Recent EFSA assessments on ASF – Matrices and Outdoor pig farming

PAFF meeting

17 June 2021

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European Food Safety Authority

Ability of different matrices to transmit ASF

Scientific opinion: https://www.efsa.europa.eu/sites/default/files/2021-04/6558.pdf

EKE report: https://www.efsa.europa.eu/en/supporting/pub/en-9994

Public consultation report: https://www.efsa.europa.eu/en/supporting/pub/en-9993

Terms of Reference

- Review the **evaluation** of the **ability** of matrices, including vegetables, arable crops, hay and straw as well as sawdust, wood chips and similar materials likely to presents a risk to **transmit ASF**. This review should take into account a retrospective analysis of ASF spread mechanisms
- The different matrices should be **ranked** on basis of their level of risk, considering also their trade flow pattern, with a view to enhance preparedness and preventions
- Propose and assess a **strategy** to **manage** the **risks** posed by different matrices. The definitions used in the report shall correspond to the ones present in the EU legislation such as EU feed law, as far as applicable

Potentially contaminated matrices included in the assessment

- Survival of ASFV in products directly derived from infected pigs (e.g., blood) and matrices that could potentially become contaminated by direct or indirect contact with infected pigs or wild boar

- Only products, which were expected to be (legally) used for pig feed or to be in direct contact with pigs, were included in the assessment

Group	Products	Key example(s)
1. Animal by-products for use in feed	1a. Hydrolysed proteins	
	1b. Pig blood products, spray dried porcine plasma	
2. Feed materials (contaminated, not pig derived)	2a. Cereal grains, their products and by-products	Wheat, maize, barley
	2b. Oil seeds, oil fruits, their products and by-products	Soybeans, rapeseeds (canola)
	2c. Other seeds, fruits and their by-products	Acorns, chestnuts, apples
	2d. Forages and roughage	Hay
	2e. Tubers, roots, their products and by-products	Potatoes, beetroot
	2f. Legume seeds, their products and by-products	Peas
3. Compound feed (includes products of categories 1 and 2)	3a. Mash (complete feeding-stuff)	**Organic or inorganic substances in mixtures, whether or not containing additives, intended for feeding to pigs in the form of complete feeding-stuffs or complementary feeding-stuffs**
	3b. Pellets (complete feeding-stuff)	
	3c. Minerals, Feed additives (complementary feeding-stuff)	
4. Bedding	4a. Straw	
	4b. Sawdust/woodchips	
	4c. Peat/Turf	
5. Vehicles	5. Empty vehicles for live pig transport, returning from affected areas (including equipment, like boards and gates)	

Data used

ASFV survival in matrices

Wild boar density

ASF prevalence in wild boar

Crop production and harvesting

Processing parameters

Livestock vehicle cleaning & disinfection

Trade data, consignment sizes

Pig farm sizes, pig diet

Farm size and livestock composition

Methods used

Systematic Literature Review

Expert Knowledge Elicitation

Modelling

Conclusions Matrices I

Relative likelihood of arriving contaminated at their destination in non-affected areas (q)

- **Compound feed** (**mash**, **pellets**), **feed additives** were the highest ranked matrices
- **Cereals** and **straw** also rank in the upper half of the risk-ranking
- These matrices are expected to have a higher risk (**2-4 orders of magnitude higher**) than the other assessed matrices

The combination of several products, each with its own likelihood of contamination, increases the probability of contamination for mixed products such as compound feed

Conclusions Matrices II

Relative indication of the potential risk for infecting pig farms in non-affected areas of the EU *(likelihood of these matrices containing infectious virus at destination (q) x imported/traded volume (N))*

- With 95–99% certainty
  - **compound feed**, **feed additives** and **cereals** rank highest and 3 orders of magnitude higher compared to **legumes, oil and other seeds**
  - **legumes, oil and other seeds** rank >4 orders of magnitude higher than **bedding/enrichment material** (sawdust, straw and wooden toys) and **forage**
  - **bedding/enrichment material** (sawdust, straw and wooden toys) and **forage** rank lowest

Conclusions Empty vehicles

Relative likelihood of arriving contaminated at their destination in non-affected areas (q)

Empty vehicles ranked 1-2 orders of magnitude lower than the highest-ranking matrices

Relative indication of their potential risk for infecting pig farms in non-affected areas of the EU (*likelihood of these matrices containing infectious virus at destination (q) x imported/traded volume (N)*)

- With 95–99% certainty
  - Empty vehicles ranked 3 orders of magnitude lower than highest ranking matrices

Recommendations

- In general, **storage** of feed products and enrichment/bedding materials originating from ASF-affected areas (at temperatures above 0 C) before their use in non-affected areas will decrease the risk of ASFV survival in the matrix.
- For **empty vehicles** for live pig transport returning from ASF-affected areas, the risk of ASF transmission can be decreased by
  - control of cleaning and disinfection of trucks (certificates and visual inspection)
  - loading pigs from assembly centers or transportable loading docks at some distance from the farm

Important to consider

- While the opinion identifies some types of feed, which may present a risk for transferring ASF to a farm, particularly in regions where wild boar contamination is present, **other risk pathways are more likely to require risk management**, such as moving live domestic pigs or allowing contact between wild boar and domestic pigs

ASF and outdoor farming of pigs

Scientific opinion: https://www.efsa.europa.eu/en/efsajournal/pub/6639

EKE report: https://www.efsa.europa.eu/en/supporting/pub/en-6595

Terms of Reference

- **characterize** and **categorize** the **keeping of pigs outdoors**
- describe the **application of biosecurity measures** for keeping of pigs outdoors and **evaluate the effectiveness of these practices** in different environments on **mitigating the risk of ASF introduction** and **ongoing spread**
- verify the **risk factors** for **ASF introduction** and **spread** that are linked to the **keeping of pigs outdoors**
- evaluate the **sustainability** of such farming **under different management and risk mitigation measures**
- assess the effectiveness of banning outdoor farming in already affected or at-risk areas, and the **risks linked to possible options for derogation to prohibition** of keeping of pigs outdoors **in affected areas**

Definition

- ***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
  - including kept wild boar (identified and owned) as well as suid animals kept for non-commercial purposes; excluding hunting pens keeping wild boars in a fenced area without clear ownership

Interpretation of ToR, Data, Methodologies

What are the characteristics of keeping pigs outdoors? (farm structures, farming practices, herd size, geographical location, biosecurity measures applied)

What are potential risk factors for introduction into farms and spread into the region linked to outdoor pig farming?

Questionnaire survey to MS VA and FA

Literature review

Internet search

ADNS review

PAFF presentations review

Aggregated information on outdoor pig farming

Expert Knowledge Elicitation (EKE)

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

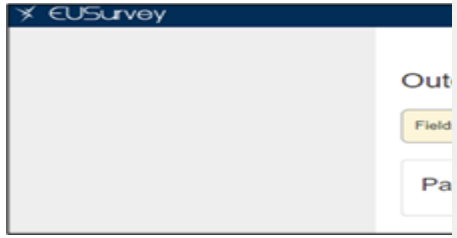
Effect of biosecurity measures on ASFV introduction and spread in a region in different environments

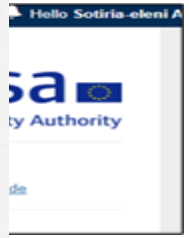
What could be required to maintain outdoor farming of pigs in ASF-affected areas of the EU MSs without increasing ASF spread and introduction risk?

EKE results, Aggregated information on outdoor pig farming

Overall assessment

QUESTIONNAIRE SURVEY





Thanks a lot for your valuable support!!

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Valuable informa
-Types of pig outdo
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-Biosecurity measu
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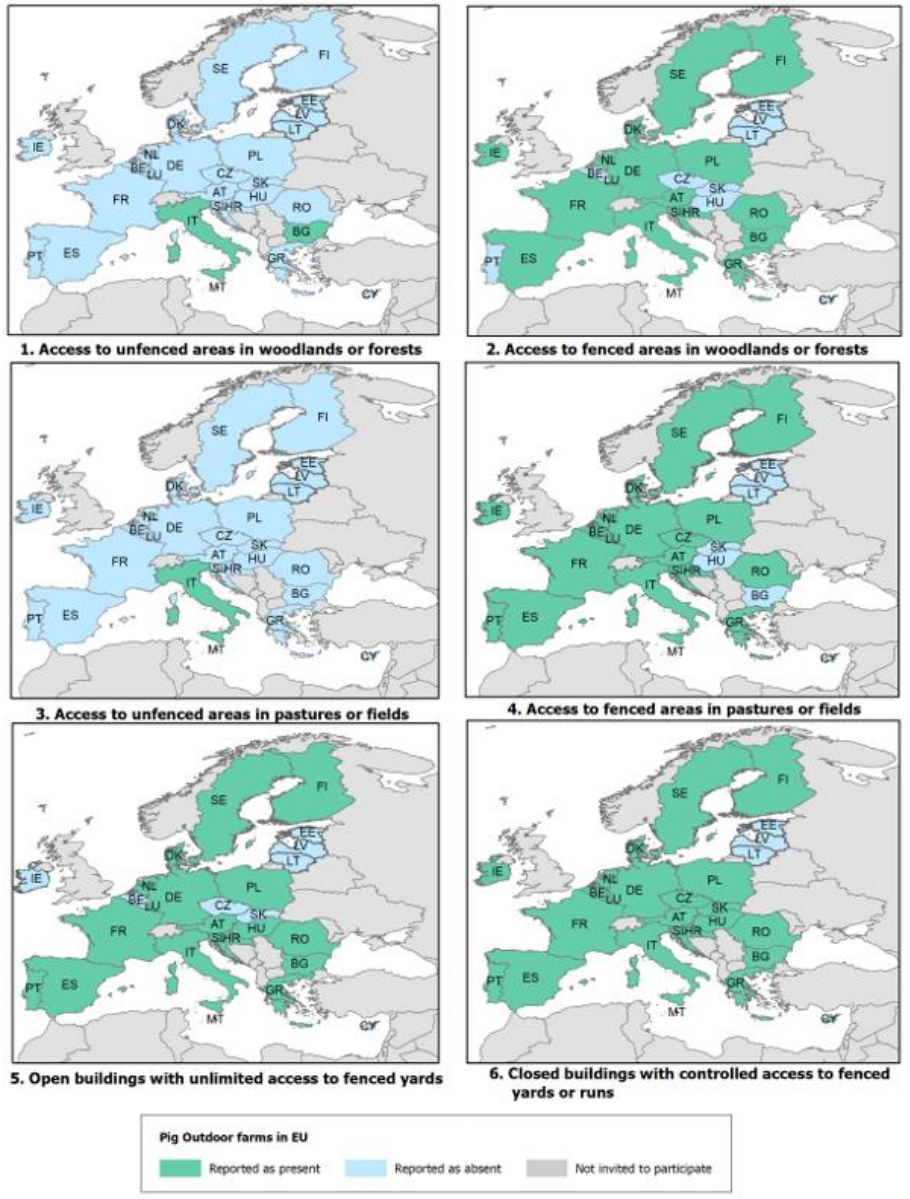
-ASF epidemiology on outdoor farms, protentional risk factors for AFS in outdoor farms

Main conclusions

Outdoor pig farms are common and present throughout the EU



Main conclusions – **baseline risk** of outdoor farm

- The **baseline risk** for ASF introduction and spread related to outdoor pig farms is **substantial** but there is 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')

Main conclusions – effectiveness of biosecurity measures: **single solid** and **double fences**

The Panel is **66-90% certain** that if **single solid** or **double fences** 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

Main conclusions – effectiveness of biosecurity measures: **simple single fences**

The Panel is **80-95% certain** that if **simple single fences** 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) (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 0-30%** compared to the baseline risk.

Main conclusions – effectiveness of **additional control measures**

regular, independent and objective on-farm biosecurity assessments using a **standard protocol/tool** (e.g., Biocheck UGent or similar)

farm-level benchmarking, designed to promote continuous improvement of biosecurity practices

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**

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.

Main recommendation

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 measures indicated below are implemented:**

- **double fences** and **single solid fences** rate highest in terms of effectiveness for both outdoor farm types and with 66-90% certainty their correct implementation would reduce the baseline risk of outdoor pig farms by more than 50%
- 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

Selected further recommendations

- 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.
- **Kept wild boar populations** in MSs should be registered and their biosafety, particularly regarding fencing, feeding, animal movements among facilities, etc. should be assessed.
- Specific risk factors/biosecurity breaches leading to outbreaks in **backyard farms** should be determined, including collecting information about outdoor access and BSMs applied in these farms.
- 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.

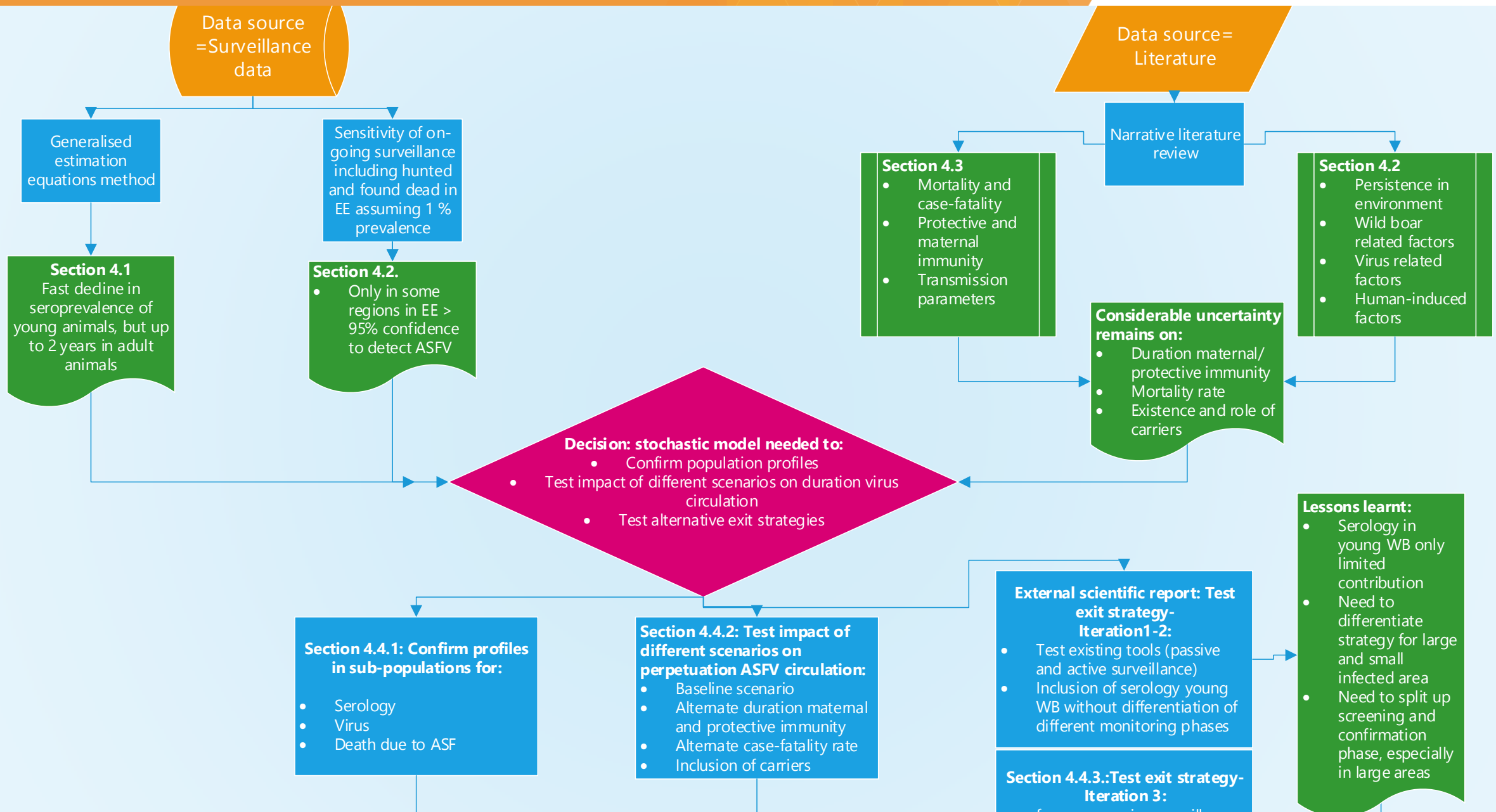
ASF exit strategy

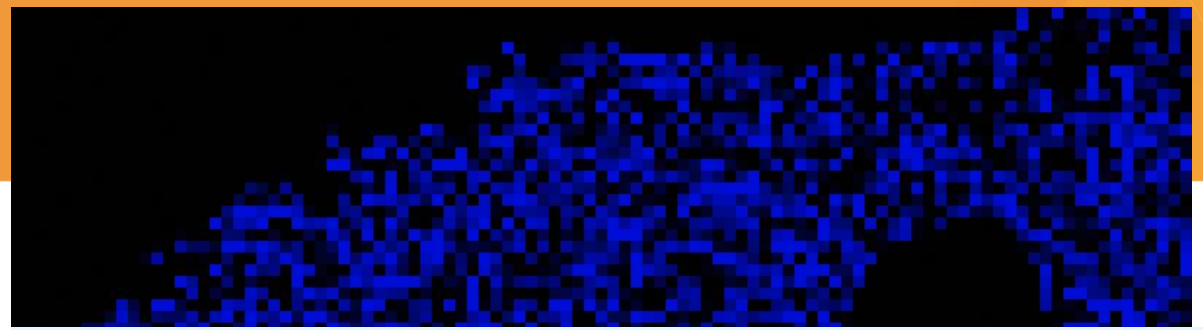
- ASF Exit Strategy Scientific Opinion (03/03/2021)
- Exit strategy: model outcomes (03/03/2021)

Exit opinion – TOR's (in brief)

- Factors contributing to multiple years of ASFV circulation in countries under surveillance (**persistence**).
- **Role of seropositive wild boar** when ASFV is NOT detected for long period. How reliable are surveillance results?
- **Pathways to exit of control status** when ongoing surveillance outcomes do not detect any PCR positive samples

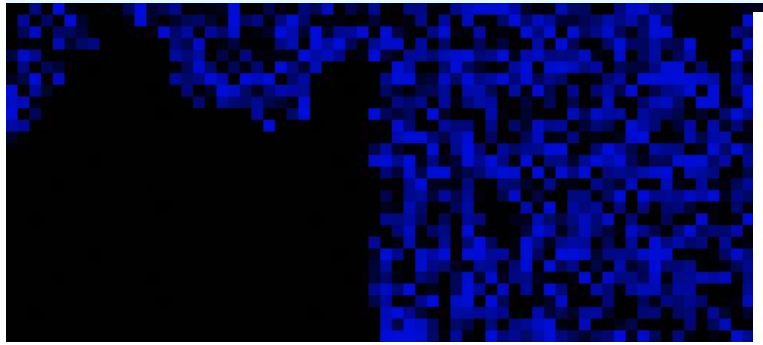
Methodological framework



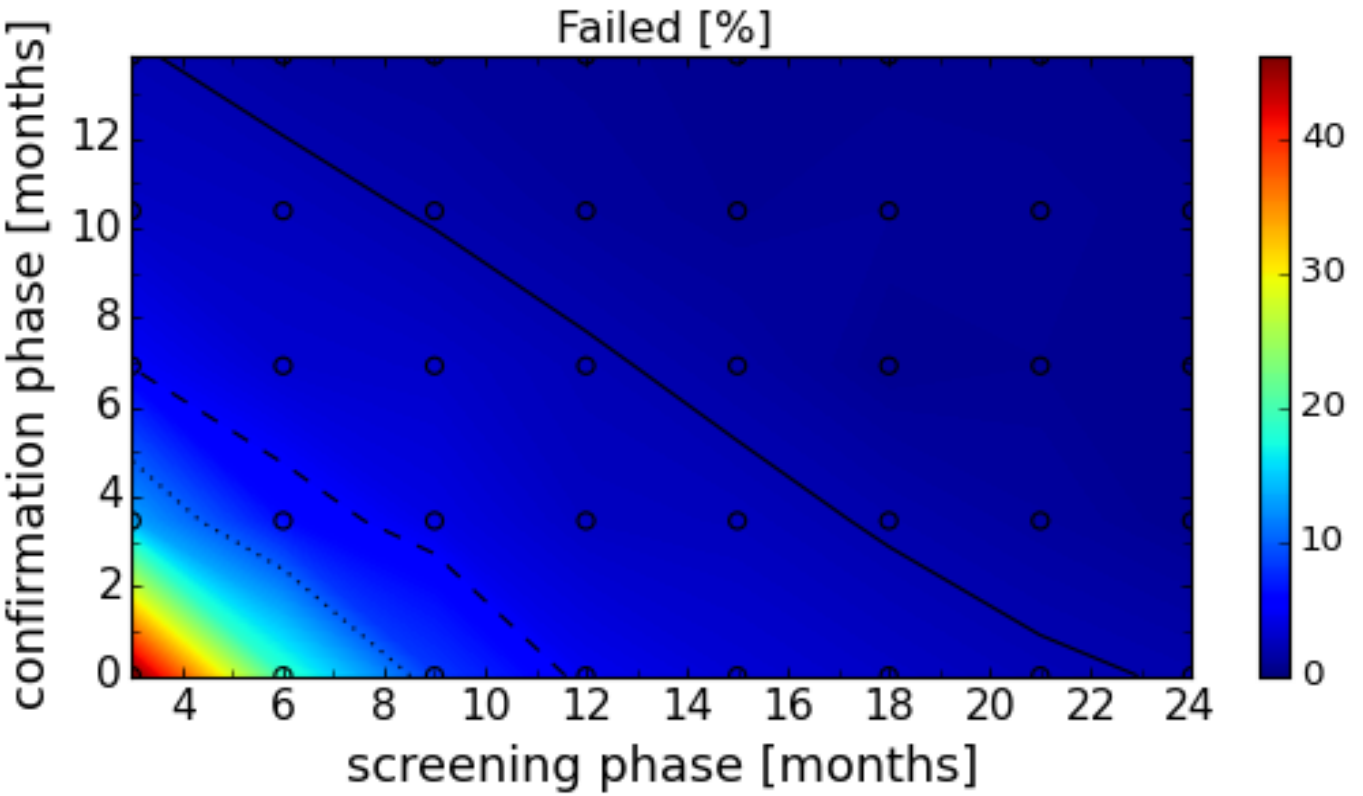


How reliable does the exit approach discriminate

Screening: **"low" effort long time**, **screen** virus circulation
Confirmation: **"high" targeted effort & short time**, **confirm** there is no evidence of presence



Fade out



Conclusions

- Model **simulations** have been used to evaluate different Exit Strategy options, which **vary by surveillance options and intensity, and the length of the monitoring period** during each phase.
- Each option was assessed in terms of performance (**failure rate**, being the per cent of simulations for which it was falsely concluded that virus is absent) and monitoring time
- The **accuracy** of the Exit Strategy approach to demonstrate freedom of ASFV circulation in a wild boar population is **increased with an increasing number of carcasses** being routinely collected and tested.
- The exit Strategy will only be **feasible if the duration and intensity of the passive surveillance can be sustained under field conditions**. This is most likely to be achieved with a longer monitoring phase during routine surveillance effort (the Screening Phase) and a shorter monitoring phase of increased surveillance effort (the Confirmation Phase).

Conclusions

- Lengthening of the monitoring periods leads to an improvement in Exit Strategy performance; however, this performance improvement should be **reasonably balanced against an unnecessary prolonged 'time free'** with only a marginal gain in performance of the Exit Strategy.
- Increased intensity of **passive surveillance** is associated with a substantial increase in Exit Strategy performance.
- In general, the inclusion of **active surveillance** in the Exit Strategy has **very limited impact** on the performance compared with a lengthening the overall monitoring period.
- A declining **seroprevalence in sub-adults can add information** about the fade-out of the epidemic and trigger the decision to initiate the Exit Strategy, however, including this surveillance activity during the Exit Strategy **only marginally improves** its performance.
- An Exit Strategy is problematic in the presence of lifelong infectious **carrier** animals. That said, it should be emphasised that the existence of such carriers is speculative, based on current knowledge.

Conclusions

- Higher **natural mortality that is not caused by ASF or hunting reduces the probability of finding infected carcasses** in an affected area, and therefore reduces the performance of passive surveillance. If there were uncertainty about natural mortality rates in a region, a conservative exit criterion would be advisable that can be derived from model outputs using the upper bound of natural mortality (i.e. 80% mortality due to hunting and 20% due to natural mortality).
- Depending on the epidemiological situation, if **PCR-positive, skeletonised carcass** remains are detected, it is **recommended that virus isolation is performed** to verify the viability of the virus. This is because PCR is able to detect the virus genome even if the virus is no longer viable/infectious.
- It is **rarely possible to accurately determine the date of death of animals** on the basis of skeletal remains.
- **Animals killed in car accidents** should be considered as **hunted** animals in the Exit Strategy.
- The Exit Strategy recommendations were **formulated per 1,000 km²** and therefore need to be scaled with the size of the specific region of application. It is expected that the samples are distributed as evenly as possible in time and space in order to provide a good representation of the wild boar population of interest.

Epidemiological analysis of ASF in the EU

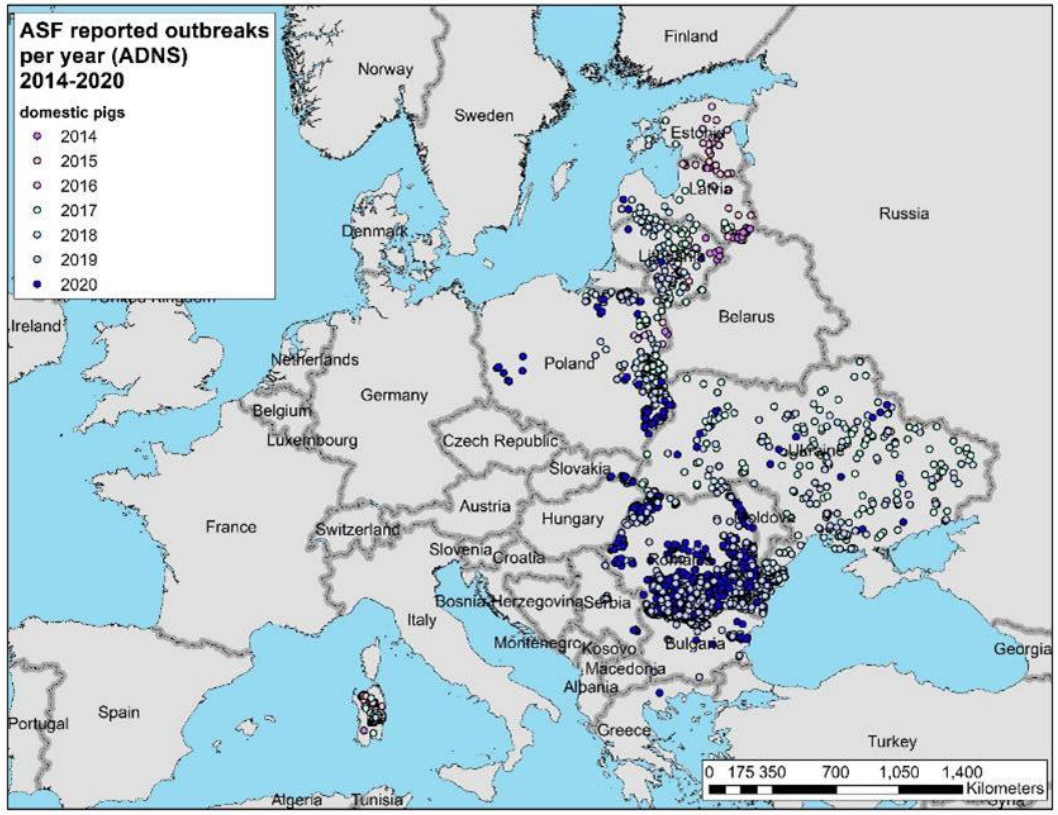
- Epidemiological analysis of ASF in the EU (06/05/2021)
- Modelling wild boar management for controlling ASF in white zones (06/05/2021)

Terms of Reference 1

TOR 1: Descriptive epidemiology:

Analyse the epidemiological data on ASF from MS and non-EU countries affected by ASFV Genotype II

- Temporal and spatial patterns
- Ranges and speed of transmission
- Sources of introduction in pig holdings



- Outbreaks reported to ADNS since 2014

TOR1: Descriptive epidemiology

Outline

- 1.1. Update of the situation in each affected MS
- 1.2. Time-profile of proportions of positive samples tested
- 1.3. Seasonality
- 1.4. Evolution yearly wild boar hunted in affected countries
- 1.5. Secondary cases network

Terms of Reference 2

TOR 2. Risk factor analysis:

- Review the previously identified risk factors involved in the occurrence, spread and persistence of the ASF virus in the wild boar population and in the domestic/wildlife interface
- Risk factors involved in the occurrence of ASF in domestic pig farms in Romania should be identified

TOR2: Risk factor analysis

Outline

2.1.Update from narrative literature review

2.2.Risk factors for the occurrence of ASF in the different counties of Romania analysed with BYM model

2.3.Risk factors for the occurrence of ASF in wild boar the different hunting grounds of Romania, analysis with Generalised Linear model

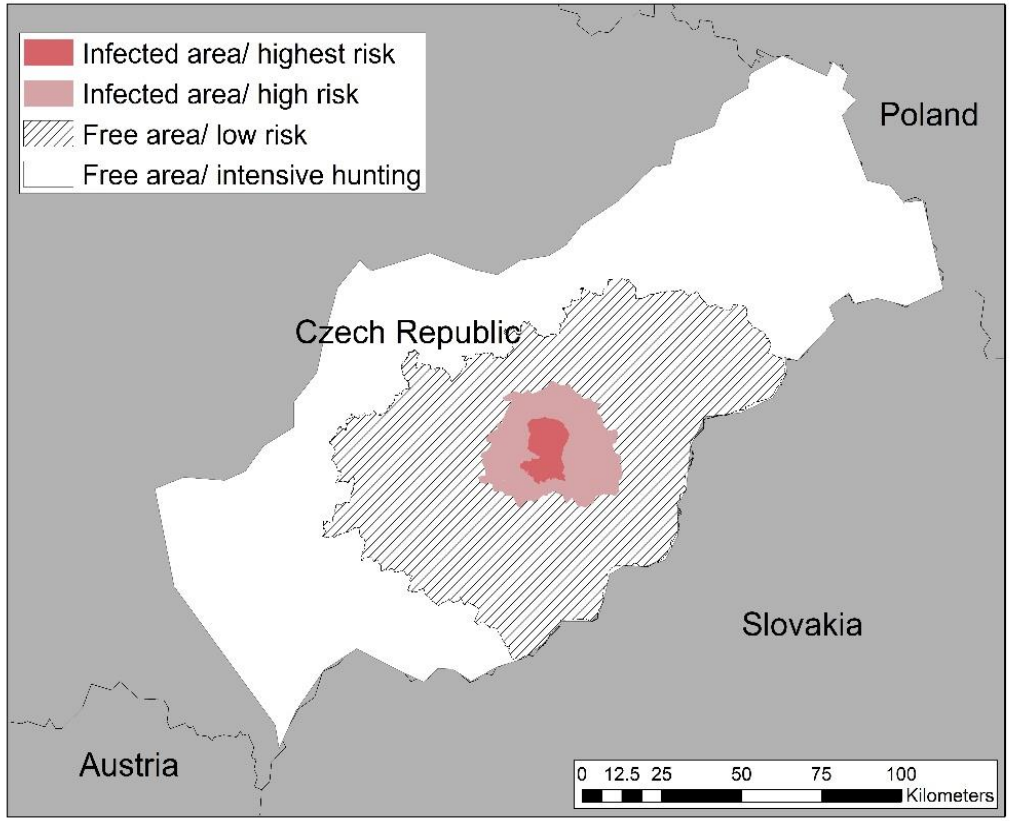
Terms of Reference 3

3. Analyse the data and information on the geographical areas called white zones applied by free Member States (in particular France and Luxembourg at the border with Belgium) for preventing the spread of the disease in wild boar.

- Assess the **effectiveness of the measures** and review scientific literature addressing these measures.
- Review and assess the **robustness and effectiveness of the boundaries** used for the determination/demarcation of these areas.

Definition: White zone = ASF-free area adjacent to ASF-affected area where measures are implemented to stop potential spread of ASF, in case it would enter from the affected area.

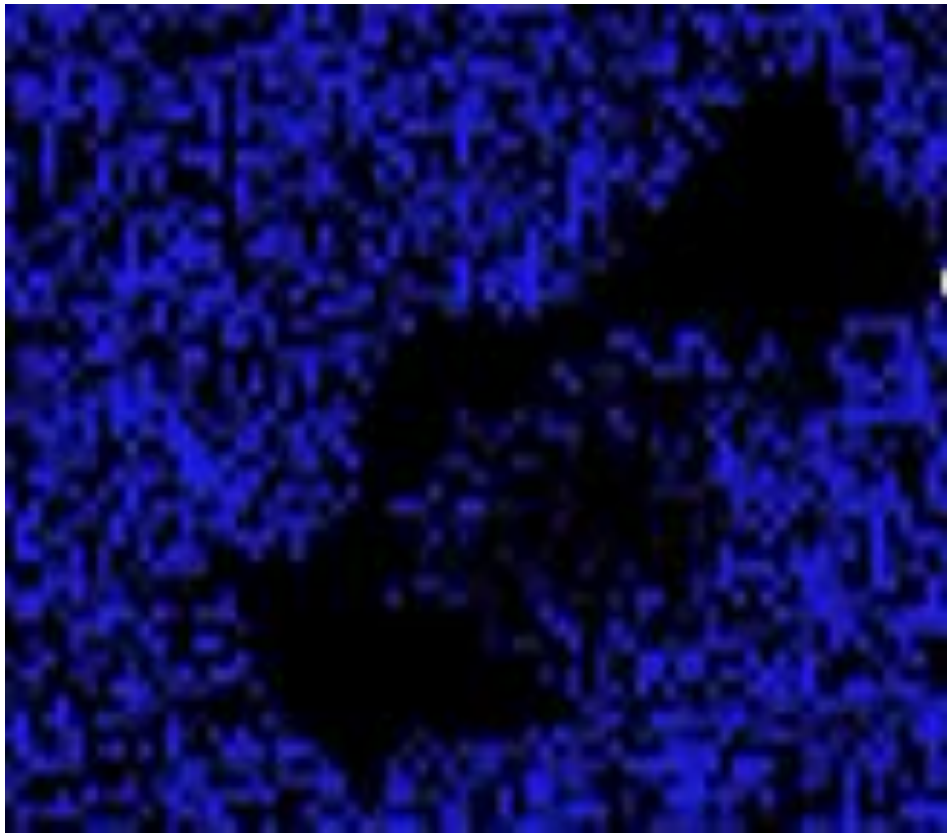
Terms of Reference 3:White zones



Wild boar management zones in Czechia

- Field evidence for different proposed white zones has been collected:
  - size of white zone
  - the time of establishment and the timing of the implementation of the measures
  - a description of the fences used as demarcation
  - the numbers of shot animals and carcasses found and the envisaged target.

Terms of Reference 3:



Simulation outcomes wild boar management zones in Czechia

- ASF spread is simulated, and control efforts are applied to the white zone including fencing, ASF related excess hunting, depopulation activities and carcass search/removal

Terms of Reference 3: Conclusions

- The failure rate of white zones that **solely used standard or intensified hunting** as the measure to stop the spread of ASF was very high, from 94% to 100% depending on the initial wild boar density that was used in the model and the time the infection needed to reach the white zone.
- The failure rate of white zones that implemented **fencing AND drastic, concentrated depopulation measures** as measures to stop the spread of ASF was low (from 20 to 30%) and depended on the initial wild boar density that was used in the model and time the infection needed to reach the white zone.
- The success of the control measures in Czechia was most likely due to silent culling of the core area (fenced highest +high risk area) and not due to the measures applied in the white zone (=low-risk + intensive hunting area). In the model, in runs with 'induced' ASF infection spreading beyond the high-risk part into Czech white zone, between 80% and 90% failure rates were observed

Terms of Reference 3: Conclusions

- **Silent culling** of wild boar (i.e., fast and drastically reducing their population whilst not disturbing them, through measures such as night shooting, the use of silencers or traps) can be **initiated a soon as the risk area, established by intensive carcass searching, is reliably fenced.**
- The white zone would need to be **very intensively hunted or even culled before ASF arrives** to be effective and it should be of sufficient width. The trade-off is that these measures require sufficient time and increased resources to be achievable.
- To be successful and allow sufficient time (for instance 2 years) to achieve the necessary pre-emptive culling targets of wild boar in the white zone, it should be **sufficiently far from the outermost wild boar case,** taking into account the natural speed of the spread of the disease, which varies with density.
- As **carcass removal** is a measure to eliminate ASFV sources from an infected area, this is not a pre-emptive measure. Nonetheless, carcass detection and testing will add to early detection and control of ASF after possible incursions in the white zone.

Terms of Reference 3: Recommendations

- Tangible, absolute population reduction targets in terms of numbers wild boar per km2 in the white zone after a certain management period should be specified for the white zone implementation.
- The distance at which the border of the white zone is placed to the non-free area needs to consider the speed of the natural spread of the disease in wild boar. The speed of spread determines the time available to implement measures in the white zone. This speed did range at 2.9-11.7 km per year on average in Eastern EU MS but will be higher in densely populated areas.
- The white zone should have a minimum width (i.e., several wild boar home ranges) to prevent ASF passing through by short infection chains as wild boar-free white zones are unlikely to be achieved.
- The white zone in a focal ASF introduction context needs a reliable fence protection towards the risk area or silent culling of the population . In the focal context the white zone will always be close to the risk area, and it is therefore needed to perform the pre-emptive measures in the white zone very quickly.
- Before WB culling activities start after a focal ASF introduction, the infected area should be properly demarcated by intensive carcass search and fenced to prevent the dispersal of ASF.

ASF GAP-RESEARCH

- **Opinions**
  - Research priorities to fill knowledge gaps on ASF seasonality (19/04/2021)
  - Research priorities to fill knowledge gaps on **ASFV survival** (to be published this week)
  - Research priorities to fill knowledge gaps on **ASFV by vectors** (to be published this week)
  - Research priorities to fill knowledge gaps on **ASFV in wild boar** (to be published in July)
- **Grants for Gap-research:**
  - 3 Monopoly grants (case control study in PL/RO/LT -2 years -700K)
  - In pipeline: CFP on ASF survival in bedding and feed and vectors-1.5 year- 400K

ASF STANDING WORKING GROUP: SUBGROUPS

European Food Safety Authority

ASF'SWG

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GOGIN Andrey	Russia
GRIGALIUNIENE Vilija	Lithuania
HELYES Georgina	Hungary
KORYTAROVA Daniela	Slovakia
LOI Federica	Italy(Sardinia)
MITEVA Aleksandra	Bulgaria
NEGHIRLA Ioana	Romania
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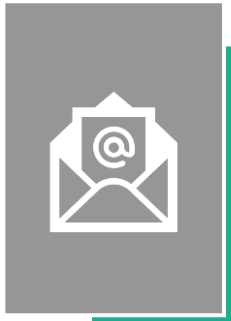

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