

# Protecting pig resources from African swine fever in north eastern India

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*African Swine Fever (ASF) is a highly contagious and lethal viral disease affecting domestic pigs and wild boars. First detected in India in 2020, ASF quickly spread across the north eastern states, severely impacting pig populations and rural economies. North eastern India, culturally and economically dependent on pig farming, is particularly vulnerable due to its predominantly small-scale, backyard-based farming systems, rich indigenous breeds, and structural inadequacies. The region suffers from uneven veterinary infrastructure and limited organized trade systems, hindering effective disease management. ASF outbreaks in Assam, Arunachal Pradesh, Mizoram, and Manipur have disproportionately impacted tribal pig farmers, especially smallholders, due to inadequate biosecurity, sub-optimal outbreak response, including compensation. Informal pig trade and poor carcass disposal practices further amplify disease risks, with potential spillover into wildlife populations, threatening local biodiversity, including endangered species like pygmy hogs. Given the absence of reliable vaccine for the diseases, comprehensive, multi-sectoral prevention strategies are critical, emphasizing farm-level biosecurity, strengthened veterinary surveillance, regulated pig trade, fair compensation, and robust public awareness. Addressing deep-rooted systemic and ecological challenges through tailored, science-based policies and sustainable veterinary frameworks will ensure ASF control, protecting pig farming as an essential socio-economic and cultural pillar in north eastern India.*

**Keywords:** Effective disease management, Pig farming, Public awareness, Veterinary surveillance

**A**FRICAN Swine Fever (ASF) is a lethal and highly contagious transboundary viral disease affecting domestic pigs and wild boars (*Sus scrofa*), caused by the African Swine Fever Virus (ASFV)—a large DNA virus and the only known member of Asfarviridae family. ASFV is unique since it is the only DNA arbovirus, capable of being transmitted by soft ticks (*Ornithodoros* spp.) in some ecological settings, although tick-borne transmission has not been confirmed in India. The disease results in nearly 100% mortality in affected pigs and currently has no vaccine or specific treatment. First confirmed in India in 2020, with outbreaks initially reported in Assam and Arunachal Pradesh, ASF has since spread rapidly across north eastern India, devastating pig populations and causing serious disruptions to rural livelihoods and the regional economy.

Pig farming plays a vital role in the socio-economic fabric of north eastern India. It is deeply integrated

into the region's culture, nutrition, and livelihoods, particularly among tribal and marginal communities. The predominance of backyard pig farming makes the region especially vulnerable to ASF outbreaks, leading to devastating losses in livestock, income, and food security. Given the complexity of pig production systems and transboundary nature of ASF, region-specific, multi-sectoral strategies are urgently required. These must include farmers, veterinarians, wildlife authorities, policy makers, and food regulators.

## Pig resources and pig farming in north eastern India

The pig resource base in north eastern India is robust yet vulnerable. It has rich indigenous diversity and is important economically and culturally. However, structural weaknesses must be addressed to protect it sustainably from threats like ASF. North eastern India holds a unique position in the country's pig farming



(a)



(b)

Varying types of pig rearing facilities employed by the farmers (a) Cemented flooring and walls, (b) Minimally resourced wooden plank walls and brick floor

sector due to its high population of pigs, strong pork demand, and cultural integration of pig rearing. According to the Basic Animal Husbandry Statistics (BAHS) 2024 (Department of Animal Husbandry and Dairying 2024), the region accounts for a significant proportion of India's total pig population, with Assam leading at over 2.1 million pigs, followed by Meghalaya (706,364), Nagaland (404,695), and Mizoram (292,465). While Assam, Meghalaya, and Mizoram showed population growth from 2012 to 2019, states like Arunachal Pradesh, Tripura, and Manipur recorded substantial declines, possibly due to systemic farming challenges.

Pig farming in this region is primarily backyard-based, practiced by smallholder and tribal households. These low-input systems rely on local feed resources and minimal infrastructure and are vital to livelihoods, food security, and rural economies. Backyard pig farming contributes significantly to household income, dietary protein, and even social status in many communities. While medium and large commercial farms are gradually emerging, especially near urban markets, traditional systems still dominate.

The region is rich in indigenous pig breeds, including Doom (Assam), Niang Megha (Meghalaya), Zovawk (Mizoram), Tenyi Vo (Nagaland), and Manipur Black. These breeds are prized for their adaptability to local conditions and disease resilience. However, crossbreeding with exotic breeds such as Large White Yorkshire and Hampshire is becoming common in semi-commercial systems to improve productivity. Balancing breed improvement with the conservation of genetic diversity remains a key policy consideration particularly with respect to disease resistance.

Despite the region's pig-farming potential, several non-disease-related challenges persist. According to BAHS 2024, veterinary infrastructure is uneven. For instance, while Assam has 431 veterinary hospitals and 767 dispensaries, states like Nagaland, Mizoram, and Sikkim have considerably fewer institutions related to their pig populations (Department of Animal Husbandry and Dairying 2024). Moreover, access to organized markets, veterinary services, and modern

slaughter facilities is limited, restricting the growth of the formal pork value chain. These gaps significantly hamper timely detection and effective containment of ASF outbreaks, exacerbating the region's vulnerability.

#### ASF threat and its impact on pig farming and trade

ASF is not transmissible to humans, but it is devastating to pigs, with case fatality rates often reaching 100% in acute cases. Transmission occurs through direct contact with infected animals, indirect spread via contaminated feed, fomites (tools, clothing, vehicles), and infected pork products in which virus can remain viable for months. Clinically, ASF presents as high fever, loss of appetite, skin discolouration, incoordination, diarrhea, and sudden death. Chronic forms exist but are less common and may act as hidden sources of viral persistence. Crucially, there is no effective vaccine or treatment, making strict biosecurity and early detection the pillars of disease control (WOAH 2024).

Since its first detection in India in 2020, ASF has emerged as a major disruptor of pig farming in north eastern India. The region, where pig farming is firmly embedded in local traditions and economically vital, has suffered disproportionate losses due to the rapid spread and poor controllability of the disease.

Official data from 2020–2023 paints a stark picture. Assam, with the country's largest pig population, reported over 42,000 pig deaths due to ASF during this period, including a peak of 38,971 deaths in 2022 alone. Arunachal Pradesh recorded more than 7,700 pigs death in 2022, while Mizoram reported a sharp surge in both deaths (12,044 pigs) and culling (10,756 pigs) in the same year. Manipur showed significant impact in 2023, with 4,319 pigs dead and 1,681 culled. These numbers are likely underestimated due to limited surveillance coverage in backyard settings.

The disease's impact has been most devastating for smallholder and tribal farmers, who dominate pig production in the region. Backyard pig farms often lack adequate biosecurity, and infected carcasses may not be promptly removed, contributing to further spread. In many cases, ASF led to the complete loss of pig herds,



(a) Clinical signs of ASF



(b) Lesions of ASF

leading to economic hardship. Compensation, pegged at ₹ 3,000 per pig, may have only partially covered losses, as it often fails to reflect the market value of breeding stock, adult pigs, or secondary losses from disrupted trade.

ASF has also crippled trade and disrupted the pork value chain. Movement restrictions, both formal and informal, have affected interstate and local pig transport. Markets have experienced panic selling and price crashes, undermining confidence among producers and traders alike. The risk of disease spillover into wild boar populations and national parks further complicates management, threatening biodiversity and reintroducing the virus to domestic settings through vulnerable farm-forest boundaries.

Besides market disruptions, ASF also exposed critical gaps in veterinary surveillance, emergency response, and disease reporting. Varying pace of culling in different states and outbreak notification methods suggest a need for stronger institutional preparedness and coordination across states. Without significant policy and infrastructural interventions, the long-term viability of pig farming in the northeast remains at risk.

#### ASF prevention: Multi-stakeholder measures

While the above measures address immediate concerns, deeper systemic and ecological challenges continue to hinder long-term control efforts. In the absence of an effective vaccine or treatment, the only viable strategy against African Swine Fever (ASF) is the prevention of its introduction and spread. For north eastern India, where pig farming is largely unorganized and community-based, ASF control requires a multi-tiered, locally tailored approach. This includes practical measures for farmers, strengthened veterinary infrastructure, regulated trade mechanisms, and policy support that acknowledges the unique challenges of backyard pig systems.

At the farm level, emphasis must be on improving basic biosecurity, particularly in traditional backyard farms that dominate the pig production landscape in the region. These systems, though economically significant, are often characterised by poor infrastructure, open housing, and informal sourcing of animals. Here, biosecurity begins with simple but critical practices i.e. isolating new pigs before introducing them into existing herds, preventing access of wild animals and dogs to pig enclosures, and ensuring the immediate removal



(a)



(b)

African swine fever: (a), Lesions; (b), Disposal of carcass

and safe disposal of carcasses. The traditional practice of swill feeding, especially using kitchen waste or pork scraps, should be discouraged, unless heat treated. ASF virus (ASFV) has a unique persistence profile marked by high virulence and high environmental resilience, meaning it can survive for prolonged periods in carcasses and contaminated feed, even under adverse conditions. Disinfecting sties, transport vehicles, and tools using approved agents such as sodium hydroxide, formalin, or chlorine is vital to reduce viral persistence. Equally important is the avoidance of purchasing pigs from unknown or unverified sources, which may serve as undetected carriers of ASFV.

These measures, however, will only be effective if they are complemented by strong veterinary surveillance and diagnostic systems. Early detection is key to containment, and this demands field-level engagement, especially in remote and pig-dense districts. Veterinary field assistants and mobile veterinary units (MVUs) must be deployed to monitor animal health and respond to farmer reports. The region's diagnostic laboratories must be strengthened with molecular and serological capabilities to confirm ASF cases quickly and reliably. Surveillance should not be limited to domestic pigs. Monitoring of wild boars, especially near forest fringes and protected areas, is essential to understand the potential spillover or maintenance of ASFV in wildlife populations. The detection of genotype II ASFV in wild boars in Assam's Manas and Nameri National Parks, which were genetically similar to strains isolated from domestic pigs, underscores the urgency of such efforts.

Regulating pig movement and trade present other challenges. Much of the pig trade in north eastern India occurs through informal channels, with limited oversight and traceability. This significantly raises the risk of disease spread across regions. Practical solutions include the enforcement of health certification for pigs in transit, establishing free disinfection and quarantine facilities at market points, and temporary market closures in outbreak zones. At the same time, pig movement restrictions should be based on real-time risk assessments and should avoid unnecessary disruptions to unaffected communities. Traders and transporters must be made aware of ASF symptoms and reporting protocols and encouraged to follow them through incentivised compliance and accessible veterinary support.

At the policy level, governments must act decisively to provide an enabling environment for ASF control. Besides the available National Action Plan on ASF (Department of Animal Husbandry and Dairying 2020), customized state-level contingency plans should clearly define outbreak response mechanisms, including surveillance zones, movement controls, humane culling procedures, and disposal protocols. Importantly, compensation packages must be fair and timely, with provision of revision based on market scenario.

Beyond reactive measures, long-term solutions must include the promotion of compartmentalization—especially in semi-commercial and large farms, which

involves implementing standardised biosecurity and management practices that allow pig establishments to continue operations during regional outbreaks. Although originally designed for commercial systems, this concept could be adapted, at least in part, to cooperative or cluster-based backyard farming systems with shared veterinary oversight. Furthermore, border control measures should be revisited.

Effective ASF control also demands broad-based public engagement. Awareness campaigns must go beyond urban centers and reach tribal and rural communities in vernacular languages. These campaigns should clearly communicate that ASF is not a human health risk but poses a serious threat to livelihoods and food security. Community-level biosecurity networks, perhaps through existing self-help groups or village councils can serve as first responders in disease detection and containment.

### Critical systemic and ecological challenges

What makes ASF particularly dangerous is not just its virological properties, but the context in which it spreads. In north eastern India, a majority of pig farmers operate in informal, resource-constrained settings with little to no access to veterinary guidance or regulated markets. These systems, while firmly embedded in local traditions and are economically significant, often involve pigs of varying age and health status reared in close quarters with minimal biosecurity. Carcasses of ASF-infected pigs are frequently left exposed or disposed improperly, creating conditions for environmental contamination and potential spillover into nearby wildlife habitats.

This overlap between domestic pig farms and wildlife-rich landscapes further complicates control efforts. The recent detection of ASFV in wild boars from Manas and Nameri National Parks in Assam underscores the growing threat of a wildlife-livestock transmission cycle. Such spillovers not only risk reintroducing the virus into domestic herds but also endanger India's biodiversity, including threatened species like the pygmy hog. Managing this interface will require not just fencing or buffer zones, but also close coordination between veterinary, wildlife, and forest departments.

The informal nature of pig trade adds another layer of complexity and movement across village, district, and even state borders. In the absence of traceability systems and health certification, the movement of pigs especially from unknown sources remains a major risk factor. Many smallholder farmers and traders lack awareness of ASF symptoms or reporting procedures. Addressing these gaps calls for targeted, multilingual awareness campaigns, farmer training, and institutional mechanisms that are locally grounded but scientifically sound.

Policy efforts must go beyond reactive culling and compensation. While compensation is necessary, it is often inadequate to match the full extent of economic loss. Strategic investments are needed in veterinary infrastructure, mobile veterinary units, diagnostic

laboratories, and frontline personnel. At the same time, regulatory frameworks must evolve to support risk-based trade restrictions, state-level surveillance protocols, and inter-agency coordination for effective outbreak response.

One promising approach is the adaptation of compartmentalization concept; currently applied in commercial systems for clusters of smallholder farms. This could allow disease-free pockets to maintain operations and trade even during regional outbreaks, provided they follow uniform biosecurity standards and are supported by state veterinary systems.

### SUMMARY

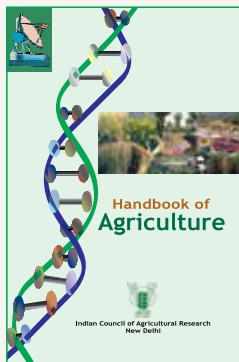
African Swine Fever (ASF) has emerged as one of the most formidable threats to pig farming in north eastern India. While the disease itself is non-zoonotic and poses no direct risk to human health; its impact on rural livelihoods, animal health systems, and regional economies has been deeply destabilizing. The outbreaks since 2020, particularly in Assam, Arunachal Pradesh, and Mizoram, have laid bare the structural systemic

weaknesses that underlie India's pig production systems, most notably in smallholder and backyard farming settings.

In sum, effectively managing in north eastern India demands a layered approach that integrates community participation, veterinary preparedness, and inter-departmental coordination. A one-size-fits-all model will not work in a region defined by its diverse landscapes, farming practices, and cultural traditions. Instead, region-specific strategies, anchored in scientific evidence, responsive governance, and public trust, must be adopted. These should include locally adapted biosecurity measures, tailored compensation frameworks, and integrated disease surveillance systems. With the right policy, vision and sustained investment, ASF can be controlled, enabling pig farming to endure as a resilient and vital source of livelihood and food security across the region.

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Size : Royal Octavo (16 cm x 24 cm) • No. of pages : i-xii + 1618 • Price : Rs 1500 • Postage : Rs 100  
ISBN No. : 978-81-7164-096-6

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