No
Croatia (HR)	Turopolje pig - Plemenita općina turopoljska	Yes	Yes	Yes
	Black Slavonian pig breeder's association	Yes	Yes	Yes
Denmark (DK)	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre	Yes	Yes	Yes
Finland (FI)	A_Farmers Ltd_Atria Finland Ltd	Yes	No	No
	Animal Health ETT	Yes	Yes	No
Ireland (IE)	Irish Farmers' Association	No	Yes	No
Portugal (PT)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)	Yes	Yes	No

Country	Association	National Legislation	Guidelines or Standards	Check lists
Romania (RO)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	Yes	No	No
Spain (ES)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)	Yes	No	No
	ARAPORC	Yes	Yes	Yes

Pig Population data (Question 3.2)

Table B.8: Pig population data in EU MSs, based on the replies received from the Veterinary Authorities of 26 EU MSs (Question 3.2). Proportions have been calculated based on the data that they have been provided

Member States	All types of pig farms		Outdoor pig farms			Commercial Outdoor pig farms		Proportions			
	Number of farms	Number of pigs	Number of farms	Number of pigs	Average Number of pigs in farms (min/max)	Number of farms	Number of pigs	Outdoor pig farms/ all pig farms	Pigs in outdoor farms/pigs in all farms	Commercial outdoor farms/total outdoor farms	Commercial outdoor pig/ total outdoor pigs
Austria (AT)	27,019	2,771,643	321 (free-range)	8,201 (free-range)	NA	NA	NA	0.01 (free-range)	0.003 (free-range)	NA	NA
Belgium (BE)	7,177	7,252,401	1,168	30,648	93 (3/1,500)	318	28,398	0.16	0.004	0.27	0.93
Bulgaria (BG)	258	508,683	20	896	45 (8/212)	20	896	0.08	0.002	1	1
Croatia (HR)	69,985	1,227,737	13,060	148,652	11 (1/3,911)	9,299	144,891	0.19	0.121	0.71	0.97
Cyprus (CY)	148	378,550	81 (backyards)	1,496 (backyards)	NA	NA	NA	0.55	0.004	NA	NA
Czechia (CZ)	6,805	1,362,331	NA	NA	NA	NA	NA	NA	NA	NA	NA
Denmark (DK)	7,782	13,313,748	544	198,684	400 (1/ 8,400)	544	198,684	0.07	0.015	1	1
Estonia (EE)	122	286,706	0	0	NA	0	0	NA	NA	NA	NA
Finland (FI)	1,050	1,073,396	15 (organic)	5,229 (organic)	NA	NA	NA	0.0143	0.005	NA	NA
France (FR)	23,982	10,165,987 (places)	5,777	NA	NA	2,721	NA	0.24	NA	0.47	NA
Germany (DE)	21,200	26,000,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Greece (EL)	1,812	392,211	769	36,019	47 (1/6,449)	618	34,978	0.42	0.092	0.80	0.97
Hungary (HU)	26,711	2,352,323	1,015	251,535	248 (1/ 10,000)	218	250,018	0.04	0.107	0.21	0.99
Ireland (IE)	1,641	1,644,121	NA	NA	NA	NA	NA	NA	NA	NA	NA
Italy (IT)	138,722	8,846,231	9,381	151,508	36 (1/8,848)	5,284	149,373	0.07	0.017	0.56	0.98
Latvia (LV)	2,527	323,348	0	0	NA	0	0	NA	NA	NA	NA
Lithuania (LT)	8,071	538,744	0	0	NA	0	0	NA	NA	NA	NA

Member States	All types of pig farms		Outdoor pig farms			Commercial Outdoor pig farms		Proportions			
	Number of farms	Number of pigs	Number of farms	Number of pigs	Average Number of pigs in farms (min/max)	Number of farms	Number of pigs	Outdoor pig farms/ all pig farms	Pigs in outdoor farms/pigs in all farms	Commercial outdoor farms/total outdoor farms	Commercial outdoor pig/ total outdoor pigs
Luxembourg (LU)	119	80,000	39	250	8 (1/20)	7	179	0.33	0.003	0.18	0.72
Malta (MT)	No reply	No reply	No reply	No reply	No reply	No reply	No reply	No reply	No reply	No reply	No reply
Netherlands (NL)	11,311	12,137,076	168	93,210	NA	168	93,210	0.01	0.008	1	1
Poland (PL)	130,000	12,000,000	67	NA	NA	NA	NA	0.0005	NA	NA	NA
Portugal (PT)	4,626	2,269,641	1,813	184,743	102 (1/ 4,321)	1,699	184,504	0.39	0.081	0.94	1
Romania (RO)	500,000	2,000,000	160 (Mangalita, Bazna)	3,500 (Mangalita, Bazna)	NA	NA	NA	0.00032	0.002	NA	NA
Slovakia (SK)	7,558	536,069	NA	NA	NA	NA	NA	NA	NA	NA	NA
Slovenia (SI)	13,269	244,598	NA	NA	NA	NA	NA	NA	NA	NA	NA
Spain (ES)	86,368	30,939,971	14,672 (holdings)	1,567,895	159.66 (1/ 7,500)	13,549	1,566,419	0.17	0.051	0.92	1
Sweden (SE)	3,823	1,450,000 (approx.)	NA	NA	NA	NA	NA	NA	NA	NA	NA
EU Total	**1,102,086**	**140,095,515**	**49,070**	**2,682,446**	**115 (1/10,000)**	**34,445**	**2,651,550**	**0.045**	**0.019**	**0.70**	**0.99**

Austria: not available according to the criteria given for 'outdoor keeping' in this questionnaire. Austria can provide figures for free-range holdings in 2019 there were 321 free-range holdings with 8,201 pigs. According to the Austrian 'Schweinegesundheits-Verordnung' farmers with this holding type are obliged to notify and approve their holding system (this is not the case for outdoor holdings).
Belgium: the minimum, maximum and average is given for the commercial outdoor farms (> 3 pigs).The non-commercial outdoor farms (= pet pigs, < 3 pigs) were not included as this will give a distorted picture of the total average on outdoor pigs farm**.**
Bulgaria: These are the farms without the non-commercial backyards.
Croatia: Only farms with 1 pig are considered as non-commercial in Croatia - Category 0
Denmark: In Denmark they do not register the type of production system the non-Commercial farms have.
Finland: All pig farms have an individual identification code, but the outdoor farms are not registered separately. Outdoor farming of pigs is very rare in Finland. There are some organic farms, some wild boar farms and some mini pigs that have access outdoors. In addition, there are a few farms keeping Mangalica pigs outdoors. Here data are provided only for the organic pig farms.
Germany: The census refers to holdings in total without reference to holdings keeping pigs indoor or outdoor. 3.2.2 and 3.2.3: At the moment, no data are available from the competent authorities of the Laender.

Ireland: Figures supplied are based on data collected under the National Pig Census 2019 which is available to view and download at: https://www.agriculture.gov.i.e/media/migration/animalhealthwelfare/animalidentificationandmovement/nationalpigcensus/2019PigCensusReport190220.pdf
Netherlands: In NL it is not obliged to register as outdoor farm or indoor farm, only to register as pig farm in NL there is no obligation for the commercial holdings to declare if they are keeping their pigs outdoors or not. The only pig holdings for which it is sure that pigs are kept (partially) outdoors are the holdings that are labelled under the Organic (SKAL) label. So we do not have any further information on commercial holdings that keep their pigs outdoors, but are not labelled Organic.
Poland: Each farm has Individual Registration Number, but ID gives not any indication of the type of the pig farm
Slovakia: The central database has only the number of pig farms (commercial) or/and so-called D farms which are non-commercial. It does not distinguish the type of holding from outdoor keeping point of view. The legal obligation to do it does not exist. However, we do not have the knowledge that somebody is keeping the pigs as so called *'outdoor keeping'.* Moreover, this type of keeping is prohibited in Slovakia and it has been established via extraordinary measures ordered in the areas with occurrence of African swine fever.
Slovenia: Registration in Central register of pigs is obligatory for each farm with at least one pig but the information on the type of housing (indoor, outdoor) is not included in the register. Therefore, Slovenia is not able to provide the number of farms and pigs in different types of outdoor farms.
Spain: There is a high seasonal production and yearly variable in the number of pigs, most evident in commercial farms, depending on market situation and natural resources availability.
Sweden: There are 1,089 registered businesses (operators) with one or more farms. These are displayed in the national statistics. The statistics includes farms with 10 or more sows or 50 pigs or any pig holding with more than 2 hectare arable or 5 hectare farm land. The total number of operators/businesses in the national database with pigs was 3,823 in January 2019. This number includes farms with housing for less than 10 sows. Also, there may be farms included that no longer have pigs.

Table B.9: Pig population data, based on the replies received from 11 Farmers' associations of 8 EU MSs (Question 3.2)

Member States	Association name	All types of pig farms		Outdoor pig farms			Commercial Outdoor pig farms	
		Number of farms	Number of pigs	Number of farms	Number of pigs	Average Number of pigs in farms (min/max)	Number of farms	Number of pigs
Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Swine	324	75,509	NA	NA	NA	NA	NA
Croatia (HR)	Turopolje pig - Plemenita općina turopoljska	15	257	NA	NA	NA	NA	NA
	Black Slavonian pig breeders' association	255	2,588	NA	NA	4.5 (1/9)	NA	NA
Denmark (DK)	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre	7,673	13,331,077	1,750	200,880	115 (1/1600)	490	195,304
Finland (FI)	A_Farmers Ltd_Atria Finland Ltd	1,200	1,000,000	NA	NA	80 (5/500)	NA	NA
	Animal Health ETT	NA	NA	NA	NA	NA	NA	NA
Ireland (IE)	Irish Farmers' Association	1,631	1,644,000	1,230	47,000	38 (1/1000)	200	3,000
Portugal (PT)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)	200	12,000	200	12,000	10,000 (8,000/ 12,000)	190	11,800
Romania (RO)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	160	3,500	160	3,500	NA	160	3,500

Member States	Association name	All types of pig farms		Outdoor pig farms			Commercial Outdoor pig farms	
		Number of farms	Number of pigs	Number of farms	Number of pigs	Average Number of pigs in farms (min/max)	Number of farms	Number of pigs
Spain (ES)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)	90,000	2,500,000	15,000	700,000	70 (5/500)	15,000	700,000
	ARAPORC	86,547	31,246,043	14,666	NA	NA	NA	NA

Croatia: Turopolje pig: Data only breeding pigs.
Denmark; Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre: Data were retrieved from the Danish CHR register on 11 August 2020.
Finland; A_Farmers Ltd_Atria Finland Ltd: We do not have any kind of outdoor pig farming within our production chain. Therefore, I do not have exact information regarding this. We are the largest pig operator in Finland and have approximately 45% market share in domestic pork.
Portugal: Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA): These numbers refer only to ANCPA association. Not to all country.
Romania, Asociatia crescatorilor de suine autohtone Mangalita si Bazna: Data only on farms of Mangalita and Bazna autochthonous breeds.

Information included in National Databases for pig population

Table B.10: Information that is registered in the national databases of the pig farms in EU MSs based on the replies received by the Veterinary Authorities of 26 EU MSs (Question 3.1)

Member States	The different types of outdoor pig farms	The housing system of the farms	The level of biosecurity of pig farms (if existing)
Austria (AT)	Partially for free range farms	Partially for free range farms	Partially for free range farms
Belgium (BE)	Yes	No	No
Bulgaria (BG)	Yes	Yes	Yes
Croatia (HR)	Yes	Yes	Yes
Cyprus (CY)	No	Yes	No
Czechia (CZ)	No	No	No
Denmark (DK)	Yes	Yes	No
Estonia (EE)	No	Yes	Yes
Finland (FI)	No	No	No
France (FR)	No	No	No
Germany (DE)	No	No	No
Greece (EL)	Yes	Yes	No
Hungary (HU)	No	Yes	No
Ireland (IE)	No	Yes	No
Italy (IT)	Yes	Yes	No
Latvia (LV)	No	No	No
Lithuania (LT)	No	No	Yes
Luxembourg (LU)	No	Yes	Yes
Malta (MT)	No reply	No reply	No reply
Netherlands (NL)	No	No	No
Poland (PL)	No	No	No
Portugal (PT)	No	Yes	No
Romania (RO)	No	No	No
Slovakia (SK)	No	No	No
Slovenia (SI)	No	No	No
Spain (ES)	Yes	Yes	Yes
Sweden (SE)	No	No	Yes
EU Total	**7**	**12**	**7**

Table B.11: Information that is registered in the national databases of the pig farms in EU MSs based on the replies received from 12 Farmers' Associations of 9 EU MSs (Question 3.1)

Country	Association	The different types of outdoor pig farms	The housing system of the farms	The level of biosecurity of pig farms (if existing)
Austria (AT)	Animal Health Organisation	NA	NA	NA
Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Swine	No	Yes	Yes
Croatia (HR)	Turopolje pig - Plemenita općina turopoljska	No	No	Yes
	Black Slavonian pig breeders' association	No	No	Yes
Denmark (DK)	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre	Yes	Yes	Yes
Finland (FI)	A_Farmers Ltd_Atria Finland Ltd	No	No	No

Country	Association	The different types of outdoor pig farms	The housing system of the farms	The level of biosecurity of pig farms (if existing)
	Animal Health ETT	NA	NA	NA
Ireland (IE)	Irish Farmers' Association	No	No	No
Portugal (PT)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)	No	No	Yes
Romania (RO)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	Yes	Yes	Yes
Spain (ES)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)	No	No	No
	ARAPORC	Yes	Yes	Yes

Policy on biosecurity measures in EU MSs

Table B.12: An overview of the policy on biosecurity measures in pig farms in EU MSs, based on the replies received from the Veterinary Authorities of 26 EU MSs (Questions 4.1, 4.3 and 4.4)

Member States	Biosecurity measures in pig farms are included in		The implementation of the biosecurity measures in pig farms		Specific or additional biosecurity measures developed for the outdoor pig farms	Tools to assess the level of biosecurity in pig farms	System that classifies the pig farms based on their level of biosecurity
	Awareness campaigns	Training activities	Is a legal requirement	Is verified by official controls to the farms			
Austria (AT)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists	Yes
Belgium (BE)	Yes	Yes	Yes	Yes	Yes	Check lists online tools	No
Bulgaria (BG)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists	Yes
Croatia (HR)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists online tools	Yes
Cyprus (CY)	Yes	No	No	No	No	Guidelines	No
Czechia (CZ)	Yes	Yes	Yes	Yes	No	Check lists	No
Denmark (DK)	Yes	No	Yes	Yes	Yes	None	No
Estonia (EE)	Yes	Yes	Yes	Yes	No	Guidelines check lists	Yes
Finland (FI)	Yes	Yes	No	Yes	Yes	None	No
France (FR)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists online tools	Yes
Germany (DE)	Yes	No	Yes	Yes	No	Check lists	No
Greece (EL)	Yes	Yes	Yes	Yes	No	Check lists	Yes
Hungary (HU)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists	No
Ireland (IE)	Yes	Yes	Yes	Yes	No	Online tools	No
Italy (IT)	Yes	Yes	Yes	Yes	Yes	Check lists online tools guidelines	Yes

Member States	Biosecurity measures in pig farms are included in		The implementation of the biosecurity measures in pig farms		Specific or additional biosecurity measures developed for the outdoor pig farms	Tools to assess the level of biosecurity in pig farms	System that classifies the pig farms based on their level of biosecurity
	Awareness campaigns	Training activities	Is a legal requirement	Is verified by official controls to the farms			
Latvia (LV)	Yes	Yes	Yes	Yes	No	Guidelines check lists	No
Lithuania (LT)	Yes	Yes	Yes	Yes	No	Check lists	Yes
Luxembourg (LU)	Yes	No	Yes	Yes	Yes	Guidelines check lists	Yes
Malta (MT)	No reply	No reply	No reply	No reply	No reply	No reply	No reply
Netherlands (NL)	Yes	Yes	No	No	No	Guidelines check lists	Yes
Poland (PL)	Yes	Yes	Yes	Yes	Yes	Check lists	Yes
Portugal (PT)	Yes	No	Yes	Yes	Yes	None	No
Romania (RO)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists	Yes
Slovakia (SK)	Yes	No	No	Yes	No	Guidelines check lists	No
Slovenia (SI)	Yes	Yes	Yes	No	No	Check lists	No
Spain (ES)	Yes	Yes	Yes	Yes	Yes	Guidelines check lists online tools	Yes
Sweden (SE)	Yes	Yes	Yes	No	Yes	Guidelines check lists online tools	Yes
Total	**26**	**20**	**22**	**22**	**15**		**14**

Table B.13: An overview of the policy on biosecurity measures in pig farms in EU MSs, based on the replies received from 12 Farmers' Associations of 9 EU MSs (Questions 4.1, 4.3 and 4.4)

	Association	Biosecurity measures in pig farms are included in		The implementation of the biosecurity measures in pig farms		Specific or additional biosecurity measures developed for the outdoor pig farms	Tools to assess the level of biosecurity in pig farms	System that classifies the pig farms based on their level of biosecurity
		Awareness campaigns	Training activities	Is a legal requirement	Is verified by official controls to the farms			
Austria (AT)	Animal Health Organisation	Yes	Yes	Yes	Yes	No	Check lists guidelines online tools	Yes
Bulgaria (BG)	Association for Breeding and Preserving of the East Balkan Swine	No	No	Yes	Yes	No	Check lists	Yes

	Association	Biosecurity measures in pig farms are included in		The implementation of the biosecurity measures in pig farms		Specific or additional biosecurity measures developed for the outdoor pig farms	Tools to assess the level of biosecurity in pig farms	System that classifies the pig farms based on their level of biosecurity
		Awareness campaigns	Training activities	Is a legal requirement	Is verified by official controls to the farms			
Croatia (HR)	Turopolje pig - Plemenita opčina turopoljska	Yes	Yes	Yes	Yes	Yes	Guidelines	Yes
	Black Slavonian pig breeders association	Yes	Yes	Yes	Yes	Yes	Check lists	Yes
Denmark (DK)	Danish Agriculture & Food Council/ SEGES - Danish Pig Research Centre	Yes	Yes	Yes	Yes	Yes	Check lists	Yes
Finland (FI)	A_Farmers Ltd_Atria Finland Ltd	Yes	Yes	No	No	No	Check lists guidelines online tools	Yes
	Animal Health ETT	Yes	Yes	No	No	No	Guidelines	Yes
Ireland (IE)	Irish Farmers' Association	Yes	Yes	Yes	Yes	No	Guidelines	Yes
Portugal (PT)	Associaçao Nacional dos Criadores do Porco Alentejano (ANCPA)	No	Yes	Yes	Yes	No	Check lists guidelines online tools	Yes
Romania (RO)	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	Yes	Yes	Yes	Yes	Yes	Guidelines	Yes
Spain (ES)	Asociación Española de Criadores de Cerdo Ibérico (AECERIBER)	Yes	Yes	Yes	Yes	Yes	None	No
	ARAPORC	Yes	No	Yes	Yes	Yes	Check lists	Yes

Levels of biosecurity in pig farms in EU MSs

Table B.14: Different levels of biosecurity in pig farms in MSs based on the replies to the questionnaire, based on the replies received from the Veterinary Authorities of 14 EU MSs (Question 4.2). The MSs that didn't reply to this question are not included in this table

Country	Level	Category Definition
Austria (AT)	All farms (except free range)	Biosecurity measures apply in all farms (except free range): – Premises must be in a good structural condition – Unauthorised persons are not allowed to enter the farm – Buildings must be built in such a way that animals cannot escape – Outdoor areas must have a livestock-proof fencing – Pigs must be kept in a way that there is no direct or indirect contact with wild boar – Buildings and equipment must allow for appropriate cleaning, disinfection and disinfestation – Buildings must be properly illuminated – Farm must be equipped in a way that footwear can be cleaned and disinfected
	Farms exceeding a certain size (> 30 fattening pigs, > 5 sows)	The following biosecurity measures also apply: – Farm must have a possibility to change clothes and footwear – Farm must have appropriate facilities for storage of feed and litter, which cannot be accessed by wild boar – Farm must have facilities allowing for the appropriate disinfection of vehicles and any other equipment used for handling/transport of animals – Farm must have facilities for the appropriate storage of fallen animals, which cannot be accessed by wild boar – Farm must have facilities to isolate sick animals; any equipment used in isolation area must not be used in other areas of farm – External persons are only allowed to enter premises after changing clothes/footwear – Cleaning, disinfection and disinfestation procedures for buildings, vehicles and fomites must be in place and carried out continuously and verifiably – Newly entering breeding pigs must be kept in isolation areas for at least 3 weeks
	Free-range holdings	For free-range holdings the following biosecurity measures apply: – Holding needs approval by veterinary authority (is only granted if biosecurity measures are appropriate) – Area needs to be double-fenced – Entries into area must be secured against unauthorised access – Spatial segregation of sick animals must be possible – Entrance area must be equipped to allow biohygienic measures (cloth/footwear changing; washing and disinfection of hands and footwear) – Holding must have facilities allowing for the appropriate disinfection of vehicles and any other equipment used for handling/transport of animals – External persons are only allowed to enter after having changed clothes

Country	Level	Category Definition
		– Farm must have appropriate facilities for storage of feed and litter, which cannot be accessed by wild boar – Farm must have facilities for the appropriate storage of fallen animals, which cannot be accessed by wild boar – Pigs must be kept in a way that there is no direct or indirect contact with pigs from other holdings or wild boar – Cleaning, disinfection and disinfestation procedures for buildings, vehicles and fomites must be in place and carried out continuously and verifiably – Newly introduced pigs must be kept in isolation areas for at least 3 weeks
Bulgaria (BG)	Industrial farms	
	Type A	Small family trade farms with good biosecurity
	Type B	Small family trade farms with bad biosecurity (they do not exist anymore)
	Backyard	Up to 3 pigs excluding boar and sows only for own consumption
	East Balkan Pig	
Croatia (HR)	Category 0	Farms keeping only one fattening pig for own consumption. No biosecurity level assessment. Only farms with 1 pig are considered as non-commercial in Croatia.
	Category 1	Lowest level of biosecurity. Clinical examination required before pig movement
	Category 2	Medium level of biosecurity
	Category 3	Highest level of biosecurity
	Category 4	Approved outdoor keeping system
Estonia (EE)	With high biosecurity measures farms	With high biosecurity measures farms. Pig farms with a high level of biosecurity which dispatch live pigs in accordance to EC Implementing Decision 2014/709 Article 3, official inspections of biosecurity compliance control at least twice a year, with a minimum inspection interval of 4 months.
	With high biosecurity measures farms	Pig farms with a high level of biosecurity that dispatch pigs for slaughter in accordance to EC Implementation Decision 2014/709 Article 3b, official inspections of biosecurity compliance control at least 4 times a year, with a maximum inspection interval 3 months.
	Other pig farms	Pig farms are inspected 2–4 times a year. The frequency of control depends on the purpose of the pig farm, the type of production, the frequency and nature of the movements, the level of biosecurity measures and other factors affecting the risk level of the pig. Inspection frequency determined in the 2020 plan for official inspections.
France (FR)	A	No non-compliance
	B	Minor non-compliance: reminder of the regulations to be observed
	C	Medium non-compliance: formal notice with delay
	D	Major non-compliance: formal notice of immediate correction

Country	Level	Category Definition
Greece (EL)	Commercial farms (CF)	Establishments which sell or supplies pigs, send pigs to a slaughterhouse or move pig products off the establishment.
	Non-commercial farms (NCF)	Establishments where pigs are kept only for fattening for own consumption or are otherwise permanently resident and pigs are not traded or leave the establishment and none of their products enter the food chain.
Hungary (HU)	Small-scale farms	There is place in the holding for less than 100 pigs. Biosecurity measures described for large-scale farms apply as applicable. Small-scale farms can be commercial and non-commercial ones. Small-scale farms can be outdoor as well, for what additional biosecurity requirements apply.
	Large-scale farms	There is place in the holding for more than 100 pigs. Strict and detailed biosecurity measures apply. They can be outdoor ones, in that case additional requirements apply.
Italy (IT)	Non-commercial or family farms	Pigs are kept only for the fattening stage and are intended for self-consumption; neither live animals nor pork products are handled outside of the company.
	Commercial farms (breeding farms and fattening farms)	Establishments which sell or supplies pigs, send pigs to a slaughterhouse or move pig products off the establishment. We use checklists included in a online tool.
	Farms in the wild or under semi-wild conditions	The pigs are kept outdoors temporarily or permanent
Lithuania (LT)	Non-commercial farms	Biosecurity is applicable for all non-commercial farms (NCF) – farms where not more than 10 pigs are kept for fattening for own consumption. Basic biosecurity requirements are applicable for non-commercial farms and owners responsibilities are foreseen such as: – to report suspicions of a transmissible disease, to allow the veterinarian to inspect the pigs, to observe them and, if necessary, to treat them, to coordinate vaccination programs with the territorial SFVS, to use only veterinary medicines registered in the Veterinary Medicinal Products Register, regularly kill rodents and insects, regularly remove manure and dead animals, to bring in only healthy pigs, to control people access to the pig holding who have participated in wild boar hunting, visited other pig holdings, slaughterhouses, etc., during the last 48 h, – to forbid for workers and visitors to bring any food of animal origin into the pig holding, – to forbid pig feeding with food waste. The area around the holding is regularly managed - mowing grass, pruning trees and shrubs. The holding area is fenced. The fence and the gates must ensure that no unauthorised persons or other animals can enter the pig holding. Workers must move through disinfectant mats when entering/leaving pig farm. Pigs are transported only by cleaned and disinfected vehicles. Drivers are not allowed to enter the production area. The place of loading onto the vehicle is located outside the production area in order to avoid contact between workers and drivers. Pigs are transported only by cleaned and disinfected vehicles. Drivers are not allowed to enter the production area. The place of loading onto the vehicle is located outside the production area in order to avoid contact between workers and drivers.

Country	Level	Category Definition
	Commercial farms	Biosecurity is applicable for commercial farms (CF) – farms which sell pigs, send pigs to a slaughterhouse, move pig products off the holding, breed pigs. All CF must meet the requirements for NCF and, additionally: register all visitors, designate a person responsible for biosecurity measures, prepare and implement biosecurity plan, production area must be separated from the rest of holding's area, the entrance of persons and transport must be controlled, the wheels of the vehicle entering the holding must be disinfected, visitors and workers must enter the holding through the designated posts where they can change clothes, shoes and shower before entering/leaving the holding. Official control is performed once per 4 months.
Luxembourg (LU)	High level	Highest level means that almost no people have access to the farm and if so, very high security measures are in please: shower and changing clothes before entering the premises, no hunters allowed, no contact to other animals, . . .
	Medium level	Medium level is for the farms where biosecurity measures are not perfect, but with some effort they can come into highest level. For the moment there are no farms in this category as they have either been classified as high level or low level.
	Low level	Lowest level for those farms where contact to other animals (especially wild boar) cannot be ruled out and/or the owner is not aware of the risk of ASF introduction in the farm. That means that the biosecurity measures are insufficient. These are mainly people who have either 1 or 2 pigs for own slaughtering or pigs kept as pet animals. These 'farmers' have been informed that in case of an outbreak in anywhere Luxembourg, there pigs will be culled immediately even if they do not show any signs of ASF.
Netherlands (NL)	High	Commercial indoor farms; no clear definition; private legislation
	Low	Hobby
Poland (PL)	Indoor farms	Separation, disinfection mats, feed protected from wild boar, documentation
	Outdoor farms	Separation, double fence around farm, double fence min 1,5 m high, disinfection mats, feed protected from wild boar management, documentation
Romania (RO)	Level 1	Non-commercial holdings: – mandatory registration in National Database (NDB) – hygiene measures – no swill feeding – no contact with pigs within 48 h after hunting activity – no contact between the non-commercial holding pigs and pigs from other holdings, feral pigs or wild boar, pig carcasses, pig products – ban of feeding fresh grass or grains to pigs for at least 30 days before feeding – ban on using straw for bedding of pigs unless stored for at least 90 days before use.
	Level 2	Small commercial farms and Bazna & Mangalita breeds, as for non-commercial holdings plus: – mandatory sanitary veterinary assistance

Country	Level	Category Definition
		– keeping pigs in closed shelters or in the case of Bazna and Mangaliţa breeds raised in a semi open system, in shelters and fences with a continuous fence doubled by an electric fence inside the fenced area, to ensure health and welfare conditions in accordance with the legislation in force, without the possibility of coming into contact with other animals, domestic pigs from other holdings or feral pigs; – prohibiting the access of foreigners to the holding; – use of protective equipment, shoe disinfectants, decontamination of means of transport, performing DDD actions (disinfection, disinsection, deratisation) – prohibition of the professional activities of staff working on the holding on other holdings with pigs
	Level 3	Big commercial farms, as for Level 1 and 2 plus: – strict delimitation of the production area from the administrative area – the existence of a sanitary filter – the storage of dead pigs, abortions and placentas is done in closed spaces, in order to prevent the circulation of pathogens and contact with unauthorised animals or persons – collection and neutralisation of animal by-products that are not intended for human consumption in accordance with the specific legislation in the field; – adequately equipped spaces for the execution of autopsies; – the prohibition of keeping pigs, at home, by the personnel carrying out their activity in the commercial holding or by his family; – the prohibition of the introduction by the personnel that carry out their activity in exploitation of the foods of animal origin;
Spain (ES)	Very high (level 1–2)	Holdings with a final score according to this level in the biosecurity questionnaire used BIOSEGPOR.
	High (level 3–4)	Holdings with a final score according to this level in the biosecurity questionnaire used BIOSEGPOR.
	Medium (level 5)	Holdings with a final score according to this level in the biosecurity questionnaire used BIOSEGPOR.
	Low (levels 6–7)	Holdings with a final score according to this level in the biosecurity questionnaire used BIOSEGPOR
	Very low (levels 8–9)	Holdings with a final score according to this level in the biosecurity questionnaire used BIOSEGPOR. All extensive farms in Spain must comply with all requisites included in the RD 1221/2009 (Table B.11), regardless the level of biosecurity assigned by BIOSEPOR to the farm based on the questionnaire and scoring.

Table B.15: Different levels of biosecurity in pig farms in MSs, based on the replies received from 7 Farmers' Associations of 6 EU MSs (Question 4.2)

Country	Association	LEVELS	Category definition
Bulgaria	Association for Breeding and Preserving of the East Balkan Swine	Family farms	Legal definition: 'Family pig farm' is a holding with introduced biosecurity measures for keeping up to 10 sows and their offspring, but not more than 200 pigs in total. Biosecurity requirements: 1) The pig holdings are built according to the requirements of the normative documents for protection and welfare of the agricultural animals; 2) are constantly provided with drinking water from their own and/or public water sources; 3) have entrance the includes a place for washing and disinfection of people and vehicles; 4) are fenced in a way, ensuring the safety of the site and the health welfare of the pigs, which does not allow free access of people and other animals; 5) have separate places and/or facilities for storage of fodder for feeding the animals and the litter, as for the pigs the separate places and/or the facilities are covered and fenced in a way, providing protection from wild birds and rodents; 6) have a sanitary unit; 7) have a separate place or container for temporary storage of carcasses of dead animals. The room, container, separate place or facility is fenced in a way that prevents the access of other animals or people, is not used for other purposes and is regularly cleaned and disinfected.
		Industrial farms	Legal Definition: 'Industrial Pig Holding' is a facility where animals are kept while ensuring a high degree of biosecurity, mechanisation and automation of production processes, intensive breeding with cyclical production and standard production. Biosecurity requirements: All biosecurity requirement applicable for the family farms plus the following: 1) Defined a white zone and a black zone and ancillary buildings and facilities between the two zones. 2) In order to limit any contact with wild boar, the following shall be established: (a) a buffer zone with a distance of not less than 500 m from the site fence to forest areas and arable agricultural land for production or (b) a double fence consisting of a net and an electric fence or c) a solid fence, which is metal or masonry
		East Balkan Pig farms	Pig farms for breeding of East Balkan Pigs only. Biosecurity requirements: 1) In the designated breeding area in the forest, the pig owner builds temporary enclosures in which he accommodates the pigs he raises at night. In the same enclosures, conditions are created for the pigs to be able to be quarantined, inspected, identified and, if necessary, to be subjected to other veterinary-preventive measures. The enclosures are double fenced. 2) The breeding of EBS is carried out in the implementation of an individual biosecurity plan where critical control points are defined for the pig farm and procedures are implemented for their management and a plan for implementation of emergency measures in case of detection of a contagious disease.
		Back Yards	Legal definition 'Personal farm (backyard pig farm)' is a livestock farm in which animals are kept for the purpose of extracting raw materials and food for personal consumption. Capacity limitation: up to 3 pigs for fattening (other than sows and uncastrated boar). Biosecurity requirements for back yards:

Country	Association	LEVELS	Category definition
			1) have a separate place for keeping the pigs, which is fenced in a way, not allowing the access of other animals, and protection from rodents is provided. 2) the area for breeding of one animal is not less than 1 m^2; 3) the facilities and inventory used allow complete and effective cleaning and disinfection. 4) the entry of people shall be carried out with work clothes and shoes after passing through a place for disinfection. 5) The backyard farms have a separate place for preliminary storage and decontamination of manure, in accordance with the number of kept animals, for not less than 40 days and in nitrate vulnerable zones for not less than 6 months.
Denmark	Danish Agriculture & Food Council/ SEGES - Danish Pig Research Centre	SPF-Red	Highest level, monthly blood samples
		SPF-Blue	Second highest level, annual blood samples
		SPF-Blue Free-range	
		Unknown	
Finland	A_Farmers Ltd_Atria Finland Ltd	3 different levels	The national system is being developed right now and is not ready. Will be operative by end of 2021
	Animal Health ETT	National spf-system	SIKAVA health classification register. Biocheck. UGent audits once per year in each holding, coverage over 95% of pork production
Ireland	Irish Farmers' Association	Biosecurity Review	Biocheck: Targeted Advisory Service on Animal Health (TASAH) funded project available to all commercial pig farms, carried out by the farms own PVP (vet) Biocheck follows a standard approach (Biocheck; Ghent University) to assess both bioexclusion (external biosecurity; measures to prevent disease entering a unit) and biocontainment (internal biosecurity; measures to prevent disease spreading within a unit)
Portugal	ANCPA Associaçao Nacional dos Criadores do Porco Alentejano	PCEDA levels for Aujeszky disease	Depending on Aujeszky disease control there are 5 levels.
Romania	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	Level II of biosecurity	a) the holding must be registered in the National System for Identification and Registration of Animals, and pigs must be identified and registered in the National Database; movements and events to which the pigs are subjected must be registered in the National Database, according to the provisions of the sanitary-veterinary legislation in force; b) keeping pigs in closed shelters or in the case of Bazna and Mangaliţa breeds raised in a semi-open system, in shelters and spaces having also the fence doubled by an electric fence inside the adjacent surface, to ensure health and welfare conditions in accordance with current legislation without the possibility of coming into contact with other animals, domestic swine from other holdings or wild herds;

Country	Association	LEVELS	Category definition
			c) prohibition of the access of foreign persons in exploitation; d) a ban on the feeding of pigs with catering waste, as defined in point 22 of Annex I to Regulation (EU) No 182/2011; 142/2011 or with other animal by-products not intended for human consumption;

Biosecurity Measures implemented specifically or additionally to outdoor farms (Question 4.5)

Table B.16: Specific or additional biosecurity measures designed and implemented in outdoor pig farms in EU MSs based on the replies received from Veterinary Authorities of 18 EU MSs (Question 4.5). The MSs that did not reply to this question are not included in this table

Country	Specific and additional biosecurity measures for outdoor farms
Austria	The following biosecurity measures apply in all farms (except free range): – Premises must be in a good structural condition – Unauthorised persons are not allowed to enter the farm – Buildings must be built in such a way that animals cannot escape – Outdoor areas must have a livestock proof fencing – Pigs must be kept in a way that there is no direct or indirect contact with wild boar – Buildings and equipment must allow for appropriate cleaning, disinfection and disinfestation – Buildings must be properly illuminated – Farm must be equipped in a way that footwear can be cleaned and disinfected In farms exceeding a certain size (> 30 fattening pigs, > 5 sows) the following biosecurity measures also apply: – Farm must have a possibility to change clothes and footwear – Farm must have appropriate facilities for storage of feed and litter, which cannot be accessed by wild boar – Farm must have facilities allowing for the appropriate disinfection of vehicles and any other equipment used for handling/transport of animals – Farm must have facilities for the appropriate storage of fallen animals, which cannot be accessed by wild boar – Farm must have facilities to isolate sick animals; any equipment used in isolation area must not be used in other areas of farm – External persons are only allowed to enter premises after changing clothes/footwear – Cleaning, disinfection and disinfestation procedures for buildings, vehicles and fomites must be in place and carried out continuously and verifiably – Newly entering breeding pigs must be kept in isolation areas for at least 3 weeks In free-range holdings, the following biosecurity measures apply: – Holding needs approval by veterinary authority (which is only granted if biosecurity measures are appropriate) – Area needs to be double-fenced – Entries into area must be secured against unauthorised access – Spatial segregation of sick animals must be possible – Entrance area must be equipped to allow bio-hygienic measures (cloth/footwear changing; washing and disinfection of hands and footwear) – Holding must have facilities allowing for the appropriate disinfection of vehicles and any other equipment used for handling/transport of animals

Country	Specific and additional biosecurity measures for outdoor farms
	– External persons are only allowed to enter after having changed clothes – Farm must have appropriate facilities for storage of feed and litter, which cannot be accessed by wild boar – Farm must have facilities for the appropriate storage of fallen animals, which cannot be accessed by wild boar – Pigs must be kept in a way that there is no direct or indirect contact with pigs from other holdings or wild boar – Cleaning, disinfection and disinfestation procedures for buildings, vehicles and fomites must be in place and carried out continuously and verifiably – Newly introduced pigs must be kept in isolation areas for at least 3 weeks. Some biosecurity measures are described in more detail at https://www.verbrauchergesundheit.gv.at/tiere/publikationen/sgk.html; with link 'Biosicherheit Schwein' a brochure describing biosecurity measures for farmers can be downloaded.
Belgium	– The pig farmer guarantees to prevent any direct contact between pigs of his farm and feral pigs by: – keeping the pigs in stables which are built in such way that feral pigs cannot enter or come in contact with the pigs; – if pigs have access to outdoors establishing a double fence or a separation made of hard material; – annual biosecurity evaluation should be performed – if not, the outdoor access of pigs is banned.
Bulgaria	There is a special National Ordinance for East-Balkan pigs herd on the way and areas of keeping, and a National Ordinance for biosecurity and requirements of the different type of farms
Croatia	Outdoor pig farming is prohibited unless pigs are kept in approved outdoor farm with double fence. In case domestic pigs are found outside the fenced farm, hunters must report that to the veterinary inspector and, with inspector approval, shoot (sanitary shooting) the pigs Definition of outdoor farming: most of the production cycle for most of the year takes place outdoor (even if part of the production cycle is indoor, e.g. sows with suckling piglets) Fencing: Double fence around open space where pigs are kept; inside fence shall be built from appropriate material which cannot be flex nor lift, at least 120 cm high. If inside fence is made from mesh (iron or similar material) it shall be with openings preventing leaving the smallest category of pigs outside the fence. Outside fence shall be electrical fence with at least two wires: lower 30 cm from the ground and higher 80 cm from the ground; outside fence shall be placed at least 30 cm from the inner fence, but not more than 50 cm The fence must be regularly checked and maintained – Pigs kept outdoor must be ear tagged (identified) – Pig holder must checked health status and pig census on a daily basis and keep records up to date – In addition to above, all other biosecurity measures appropriate for number of kept pigs must be implemented
Czechia	Double fencing
Denmark	Prohibition on swill feeding, regulation on the design of the fence
Finland	There is a ban of keeping pigs outdoors unless pigs are kept in a double fence with electricity or other fence structure with similar security. The detailed technical requirements for the fence are listed in a national decree. Pig holdings have to announce in advance to the official veterinarian if they intend to keep pigs outdoors. The OV inspects the fence and he/she may give an order to move the pigs inside or to improve the fence, if necessary.
France	Double fences
Germany	Reference is made to the Pig Husbandry Hygiene Ordinance Requirements on outdoor husbandry systems: 1) Owners of pigs kept in outdoor husbandry systems must keep them in accordance with the requirements of Annex 4. 2) Supplementary to the requirements of paragraph 1, owners of pigs in holdings as follows must keep pigs in accordance with the requirements of

Country	Specific and additional biosecurity measures for outdoor farms
	Annex 5: a) fattening and rearing holdings with more than 700 fattening or rearing places; b) breeding holdings having, other than breeding pigs, no pigs older than 12 weeks and more than 150 sow places; and c) other breeding holdings or mixed holdings with more than 100 sow places. d) Operation of an outdoor husbandry system requires a licence from the competent authority. Annex 4: General requirements on outdoor husbandry systems *PART I: Accommodation and organisational requirements* 1) In the case of outdoor husbandry systems: a) the holding must have a double perimeter enclosure in accordance with specific instructions from the competent authority so that vehicles and pedestrians are restricted to designated entrances and exits; b) entrances and exits must be secured from unauthorised access; c) the holding must be marked with a sign saying 'Piggery – No Unauthorised Feeding or Entry'; d) the holding must have sufficient facilities for isolating the pigs kept in the outdoor husbandry system in compliance with animal disease law; e) the holding must have equipment to clean and disinfect footwear, shelters and vehicle wheels. The facilities and equipment for cleaning and disinfecting footwear and vehicle wheels must be fully operable at all times and be stored in an easily accessible place on the holding. 2) Non-holding personnel must not be allowed to enter the outdoor husbandry system without the animal owner's consent. The animal owner must ensure that non-holding personnel wear protective clothing belonging to the holding or disposable clothing when they enter the outdoor husbandry system and that all such clothing is cleaned or safely disposed of after they exit. 3) The holding must have: a) changing facilities; b) rooms or containers for storing feed; c) at least a closed container or other suitable facility for proper storage of fallen stock; this must be secured to prevent tampering, penetration by rodents and the escape of fluids and must be easy to clean and disinfect. Containers for storing fallen stock must be made available for collection and transportation to a rendering plant/cat 2-material), if possible so that emptying can be done without the collection vehicle entering the holding. *PART II: Organisation* The animal owner must ensure that: 1) pigs kept in an outdoor husbandry system do not come into contact with pigs from other holdings or with wild boar; 2) feed and litter are stored secure from wild boar; and 3) the number of deaths each day and, in the case of piglets, the number lost per litter, the number of spontaneous abortions and the number of stillbirths are recorded without delay in the herd book required by the Livestock Trade Ordinance (Viehverkehrsverordnung) or in other herd records. *PART III: Cleaning and disinfection* 1) After every movement of pigs into or out of an outdoor husbandry system, the equipment used must be cleaned and disinfected. 2) After transporting any animals, vehicles belonging to the holding must be fully cleaned and disinfected on a paved area.

Country	Specific and additional biosecurity measures for outdoor farms
	3) Vehicles, machinery and equipment used directly for pig keeping purposes by two or more holdings must be cleaned and disinfected before being transferred from one holding to another. 4) The animal owner must ensure that: a) containers or other facilities used for storing fallen stock are cleaned and disinfected immediately after emptying; b) non-disposable protective clothing and footwear is cleaned regularly at short intervals and disposable clothing is safely disposed of after use; c) litter and dung are stored secure from wild boar; 5) Liquids arising in the course of cleaning and disinfection must be safely disposed of. Annex 5: Supplementary requirements on outdoor husbandry systems pursuant to Section 4 (2) *PART I: Accommodation requirements* 1) The holding operating the outdoor husbandry system must have: a) a paved area, ramp or other facility for loading and unloading pigs, capable of being cleaned and disinfected; and b) a changing room or cabin in the entrance area to the holding. 2) The changing room or cabin must be such that it can be washed down and disinfected. It must have at least the following amenities: a) wash basin; b) water outlet with drain for cleaning footwear; c) disinfection bath or equivalent facility for disinfecting footwear; and d) provision for separate storage street clothes separate from protective clothing belonging to the housing, including footwear. 3) The area of the outdoor husbandry system must only be entered with protective clothing belonging to the holding or with disposable clothing; this must be removed on exit. *PART II: Movements of pigs onto and off the holding; isolation* 1) Pigs moved to a holding must be kept in isolation for at least three weeks. If additional pigs are moved to the holding during this time, the isolation period extends for all animals until the last pig moved to the holding has been kept in isolation for at least three weeks. Animals may only be moved out of isolation: a) if all animals are free from symptoms suggesting a notifiable disease; b) for diagnostic purposes; or c) for killing and safe disposal. In departure from the first sentence above, pigs may alternatively be isolated on the source holding provided that they are subsequently moved directly to the target holding in previously cleaned and disinfected vehicles without coming into contact with pigs of other origin. 2) When moving or taking in pigs, the pig owners involved must ensure that: a) pigs are only transported in previously cleaned and disinfected vehicles; b) non-holding personnel involved in moving, loading and unloading livestock do not enter the immediate area in which pigs are kept and holding personnel do not enter non-holding transportation vehicles unless the requirements of Part I paragraph 4 are met; c) animals cannot return to the housing once loaded on the transportation vehicle.

Country	Specific and additional biosecurity measures for outdoor farms
Greece	Minimum biosecurity requirements for outdoor pig farms: (Ministerial Decision No 758/68204/18.02.2020 (GG 730B/09.03.2020) a) No swill feeding and removal of animal by-products in accordance with Regulation (EC) No 1069/2009. b) No contact between the pig(s) of the farm with pigs from other holdings and feral pigs or wild boar. Pigs should be kept in a way that ensures that there is no direct, neither indirect, contact with pigs coming from other holdings or with pigs outside the premises nor with wild boar. c) No contact to any part of the carcass of feral pigs/wild boar (including hunted or dead wild boar/meat/by-products). d) The owner (or the person in charge of the pigs) should take appropriate biohygienic measures such as change clothes and boots on entering the stable and leaving the stable. Disinfection should be performed at the entrance of the holding and the stable. e) No contact with pigs within 48 h after hunting activity. f) No unauthorised persons/transport are allowed to enter the pig holding (stable) and records are kept of people and vehicles accessing the area where the pigs are kept. g) Ban of feeding fresh grass or grains to pigs unless treated to inactivate ASF virus or stored (out of reach of wild boar) for at least 30 days before feeding. h) Ban on using straw for bedding of pigs unless treated to inactivate ASF virus or stored (out of reach of wild boar) for at least 90 days before use. i) Farms buildings should: – be built in such a way that no feral pigs or other animals (e.g. dogs) can enter the stable. – Allow for disinfection facilities (or changing) for footwear and clothes at the entrance into the stable. j) Outdoor keeping of pigs is banned.
Hungary	Compulsory double fencing of all outdoor farms. For small-scale outdoor farms: basically, the same requirements apply as for large-scale farms in Part II and it is recommended in Part I.
Ireland	'Under the current Rural Development Programme (2013–2020) funding is available through a mechanism called the Targeted Advisory Service for Animal Health (TASAH) for commercial pig farmers to have a free comprehensive biosecurity review (Biocheck.Ugent) carried out on their farms by a trained private veterinary practitioner. The Department of Agriculture, Food and the Marine also produce tailored biosecurity advice for both commercial and non-intensive pig farmers for the prevention of diseases such as African swine fever. Each new registered farm must have demonstrably effective containment of the pigs (Part 2 Section 8 Animal Health and Welfare Act 2013). New guidelines are being developed for registration requirements. Swill feeding is prohibited on all pig holdings in Ireland (Statutory Instrument No. 187/2014 which brought into effect EU Animal By-Products Regulations 1069/2009 in Ireland). The Biosecurity Procedures for Visitors to Pig Units in Ireland document produced by the agricultural advisory body Teagasc is too large to upload but can be viewed and downloaded here: https://www.agriculture.gov.i.e/media/migration/animalhealthwelfare/diseasecontrols/africanswinefever/BiosecurityProceduresIrishPigFarms300714.pdf'
Italy	Minimum biosecurity criteria for wild or semi-wild farms are: a) ban on the administration of kitchen/catering/food waste and the adoption of suitable procedures for the disposal of animal by-products (EC Reg. No. 1069/2009). b) prohibition of any contact with pigs from other farms and with wild boar. c) prohibition of any contact with wild boar carcasses (including by-products, carcass or hunting residues). d) no contact with pigs reared on the farm in the 48 h following hunting activities. e) prohibition of unauthorised persons/vehicles from entering the company. Any entry of people and vehicles into the farm must be documented.

Country	Specific and additional biosecurity measures for outdoor farms
	f) mandatory fencing, which includes watering, feeding, food or sewage storage points. In case of double fencing, the two fences must be at least 1 metre apart. g) quarantine obligation for newly introduced animals.h) official veterinary control for on-farm slaughter.
Luxembourg	a) double fence b) possibility of keeping pigs indoor (for example, in case of ASF restrictions) c) no contact to any other animals d) changing clothes e) no access for unauthorised people
Poland	Double fence 1,5 m high – additional requirement to basic conditions described in working doc. SANTE/7113/2015/rev 12. a) No swill feeding and removal of animal by-products in accordance with Regulation (EC) No 1069/2009. b) No contact between the pig(s) of the NCF, pigs from other holdings and feral pigs or wild boar. Pigs should be kept in a way that ensures that there is no direct, neither indirect, contact with pigs coming from other holdings or with pigs outside the premises nor with wild boar. c) No contact to any part of the carcass of feral pigs/wild boar (including hunted or dead wild boar/meat/by-products). d) The owner (or the person in charge of the pigs) should take appropriate bio-hygienic measures such as change clothes and boots on entering the stable and leaving the stable. Disinfection should be performed at the entrance of the holding and the stable. e) No contact with pigs within 72h after hunting activity. f) No unauthorised persons/transport are allowed to enter the pig holding (stable) and records are kept of people and vehicles accessing the area where the pigs are kept. g) Home slaughtering is allowed only under veterinary supervision. h) Ban of feeding fresh grass or grains5 to pigs unless treated to inactivate ASF virus or stored (out of reach of wild boar) for at least 30 days before feeding. i) Ban on using straw6 for bedding of pigs unless treated to inactivate ASF virus or stored (out of reach of wild boar) for at least 90 days before use. j) Disinfection mats or other disinfection equipment should be established at the entrance/exit to the farm and stables. k) Farms buildings should: – be built in such a way that no feral pigs or other animals (e.g. dogs) can enter the stable. – allow for disinfection facilities (or changing) for footwear and clothes at the entrance into the stable.
Portugal	Ordinance n° 636/2009, 9th of June that establishes the regulatory norms applicable to the activity of keeping and producing livestock or complementary activities of animals of the swine species, in the pig farms and production centres.
Romania	For hunting complex and game farms were wild pigs are kept (Government Decision 830/2016): a) holdings are fenced to prevent the movement of wild boar outside the holding; b) at the entrance to the operation there are means of disinfection for staff, visitors and for means of transport; c) concluding a contract with a slaughter unit to collect animal by-products; d) concluding a contract with a veterinarian of free practice to assist the hunting parties, to examine the game, to collect the samples and to certify the shipments to the processing centres; e) the notification to the sanitary-veterinary and food safety directorate of all organised hunting parties, of dead or sick animals, as well as of the increase of morbidity or mortality in the animals from the farm; f) hunters from other countries participating in hunting campaigns must sign, on entering the holding, a declaration on their own responsibility that they have not participated, together with their dogs, in the last month, in wild boar hunters in countries where they operate African swine fever;

Country	Specific and additional biosecurity measures for outdoor farms
	g) in case of official confirmation of an outbreak of African swine fever in such a holding, the establishment of protection and surveillance zones is carried out in accordance with the provisions of Directive 60/2002/CE 2) In order to avoid the spread of pathological material, the holding must be provided with: a) game collection centre, provided with appropriate means of disinfection; b) platform/space for evisceration of shot animals, provided with collection containers for gastrointestinal mass from the evisceration of animals; c) containers for collecting dead animals. For outdoor holdings were local/autochthon domestic breeds Bazna and Mangalita are kept (draft Agriculture and Rural Development Ministry and N): – mandatory registration in NDB – hygiene measures – no swill feeding – no contact with pigs within 48h after hunting activity – no contact between the non-commercial holding pigs and pigs from other holdings, feral pigs or wild boar, pig carcasses, pig products – ban of feeding fresh grass or grains to pigs for at least 30 days before feeding – ban on using straw for bedding of pigs unless stored for at least 90 days before use. – mandatory sanitary veterinary assistance – keeping pigs in closed shelters or in the case of Bazna and Mangaliţa breeds raised in a semi-open system, in shelters and fences with a continuous fence doubled by an electric fence inside the fenced area, to ensure health and welfare conditions in accordance with the legislation in force, without the possibility of coming into contact with other animals, domestic pigs from other holdings or feral pigs; – prohibiting the access of foreigners to the holding; – use of protective equipment, shoe disinfectants, decontamination of means of transport, performing DDD actions – prohibition of the professional activities of staff working on the holding on other holdings with pigs.
Spain	The following biosecurity measures are compulsory as specified on the Royal Decree 1221/2009, establishing basic rules for the organisation of the extensive pig sector: – Complete perimeter isolation with a fence or equivalent system that prevents the uncontrolled transit of animals and vehicles. – Entrances must have an effective system for disinfecting the wheels and the rest of the vehicle. Likewise, they must have an appropriate system for disinfecting the footwear of workers and visitors. – The disposition of the buildings, tools and equipment must make it possible, at all times, to carry out effective cleaning and disinfection and pest control programs. – Permanent buildings with capacity adapted to farm census called 'unidades de secuestro' where the animals would have to be allocated in case of animal health events in the area. – An effective system of control or registration of visits must be available. All visits are recorded including the identification of vehicles entering or leaving the farm. – In the farms, tools, staff's clothing and changing rooms must be properly maintained and must be for the exclusive use in each farm, and hygienic and biosecurity measures must be applied to their use. – Extensive pig farms must apply and maintain health programs effective against the main diseases subject to official control, approved by the competent authority and controlled and applied by the authorised or authorised veterinarian.

Country	Specific and additional biosecurity measures for outdoor farms
	– The holdings must have a system for collecting and storing carcasses and other by-products of animal origin not intended for human consumption, with a view to their removal and disposal in a proper manner. The system must comply with EU legislation on animal by-products; Regulation 1069/2009. Moreover, in farms registered after the RD 1221/2009 came into force in 2009: – Farm location must comply with legal minimum distances to sources of risk (farms, slaughter houses, rendering plants, etc.) included in the Royal Decree 306/2020. – Buildings must allow loading and unloading of animals, feed, slurry and by-products from outside the perimeter of the epidemiological breeding or reproduction unit. In addition, the following biosecurity measures are not mandatory but highly recommendable in order to minimise risks of animal diseases: – Existence of a double-fencing system or similar (impermeable to wild boar) guaranteeing non-direct contact between production pigs and feral pigs/ wild boar and minimising the possibilities of entrance of other mammals that may act as vectors of infectious diseases. – In case the vehicles must enter the perimeter of the production unit, there is a clear separation and identification of clean and dirty areas and paths. – There is specific clothing for visitors. – There are visible instruction about hygienic protocols to be applied by the personnel entering the farm/production units.– Quarantine units available for new coming animals. – Record of feed suppliers. – Silos, pipes and feeding systems in good condition and preventing spillage of feed in areas where there are no animals. – The drinking water of the animals should have adequate macroscopic and organoleptic characteristics (transparent and clean, odourless, etc.) – The tanks and water pipes should be kept in good state of maintenance and cleaning. – Updated record of death on the farm and disposed animals. – Personnel should not work in other pig farms. – An active and continuous training program for personnel on hygiene and biosecurity and records of its implementation should be performed and kept. – The farms should apply internal biosecurity measures to reduce the risk of spread of infectious agents within the farms such as foot-washers or specific clothing between production units, among others. – Updated record of all animal batches entering and leaving the farm is kept from at least the last year. – Animal health surveillance plan with appropriate monitoring and record of mortality, symptoms, abortions, reproduction failures, laboratory results, treatment used, veterinary controls, etc. – Updated and recorded maintenance program in place. – In case semen is introduced into the farm, an updated record should be kept of the semen batches that have been used on the farm for at least the last year and in all cases the origin must be an authorised semen collection centre based on Directive 90/429/EEC and subsequent amendments. – Effective measure to prevent the entry of birds and rodents into the farm in place. – Recorded and updated cleaning and disinfection program in place. Nevertheless, there are other measures such as traceability requirements that farms must comply with in the frame of the EU Hygiene legal framework; these measures have not been specifically included above where only specific biosecurity legislation has been included.
Sweden	Fencing of outdoor farms mandatory according to legislation. Type of fence not specified. Fencing of outdoor pigs is required according to the Swedish animal protection legislation (chapter 6 §1, SJVFS2019:20)

Table B.17: Specific or additional biosecurity measures designed and implemented in outdoor pig farms in EU MSs, based on the replies of 9 Farmers' associations of 7 MSs (Question 4.5)

Country	Association	Specific and additional measures for the Outdoor farms
Bulgaria	Association for Breeding and Preserving of the East Balkan Swine	Specific biosecurity measures are implemented for the farms of East Balkan Swine and for the personal backyards only. No specific measures are implemented for the other types of outdoor pig farming. They follow the main requirements applicable for industrial and family farms.
Croatia	Plemenita opčina turopoljska	Strict adherence to regulations on the marking, movement and trade of animals. All pig owners must ensure that domestic pigs are kept in such a way that any direct and indirect contact of domestic pigs with wild animals is completely prevented. It is forbidden to graze pigs and let pigs out into the open, unless the pigs are kept in an area surrounded by a double fence. It is necessary to report to the veterinarian any pig that shows signs of disease, death of domestic pigs and found dead wild boar. It is obligatory to test the organ samples of dead domestic and wild pigs in order to exclude ASF. Owners of pigs must ensure the safe disposal of by-products produced during the slaughter of pigs for their own needs in accordance with special regulations.
	Plemenita opčina turopoljska	NA
Denmark	Danish Agriculture & Food Council/SEGES - Danish Pig Research Centre	The official requirements for fence have to be complied with:1. An inner and an outer fence with a minimum of 5 metres between, should also have an electrical circuit or 2. An outer fence with 3 electrical circuits with alarm
Finland	A_Farmers Ltd_Atria Finland Ltd	Double fencing against wild boar contacts (ASF).
	Animal Health ETT	Fencing for outdoor pigs to prevent contact with wild boar
Ireland	Irish Farmers' Association	Information campaigns by DAFM (Department of Agriculture and Marine)
Portugal	ANCPA Associaçao Nacional dos Criadores do Porco Alentejano	NA
Romania	Asociatia crescatorilor de suine autohtone Mangalita si Bazna	a) the holding must be registered in the National System for Identification and Registration of Animals, and pigs must be identified and registered in the National Database; the movements and events to which the pigs are subjected must be registered in the National Database, according to the provisions of the sanitary-veterinary legislation in force; b) keeping pigs in closed shelters or in the case of Bazna and Mangaliţa breeds raised in a semi-open system, in shelters and fences with a continuous fence doubled by an electric fence inside the fenced surface, to ensure health and welfare conditions in accordance with the legislation in force, without the possibility of coming into contact with other animals, domestic pigs from other holdings or feral pigs;

Country	Association	Specific and additional measures for the Outdoor farms
		c) prohibiting the access of foreigners to the holding; d) a ban on the feeding of pigs with catering waste, as defined in point 22 of Annex I to Regulation (EU) No 182/2011; 142/2011 or with other animal by-products not intended for human consumption; e) the obligation to use the protective equipment; f) special places for shoes disinfections, both at the entrance and at the exit from the holding; g) ensuring the sanitary-veterinary assistance by the private veterinarian organised in accordance with the law; h) the inclusion of holdings and animals in the Program of actions for the surveillance, prevention, control and eradication of animal diseases, those transmissible from animals to humans, animal and environmental protection identification and registration of bovine animals, pigs, sheep, goats and equidae. i) ensuring, on the basis of a contract, the sanitary-veterinary assistance by the private veterinarian organised in accordance with the law; j) carrying out disinfection, pest and rodent control actions, whenever necessary, using only products included in the official list of approved veterinary medicinal products authorised for marketing and having the active substance concentration provided in the instructions for use. use, and the disinfectant solution must be changed frequently to ensure that the same concentration is maintained; k) the existence of the facilities for the decontamination of the means of transport entering/leaving the holding; l) in the case of pigs raised in semi-open system, from Bazna and Mangaliţa breeds, for the sanitary-veterinary authorisation of this type of holding, the operator must prove that the pigs belong to these breeds by presenting a certificate issued by the association accredited by the National Agency for Zootechnics 'Prof. dr. G. K. Constantinescu' for maintaining and managing the genealogical register; m) the prohibition to enter the pig farm of the operator or of the personnel who carry out their activity on the farm for 48 h if they participate in hunting activities; n) there is no possibility of contact between the pigs on the holding and any carcass or part of the carcass from domestic/wild pigs hunted or dead meat and by-products resulting from them; o) prohibition of feeding pigs with vegetable fodder for a period of at least 30 days from their harvest; p) prohibition of the use of vegetable bedding for a period of at least 90 days from harvest; q) prohibition of the performance of professional activities by the staff carrying out their activity on the holding including by the authorised private veterinarian in other holdings breading pigs; The access of the authorised private veterinarian may be admitted for the performance of some professional activities only if he respects the specific procedure included in the own biosecurity program of the holding.

Epidemiological Information (Question 5.2 and 5.3)

Table B.18: ASF outbreaks in pig farms and in outdoor pig farms as they have been notified in the ADNS

Affected Country	First outbreak in pig farms (domestic pigs) in the Country	Year	ASF Outbreaks occurred in pig farms		ASF affected regions where the outbreaks occurred in pig farms (Region as defined in ADNS that corresponds to NUTS 3 level)		INFO
			Total number	Number of outbreaks occurred in outdoor farms	Total Number of affected regions	Number of regions where the first outbreak occurred in outdoor pig farm	
Bulgaria (BG)	Was not in an outdoor pig farm	2019	44	8	13	3	In 2019 – 44 outbreaks in total – 8 in industrial farms, 3 in family farms type A, 25 backyards and 8 EBP (for EBP - Regions Varna, Shumen, Burgas)
		2018	1	NA	1	NA	
		Total	**45**	**8**	**14**	**3**	
Estonia (EE)	Was not in an outdoor pig farm	2017	3	0	3	0	Keeping of pigs outdoor is prohibited in Estonia since 1. September 2015. Keeping of pigs outdoor is prohibited in Estonia since 1. September 2015.
		2016	6	0	4	0	
		2015	18	1	7	1	
		Total	**27**	**1**	**10**	**1**	
Italy (IT)	Was not in an outdoor pig farm	2019	1	1	1	1	Sardinia (Illegal free ranging pigs)
		2018	25	20	2	1	Sardinia
		2017	17	2	4	1	
		2016	23	9	3	1	
		2015	16	7	4	1	
		2014	40	10	5	1	
		Total	**122**	**49**	**7**	**7**	
Latvia (LV)	Was not in an outdoor pig farm	2019	1	0	1	0	
		2018	10	1	5	1	
		2017	8	0	6	0	
		2016	3	0	2	0	
		2015	10	1	5	1	
		2014	32	2	2	1	
		Total	**64**	**4**	**17**	**3**	

Affected Country	First outbreak in pig farms (domestic pigs) in the Country	Year	ASF Outbreaks occurred in pig farms		ASF affected regions where the outbreaks occurred in pig farms (Region as defined in ADNS that corresponds to NUTS 3 level)		INFO
			Total number	Number of outbreaks occurred in outdoor farms	Total Number of affected regions	Number of regions where the first outbreak occurred in outdoor pig farm	
Lithuania (LT)	Was not in an outdoor pig farm	2019	19	0	6	0	According to national biosecurity requirements it is forbidden to keep pigs outside.
		2018	51	0	19	0	
		2017	30	0	11	0	
		2016	19	0	5	0	
		2015	13	0	3	0	
		2014	6	0	2	0	
		Total	**138**	**0**	**33**	**0**	
Poland (PL)	Was not in an outdoor pig farm	2019	48	0	25	0	First outbreak in the outdoor farm has been reported in 2020.
		2018	109	0	22	0	
		2017	81	0	11	0	
		2016	20	0	9	0	
		2015	1	0	1	0	
		2014	2	0	1	0	
		Total	**261**	**0**	**46**	**0**	
Romania (RO)	Was not in an outdoor pig farm	2019	1,728	NA	35	NA	This information is not available
		2018	1,164	NA	18	NA	
		2017	2	NA	1	NA	
		Total	**2,894**	**NA**	**35**	**NA**	
Slovakia (SK)	Was not in an outdoor pig farm	2019	11	0	1	0	
EU Total		**2014–2019**	**3,562**	**63**	**163**	–	

Table B.19: The main factors that might have contributed to the introduction of ASF to outdoor farms based on the results of the epidemiological enquires according to the VAs of the affected MSs

Factors	Bulgaria	Estonia	Greece	Italy	Latvia	Netherlands	Poland	Romania
Lack of fence	✓	✓		✓				
Damaged, not well-maintained fence	✓			✓			✓	
Contact with wild boar	✓	✓		✓			✓	✓
Uncontrolled access of people	✓		✓	✓				✓
Grazing directly on the ground		✓		✓	✓		✓	
Provide fresh grass for feed		✓						✓
Illegal movement of animals			✓					
Swill feeding (illegally used)				✓	✓	✓		
Sharing males during breeding period				✓				

Annex C – Literature review protocol

Objectives:

i) **describe outdoor farming of pigs in the EU** (e.g. in terms of farming structures and practices).
ii) **identify biosecurity measures applied on outdoor farms of pigs** (in the EU and elsewhere).

Sources of information

Searches were run in the following databases using the Web of Science platform:

Web of Science Core Collection

- Science Citation Index Expanded
- Social Sciences Citation Index
- Conference Proceedings Citation Index- Science
- Conference Proceedings Citation Index- Social Science & Humanities
- Book Citation Index – Science
- Book Citation Index – Social Sciences & Humanities
- Emerging Sources Citation Index
- Current Chemical Reactions
- Index Chemicus

Limits in the search

Last 5 years

Search strings

Population: Pig OR Pigs OR Hog OR Hogs OR Suis OR Suidae OR "sus scrofa" OR Swine OR "wild boar" OR "wild boar" OR "wild pig" OR "wild pigs" OR "Iberian pig" OR Bazna OR Basner OR "Porcul de Banat" OR "Romanian Saddleback" OR Mangalica OR Mangalitsa OR Mangalitza OR "East Balkan Pig" OR "Black Slavonian pig" OR "Turopolje pig" OR "Bania spotted pig"

Intervention: outdoor OR "open air" OR "free range" OR "free ranging" OR brado OR "extensive farming" OR smallholder*

Searches done:

Population AND Intervention (# 3)

Search results were de-duplicated and checked for relevance. The criteria to be fulfilled to be considered relevant were:

1) Main text in English, French, Spanish, Italian, German, Greek AND
2) Description of farming structures and/or practices with respect to outdoor access/exposure of pigs in the EU MSs (studies describing experimental outdoor settings were excluded)

Set	Query	Results
# 1	**TOPIC:** (Pig OR Pigs OR Hog OR Hogs OR Suis OR Suidae OR "sus scrofa" OR Swine OR "wild boar" OR "wild boar" OR "wild pig" OR "wild pigs" OR "Iberian pig" OR Bazna OR Basner OR "Porcul de Banat" OR "Romanian Saddleback" OR Mangalica OR Mangalitsa OR Mangalitza OR "East Balkan Pig" OR "Black Slavonian pig" OR "Turopolje pig" OR "Bania spotted pig") *Databases= WOS, BCI, CABI, CSCD, CCC, DRCI, FSTA, KJD, MEDLINE, RSCI, SCIELO, ZOOREC Timespan=Last 5 years* *Search language=Auto*	**111,448**
# 2	**TOPIC:** (outdoor OR "open air" OR "free range" OR "free ranging" OR brado OR "extensive farming" OR smallholder*) *Databases= WOS, BCI, CABI, CSCD, CCC, DRCI, FSTA, KJD, MEDLINE, RSCI, SCIELO, ZOOREC Timespan=Last 5 years* *Search language=Auto*	**52,078**

Set	Query	Results
# 3	#2 AND #1 *Databases= WOS, BCI, CABI, CSCD, CCC, DRCI, FSTA, KJD, MEDLINE, RSCI, SCIELO, ZOOREC Timespan=Last 5 years* *Search language=Auto*	**935**

Review of #3:

After search: 935 records

After de-duplication: 893 records

After relevance screening of title and abstract: 77 records

Retrieved full-text documents: 57

After relevance screening of full text and identification of additional relevant references:

The review of the full text manuscripts was used to identify additional relevant references

Final number of relevant references included in the data extraction: 36

Data extracted:

Information on

- farming (infra)structures with respect to outdoor access/exposure of pigs.
- farming practices with respect to outdoor access/exposure of pigs.
- interaction of farmed pigs with wild animals.
- biosecurity (measures, levels) on outdoor farms.
- outdoor farms and infectious diseases.