

Transboundary Animal Diseases: *A Global Challenge that Requires Action*

The COVID-19 pandemic caused by a new coronavirus was a powerful reminder that certain human pathogens can generate health crises with global impact. The rapid spread of the virus caused millions of deaths, stretched health systems to their breaking points and disrupted global economies. Although they receive less attention, animal pathogens can have a similar or even greater impact, in particular those causing Transboundary Animal Diseases (TADs). These diseases, mostly affecting livestock, spread quickly across borders, posing an imminent threat to animal health, economies and food security.^{1,2} They result in the loss of hundreds of millions of animals leading to annual industry-wide damage of 48 to 330 billion USD.³



TADs are a Truly Global Concern – Now More than Ever

The term Transboundary Animal Diseases was introduced in the 1990s,¹ yet the scale and complexity of today's TADs situation extend far beyond that original definition. While TADs disproportionately affect emerging countries, they represent a global threat due to the globalisation of trade and commerce, but also due to climate change, regional conflicts or demographic change. They often have unusual names that may sound distant to most of us, such as African Swine Fever (ASF), Highly Pathogenic Avian Influenza (HPAI), Foot-and-Mouth Disease (FMD) and Lumpy Skin Disease (LSD), but they are much closer than we think and spare no livestock species and region.⁴

Animal and Public Health at Risk:

The Unprecedented Spread of HPAI in Recent Years

Few examples illustrate the global dimension of TADs better than HPAI. This disease cannot be considered a regional concern limited to certain borders. Today, HPAI is a global threat to wildlife and the poultry industry in Africa, Europe, the Americas and Asia.⁵ HPAI outbreaks have resulted in the culling of hundreds of millions of birds in recent years, constricting the supply of poultry meat and eggs, a crucial source of protein for a large part of the world population. The increase of HPAI spillover to other species has raised concern about its impact on biodiversity due to the death of hundreds of thousands of wild birds and marine mammals. Being a zoonotic disease, avian influenza can also infect humans. There have been very few human cases so far and according to health authorities, the risk for humans remains low, but further mutation of the virus could lead to a potential new pandemic.

ASF Devastates Pig Populations and the Economy

Similarly, African Swine Fever, once confined to Africa, has been spreading across Europe and Asia since its introduction into Georgia in 2007.⁶ This lethal virus, which causes up to 100 percent mortality in affected pigs, wiped out more than half of China's pig population when it entered the country around 2018.⁷ The economic consequences were far-reaching, as China is the world's largest pork producer.⁸ ASF was recently introduced in Spain, the largest pig producer in the European Union.⁹ The virus is now circulating from the Iberian Peninsula in Europe to Indonesia in Asia. Not even the Americas are completely free as ASF is present on the Caribbean Island of

Hispaniola since its introduction in 2021.¹⁰ The global spread of ASF is mainly due to human activities, such as the legal and illegal trade of animals and animal products across and within borders.¹¹

FMD and LSD Threaten Cattle Health and Livelihoods

Another TAD that has received public attention in recent months is foot-and-mouth disease (FMD), a fast-spreading viral disease affecting cloven-hoofed animals such as cattle, pigs, sheep and goats. It causes fever and painful blisters on the mouth, tongue and feet of affected animals, leading to severe weight loss, reduced milk production, lameness and mortality in the young. FMD, which is endemic in parts of Africa and Asia, resurfaced in Europe in 2025. Two separate incursions in Germany after 36 years of being FMD-free and then Slovakia and Hungary, caused trade bans and billions in losses in the agricultural sector. The risk of introduction in FMD-free regions remains high as shown by the rapid spread of FMD serotypes SAT2 (from 2022) and SAT1 (2023 and 2025). Once restricted to Southern Africa, these serotypes have disseminated through neighboring regions, underscoring the ongoing risk of FMD spread towards Europe.

Similarly, Lumpy Skin Disease has spread across Asia and Europe in recent years. LSD affects cattle by causing firm, painful skin nodules. These lesions can lead to secondary infections, mastitis and reduced milk yield, significantly impacting





productivity. In severe cases, LSD can even lead to death. LSD has a disproportionate impact on poor rural communities. The LSD outbreaks in Pakistan and India during 2021–2022 caused a substantial economic burden for smallholder cattle farmers. The direct and indirect costs associated with LSD forced rural households into debt selling assets, or abandoning farming altogether, which exacerbated poverty.^{14,15} Beyond economic losses and animal welfare impacts, TADs also have significant social consequences. In Europe, the culling of cattle to limit the risk of spread of LSD has resulted in protests from farmers seeing their livelihoods at risk.¹⁶

The Need for Robust TADs Preparedness

Paradoxically, control tools and strategies for most Transboundary Animal Diseases do exist. Biosecurity, movement restrictions and vaccination have allowed the elimination of some of these diseases from entire continents. While international institutions like the World Organisation for Animal Health (WOAH) advocate for stronger preparedness to address health security threats, including TADs,¹⁷ the response to TADs is often limited, delayed or non-existent. The reasons for this are complex and diverse.

First of all, research is essential to improve our response to known TADs and emerging animal diseases. It requires resources and appropriate long-term funding. As an example, since its first description in 1921 in Kenya, ASF research has attracted limited funds. This, combined with the complexity of the ASF virus, resulted in the lack of safe and efficacious vaccines when ASF started spreading globally. For several TADs, effective vaccines and diagnostics exist, but for various reasons they often don't come into play. To ensure sustained access to high-quality veterinary products for TAD control in the required quantities and timelines, appropriate planning and

financial incentives are essential. Mechanisms to guarantee or accurately predict production volumes would allow the animal health industry to invest in manufacturing capacity. Similarly, a robust but rapid regulatory process would encourage the production and accelerate the access of vaccines and diagnostics for TADs where and when they are needed. Enhancing public-private partnerships (PPPs), which the WOAH actively promotes,¹⁸ is essential to improve the development and access of these control tools. Strategic stockpiles, also known as vaccine and diagnostic banks, are the only solution for immediate access to these essential countermeasures in case of outbreak. Such banks already exist for several TADs in Europe, North America and Australia and they have proven essential to respond to recent FMD and LSD outbreaks in Europe [19]. This approach could be expanded to other TADs and other regions, whether they are endemic or threatened by these diseases. Even when vaccines are available, their use can be restricted by international regulations as some countries ban imports from vaccinating countries. With HPAI for example, this happens due to concerns about reliably distinguishing vaccinated birds from naturally infected birds. So-called DIVA (Differentiating Infected from Vaccinated Animals) vaccines and adequate surveillance are crucial to ensuring safe global trade with vaccination. Other international agreements such as the Nagoya Protocol may result, unintentionally, on the delay or even the stoppage of vaccines and diagnostics developments for TADs such as FMD.²¹ The eradication, elimination and control of these animal diseases require commitment and coordinated efforts across countries, regions and economic sectors.

The word 'transboundary,' underestimates the scale and the impact of TADs. It suggests regional or bilateral problems. Transboundary Animal Diseases are a global challenge. Addressing TADs requires mobilising economic and political

resources to enhance preparedness and provide a global response. Protecting livestock is not just an agricultural issue, it should be a geopolitical priority.

REFERENCES

- Jean-Philippe, A. and Bernard, T. (2019) LES MALADIES ANIMALES TRANSFRONTALIÈRES. *Épidémiol. et santé anim.* 27–36. https://aeema.vet-alfort.fr/images/Documents/Ressources_en_%C3%A9pid%C3%A9miologie/Revue_%C3%A9pid%C3%A9miologie_et_sant%C3%A9_animale/Publications/2019/AEEMA_2019-75-07_Amat-T.pdf.
- Lubroth, J. and Balogh, K. de (2009) Transboundary animal diseases. In: Session I: Prevention/control of transboundary diseases, zoonoses and emerging infections, Ed: F.A.H. Service. https://www.woah.org/fileadmin/Home/eng/Conferences_Events/sites/deans2009/deans_abstract/day2/session1/de%20balogh.pdf.
- FAO (2025) Transboundary animal diseases pose urgent threat to global food security, FAO warns. <https://www.fao.org/north-america/news/details/transboundary-animal-diseases-pose-urgent-threat-to-global-food-security--fao-warns/en>. Accessed January 30, 2026.
- Nguyen, T.-Q., Hutter, C.R., Markin, A., Thomas, M., Lantz, K., Killian, M.L., Janzen, G.M., Vijendran, S., Wagle, S., Inderski, B., Magstadt, D.R., Li, G., Diel, D.G., Frye, E.A., Dimitrov, K.M., Swinford, A.K., Thompson, A.C., Snekvik, K.R., Suarez, D.L., Lakin, S.M., Schwabenlander, S., Ahola, S.C., Johnson, K.R., Baker, A.L., Robbe-Austerman, S., Torchetti, M.K. and Anderson, T.K. (2025) Emergence and interstate spread of highly pathogenic avian influenza A(H5N1) in dairy cattle in the United States. *Science* 388, eadq0900.
- Bellido-Martin, B., Rijnink, W.F., Iervolino, M., Kuiken, T., Richard, M. and Fouchier, R.A.M. (2026) Evolution, spread and impact of highly pathogenic H5 avian influenza A viruses. *Nat. Rev. Microbiol.* 24, 45–60.
- Penrith, M.L. (2020) Current status of African swine fever. *CABI Agric. Biosci.* 11.
- Business, P. (2021) African Swine Fever Surge Hits Small Farms in China's Sichuan. <https://www.porkbusiness.com/news/hog-production/african-swine-fever-surge-hits-small-farms-chinas-sichuan>. Accessed January 28, 2026.
- The \$100-billion toll of a pig epidemic in China (2021). *Nature* 598, 11–11.
- African swine fever in Spain (2025). https://assets.publishing.service.gov.uk/media/69304e1d0cf0b7e681ff41a7/ASF_in_Spain_-_Preliminary_Outbreak_Assessment.pdf.
- Schambow, R.A., Carrasquillo, N., Kreindel, S. and Perez, A.M. (2025) An update on active and passive surveillance for African swine fever in the Dominican Republic. *Sci. Rep.* 15, 2244.
- FAO (2024) FAO ALERT ON AFRICAN SWINE FEVER. <https://openknowledge.fao.org/server/api/core/bitstreams/4a43e3e3-9c0a-4659-ad38-cd3f73b9c918/content>.
- Nardo, A.D., Shaw, A.E., Gondard, M., Wadsworth, J., Girault, G., Parekh, K., Ludi, A., Mioulet, V., Bernelin-Cottet, C., Hicks, H.M., Polo, N., Bulut, A., Parlak, U., Gizaw, D., Ababneh, M., Ameer, M.A., Abdulrasool, L.M.S., Saloom, F.S.A., Al-Rawahi, W.A., Knowles, N.J., Bakkali-Kassimi, L. and King, D.P. (2025) Early Release – Eastern Africa Origin of SAT2 Topotype XIV Foot-and-Mouth Disease Virus Outbreaks, Western Asia, 2023 – Volume 31, Number 2—February 2025 – *Emerging Infectious Diseases journal – CDC. Emerg. Infect. Dis.* 31, 368–372.
- FAO (2025) Rapid risk assessment: foot-and-mouth disease (FMD). <https://www.fao.org/animal-health/rapid-risk-assessment-fmd/en>. Accessed January 30, 2026.
- Ground Report: Lumpy Skin Disease has created a livelihood crisis for India's small dairy farmers. <https://www.downtoearth.org.in/economy/ground-report-lumpy-skin-disease-has-created-a-livelihood-crisis-for-india-s-small-dairy-farmers-85245>. Accessed January 30, 2026.
- Saqib, S.E., Yaseen, M., Visetnoi, S., Sikandar and Ali, S. (2023) Epidemiological and economic consequences of lumpy skin disease outbreaks on farm households in Khyber Pakhtunkhwa, Pakistan. *Front. Vet. Sci.* 10, 1238771.
- French farmers' union calls for 'blockades' as cows slaughtered over skin disease – France 24. <https://www.france24.com/en/france/20251212-farmers-clash-with-police-as-dozens-of-cows-culled-in-france-due-to-skin-disease>. Accessed January 30, 2026.
- WOAH Emergency Preparedness. <https://www.woah.org/en/what-we-offer/emergency-preparedness/>. Accessed January 28, 2026.
- WOAH The WOAHPublic-Private Partnerships – WOAHPublication. https://bulletin.woah.org/?panorama=04-3-1-2023-1_ppp-database. Accessed January 30, 2026.
- WOAH (2025) GF-TADs information webinar on the FMD situation in certain Member States of the European Union – WOAHPublication. <https://rr-europe.woah.org/en/Events/gf-tads-information-webinar-on-the-fmd-situation-in-certain-member-states-of-the-european-union/>. Accessed January 30, 2026.
- USDA (2023) USDA Protects U.S. Poultry with Restrictions on Poultry and Poultry Products from France and the European Union. <https://content.govdelivery.com/accounts/USDAAPHIS/bulletins/373425f>. Accessed January 30, 2026.
- Horsington, J., Abbeloos, E., Kassimi, L.B., Seeyo, K.B., Capozzo, A.V., Chepkwony, E., Eblé, P., Galdo-Novo, S., Gizaw, D., Gouverneur, L., Grazioli, S., Heath, L., Hudelet, P., Hyera, J.M.K., Ilott, M., King, A., Lefebvre, D.J., Mackay, D., Metwally, S., Mwiine, F.N., Nfon, C.K., Park, M.-K., Pituco, E.M., Rosso, F., Simon, F., Ularanu, H.G., Vermeij, P., Vosloo, W. and King, D.P. (2023) Application of the Nagoya Protocol to veterinary pathogens: concerns for the control of foot-and-mouth disease. *Front. Vet. Sci.* 10, 1271434.



Albert Picado

Dr. Albert Picado is currently serving as Principal Scientist within the Viral Diseases Research team at Boehringer Ingelheim in Lyon, France, where he provides strategic epidemiological support for the development of vaccines targeting priority infectious diseases. His work includes a strong focus on Transboundary Animal Diseases, contributing to global efforts to improve disease prevention and control through innovative vaccine solutions. Dr. Albert Picado is a Veterinary Epidemiologist with over 20 years of experience in designing and conducting epidemiological studies, as well as in the development, evaluation, and implementation of control tools for infectious diseases affecting both animals and humans.



Dr. Pascal Hudelet

Dr. Pascal Hudelet is the Head of Technical Services at the Veterinary Public Health department of Boehringer Ingelheim. Based in Lyon, France, he oversees a global team of veterinary specialists supporting countries in the control of Transboundary Animal Diseases, focusing on vaccine use and antigen bank management. A graduate of the Lyon Veterinary School, France, Dr. Pascal Hudelet also holds a degree in epidemiology from the Grenoble University. With over 20 years of industry experience, he has held roles in R&D, clinical development and vaccine project management, including the development of vaccines against bluetongue virus and foot-and-mouth disease.