



Research Project Impact Case Study

Water security risks from responding to
HPAI and other livestock emerging diseases

Key researchers

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Introduction

The Te Niwha HPAI project, *Water Security Risks from Responding to HPAI and Other Livestock Emerging Diseases*, delivered a comprehensive evidence-based and practical guidance to strengthen New Zealand's preparedness for Highly Pathogenic Avian Influenza (HPAI) outbreaks. This research addressed critical gaps in emergency carcass disposal planning, focusing on biosecurity, environmental protection, and cultural legitimacy. By integrating global lessons with local risk assessments, the project moves New Zealand from reactive crisis management to proactive, science-informed preparedness.

Core activities

The project comprised six core activities:

1. **Global Review of Disposal Practices** - A systematic review of international strategies for poultry carcass disposal during HPAI outbreaks identified best practices, regulatory frameworks, and lessons learned from the USA, UK, Europe, Canada, South Africa and Asia. Preferred methods, composting, regulated landfilling, rendering, and alkaline hydrolysis, were evaluated for pathogen inactivation, scalability, and environmental safety. High-risk methods like on-farm burial were found to pose significant groundwater contamination risks, particularly in permeable soils or flood-prone areas. This global synthesis provided a benchmark for New Zealand's planning and highlighted the importance of engineered containment systems.
2. **New Zealand Landfill Risk Assessment** - A targeted assessment examined the suitability of Class 1 engineered landfills for emergency carcass disposal. Findings confirmed that secure, engineered landfills offer containment advantages through composite liners, leachate collection systems, and groundwater monitoring. However, the review revealed uneven infrastructure across regions, long-term leachate risks, and the absence of nationally consistent emergency protocols. Recommendations include pre-approval of suitable sites, robust monitoring frameworks, and iwi engagement to ensure cultural legitimacy.
3. **Review of Decomposition Science** - This review analysed carcass breakdown processes, pathogen survival, and leachate transport under burial, composting, and landfill conditions. Results showed that anaerobic burial environments prolong pathogen persistence and generate nutrient-rich leachate capable of contaminating groundwater, especially in shallow aquifers. Conversely, composting under controlled conditions accelerates pathogen inactivation and reduces leachate risks, reinforcing its role as a preferred disposal method where feasible.
4. **Best Practice Guidance Document** - A nationally consistent framework was developed for MPI and industry, detailing disposal method hierarchies, site selection criteria, buffer distances, hydrogeological assessments, and monitoring protocols. The guidance integrates mātauranga Māori and principles of kaitiakitanga, ensuring culturally legitimate responses. It also includes operational safeguards such as vehicle disinfection stations, emergency landfill cells, and enhanced post-disposal monitoring.
5. **Stakeholder Summary and Engagement** - Engagement with MPI, iwi, regional councils, and poultry industry stakeholders informed recommendations and strengthened trust. Co-design processes were emphasised to embed Māori perspectives in emergency planning. This collaborative approach ensures that technical decisions align with cultural values and community expectations, reducing conflict during outbreak responses.
6. **Draft Publications** - A review paper, *Emergency Poultry Carcass Disposal During Highly Pathogenic Avian Influenza Outbreaks: Global Lessons and a Framework for New Zealand*, was prepared for international peer-reviewed publication. This positions New Zealand within global biosecurity discourse and demonstrates leadership in environmentally responsible and culturally grounded disposal practices.

Outcomes

The project delivered science excellence through rigorous literature reviews, risk assessments, and synthesis of international and local evidence. Outcomes include:

- **Enhanced National Preparedness** - Evidence-based guidance to equip MPI and industry to implement rapid, safe, and scalable disposal strategies during HPAI outbreaks.
- **Water Security Protection** - Recommendations on buffer distances, hydrogeological modelling, and monitoring protocols.
- **Cultural Integration** - Embedding mātauranga Māori and iwi co-design ensures responses uphold Te Tiriti obligations and protect taonga such as land and water.
- **Global Contribution**: Draft publications advance international understanding of integrated disposal strategies that balance biosecurity, environmental safety, and cultural legitimacy.

Impact

This research shifts emergency carcass disposal planning from an ad hoc approach to a structured, nationally consistent framework. It informs regulatory reform, operational planning, and future research on pathogen survival, hydrogeological modelling, and emerging technologies such as pyrolysis and thermal treatment. By bridging science, policy, and cultural values, the project strengthens resilience against HPAI and other livestock disease emergencies, safeguarding both public health and environmental integrity.