

Master of Public Health

Applied Practice Experience

***OPERATIONALIZING AGRICULTURAL SECURITY:
STRENGTHENING NEW MEXICO'S BIOSECURITY AND
EMERGENCY READINESS IN ANIMAL AGRICULTURE***

by

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Chapter 1 - Portfolio Products

Background

New Mexico's (NM) agricultural economy plays a pivotal role in the region's food production and trade, characterized by extensive livestock operations and dynamic market activity. Encompassing over 40 million acres of farmland and rangeland and supporting more than 25,000 farms and ranches, the state sustains a wide range of livestock species, including beef cattle, dairy cows, sheep, goats, and farmed cervids. This expansive agricultural footprint, coupled with New Mexico's proximity to Mexico and its role as a livestock trade hub—with six public livestock auctions and two international ports of entry—creates unique vulnerabilities in managing transboundary animal health threats. The potential for natural disasters, production system failures, or outbreaks of foreign animal diseases (FADs) underscores the need for comprehensive preparedness measures, including proactive carcass management planning and strategic vaccination strategies to protect livestock health, environmental integrity, and economic stability.

Responsibility for agricultural security and FAD response in New Mexico is led by the New Mexico Livestock Board (NMLB) and the New Mexico Department of Agriculture (NMDA). The NMLB oversees animal health surveillance, disease investigation, and livestock movement control, working closely with producers and federal partners during animal health emergencies. NMDA complements these efforts by coordinating emergency planning, regulatory oversight, and interagency response across the agricultural sector. Together, these agencies form the core of New Mexico's agricultural emergency preparedness framework, ensuring swift and coordinated action to mitigate risks and safeguard the state's vital livestock industries.

As New Mexico continues to navigate evolving threats to animal agriculture, robust response capabilities—particularly in carcass management—are essential to minimizing the impacts of high-consequence disease events and maintaining continuity in the state's livestock production systems.

Carcass Management Planning

New Mexico's livestock sector is characterized by its scale and diversity, with approximately 1.29 million cattle, including 450,000 beef cows and 250,000 dairy cows, as of January 2024.¹ Many of these are concentrated in the counties of Chavez, Curry, Lea, and Roosevelt, which are significant hubs for dairy and beef production. The state also plays a vital role in international livestock movement, with substantial numbers of cattle and horses imported annually through ports like Santa Teresa and Columbus. Wildlife migration across the border further compounds disease risks. In mass mortality incidents—whether from foreign animal diseases (FAD), natural disasters, or other

¹ New Mexico Department of Agriculture. 2023 New Mexico Agricultural Statistics. Retrieved from https://data.nass.usda.gov/Statistics_by_State/New_Mexico/Publications/Annual_Statistical_Bulletin/2023-2024/2023-2024-NM-Ag-Statistics.pdf

emergencies—timely and biosecure carcass disposal is essential to prevent disease spread, environmental degradation, and public health risks.

The NM Large Animal Mass Mortality Carcass Management Plan provides a scalable framework for responding to such events. It integrates operational guidance for local, multi-jurisdictional, and state-level responses under the National Incident Management System (NIMS) and incident command structures. Core elements of the plan include the following:

- **Disposal Methodologies:** A flexible range of methods for biosecure carcass disposal tailored to the event's scale and nature.
- **Coordination:** Collaboration with the New Mexico Environment Department (NMED) to ensure compliance with environmental regulations regarding solid waste, air, and water quality.
- **Activation Criteria:** Specific triggers for plan implementation, including disease outbreaks, governor-declared disasters, and elevated risks detected through monitoring.
- **Roles and Responsibilities:** Clear delineation of duties among agencies and stakeholders to ensure efficiency during emergencies.

The plan's emphasis on adaptability and continuous improvement ensures readiness to handle incidents ranging from localized mortality events to large-scale emergencies impacting livestock, poultry, and wildlife.²

Vaccination Strategy Planning

FADs, such as foot-and-mouth disease (FMD), present a persistent threat to NM's livestock health and agricultural economy. The state's location along critical trade routes and proximity to international borders, coupled with its significant livestock densities, heightens the risk of disease introduction. A large-scale outbreak could overwhelm depopulation and disposal resources, making emergency vaccination an essential tool to mitigate disease spread and protect vital agricultural operations.

The NM Emergency FAD Vaccination Plan, part of the state's Livestock Disease Response Plan, outlines a comprehensive approach to disease control during an FAD outbreak. Key components include:

- **Targeted Vaccination Strategies:** Emphasis on ring or regional vaccination, prioritizing high-risk and high-value herds, such as dairies, feedlots, and large-scale beef operations.
- **Resource Allocation:** Strategies for equitable vaccine distribution based on disease prevalence, herd density, and economic significance.
- **Biosecurity Protocols:** Measures to prevent secondary transmission, including movement restrictions, disinfection protocols, and educational outreach.

² New Mexico Department of Agriculture. (2023). *New Mexico Large Animal Mass Mortality Carcass Management Plan*. Southwest Border Food Protection and Emergency Preparedness Center.
<https://preparedness.nmsu.edu/documents/New%20Mexico%20Carcass%20Management%20Plan.pdf>

- **Regulatory Oversight:** Streamlined processes for vaccine approval, quarantine enforcement, and movement control.
- **Operational Readiness:** Infrastructure support, including cold storage for vaccines and mobile vaccination units.
- **Stakeholder Communication:** Transparent and timely dissemination of information to producers, veterinarians, and the public regarding outbreak status, vaccination efforts, and regulatory measures.
- **Continuity of Operations:** Maintaining agricultural productivity and protecting the food supply chain during emergency response efforts.

This plan is the result of a collaborative effort involving state and federal agencies, tribal authorities, industry leaders, and academic researchers. It prioritizes efficiency, coordination, and adaptability to minimize economic losses and animal welfare impacts while safeguarding public and animal health.³

By integrating carcass management and vaccination strategies into a cohesive emergency response framework, New Mexico affirms its commitment to agricultural security and the broader objective of systemic resilience. In this context, resilience refers to the capacity of institutions, communities, and systems to prevent, anticipate, absorb, adapt to, and recover from a wide array of shocks—such as disease outbreaks or mass mortality events—while maintaining essential functions and safeguarding long-term sustainability.⁴ Through the deliberate incorporation of these preparedness measures, the state enhances its ability to respond effectively to biological threats without undermining the viability of its livestock sector, the integrity of its natural resources, or the continuity of food production and trade.

This APE project sought to leverage and learn from the above plans. By actively participating in livestock emergency planning, the author was able to pursue a number of activities which resulted in several portfolio products. These products appear in Table 1.1 below.

Table 1.1 Summary of Portfolio Products

Portfolio Product		Description
1	Contributions for both the “Large Animal Mass Mortality Carcass Management Plan” and “Emergency FAD Vaccination Plan.”	Development of the "New Mexico Large Animal Mass Mortality Carcass Management Plan" and the "New Mexico Emergency FMD Vaccination Plan" including research, synthesis, and documentation of findings to inform planning inputs, considerations, and supplemental end-user guidance (approximately 20% text of larger

³ Foreign Animal Disease Vaccination Planning. New Mexico State University, Southwest Border Food Protection and Emergency Preparedness Center. <https://preparedness.nmsu.edu/emergency/vaccination.html>

⁴ FAO. 2024. The State of Food and Agriculture 2024 – Value-driven transformation of agrifood systems. Rome. <https://doi.org/10.4060/cd2616en>

		plans/writing efforts; Portfolio Products 1A and 1B, both regarding a decision support tool, are the most noteworthy contributions).
2	Commentary article (written to provide guidance to ag security practitioners and stakeholders) on fair and livestock exhibition biosecurity published in the <i>Domestic Preparedness Journal</i> .	Article for the <i>Domestic Preparedness Journal</i> on fair and livestock exhibition biosecurity planning considerations with an emphasis on FAD (solely authored by Joshua Dise).
3	Commentary article (written to provide guidance to ag security practitioners and stakeholders) examining agricultural security risks across U.S. crop and livestock systems, emphasizing shared vulnerabilities, sector-specific challenges, and the need for integrated, systems-based approaches to strengthen national resilience—published in the <i>Domestic Preparedness Journal</i> .	This commentary examines agricultural security through the lens of evolving risks to both crop and livestock production systems in the United States. It emphasizes the shared vulnerabilities and sector-specific challenges each faces—from extreme weather and invasive species to emerging diseases and cyber threats. Rather than comparing infrastructure or protocols, the article highlights the importance of a systems-based approach that integrates biosecurity, resilience planning, and cross-sector coordination to safeguard agricultural inputs, protect food supply chains, and ensure long-term food security (jointly authored by Joshua Dise and another colleague; Joshua’s contribution was approximately 80%).

Each of the three portfolio products above represent effort towards specific MPH competencies. As indicated in Table 1.2 (below), five competencies were emphasized in the creation of the portfolio products.

Table 1.2 Portfolio Products and Competency Addressed

Portfolio Product		Number and Competency Addressed	
1	Contributions for both the “Large Animal Mass Mortality Carcass Management Plan” and “Emergency FAD Vaccination Plan.”	7	Assess population needs, assets and capacities that affect communities' health
		9	Design a population-based policy, program, project or intervention
		13	Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes

		21	Perform effectively on interprofessional teams
2	Commentary article (written to provide guidance to ag security practitioners and stakeholders) examining agricultural security risks across U.S. crop and livestock systems, emphasizing shared vulnerabilities, sector-specific challenges, and the need for integrated, systems-based approaches to strengthen national resilience—published in the <i>Domestic Preparedness Journal</i> .	22	Apply systems thinking tools to a public health issue
3	Commentary article (written to provide guidance to ag security practitioners and stakeholders) on fair and livestock exhibition biosecurity published in the <i>Domestic Preparedness Journal</i> .	22	Apply systems thinking tools to a public health issue

Chapter 2 - Competencies

During the course of the author's APE project, he emphasized a number of competencies. First, and as indicated in Table 2.1 below, the author practiced 5 of the overall 22 MPH Foundational Competencies. As the table documents, these were achieved through both specific activities and the creation of specific products (also documented in chapter 1).

Table 2.1 Summary of MPH Foundational Competencies

Number and Competency		Description
7	Assess population needs, assets and capacities that affect communities' health	This project thoroughly assessed the agricultural landscape of New Mexico, identifying key factors such as livestock populations, border trade dynamics, and infrastructure capacities that affect the state's ability to respond to mass mortality and foreign animal disease outbreaks. The needs of the agricultural community were evaluated in terms of resources, logistical challenges, and vulnerability to transboundary animal diseases, ensuring that the plan was responsive to both local and state-level concerns.
9	Design a population-based policy, program, project or intervention	The project designed a comprehensive vaccination and carcass management plan specifically tailored to New Mexico's agricultural conditions, addressing the need for rapid response during disease outbreaks. These interventions, which include prioritized vaccination strategies and scalable carcass disposal methods, were developed to minimize economic losses, protect livestock health, and maintain the stability of the food supply chain, all while being adaptable to varying scales of emergencies.
13	Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes	To ensure the plan's success, the project identified key stakeholders including government agencies, industry professionals, tribal authorities, and environmental organizations. Strategic partnerships were built to foster collaboration, facilitate resource sharing, and ensure a unified approach to managing livestock diseases, thereby enhancing public health outcomes and strengthening the resilience of New Mexico's agricultural systems.

21	Perform effectively on interprofessional teams	The project involved collaboration across diverse interprofessional teams, bringing together veterinarians, state and local agencies, environmental experts, and agricultural stakeholders. This interdisciplinary approach ensured that the plan was comprehensive, aligning with public health objectives, and enabling effective coordination and resource allocation during potential disease outbreaks or mass mortality events.
22	Apply systems thinking tools to a public health issue	The author used systems thinking to analyze the interconnectedness between livestock health, environmental sustainability, and public health outcomes in the context of carcass disposal and mass mortality operations. By considering the broader impacts of carcass management on disease control, waste management, and environmental safety, the author framed vaccination strategies within a holistic view, acknowledging how various systems—agriculture, public health, and environmental regulations—interact to mitigate the risk of foreign animal disease outbreaks. This comprehensive approach ensured that all aspects of the public health issue were addressed efficiently, from disease prevention to economic recovery.

While Table 2.1 identifies the 5 Foundational Competencies pursued during the APE project, Table 2.2 summarizes how all 22 of the Foundational Competencies were achieved through the coursework of the program. In addition, Table 2.3 lists all of the competencies for the "Food Safety and Biosecurity" emphasis area, the author's chosen area of emphasis.

Table 2.2 MPH Foundational Competencies Course Mapping

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
Evidence-based Approaches to Public Health					
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	x		x		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	x	x	x		

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	x	x	x		
4. Interpret results of data analysis for public health research, policy or practice	x		x		
Public Health and Health Care Systems					
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		x			
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels					x
Planning and Management to Promote Health					
7. Assess population needs, assets and capacities that affect communities' health		x		x	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs					x
9. Design a population-based policy, program, project or intervention			x		
10. Explain basic principles and tools of budget and resource management		x	x		
11. Select methods to evaluate public health programs	x	x	x		
Policy in Public Health					
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		x	x	x	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		x		x	x
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		x			x
15. Evaluate policies for their impact on public health and health equity		x		x	
Leadership					
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		x			x

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
17. Apply negotiation and mediation skills to address organizational or community challenges		x			
Communication					
18. Select communication strategies for different audiences and sectors	DMP 815, FNDH 880 or KIN 796				
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	DMP 815, FNDH 880 or KIN 796				
20. Describe the importance of cultural competence in communicating public health content		x			x
Interprofessional Practice					
21. Perform effectively on interprofessional teams		x			x
Systems Thinking					
22. Apply systems thinking tools to a public health issue			x	x	

Table 2.3 Summary of MPH Emphasis Area Competencies*

MPH Emphasis Area: Food Safety & Biosecurity		
Number and Competency		Description
1	Food safety and biosecurity Evaluate solutions appropriate for different food safety, biosecurity, and defense issues in the food production continuum.	Both plans to which the author contributed address critical issues related to food safety and biosecurity by evaluating appropriate strategies for carcass disposal and vaccination in response to foreign animal diseases (FADs). The commentary on carcass management provides a comprehensive approach to biosecurity, ensuring that disposal methods prevent the spread of animal diseases and protect human health. Similarly, the biosecurity programming commentary compares practices for preventing contamination across plant and animal sectors, emphasizing the importance of biosecurity in maintaining a safe and sustainable food production system.
2	Threats to the food system	The projects thoroughly examine threats to the food system posed by animal diseases,

	Examine specific threats to the food system and scientifically investigate how each can be prevented, controlled, and/or mitigated in the food production system.	particularly in scenarios involving mass animal mortality or FAD outbreaks. By investigating solutions such as carcass disposal and emergency vaccination strategies, the commentary articles identify how these threats can be mitigated through effective management and regulatory approaches. The articles stress the need for preparedness and the rapid implementation of response strategies to prevent economic and public health consequences from disease outbreaks.
3	Food safety laws and regulations Differentiate key U.S. food safety regulatory bodies and their unique legislative authorities, missions, and jurisdictions.	These projects highlight the role of key regulatory bodies, such as the U.S. Department of Agriculture (USDA) and the Animal and Plant Health Inspection Service (APHIS), in managing food safety and biosecurity during mass mortality or disease outbreaks. The vaccination strategy commentary outlines the legal framework for vaccine approval and the role of regulatory agencies in enforcing movement restrictions and quarantine measures, ensuring the safety and security of the food supply chain during emergencies.
4	Food safety policy and the global food system Analyze and distinguish how food safety and governmental biosecurity policies, globalization, and international trade cooperation influence public health.	The projects reflect on how U.S. food safety policies, such as FAD vaccination strategies and carcass management, align with international biosecurity standards and regulations. In discussing New Mexico's geographical and agricultural context, the articles emphasize how the state's policies and response strategies must integrate with global food trade systems, cooperating with international partners to prevent the spread of diseases and maintain public health security across borders.
5	Multidisciplinary Leadership Contrast the food safety and biosecurity technical needs of different stakeholders and make judgements as to the appropriate methods of collaboration.	The projects demonstrate the need for collaboration between various stakeholders, including government agencies, veterinary professionals, farmers, and international trade partners, to address food safety and biosecurity

		challenges. By contrasting the technical needs of different sectors involved in food production, the articles underscore the importance of leadership that integrates expertise from agriculture, public health, environmental science, and regulatory bodies to effectively manage risks and implement response strategies.
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*All five competencies were emphasized in the required FS&B coursework.