

World Swine Report

Special Contribution

African Swine Fever

(Catalonia, Spain, November 2025)

Lessons Learned from Science, Surveillance,
and Field Response

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In this special contribution to Friend of Pig Farmers, a leading swine production magazine in Japan, we present an interview with Dr. Jaime Bosch, eco-epidemiologist and specialist in transboundary animal diseases. In this interview, Dr. Bosch responds to a series of questions regarding the African Swine Fever (ASF) outbreak confirmed in November 2025 in Catalonia, Spain, providing insights from both field response and scientific modeling perspectives. Through this question-and-answer format, the article explores preparedness, surveillance, epidemiological risk, and lessons learned that may be relevant for Japan and other ASF-free countries. This text represents an adapted English-language version of the original interview, in which selected expressions and phrasing have been refined to ensure clarity, accuracy, and readability for an international audience while preserving the original technical content.

Introduction

In this article, we present an exclusive interview with Dr. Jaime Bosch, an eco-epidemiologist who has been involved in African swine fever (ASF) from both field and research perspectives in Spain and across Europe for many years, regarding the ASF outbreak confirmed in November 2025 in Spain (Catalonia). Spain is a country that confronted ASF for several decades beginning in the 1960s and achieved official eradication in the 1990s. It also possesses research and diagnostic networks

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that serve reference functions for the World Organisation for Animal Health (WOAH) and the EU, which are globally valuable, and it has maintained a high level of preparedness not only institutionally but also operationally. This outbreak was confirmed under circumstances in which neighboring France remained free from ASF, and it has been suggested that it may have resulted not from a continuous “oil stain-type” spread but from a “long-distance jump” associated with human activities. This point is by no means irrelevant to Japan, where the risk of introduction is constantly discussed in light of surrounding countries and the movement of people and goods. Immediately after detection, how were countermeasures against wild boar, surveillance, biosecurity, and interfaces with society (urban environments and waste management) addressed in real time for containment? The lessons derived from this case are expected to provide important insights for concretizing our preparedness and decision-making.

About Dr. Jaime Bosch

Dr. Bosch is an eco-epidemiologist with more than 15 years of research experience at the interface of wildlife, livestock, environment, and humans, and is a specialist in animal health and transboundary and zoonotic diseases. He obtained his PhD at the Faculty of Veterinary Medicine, Complutense University of Madrid, and has conducted research at institutions well known for ASF research, including the Department of Animal Health at the same university, the VISAVET Animal Health Surveillance Center (Spain), and the Animal Health Research Center (INIA-CISA), a reference center for ASF. His research focuses on clarifying the role of wildlife in the transmission and persistence of infectious diseases shared with livestock, integrating ecology, veterinary medicine, and quantitative methods including spatial modeling. In recent years, he served as coordinator of Work Package 7 (WP7) in the European research project VACDIVA, leading research aimed at ASF control under various conditions through vaccine strategies, spread models, and field trials. He is scheduled to serve as a keynote speaker in Program 3-2, “Current Status of Transboundary Swine Diseases and Their Control Strategies,” at the 41st World Veterinary Association Congress 2026 to be held at the Tokyo International Forum from April 21–24, 2026. These results are the outcome of a strongly multidisciplinary approach built on close collaboration established during the VACDIVA project among Cecilia Aguilar-Vega, Satoshi Ito and José Manuel Sánchez-Vizcaíno (Universidad Complutense de Madrid - UCM, Department of Animal Health, Viral Immunology and Preventive Medicine Unit, Faculty of Veterinary Medicine, and VISAVET Health Surveillance Centre), together with Benjamín Ivorra and Ángel Manuel Ramos (UCM-MOMAT, Mathematical Models in Science and Technology). All are leading researchers working on diseases with major sanitary and environmental impact. The integration of applied mathematics,

epidemiology, biology, veterinary science, ecology and management provides the foundation for developing truly operational models that are directly applicable to decision-making in complex epidemiological scenarios.

1. Had Spain anticipated the introduction of ASF?

Yes. Spain had been preparing for ASF for many years. This preparation was not limited to institutional aspects but clearly extended to practical and operational levels. Specifically, there were surveillance programs targeting wild boar and domestic pigs, emergency response plans, operational manuals, carcass search and recovery protocols, and high levels of biosecurity in commercial pig farms. Spain was also familiar with ASF as a disease. It coexisted with ASF for more than 30 years beginning in 1960 and was officially recognized as free in 1994. In other words, although there had been no ASF outbreaks for more than 30 years, technical and institutional memory and accumulated experience had been maintained. This legacy is inseparable from the work of Professor José Manuel Sánchez-Vizcaíno, a world-renowned expert on ASF whose scientific leadership has been instrumental in shaping Spain's, Europe's, and other continents' understanding and control of the disease. Having had the privilege of working alongside him and learning directly from his expertise has been an extraordinary professional and personal honor. As he now steps into retirement, his career closes at a time when ASF has once again re-emerged in Spain, marking both the end of an era and the continuation of the foundations he helped build. Notably, within the framework of the VACDIVA project (*1), coordinated and scientifically led by Professor José Manuel Sánchez-Vizcaíno, three vaccine prototypes for domestic pigs and wild boar have been developed, one of which has shown particularly promising performance in wild boar populations as a safe and effective DIVA (differentiating infected from vaccinated animals) vaccine candidate. This capability is essential for surveillance management and for evaluating the effectiveness of vaccination and disease control programs. Beyond this scientific and institutional legacy, it is important to underline that preparedness alone does not guarantee prevention. Anticipation does not necessarily mean the ability to prevent all introductions. In ASF, introductions often occur not through gradual "oil-like" spread but through "long-distance jumps" associated with human activities. Contaminated pork products or waste (fomites) are typical examples. No system exists that can completely prevent such introductions, and the disease can travel thousands of kilometers and reach any country.

Furthermore, effective preparedness requires that measures extend not only within farms but also to people and environments outside farms, with attention to points of contact with the external environment. At the beginning of 2026, specialized training for hunters was announced, and on January 20, 2026, online training for veterinarians began. This followed previous training in 2023

attended by more than 500 veterinarians. In parallel, in cooperation with the transport sector, waste collection and fence maintenance at highway service areas were addressed, and awareness campaigns were implemented to discourage feeding wildlife.

2. When, where, and how was the first positive case detected?

The first detection occurred between November 25 and 26, 2025, when two dead wild boars were confirmed in the municipality of Cerdanyola del Vallès, Barcelona Province, in northeastern Spain (Figure 1). This area is close to the Pyrenees Mountains and the French border. The outbreak site was located in a highly anthropized urban environment around the campus of the Autonomous University of Barcelona (UAB) and the Bellaterra residential area. Medium-sized forest patches (Collserola Natural Park) are scattered in the area, and wild boar density is estimated at approximately 4.3 animals/km². Parts of the area are separated by major transportation infrastructure such as highways and railways, and fencing was installed.

The samples were first analyzed at the Catalonia Animal Health Research Center (IRTA-CReSA), where PCR positivity was confirmed. Confirmation testing was subsequently conducted at the Spanish National Central Veterinary Laboratory (LCV) and the Spanish National Animal Health Research Center (CISA-INIA-CSIC). On November 27, PCR positivity was confirmed at LCV, representing the re-confirmation of ASF (genotype II) in Spain since eradication in 1994. Necropsy revealed lesions typical of ASF. One point that was clear from the beginning was that detection was limited to carcasses, and no infected live animals or infections in pig farms were confirmed. Fresh carcasses were found initially, and skeletal remains were later identified, suggesting the possibility that the virus had been present prior to official notification.

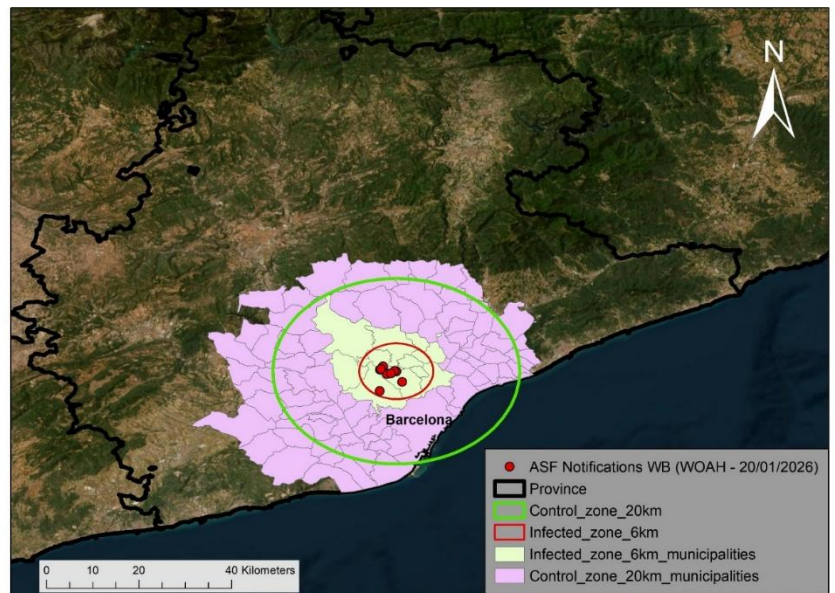


Figure 1: ASF outbreak site and infected and surveillance zones in Catalonia.

3. How did farmers, veterinarians, and other stakeholders respond to this situation?

The response was rapid and highly professional. The focus was placed on strengthening biosecurity, intensifying surveillance, and absolutely preventing the virus from entering farms. In Spain, a major pork-producing and exporting country, there is a shared understanding that once infection reaches farms, it constitutes the greatest risk both from a sanitary and economic standpoint. This case occurred in an environment with easy access to waste, high human movement, and routine contact between wild boars and urban settings. Under such circumstances, indirect virus movement via shoes, vehicles, dogs, and equipment may become more important than wild boar movement itself. Therefore, waste management, access control, cleaning and disinfection, and public information must be integrated as part of sanitary measures. This characteristic differs from other European countries where outbreaks have been confirmed in more natural environments.

4. Has the route of infection been identified?

As of January 20, 2026, it has not been confirmed, but several facts are known. First, the detected virus belongs to genotype II, which has caused the European epidemic since 2007, but it exhibits unique genomic characteristics different from known European strains. ASF viruses circulating in European wild boar and domestic pig populations since 2007 are classified within genetic groups up to group 2-28, whereas the strain detected in wild boar in Catalonia has been classified as a new genetic group (Group 29). Although ASF virus is a large DNA virus with a low mutation rate, this strain shows high genetic divergence exceeding the expected mutation rate. Based solely on publicly available information, it is not possible to determine or exclude a precise origin.

One hypothesis is a sporadic introduction related to human activity, namely introduction through contaminated waste or pork products accessible to wild boars. Additionally, the possibility of accidental release or escape from nearby facilities handling ASF virus or ASF vaccines was considered, but no clear introduction route has been identified. Furthermore, the possibility of intentional introduction as agricultural terrorism or malicious action targeting livestock production was examined as a hypothesis. However, including this hypothesis, there is currently no direct evidence, and investigations continue.

The confirmation of multiple dead wild boars within a short period is consistent with a localized introduction via a long-distance jump. As often occurs in ASF cases in wildlife, the virus may have been present days to months prior to official detection. Detection of skeletal remains suggests that introduction may have occurred between late August and early October. Even when significant genetic differences are observed in a DNA virus with slow evolutionary speed, this alone does not allow determination of a specific origin. However, it suggests the need to consider hypotheses such

as evolution in an as yet unidentified host, undetected circulation over an extended period, or artificial selection or manipulation. In any case, without complete and mutually comparable genomic data, these hypotheses cannot be confirmed or excluded. Regarding the relatively low apparent mortality observed in this outbreak, several possibilities have been considered, such as deletion of genes associated with virulence leading to acute or subacute disease progression, or lower transmissibility within the area. However, although such interpretations may influence approaches to wild boar control, they do not provide evidence for determining the origin of the virus. In most ASF outbreaks in European wildlife, the origin has not been identified. The top sanitary priority is not to determine responsibility but to interrupt transmission and achieve containment.

5. What preparations and biosecurity measures were implemented?

Prior to the outbreak, Spain had already established a national surveillance program targeting wild boar, operational manuals for field response, and high levels of biosecurity in commercial pig farms. Following the ASF outbreak in Catalonia, the National Emergency Response Plan, coordinated by the Ministry of Agriculture, Fisheries and Food (MAPA), was activated, and response measures were implemented with the support of multiple operational organizations. Specifically, regional rural guards (rangers, etc.), SEPRONA (the nature protection unit of the Guardia Civil, responsible for environmental and wildlife protection), and UME (the Spanish Military Emergency Unit, which has logistical and operational capabilities for civilian emergencies) were involved in logistics, coordination, and field support. The measures implemented included the following:

- Zoning: Establishment of a high-risk zone (infection core) with a radius of 6 km, and a surveillance zone extending up to 20 km.
- Enhanced carcass search and recovery: Intensive search and recovery conducted by regional personnel, using trained dogs, drones, and aerial means.
- Prohibition of traditional hunting: Suspension of conventional hunting activities that could increase the risk of spread.
- Wild boar movement management: Closure and reinforcement of corridors used by animals for movement; utilization of existing fencing along highways and railways; installation of new metal fencing to block routes frequently used by wild boar.
- Restriction of human activities: Limitation of human activities to avoid indirect spread.
- Strengthening of farm biosecurity: Reinforcement of measures to prevent virus entry into farms as the highest priority.
- Wild boar population management: Selective management using traps and targeted hunting, avoiding “disorganized hunting” that could promote dispersion of wild boar.

In the high-risk zone (0–6 km), capture by specialized teams using technical support such as silencers and thermal cameras with drones was conducted, and eight pig-brig traps were installed. In the buffer zone (6–20 km), authorized hunting was intensified with the aim of forming a “white zone” with minimized wild boar density. The width was set at more than 6 km to reduce the risk of virus spread from the infection center. As population increase may occur toward the breeding season in March–April, the urgency of measures increases. These measures are consistent with European standards for ASF control in wildlife.

As of January 11, 2026, testing has mainly been conducted in the infection core area:

- 0–6 km: 499 tested, 64 positive
- 6–20 km: 205 tested, 0 positive
- Total: 704 tested, 64 positive, 640 negative

Regarding pig farms, there are 68 registered farms (57 active, total 66,680 pigs). Regular visits to 41 commercial farms have continued, and no abnormal findings such as clinical signs or lesions have been confirmed. Passive surveillance in farms has also been strengthened, with PCR testing conducted once per week on the first dead animal. In addition, leachate from carcass containers has been added to PCR testing.

6. How do you assess the risk of spread within Spain?

As long as the virus circulates within wild boar populations, risk exists. Control in wildlife is inherently complex. As of January 20, 2026, all confirmed positives are in wild boar and are concentrated within the high-risk zone (64 positives within the high-risk zone). This indicates that spatial containment is functioning at present. However, because a positive case was confirmed south of the AP-7 highway, isolation of Collserola Park in the direction considered to have high infection pressure from the outset was strengthened. In wildlife outbreaks, simply reviewing past occurrence does not prevent the next spread. It is necessary to anticipate in which direction and in what temporal sequence risk may move, and to determine where to concentrate surveillance, carcass search, barriers (fencing, etc.), and population management. Based on available data and previous experience, epidemiological and mathematical models are useful as a means to consider where the disease may spread in the future. Modeling does not replace field operations, but it provides qualitative and quantitative frameworks to support decision-making under limited data, and is useful for comparing intervention scenarios and prioritizing resource allocation.

WIMBOARD (Wild Integrated Movement Boar Outbreak and Risk Dynamics), developed by our team, is an operational spatiotemporal modeling tool that integrates ASF epidemiology, wild boar

ecology and biology, population dynamics, animal movement (corridors), landscape structure, and connectivity. It simulates outbreaks in wild boar populations and enables evaluation of control and surveillance scenarios. The WIMBOARD modeling platform was developed within the framework of the ASF vaccine development project VACDIVA (<https://vacdiva.eu/>), which was completed in 2024, and also contributes to the consideration of future vaccination strategies (*1).

It should be noted that WIMBOARD is currently configured to simulate highly virulent ASF strains, which is appropriate for most historical scenarios. However, in light of recent findings suggesting the possible involvement of a lower-virulence strain with a different epidemiological behaviour, the platform is being expanded through the development of a new module to simulate attenuated strains circulating in wild boar populations, thereby broadening its applicability to a wider range of epidemiological contexts. Under this framework, current model projections should be interpreted as potentially conservative, as simulations based on highly virulent strains may underestimate the spatial dispersion that could occur under lower-virulence scenarios characterized by increased survival and mobility of infected animals. This perspective reinforces the need for intensified field precision, strengthened surveillance efforts, and adaptive management to ensure early detection and effective containment. It is also important to highlight that the simulation results obtained incorporate the implementation of control measures currently applied within the European Union. WIMBOARD integrates multiple operational modules, including the simulation of control measure deployment, enabling the recreation of realistic intervention scenarios, the comparison of alternative strategies, and the optimization of applied control actions. The integration of both virulent and attenuated strain dynamics within the modeling framework will ultimately allow more robust preparedness planning and more resilient response strategies under evolving epidemiological conditions. These attenuated-strain dynamics have already been studied and modeled using real experimental data from wild boar within the framework of the VACDIVA project (Martínez & Bosch et al., 2023), and are currently being adapted for integration as a specific subcomponent within the WIMBOARD platform. The platform is intended as a decision-support tool for veterinary services, ministries of agriculture, environmental agencies, wildlife population managers, hunting authorities, epidemiologists, and research centers engaged in ASF preparedness and response across Europe.

On December 1, 2025 (*2), using publicly available data at that time, we input the coordinates of the first outbreak site into WIMBOARD and set initial scenarios assuming that infection had circulated for a certain period prior to initial detection, based on empirical knowledge. As a result, monthly spatio-temporal risk maps and days post-infection maps (reflecting spread speed in days) were obtained, showing three phases of spread over 500 days (approximately 1.37 years) (Figure 2).

Additional simulations have already been conducted up to 1,000 days to assess longer-term trends and projected disease evolution (~2.74 years).

- *Phase 1:* Southward spread within the first 30–60 days, extending up to approximately 90 days (toward Collserola and around the peri-urban areas of Barcelona).
- *Phase 2:* Spread north to northwest within 250–350 days (most important and highest infection pressure zone).
- *Phase 3:* Spread northeast within 400–490 days (relatively smaller from the perspective of infection pressure).

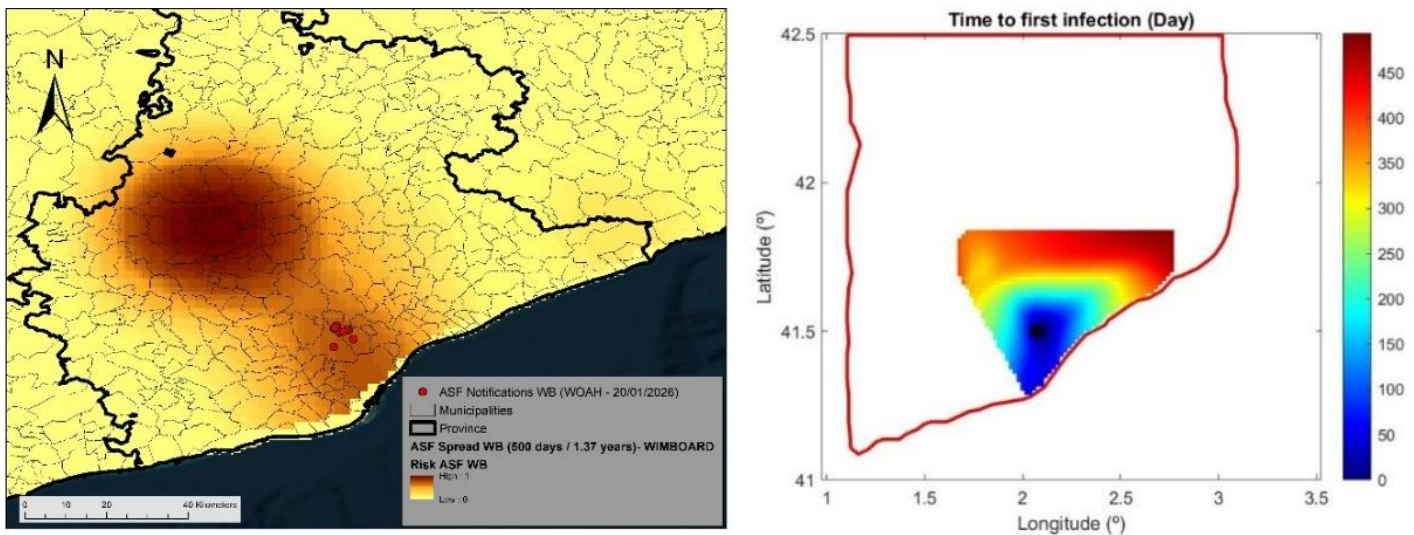


Figure 2. *WIMBOARD* model showing, in the left panel, the spatial spread risk over 500 days (approximately 1.37 years), and in the right panel, the time since infection (days) and the expected sequence and speed of spread. The red and black dots indicate the first detected cases in wild boar.

Wild boars are not the “culprit.” Rather, in ecosystems heavily modified by humans, wild boars are in many respects victims. Wild boars exhibit scavenging behavior and can consume carcasses and animal remains. Cannibalistic behavior (consumption of conspecifics) is also observed. This behavior increases opportunities for contact with and exposure to virus in the environment, thereby increasing the importance of the environment as a reservoir for pathogen survival and maintenance. Wild boars utilize human waste and move between urban areas, agricultural land, and forests. In many countries, hybridization with domestic pigs, monoculture crops providing year-round food resources, absence of natural predators, and inappropriate hunting management (removal of breeding adults leading to earlier estrus in young females and further population increase) have

further altered ecology. When a disease that can approach 99.9% mortality in non-immune populations is superimposed on such conditions, it produces extremely significant sanitary and ecological impacts.

The observed pattern is compatible with moderate transmissibility or potentially lower virulence, which may explain a slower-than-expected progression. However, this interpretation is necessarily preliminary and a priori, as it remains subject to confirmation through additional field data under the current Spanish epidemiological scenario. This reinforces the urgency of accelerating population control measures before the wild boar reproductive peak in March–April. Lower-virulence or attenuated strains may pose additional challenges, including increased survival of infected individuals, more complex detection patterns, and possible intermittent carrier dynamics. These aspects should be carefully considered in surveillance and control strategies.

In wild boar populations, attenuated ASF strains may considerably complicate control efforts. First, infected animals may survive, rather than die rapidly, allowing continued movement and viral excretion over longer periods. This increases the probability of transmission over greater distances (potentially several kilometers), while leaving fewer detectable epidemiological signals compared with highly virulent strains. Second, when virulent strains dominate, mortality can approach 99.9% in naïve populations, which paradoxically facilitates spatial delimitation of infected zones through carcass detection and clearer epidemiological clustering. In contrast, attenuated strains may produce a more diffuse transmission pattern, making surveillance, zoning, and containment significantly more challenging. Third, attenuated ASF strains are known to exhibit genetic instability, with documented potential for reversion to virulence. Although the timeframe for such reversion is unpredictable, this possibility introduces an additional layer of epidemiological uncertainty. Under such conditions, mixed transmission dynamics involving both attenuated and virulent variants could emerge, further complicating risk assessment and control strategies. Importantly, the precise characteristics of the newly detected strain in Spain remain insufficiently defined. This lack of full characterization increases epidemiological uncertainty and reduces predictability, making anticipation and control more complex.

7. Please give a message to Japan.

First, I would like to sincerely express my gratitude for the opportunity for this interview and for the opportunity to present and discuss ASF at the 41st World Veterinary Association Congress to be held in Tokyo this April. My message to Japan is that, because Japan is an island nation, its risk profile is different. The greatest vulnerability is not land routes but accidental introduction via passengers, tourists, and cargo, particularly contaminated pork products carried in baggage at ports

and airports. Emphasis should be placed on identifying locations where contaminated waste may be consumed by wild boars, potentially causing localized introduction. The significance of estimating these areas in Japan lies in the fact that, even if contaminated products are brought into the country, the existence of operational maps of key locations would enable early detection, focused surveillance, and concentrated communication and awareness in areas with high risk of contact between wild boars and waste. In our research, we have developed applicable methodologies, including risk assessment of introduction via international air passenger baggage (*Ito et al., 2020*), identification of sites where wild boars may access and consume anthropogenic food waste (directly useful for early detection and targeted communication) (*Aguilar-Vega et al., 2024*), and mapping of infection and transmission risk between domestic pigs and wild boars in Asia (presenting surveillance priority areas including potential transmission in Japan) (*Kawaguchi et al., 2025*). These can be applied as practical preparedness and planning tools to strengthen ASF surveillance plans in Japan.

Final Remarks

ASF does not infect humans, but it can have serious impacts on livestock production, the economy, and rural areas. Spain is one of the major pork-producing and exporting countries in Europe and globally. Within the EU, regionalization allows trade from free areas to continue; however, markets outside the EU are far more sensitive, and even a single focus in wild boar can result in immediate economic consequences. It is also worth recalling that ASF has been eradicated under various circumstances without the use of vaccines. In the past, genotype I ASF was eradicated in Spain and Portugal. More recently, control of genotype II has been achieved in Belgium and the Czech Republic (in the Czech Republic, status was later changed after re-detection). Furthermore, on the island of Sardinia in Italy, eradication of genotype I was achieved, and when genotype II was subsequently introduced in a limited manner, it was also controlled. At present, there is not completely safe and commercially available ASF vaccine. Although vaccines are a very important tool, they are neither the sole solution nor a universal solution. Rather, they should be positioned as one element among multiple measures whose importance varies depending on the epidemiological situation. Therefore, effective ASF control requires combining and coordinating all available tools: early detection, prevention, enhanced surveillance, operational field response capacity following confirmation, population management, biosecurity, and the use of epidemiological and mathematical models to simulate scenarios and support decision-making even when field data are scarce or unavailable. There is no single “universal prescription” for ASF control or eradication. Response should be adjusted according to the epidemiological situation and stakeholders involved,

identifying risk, using simulations as training tools, and applying an approach based on adaptation and continuous improvement. Science, ecology, epidemiology, and integrated management function only when combined. Projects such as VACDIVA clearly demonstrate this. And the question is not whether a new case will occur. It will occur. *The question is what will have been learned by then and what can be applied when it arrives.*

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<https://w3.alpha-web.ne.jp/~chikutomo/youton.html>



***1 Wild Integrated Movement Boar Outbreak & Risk Dynamics (WIMBOARD), November 2024**

<https://vacdiva.eu>

<https://vacdiva.eu/activities/vacdiva-final-world-technology-transfer-workshop-key-advancements-in-asf-control/>

***2 Public communication of the WIMBOARD modeling results: December 15, 2025**

<https://www.ucm.es/momat>

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<https://www.ucm.es/imi/file/noticia-pestes-porcina?ver>

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