By Shane Brennan

OUTBREAK

How cold chain logistics are adapting to the rising threat of animal disease in the global food trade.

Brazil confirmed its first-ever case of Highly Pathogenic Avian Influenza (HPAI) in a commercial chicken flock in May 2025. Though not an unusual global event, the news sent a jolt through international supply chains. Brazil is a key player in poultry exports, and global markets reacted with bans and restrictions imposed almost immediately.

"Our clients were very concerned about the cancellation of their contracts, knowing they had many shipments already en route to their destination," says Vivianne Leite, Chair of the GCCA Food Safety Committee in Brazil and a Director at CAP Logística Frigorificada. "They knew that the suspension, according to the market, would trigger a chain reaction in the manufacturing process."

The incident reflects a broader reality: outbreaks of animal disease are becoming more frequent and disruptive. For the temperature-controlled logistics sector, these events aren't just veterinary crises – they're trade disruptors, supply chain stress tests, and reputational risks.

Leite notes her company accepted all recommendations following the outbreak. Even after being HPAI free for 45 days, they still receive daily reports from the Ministry of Agriculture.

Another challenge was rearranging and maximizing stock to find room for the client's product. "It's interesting that we were struggling with space availability in the last year and a half. Our clients changed their strategy, storing products in containers instead of using our warehouses," says Leite. "I even decided to turn off two chambers in order to store dry products in them."

As animal-borne threats like African Swine Fever (ASF), (HPAI), and Foot-and-Mouth Disease (FMD) increase, how is the cold chain coping?

A Decade of Disruption

Over the past decade, there has been a significant increase in both the frequency and severity of major animal disease outbreaks. The World Organization for Animal Health (WOAH) estimates up to 20% of global production is lost annually due to animal diseases. There is no single cause of this increase. Still, factors such as high-density farming, wildlife migration, habitat loss, and the expansion of trade in live animals and animal products are considered contributing factors.

Three major diseases dominate recent history:

- FMD: A recurring threat in Africa, Asia, and the Middle East, FMD caused South Africa's beef exports to drop by 20% in 2022. The disease costs the global economy more than $10 billion annually.
- ASF: Beginning in China in 2018, ASF led to the culling of more than 200 million pigs – approximately 40% of the global pig stock – resulting in an estimated $130 billion in losses by 2020. Global pork supply chains saw price spikes, trade shifts, and protein substitutions.
- HPAI: Once seasonal, HPAI is now a constant risk. Between 2021 and 2023, more than 800 million birds were culled globally. In the United States, losses exceeded $1.2 billion. Export bans in Brazil, France, and Poland have impacted producers, leading to ripple effects on meat and egg prices.

Other emerging threats include:

- Lumpy Skin Disease: Spread to more than 25 countries since 2019. India lost 2 million cattle in 2022, sparking severe milk shortages.
- Brucellosis and BSE (mad cow disease): These diseases continue to cause sudden export halts such as Brazil's BSE-linked suspension of beef exports to China in 2021.
- New World Screwworm: It's a growing threat in Mexico and Central America, triggering movement restrictions and export scrutiny.

These outbreaks prompt emergency responses including culling, biosecurity upgrades, movement restrictions, surveillance, and vaccination. However, these measures are costly, reactive, and inconsistently applied.

Small producers bear the brunt and heartache of lost animals and revenue, but it falls to cold chain companies to find ways to ensure supply chain continuity. In doing so, temperature-controlled logistics operators face increasing regulatory complexity, certification burdens, and real-time tracking demands.

Regionalization vs. Blanket Bans

When disease is detected, importing countries must decide whether to block all products from the affected country or only those from specific regions. While WOAH promotes "regionalization" – accepting products from disease-free zones – this depends on the credibility of data, traceability systems, and real-time monitoring.

"Our industry relies on traceability," explains Dr. Stephen Neel, Vice President of Global Food Optimization at Lineage. "The 3PL industry has the responsibility to verify which countries, states, and products are eligible and/or ineligible for trade to any company, and then to verify that all shipping routes are through eligible areas. We do this by working closely with the producer/supplier to verify lot codes, slaughter locations, and slaughter dates to verify eligibility as animal outbreaks ebb and flow, grow or expire based on eradication efforts at the production locations. Mistakes are costly. Such measures place a heavy operational burden on cold chain companies."

Vaccination Dilemmas

Vaccination can help control disease spread, but global trade acceptance is inconsistent. Many countries hesitate to import meat from vaccinated animals, fearing they may not be able to distinguish between vaccination and infection. This hesitancy creates complex certification challenges, including proving vaccine types, maintaining separate supply lines, and additional quarantine periods – all of which increase costs and delay shipments.

In October 2023, faced with repeated HPAI outbreaks in major duck production zones, the French authorities launched a targeted duck vaccination strategy. The decision was underpinned by research that showed vaccination could dramatically reduce outbreak numbers and economic losses.

"There has been a study by the veterinary school of Toulouse (France), which shows that they had, I think, 10 outbreaks last year, and if they did not vaccinate, they would have had 700 outbreaks," said WOAH Director General Emmanuelle Soubeyran. "The cost of the vaccine, the surveillance, and vaccination, was 10 times less than the cost of the outbreaks."

Despite domestic success, the decision had swift international consequences. Following the announcement, both the United States and Canada temporarily halted poultry imports from France. Officials expressed concern that vaccinated birds could carry and spread the virus without symptoms, complicating outbreak detection. While a precaution, the trade bans exposed ongoing tension between disease control and international trade realities.

Hidden Protectionism

Some disease-related trade restrictions are suspected to mask protectionist policies. In 2014, Russia banned all EU pork exports after ASF was found in wild boars in Lithuania

and Poland. The World Trade Organization (WTO) later ruled the blanket ban scientifically unjustified.

In May, speaking at an international conference, WTO Representative Dr. Rolando Alcala reported that since 1995, more than 600 complaints have been filed with the WTO regarding trade restrictions imposed due to animal health. Over a third of these were directly related to non-compliance with WOAH standards.

Building trust in harmonized animal disease control standards often flounders in the face of stronger protectionist or political motivations.

Developing Country Gaps

Many low- and middle-income countries struggle to meet the technical demands of regionalization and certification. A 2021 FAO study found only 30% of African nations met WOAH reporting standards. This leads to precautionary bans from risk-averse importers, even when outbreaks are limited.

Botswana – long praised for beef quality – faced repeated export suspensions due to its inability to satisfy EU traceability standards during FMD outbreaks. Despite low case numbers, trade was halted until surveillance systems were upgraded.

From Coping to Resilience

Cold chain logistics have adapted impressively, improving traceability, revising routes, and bolstering compliance capacity. Resilience, however, remains a work in progress.

Some positive trends are emerging. ASF containment in parts of Europe shows that cross-border cooperation works. HPAI protocols are becoming more harmonized, improving predictability. Disease-free zones enable limited trade continuity, even during outbreaks.

Yet challenges remain – fragmented national responses, politicized trade decisions, and rapidly evolving animal health threats test even the most robust supply chains.

What Comes Next?

The next outbreak is inevitable. The question is whether the global food system, and its cold chain backbone, can continue the broad trend of rapid intervention, coordinated response, and robust, trusted systems.

For governments, this means aligning more closely with international science-based standards, investing in veterinary infrastructure, and committing to transparency.

For the cold chain industry, it means building agility and traceability into every link, from farm to fork. Digital documentation, geofenced logistics, and end-to-end visibility must become the norm, not the exception.

Cold chain professionals are not just logistics providers – they are critical enablers of food security, trade stability, and public health. In an era of recurrent animal disease, their role has never been more vital.

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