

Herramientas y oportunidades para controlar la PPA en jabalíes



SABIO
Health and Biotechnology

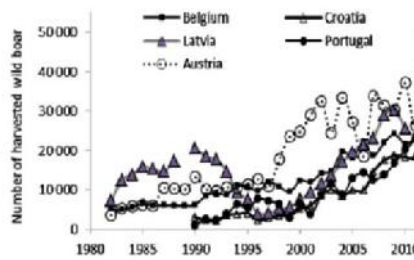
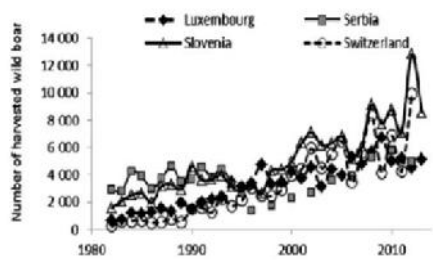
Christian Gortázar, IREC

@ChristianGortaz



1

Wild boar populations are growing



Review
November 2014, 2014
doi:10.1016/j.wild.2014.10.003

Wild boar populations up, numbers of hunters down? A review of trends and implications for Europe

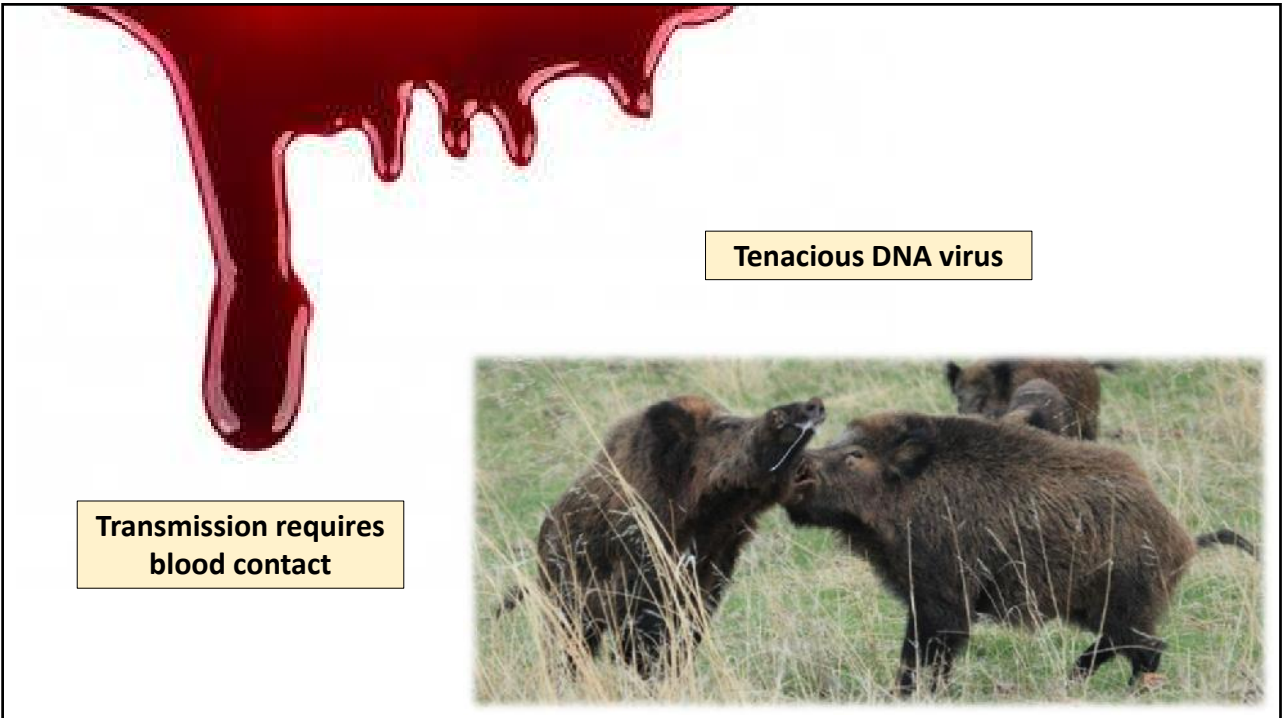
Giovanna Massel,¹ Jonas Kindberg,² Alain Licoppe,³ Dragan Gačić,⁴ Nikica Sprem,⁵ Jiří Kamler,⁶ Eric Baubet,⁷ Ulf Hohmann,⁸ Andrea Monaco,⁹ Janis Ozoliņš,¹⁰ Sandra Cellina,¹¹ Tomasz Podgórski,¹² Carlos Fonseca,¹³ Nikolay Markov,¹⁴ Boštjan Pokorny,¹⁵ Carme Rosell¹⁶ and Andras Nahlik¹⁷

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Wild boar play a key role in the spread of ASF, yet despite their significance, little is known about the key mechanisms that drive infection transmission and disease persistence

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Tenacious DNA virus

Transmission requires blood contact

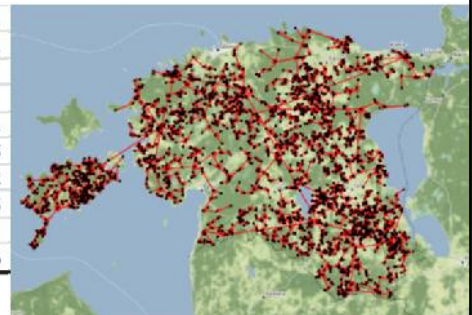
4

Speed of natural ASF spread

SCIENTIFIC REPORT
 EFSA Journal
 APPROVED 18 November 2019
 DOI: 10.29026/EFSA.2019.1899
Epidemiological analyses of African swine fever in the European Union (November 2018 to October 2019)
 European Food Safety Authority (EFSA)
 Alessandro Piraveanu, Alexandra Papadimitriou, Andreu Gual, Andreu Bellas, Antonio Barrio, Anissa Lahlou, Anna Miliute, Christian Gabriel Schmidt, Guntis Valters, Carole Desmarest, Daniela Kucharska, Edina Okonko, Georgina Ferrer, Christophe Buchon, Gergely Szendrői, Hans-Hermann Thiel, Heide Sautter, José Carlos Argente, Karl Dittl, Klaus Depner, Laura C. González Velasco, Hilwete Spruiell, Sana Ghalib, Simon Muir, Theodoros Christou, Verónica Vilas Graells, Yilgor Gurbani and Richard Wall

Country	Numbers of cases reported to ADNS	Time	Speed of propagation (km/year)			Mean(excluding extreme)
			P25	Median	P75	
Belgium	642	Closest	2.4	7.8	25.1	12.1
		> 7 days	2.3	5.7	15	8
Czechia	230	Closest	1.3	5	11.7	6.6
		> 7 days	0.7	2.9	6.6	3.4
Estonia	2,745	Closest	2.3	7.1	25.4	13.2
		> 7 days	2.2	6.3	19.1	9.9
Hungary	1,174	Closest	3.5	11.7	38.4	21.1
		> 7 days	3.2	8.6	24.1	13.1
Latvia	3,639	Closest	1.7	5	19.4	9.9
		> 7 days	1.6	4.5	15.3	7.8
Poland	5,080	Closest	2.9	9.1	31.1	16.1
		> 7 days	2.6	7.7	22.9	11.5
Lithuania	3,596	Closest	2.5	8.1	26.7	14.2
		> 7 days	2.3	6.9	19.9	10.5
Romania	671	Closest	9.3	31.4	120.3	64
		> 7 days	7.6	25	87.8	43.6

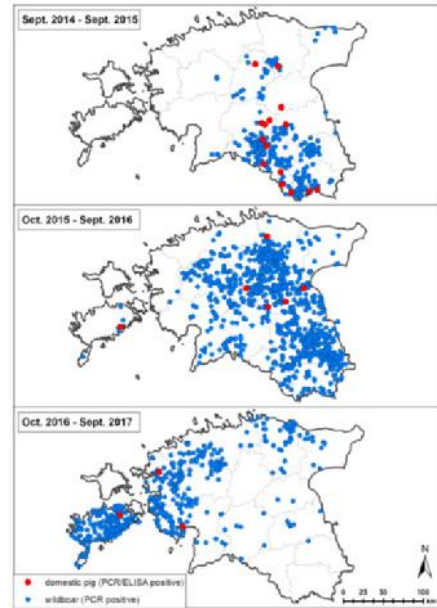
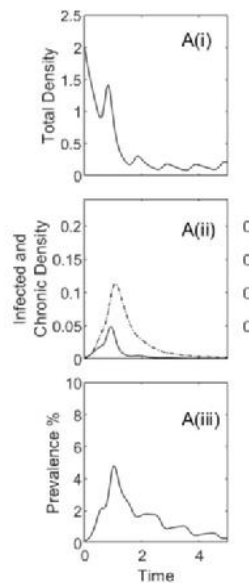
Mean speed 10-13 km/year



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What happens in case of an ASF outbreak?

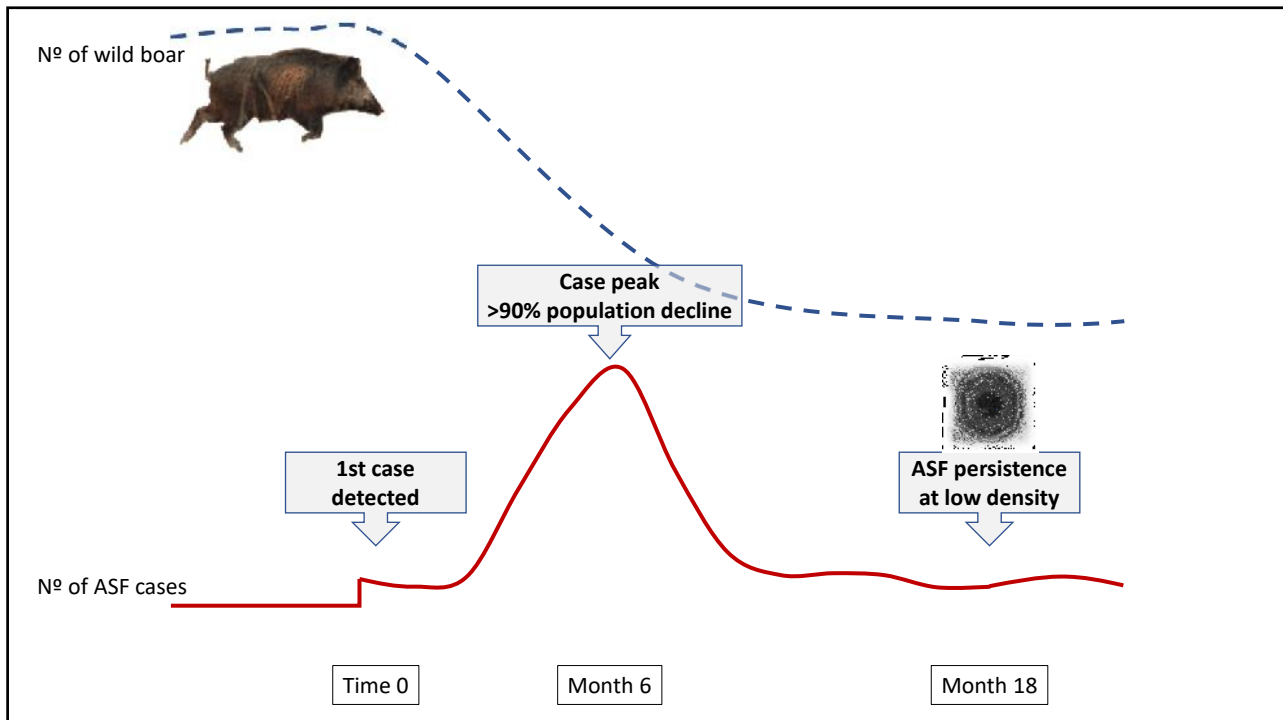
- Huge and long-lasting drop in population density
- Peak in infected density ≈6 months after the virus is initially discovered
- Persistence of the virus over years despite low population density



Custom lists available at <https://www.elsevier.com/locate/preventive-veterinary-medicine>
 Preventive Veterinary Medicine
 journal homepage: www.elsevier.com/locate/preventive-veterinary-medicine

SVEPM 2018
 Epidemiological analysis of the 2015–2017 African swine fever outbreaks in Estonia
 Imbi Nurmaja^{a,b,*}, Kerli Mäestu^a, Maarja Kristian^a, Tarmo Niine^a, Katja Schulz^a, Klaus Depner^a, Arvo Vilrop^a

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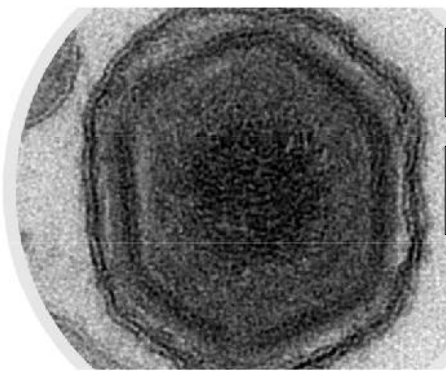


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Insights from modelling

SCIENTIFIC REPORTS
nature research

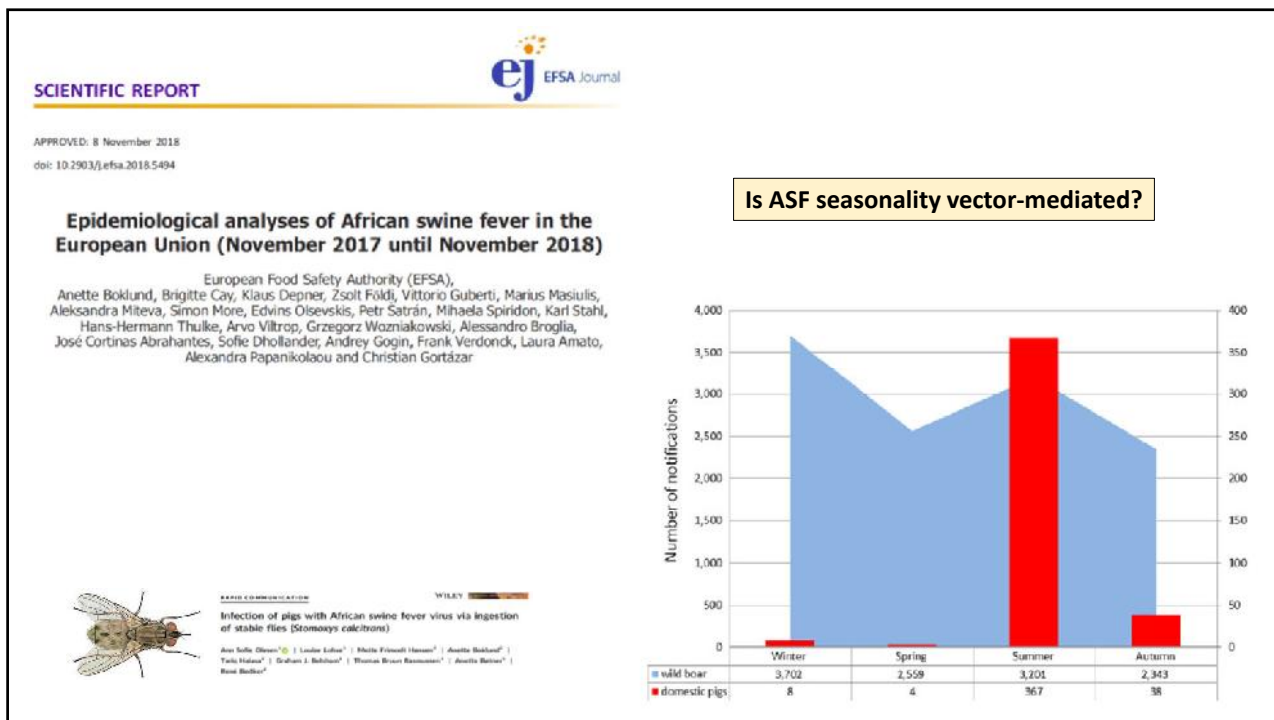
Modelling the transmission and persistence of African swine fever in wild boar in contrasting European scenarios
Xander O'Neill¹, Andy White², Francisco Ruiz-Fons³ & Christian Gottsard¹



- Direct transmission**
(mostly intra-group)
- Environmental transmission**
(carcass-mediated)
- (Short-term) Survivors**
(maintenance)

- **All 3 mechanisms are essential** to capture the initial population crash and long-term persistence of ASF at low density.
- The **long-term persistence** of ASF makes the virus difficult to eradicate and increases the opportunity of infectious spread to neighboring populations.

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Medical and Veterinary Entomology
Journal of Medical and Veterinary Entomology (2021), 35, 48–50
doi: 10.1111/mve.12499

SHORT COMMUNICATION

The contribution of insects to African swine fever virus dispersal: data from domestic pig farms in Lithuania

J. TURČINAVIČIENĖ¹, A. PETRAŠIŪNAS¹, R. BERNOTIENĖ¹, M. MASIULIS^{2,3} and V. JONUŠAITIS²



Stomoxys

Musca

Culex

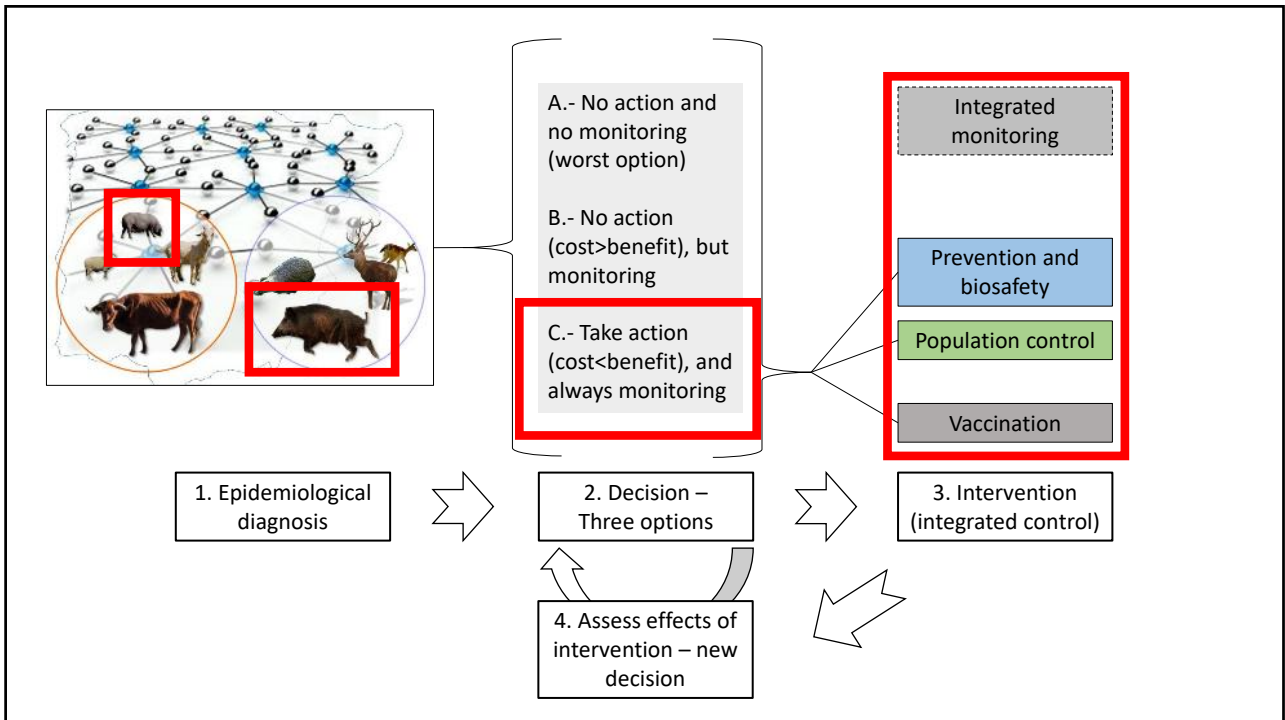
Table 2. Number of target Diptera insect specimens collected using Nzi traps in Lithuania in 2018 and 2019.

Insect family and genus	Poškaičiai*	Papečiai†	Skuoliai†	Poškaičiai†	Sirvydai†	No of tested insects‡	Ažuolų Būda†,§	Total trapped
	2018	2018	2018	2019	2019		2019	
Tabanidae								
<i>Haematopota</i>	71	4	16	4	25	10	1	121
<i>Hybomitra</i>	52	63	5	5	699	5	0	824
<i>Chrysops</i>	1	2	3	1	5	2	0	12
Muscidae								
<i>Stomoxys</i>	48 (8)	47	9	59	124	94	367 (1)	654
Other	34 (1)	75	0	19	1	13	0	129
Culicidae	2 (1)	11	2	11	23	20	8	57
Calliphoridae	44	20	5	76 (1)	64	41	29	238
Total						185		2035

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ASF vaccines

- Inactivated → safe but ineffective
- Vector and subunit → safe but low level of protection
- Life attenuated → dangerous
- Recombinant life attenuated → maybe
- (other)



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ASF vaccines

- Baits needed → IREC bait achieved uptake rates >70%



(a)



(b)



Evaluation of baits for oral vaccination of European wild boar piglets
Cristina Ballesteros^a, Christian Gortázar^a, Mario Canales^a, Joaquin Vicente^a, Angelo Lasagna
José A. Gamarra^a, Ricardo Carrasco-García^a, José de la Fuente^{a,b,c}

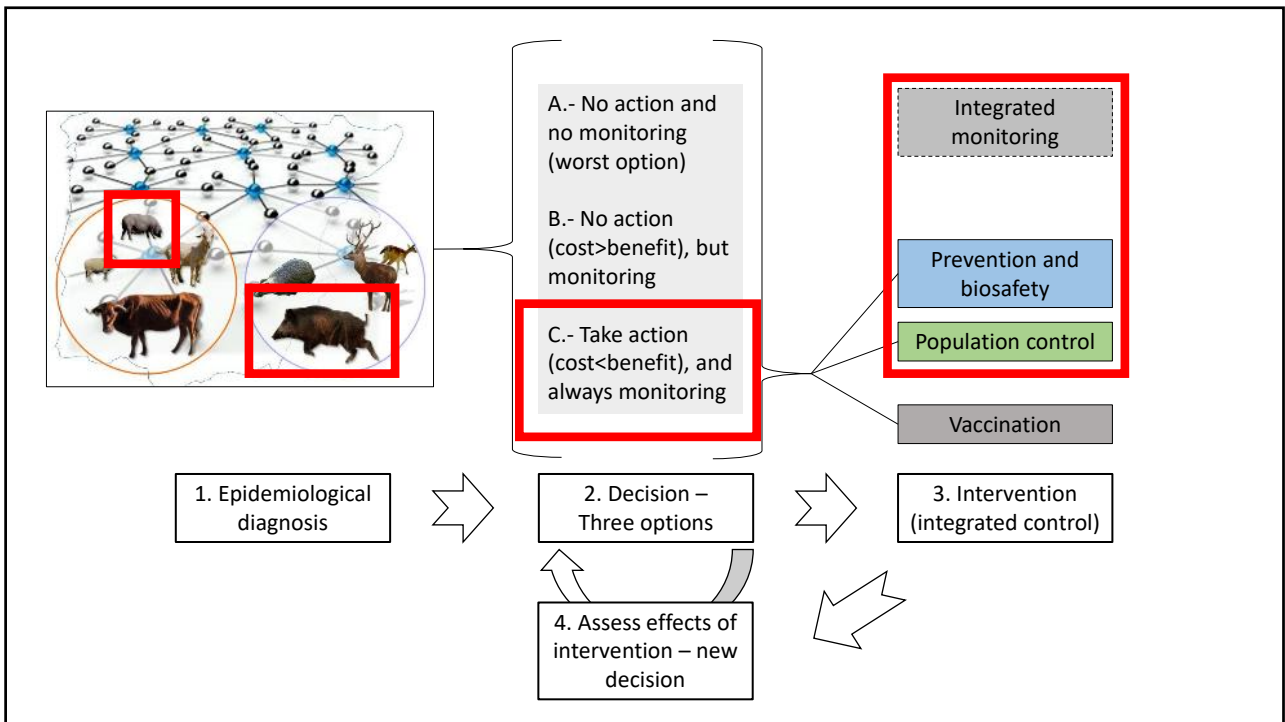
Preventive Veterinary Medicine 155 (2018) 13–20



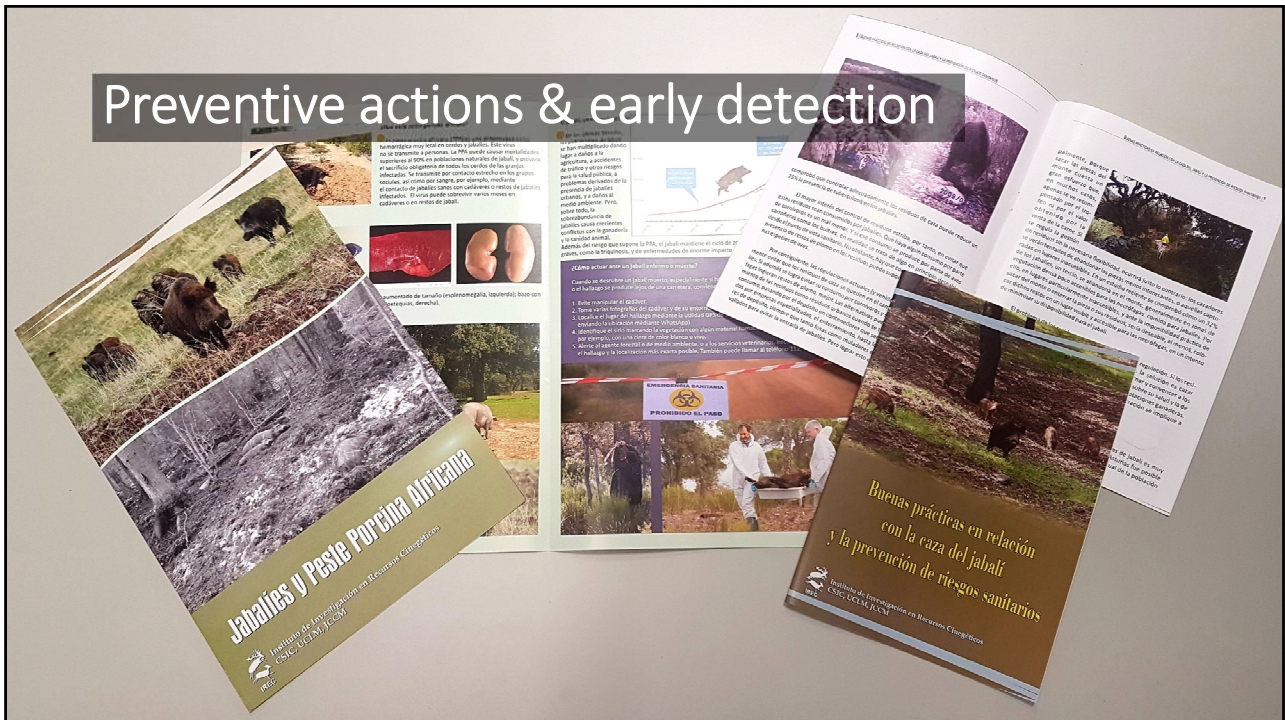
Impact of piglet oral vaccination against tuberculosis in endemic free-ranging wild boar populations

Iratxe Díez-Delgado^{a,b,c}, Iker A. Sevilla^a, Beatriz Romero^a, Eleanor Tanner^a, Jose A. Barasona^{a,d},
Andrew R. White^a, Peter W.W. Lutz^a, Mike Boots^{a,b}, José de la Fuente^{a,b}, Lucas Dominguez^{a,d},
Joaquin Vicente^a, Joseba M. Garrido^a, Ramón A. Juste^{a,d}, Alicia Aranzaz^a, Christian Gortazar^b

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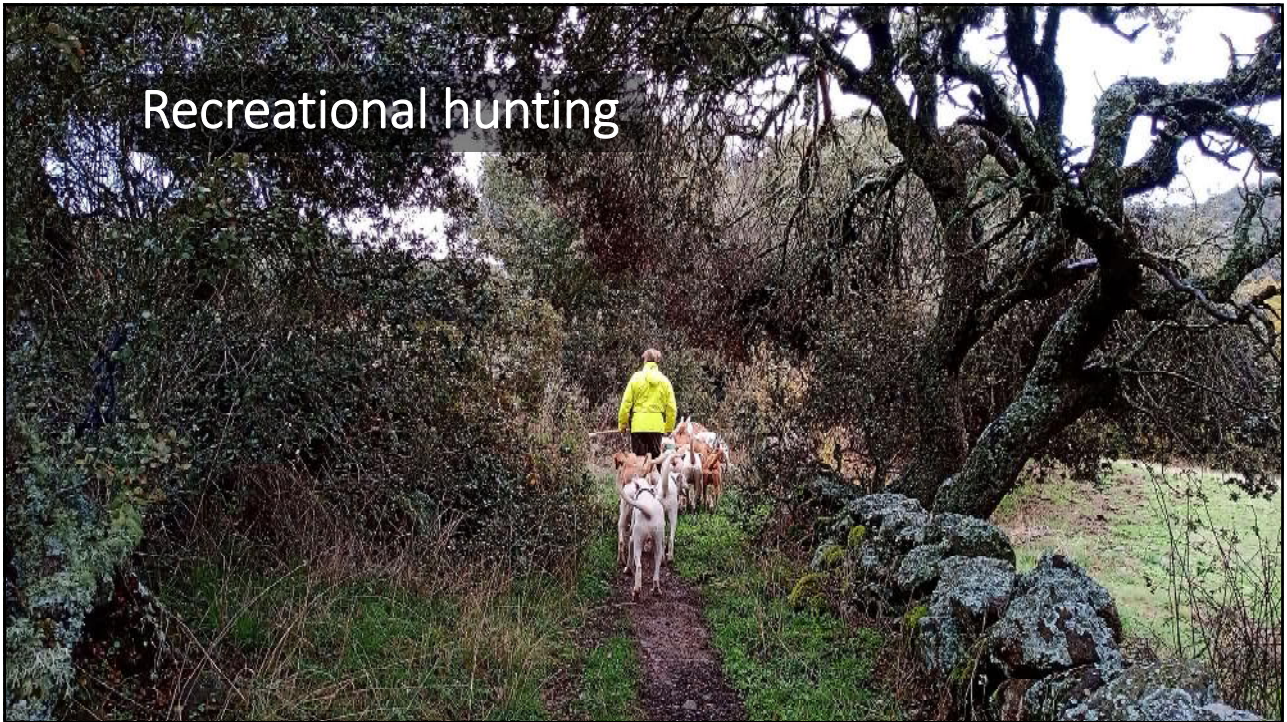
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Recreational hunting

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Culling

Photo: Ivor Jockney, NZ

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Fencing

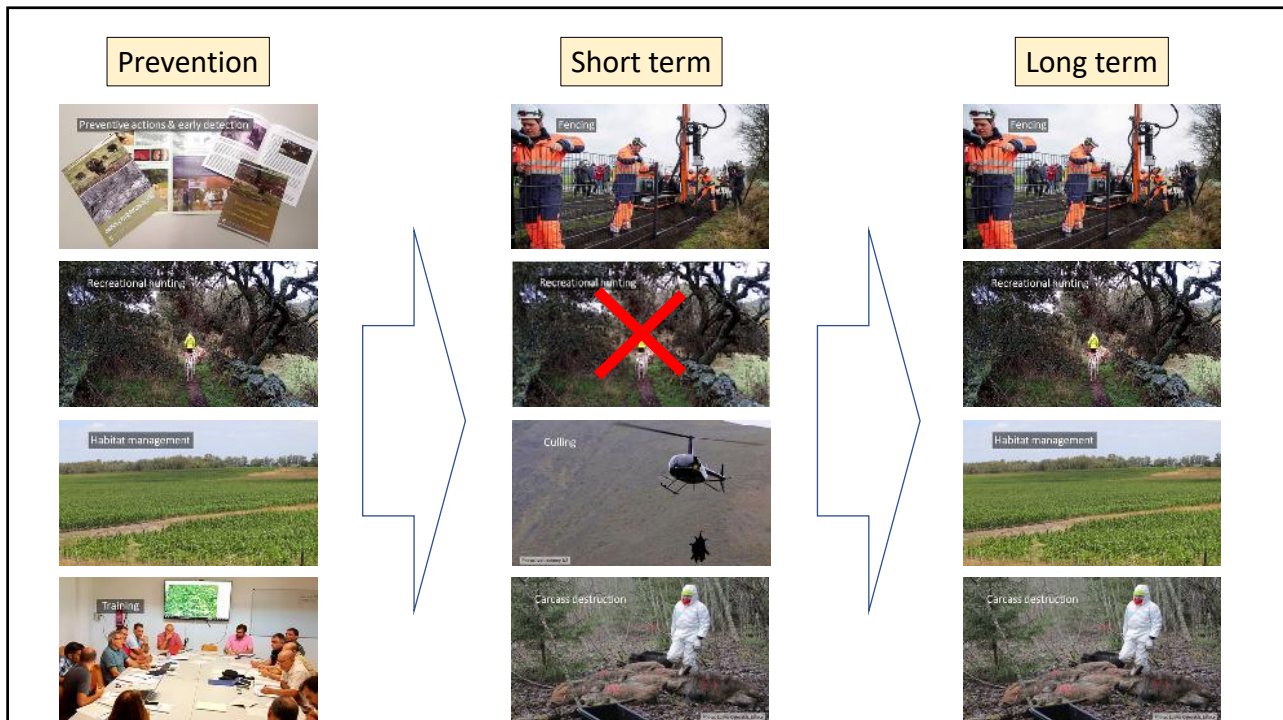
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Carcass destruction

Photo: Edvins Oslevskis, Latvia

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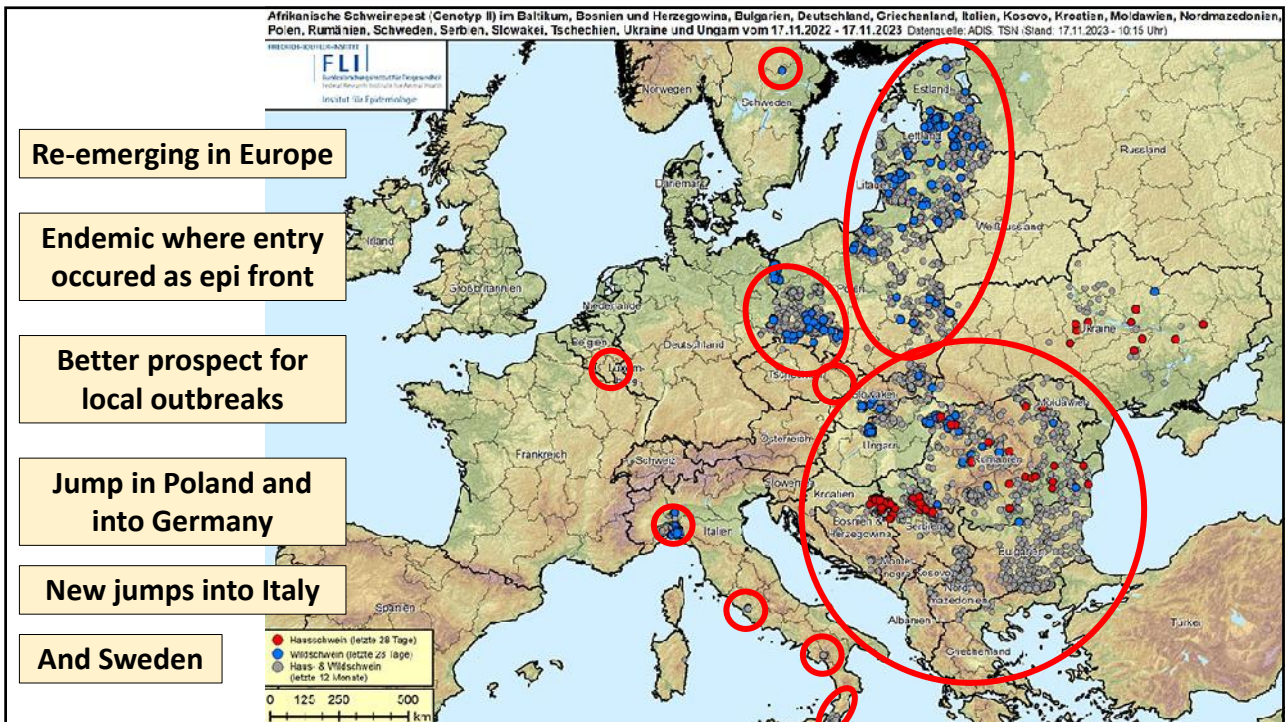
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Presentation structure

- Intro
 - Wild boar and feral pig ecology
 - ASF epidemiology
 - ASF control tools
- **Disease control by scenario**
 - **Endemic regions**
 - **Point introductions**
 - **Epidemic fronts**
- Preventing ASF during peacetime
 - Pig farm biosafety
 - Population monitoring
 - Hunters & WB control
- Conclusions



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Endemic zones

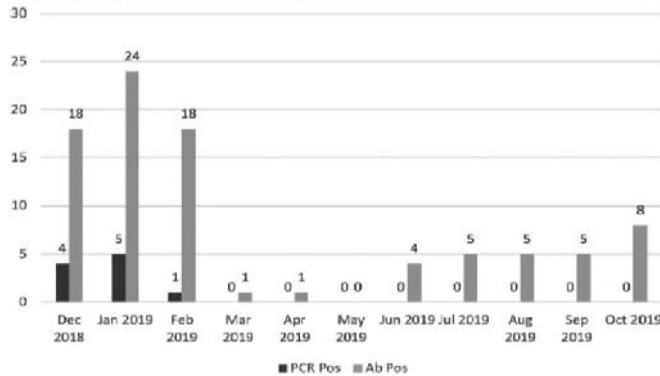
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Wild boar maintain ASF even at low density

African Swine Fever scientific report



The epidemic of ASF in Estonia has been in a descending phase since the beginning of 2018. The last outbreaks in domestic pig herds occurred in summer 2017 and the number of cases detected among wild boar has been gradually decreasing. Most cases detected in wild boar have been antibody positive but virus (PCR) negative. The last PCR-positive wild boar in 2019 was detected in February.



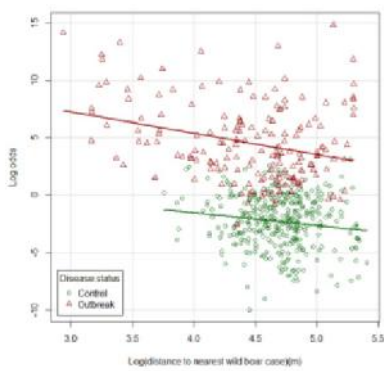
Persistence at very low WB density

Fading out?

Figure 6: Numbers of ASF virus (PCR)-positive and antibody (Ab)-positive wild boar detected in Estonia in the period 1 December 2018 to 31 October 2019

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Focus on pig farm biosecurity



SCIENTIFIC REPORTS
nature research

Risk factors for African swine fever incursion in Romanian domestic farms during 2019

A. Boklund^{1,2}, S. Dhollander², T. Chesnoiu Vasile¹, J. C. Abrahantes², A. Botner^{1,3}, A. Gogin⁴, L. C. Gonzalez Villete⁴, C. Gortázar⁵, S. J. More⁶, A. Papanikolaou¹, H. Roberts⁶, A. Stegeman¹⁰, K. Ståhl¹¹, H. H. Thulke¹², A. Viltrop¹³, Y. Van der Stede² & S. Mortensen¹⁴

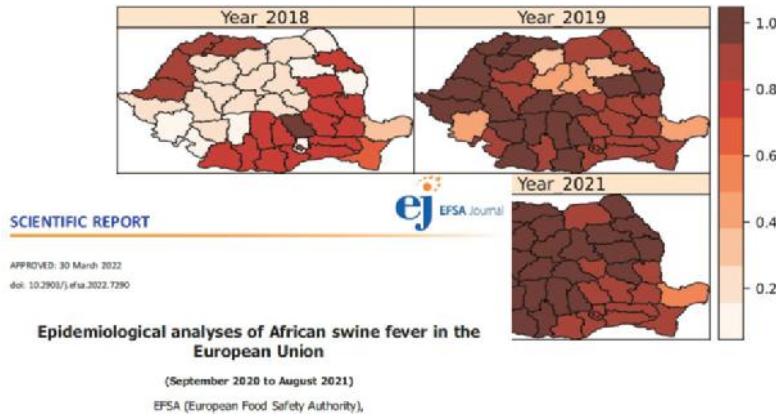


- Fenced industrial pig farm
- Navarra (courtesy M Guibert)

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Keep wild boar populations hunted?

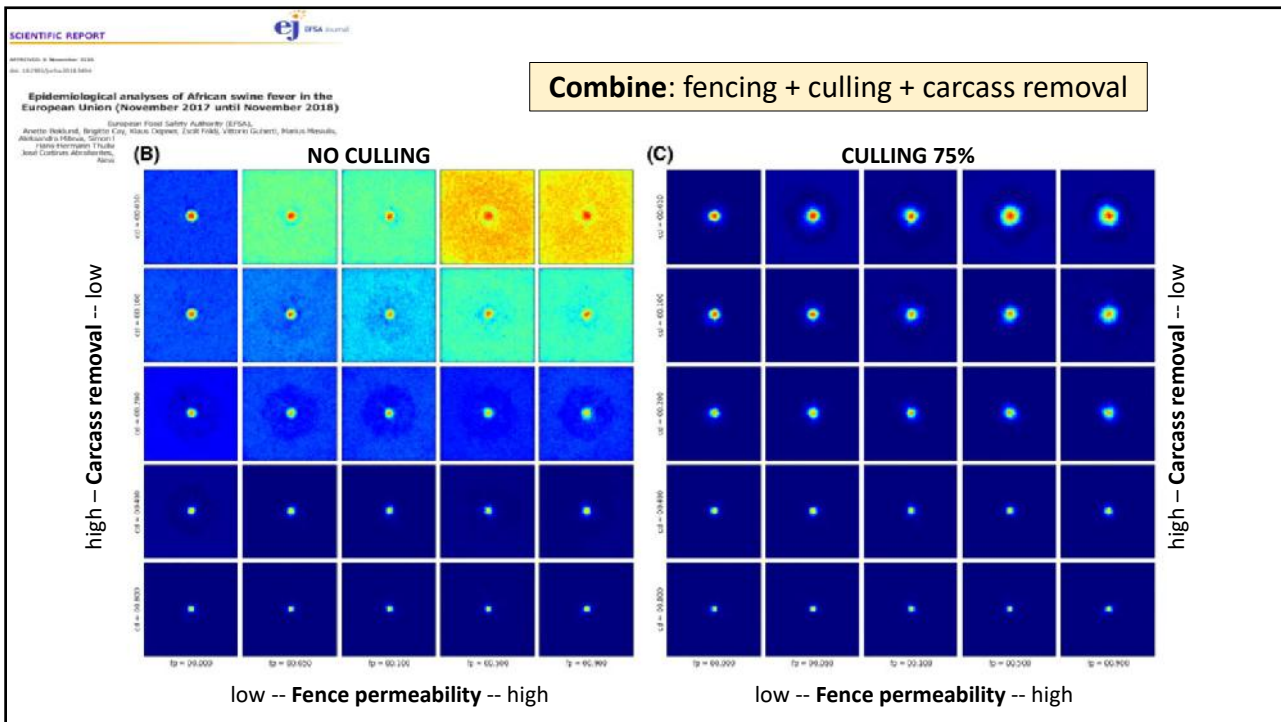
- “intense hunting helps to reduce the probability of recording positive PCR results in wild boar in Romania”



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Local outbreaks

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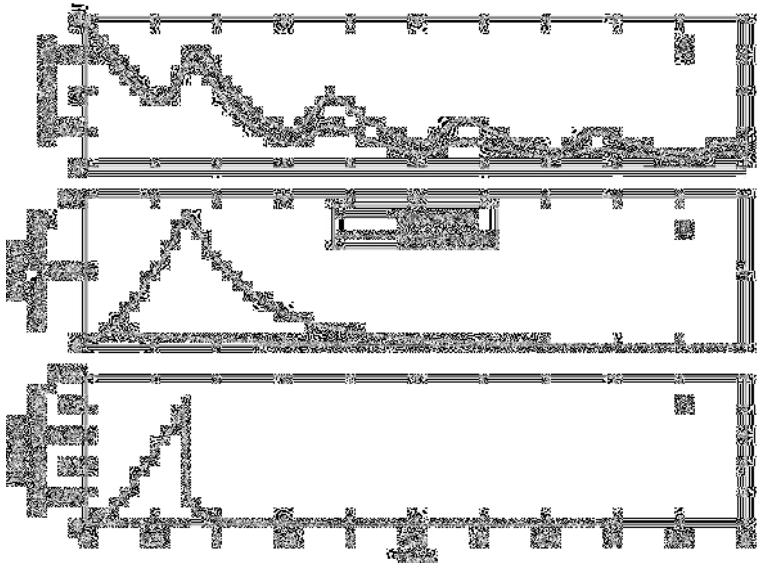
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Expect better control prospects if:

Early detection

→ Interventions start early

Lower wild boar density and habitat quality





Modelling the transmission and persistence of African swine fever in wild boar in contrasting European scenarios

Kender O'Neill¹, Andy White^{1*}, Francisco Ruiz-Fons² & Christian Gortázar³

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Belgium: control measures in wild boar

- **Zoning:** infected area + peripheral zones
 - WB feeding strictly prohibited
 - Initial hunting ban in the infected area
 - Partial ban of circulation and logging
- **Carcass search and removal:**
 - Active & systematic
 - Immediate carcass removal to rendering plant
- **Fencing:**
 - Network of concentric fences on the border & within the zones (≈300 km). Goals:
 - (i) slowing down spread
 - (ii) creating tight depopulation corridors
- **Depopulation:**
 - Trapping, night shooting, single hunting on baiting points, driven hunts with/without dogs with specific restrictions according to the area
 - Hunters were involved in the depopulation operations. Compensations (50 EUR or 100 EUR per wild boar, depending of the area) provided to agreed hunters w. specific training on biosecurity procedures, including packaging and transport of culled wild boar to the collect/diagnostic centres

SCIENTIFIC REPORT

APPROVED: 18 December 2019
doi: 10.2903/j.efsa.2020.5966

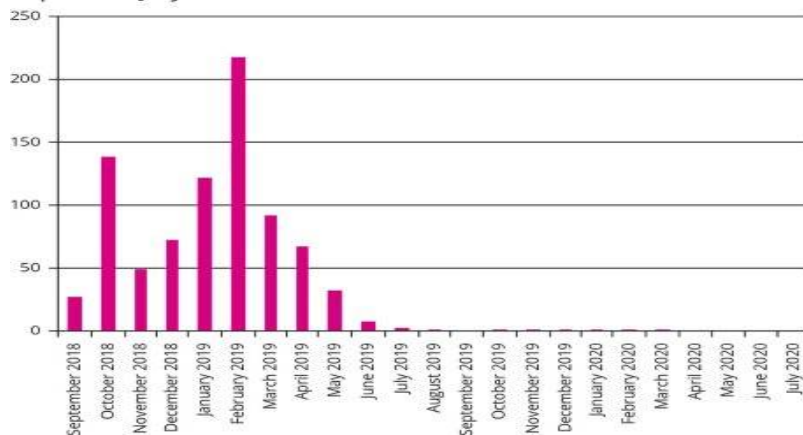
Epidemiological analyses of African swine fever in the European Union (November 2018 to October 2019)

European Food Safety Authority (EFSA),
 Aleksandra Miteva, Alexandros Papanikolaou, Andrey Gogin, Anette Boklund, Anette Botner,
 Annick Linden, Arvo Viltrop, Christian Gortázar Schmidt, Corina Ivanciu, Daniel Desmecht,
 Daniela Konstarova, Edvina Olseski, Georgina Helyes, Grzegorz Wozniakowski,
 Hans-Hermann Thulke, Helen Roberts, José Cortiñas Abrahantes, Karl Szűh, Klaus Depner,
 Laura C. González Vileta, Mihaela Spiridon, Sasa Ostojic, Simon More,
 Theodora Chesnou Vasile, Vilija Grigaluniene, Vittorio Guberti and Richard Wallo

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Belgium: ASF-free again

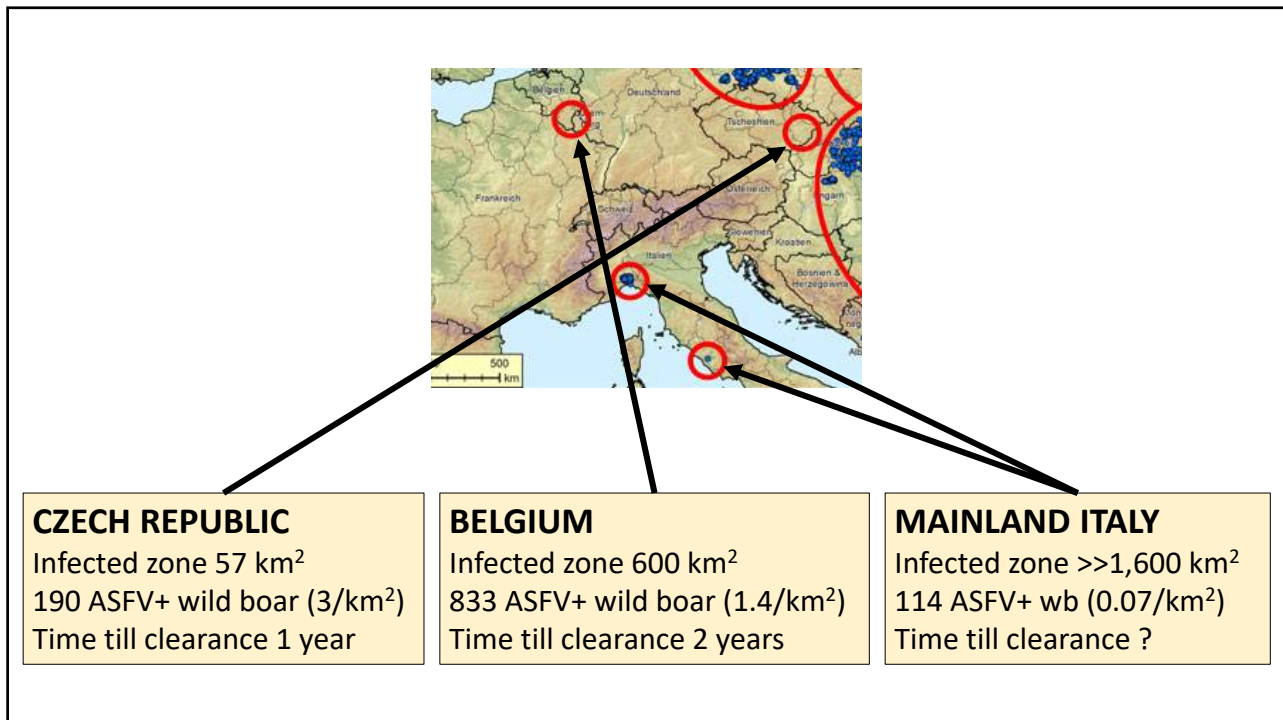
Figure 1 - ASF outbreaks in Belgium's wild boar population, Sept 2018-July 2020.



Source: Pig Progress on the basis of OIE data.



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Cz and Be

	Czech Republic	Belgium
Timing	Jun 2017 – Apr 2018	Sep 2018 – Ongoing (data 30 Sep 2019)
Infected surface	500 km ²	<1106 km ²
Kernel zone with most cases	57 km ²	X>10 ≈500 km ²
Fencing	Incomplete	Incomplete
N ^{er} confirmed ASF cases	230 (0.46/km ²)	827 (1.3/km ²)
N ^{er} of wild boar culled	3563 (7.13/km ²)	≈2800 (2.53/km ²)
N ^{er} of carcasses found & destroyed	319 (0.64/km ²) until Feb 2018	≈820 (1.64/km ²) by Sep 2019

Early detection is of Paramount importance to prevent local spread

Main control tools: Fencing (even incomplete); Carcass destruction; Culling

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Belgium: ASF-free again

#USE FIGS

SCIENTIFIC OPINION



ADOPTED: 21 January 2023
doi: 10.2903/j.efsa.2023.6439

ASF Exit Strategy: Providing cumulative evidence of the absence of African swine fever virus circulation in wild boar populations using standard surveillance measures

European Food Safety Authority (EFSA),
Søren Sørum, Nilsen, Julia Alvarez, Dominique Joseph Biscuit, Paolo Calzati,
Klaus Depner, Julian Ashley Drewe, Bruno Garr-Bastuj, Jose Luis Gonzalez Rojas,
Christian Gottzsch Schmidt, Helle Hensson, Virginie Michel, Miguel Angel Miranda Churrua,
Paolo Pasquali, Helen Clare Roberts, Lisa Helena Silvenoinen, Hans Spooeder, Karl Stahl,
Antonio Velarde, Christoph Winckler, José Cortes Abrantes, Sofie Drollander,
Conna Ivanici, Alexandra Popelawski, Yves Van der Stede, Sandra Blome, Vittoria Guberti,
FedERICA LU, Simon Moro, Ettore Cecchetti, Hans Hermann Thulke and Arvo Viljap

Table 6: Minimum requirements during Exit Strategy proposed for two different epidemiological scenarios

	Exit Strategy I	Exit Strategy II
Target	Freedom following eradication scenario (see EU strategy ⁽²⁾) Local containment of epidemic in small area, e.g. the past epidemics in the affected area in Czechia and Belgium	Freedom following control scenario (see EU strategy ⁽²⁾) Countrywide spread of epidemic, large area, e.g. Estonia and Latvia
Screening Phase (SP): all samples negative		
Passive surveillance	Number of carcasses – 2% of hunting bag prior to ASF introduction (2% HB)	Test at least 1 carcass per 1,000 km ² per year (SP 1) ⁽³⁾ (baseline intensity)
Active surveillance	No specific requirements	Test all hunting bag for virus
Confirmation Phase (CP): all samples negative		
Passive surveillance	Number of carcasses – 2% of hunting bag prior to ASF introduction (2% HB)	Test at least 1, 2 or 6 ⁽³⁾ carcasses per 1,000 km ² per year (CP1, CP2 and CP3, respectively) ⁽³⁾ (increased intensity)
Active surveillance	No specific requirements	Test all hunting bag for virus
Minimum monitoring periods	Combination of duration Screening Phase (phase A) with the adequate period for Confirmation Phase (phase B) can be seen in Figure 29	Combination of duration monitoring period Screening Phase with the adequate period for Confirmation Phase can be seen in Figures 30–32. Example: To achieve a failure rate of maximum 2% (solid line) after 12 months applying Exit Strategy II's Screening Phase (including 1 carcass per 1,000 km ² per year) one may need to monitor further 11 months in the Confirmation Phase with 1 carcass per year and 1,000 km ² (Figure 30), 7 months with 2 carcasses (Figure 31), 3 months when collecting 6 carcasses (Figure 32)

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Front wave

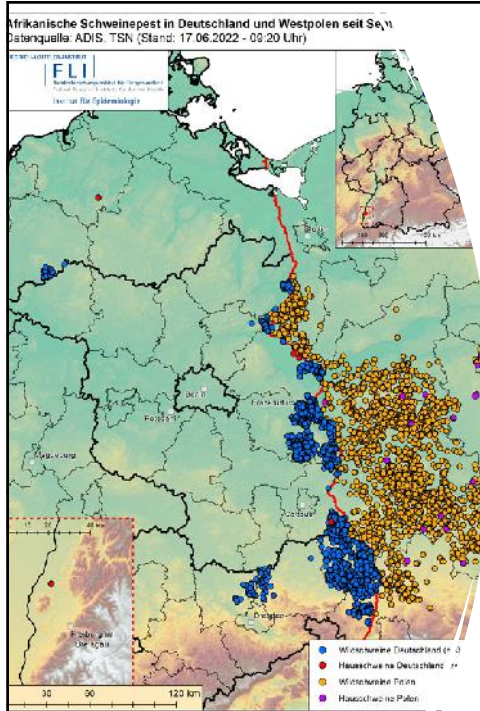
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Polish-German border, 1939



WAR & HISTORY IMAGES historyimages.blogspot.com

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Germany and Poland 2022

- Challenging, front-like setting
- Attempts to contain the wave failed
- (Hoping for oral vaccines)

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German ASF preparedness



Einsatzkiste II

Verbrauchsmaterial

Absperrband rot/weiß	3
Gewebeklebeband, silber	4
Gewindedichtband	3
Wickeldraht	5
Kabelbinder, 305mm	1
Kabelbinder, 200mm	1
Kabelbinder, 150mm	1
Schrauben, Kreuz 4,0 x 30 mm	25
Dübel, 12mm	500
Dübel, 10mm	25
Heißlüfter, 2000W	50
Paßhölzer, 2,8 x 25 mm	1000
Absperrleine, 20m	1
Schrauben Schellen	1

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German ASF preparedness

AED Bohrbahnmaschine	1
Hybrid Akkuschrauber	1
Kabeltrommel 50m	1
Wellenschneider	1
Kreuzzange	1
gekürbter Ringschlüssel 6 bis 17	1
Schraubdriver 10mm	1
Schraubdriver 12mm	1
Äxzel	1
Hammer	1
Heißlüfter 1500W	2
Spanngurt m. Ratsche 6m	3
Sonnlampen	9
Erdräger	1
Adapter Verlagerung, blauer Stecker	1



Achtung!
Aufsicht über die Tiere ist erforderlich. Bei Verdacht auf Afrikanische Schweinepest (ASF) sofort die Behörden informieren.

Warning!
The area is under strict supervision. In case of suspicion of African Swine Fever (ASF), immediately inform the authorities.

Uwaga!
Wymagowane nadzwanie nad zwierzętami. W przypadku podejrzenia Afrykańskiej Wściekłości Świńskiej (ASF) natychmiast powiadom władze.

Atención!
Se requiere supervisión estricta de los animales. En caso de sospecha de Fiebre del Cerdo Africano (ASF), informar inmediatamente a las autoridades.

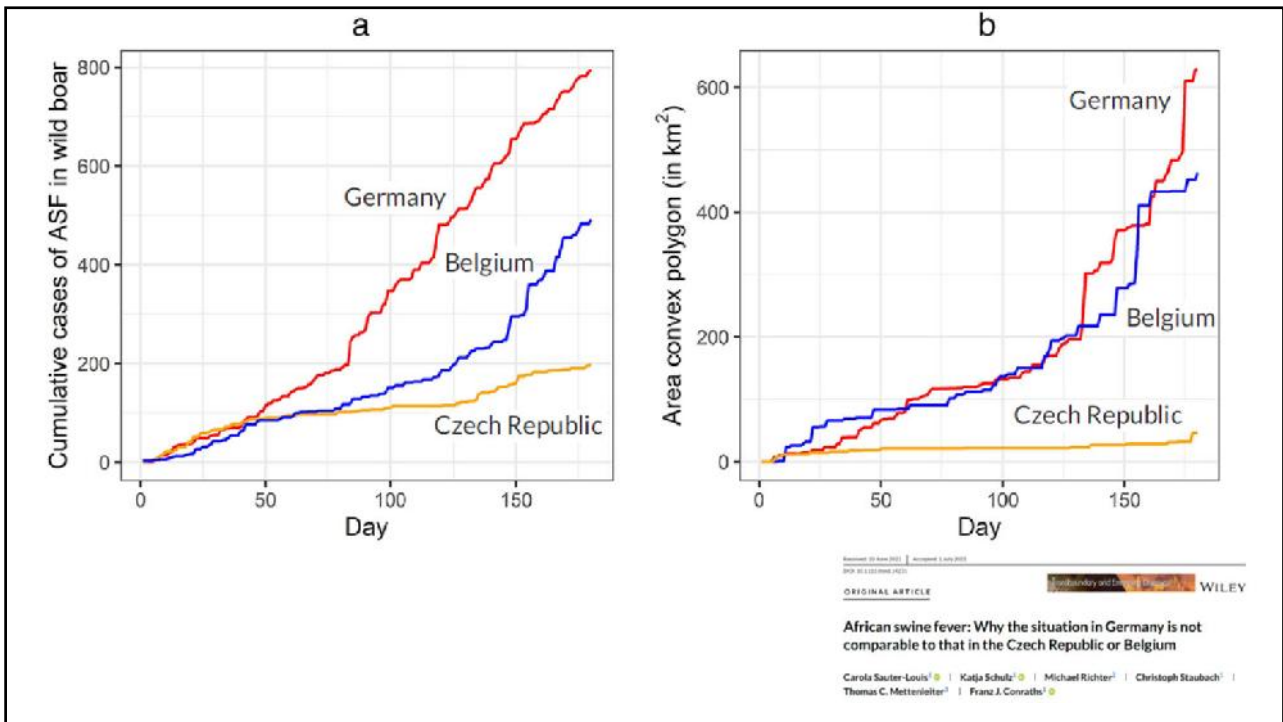
Wichtig!
Überwachen Sie die Tiere. Bei Verdacht auf Afrikanische Schweinepest (ASF) sofort die Behörden informieren.

Attenzione!
Sorvegliare attentamente gli animali. In caso di sospetto di Peste Sui Porci Africana (ASF), informare immediatamente le autorità.

Geflügelpest-Sperrbezirk

Maul-Klawense-Sperrbezirk

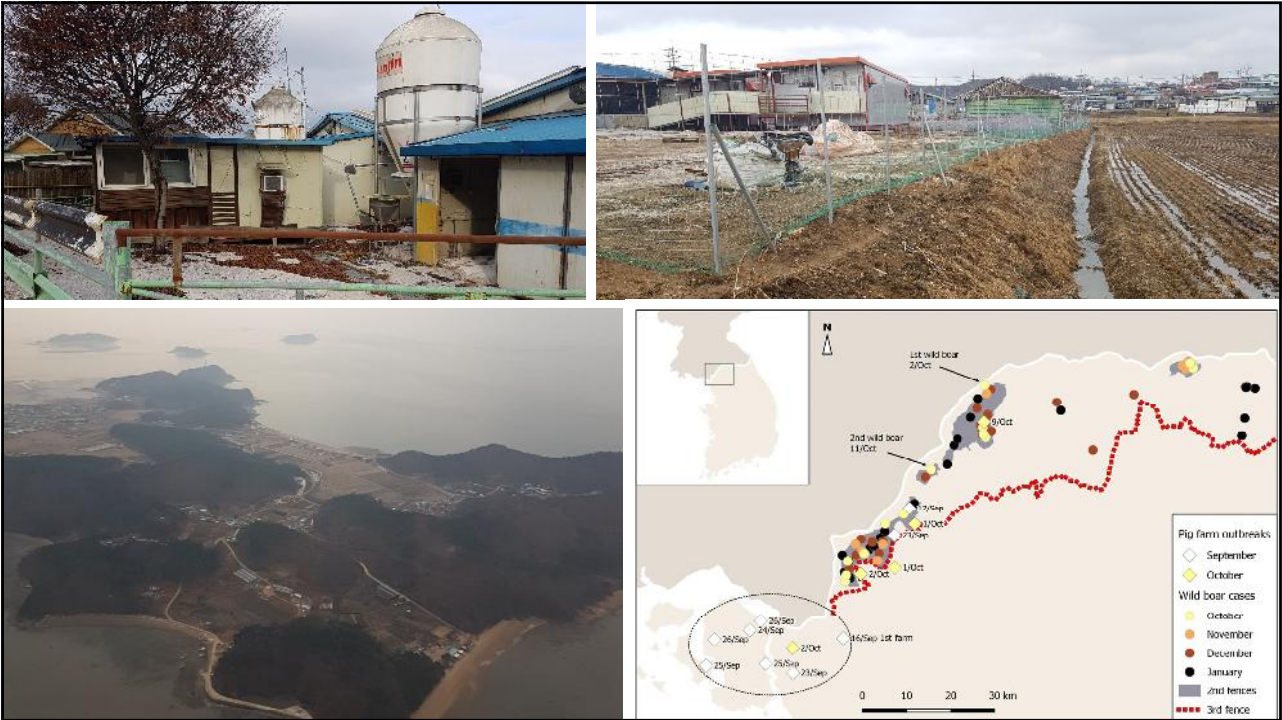
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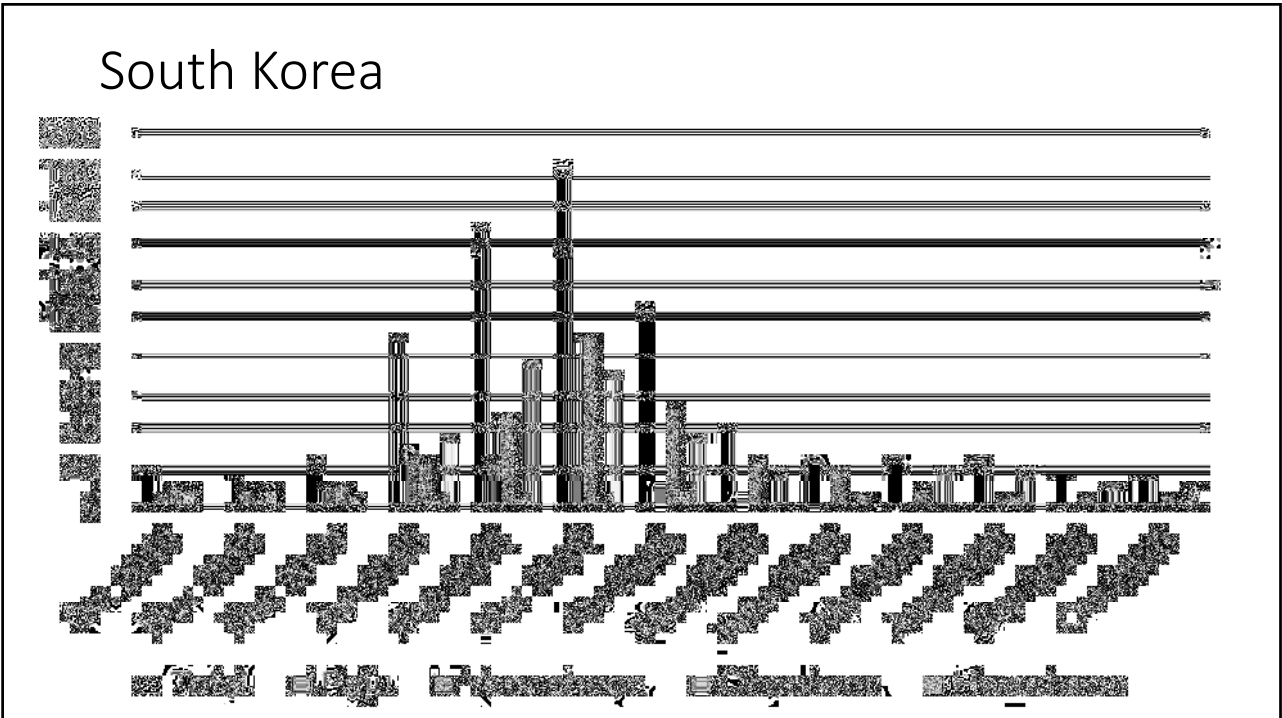
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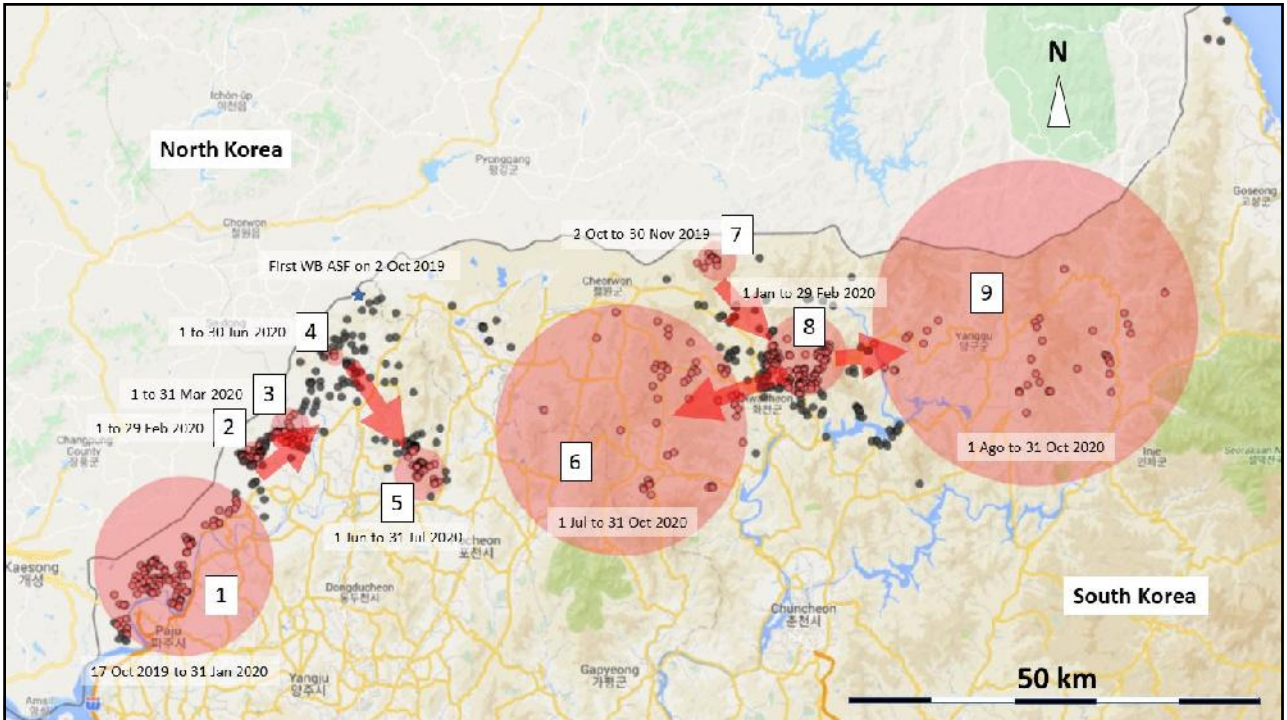
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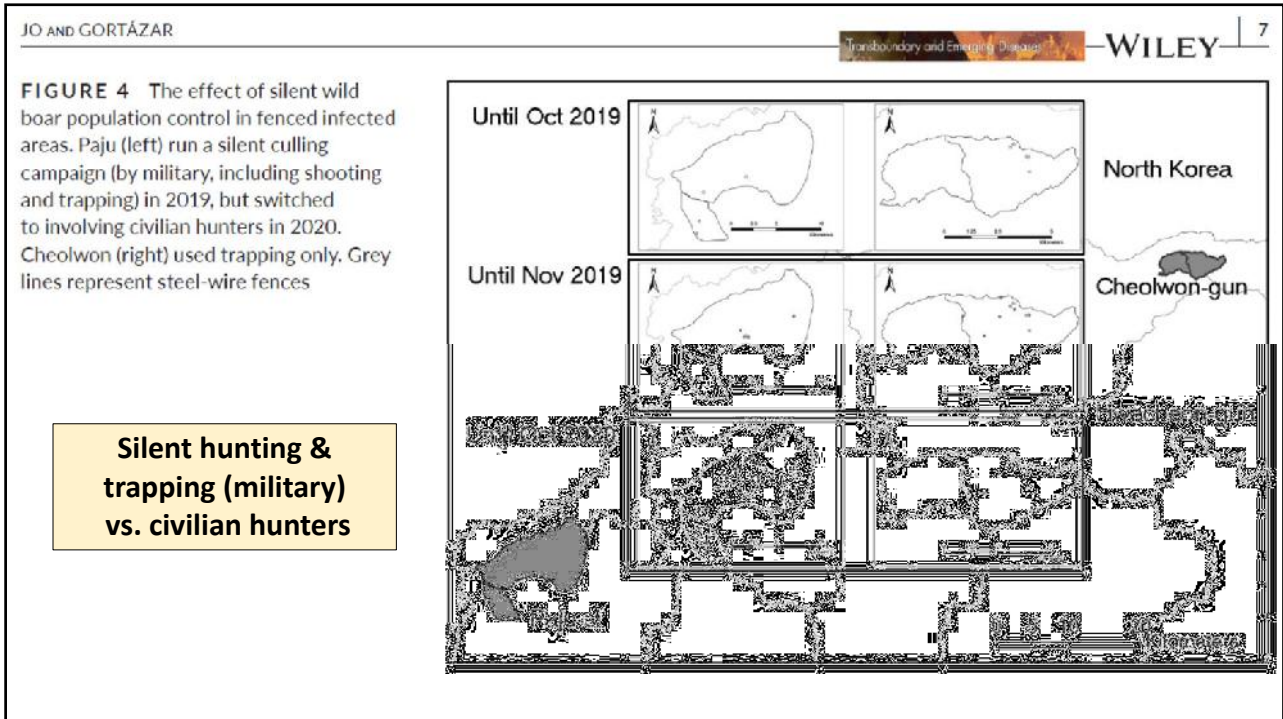
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Front waves are difficult to stop...



...unless you fight like Ukrainians!

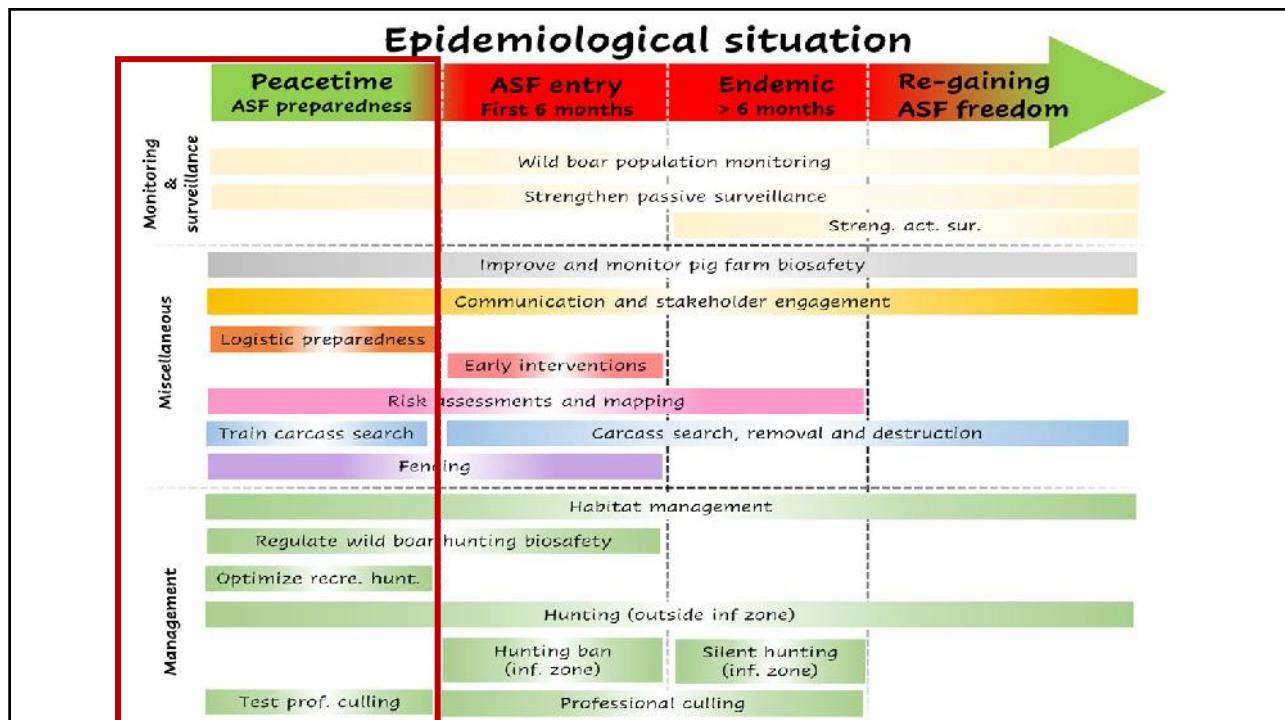
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Presentation structure

- Intro
 - Wild boar and feral pig ecology
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 - **Population monitoring**
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- Conclusions



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Pig farm biosafety

- Improve farm perimeter fencing
- Other BSMs depending on farm type (open air vs. indoor)
- Monitor BSM implementation
- Promote R&D on BSM efficacy
- Remember: farm biosafety is a must, can be (much) improved, but is not 100% effective

Jiménez-Ruiz et al.
Porcine Health Management (2022) 8:2
<https://doi.org/10.1186/s13028-021-00245-7>

Porcine Health Management

RESEARCH

Open Access

Characterization and management of interaction risks between livestock and wild ungulates on outdoor pig farms in Spain

Saúl Jiménez-Ruiz^{1,2}, Eduardo Laguna¹, Joaquín Vicente¹, Ignacio García-Bocanegra³, Jordi Martínez-Gujosa¹, David Cano-Terriza², María A. Risalde⁴ and Pelayo Acevedo¹

SCIENTIFIC OPINION



ADOPTED: 5 May 2021

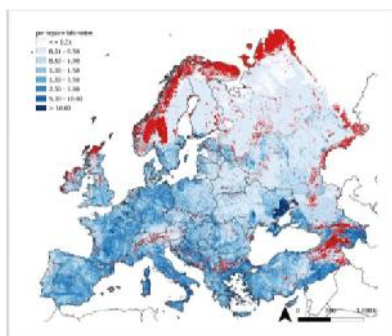
doi: 10.2903/efsa.2021.6639

African swine fever and outdoor farming of pigs

EFSA Panel on Animal Health and Welfare (AHAW),
 Søren Saxmose Nielsen, Julio Alvarez, Dominique Joseph Bicot, Paolo Calistri,
 Elisabetta Canali, Julian Ashley Drewe, Bruno Garin-Bastuji, Jose Luis Gonzales Rojas,
 Mette Herskin, Miguel Angel Miranda Chueca, Virginie Michel, Barbara Padalino,
 Paolo Pasquati, Helen Clare Roberts, Liisa Helena Sihvonen, Hans Spoolster, Karl Stahl,
 Antonio Velarde, Arvo Viltrop, Christoph Windler, Sandra Blome, Simon More,
 Andrea Gervelmeyer, Sotiria-Eleni Antoniou and Christian Gorzazar Schmidt

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Monitoring wild boar & feral pigs



<https://enetwild.com/reports-docs/>

- In Europe, EFSA is taking the lead
- EFSA-funded Enetwild consortium:
 - New tools for wildlife abundance assessment
 - Maps and data on WB density & WB-pig interface

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The role of hunters



- Help in sampling
- Mortality detection
- Smart game management
- Pest species control (wild boar)
- Targeted culling of sick individuals
- Game meat hygiene and offal disposal

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Can we control wild boar?

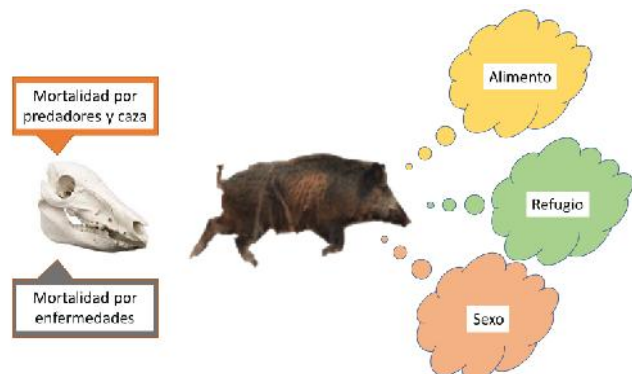
Opciones para control de jabalí

• Aumentar la mortalidad

- ✓ • **Caza recreativa**
- ✓ • **Control profesional**
- ✗ • Medios no autorizados en Europa: lazos, tóxicos
- ✓ ✗ • Favorecer a los depredadores: lobo

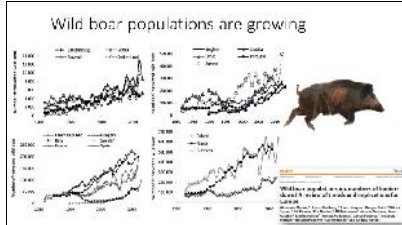
• Reducir el reclutamiento

- ✗ • Control de fertilidad
- ✓ • **Manejo del hábitat: reducir alimento**



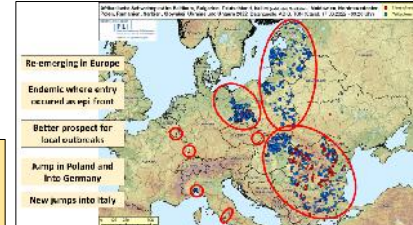
60

Concluding...



Invasive species, still expanding

ASF control success depends on setting



- Monitor wild boar or feral pig populations
- (Try to stabilize populations)
- Optimize pig farm biosafety
- Improve early detection (hunters!)
- Train interventions & prepare logistics

Get ready: The question is not **if** ASF will enter, but **when**

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illustration by Victor Juhasz

Several crises in sight

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