



Research Problem Statement

RESEARCH PROGRAMS USE ONLY	
RESEARCH IDEA NO:	25-018
DATE OF RECEIPT:	Dec. 10, 2024
TOTAL MDT COST WITH IDC:	

Title: Determining the Testing, limits and elimination of CWD Prions in composting byproducts for MDT

Yes No **Are you an MDT Employee?**

Name: Douglas McBroom
Bureau: Maintenance Division
Section: Maintenance Operations

By submitting this idea, you are considered the champion for this project.

1. Problem Statement: What issue or situation are you trying to solve?

Chronic Wasting Disease (CWD) a transmissible disease affecting deer, poses significant challenges for deer population management, and safe disposal of deer carcasses. Composting animal carcasses is an environmentally friendly disposal method and is being successfully used in some areas of Montana for animals killed along the roadways. Yet concerns persist regarding the presence of infectious proteins or prions that cause CWD in the compost byproducts. These prions are notoriously resilient, withstanding standard composting temperatures and environmental degradation, thus raising questions about their persistence and potential spreading through applications of compost byproducts.

Currently MDT cannot use the animal composting byproducts because Montana Fish, Wildlife and Parks (FWP) has expressed concern that it may spread CWD to uninfected animals. The composting byproduct is essentially topsoil, which MDT has plenty of uses if available for application along the roadside. Currently, it is simply stored at the composting site. If it can't be used, it will have to be disposed in a landfill.

2. Research Proposed: What work will be completed and accomplished to address the problem?

This proposal investigates the feasibility of using deer composting byproducts in transportation applications (e.g., soil stabilization, erosion control, or road construction and topsoil for vegetation along MDT's ROW) while assessing the associated risks of prion contamination. The study also considers the detection limits of prions in compost and defines thresholds for "prion-free" classification based on current detection technologies.

Research Questions

1. How effectively does composting degrade or inactivate CWD prions in deer carcasses?
2. What is the detection limit for prions in compost, and how does this influence the definition of "prion-free"?
3. Are there prion-contaminated byproducts below detectable limits that still pose risks when used in transportation applications?
4. Can deer composting byproducts be modified or treated further to mitigate prion-related risks?

Note: All research ideas submitted become public property and submitters are not guaranteed to receive a contract for any work that may result from this research idea.



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3. Background: What led you to this topic? Provide sufficient background in non-technical language (no jargon) to help reviewers understand your thoughts behind the issue or statement (problem).

The environmental spread of CWD is a significant concern. CWD is caused by highly stable proteins called prions. Prions are shed in the bodily fluids (saliva, urine, feces) of infected animals and can contaminate soils, plants, and water sources. Studies have demonstrated that prions bind to clay and soil particles, which can enhance their stability and infectiousness. Alarmingly, research has shown that plants like grasses can uptake prions from contaminated soils and retain infectious particles on their surfaces or within their tissues. These prion-laden plants can serve as vectors, potentially infecting herbivores that consume them. Other environmental pathways, such as shared water sources and human activities like transporting contaminated feed or soil, further amplify the spread. The persistence of prions in the environment poses a long-term challenge for managing CWD and protecting cervid populations.

4. Expected benefits to MDT: What benefits do you anticipate this project would offer? How would results be used within MDT (District and Divisions)?

If the Department can show prions are not present, then this byproduct can be use by and benefit the department. If there are prions present in the compost byproduct then the next step would be to see if those prions can be destroyed or eliminated so the compost byproduct can be used

Yes No **Has the problem statement been vetted through initial review by the Research Section, which includes a literature review completed by the MDT Librarian?**

5. Research Objectives: Identify the outcome of the research. Basic listing of deliverables or sets of deliverables. *This should be a basic list of what is "likely" to be required as a part of this research. This does not have to be detailed but will help any reviewers and proposal responders understand your thoughts behind the problem. We don't want to tell them how do to the research but we want to state what the objectives are.*

Expected Outcomes

- A clear understanding of the effectiveness of composting in reducing detectable prion levels.
- Defined thresholds for "prion-free" composting byproducts based on detection limits.
- A risk assessment for the use of these byproducts in transportation.
- Protocols and recommendations for safely utilizing deer composting byproducts.

6. Deliverables and Products: What tools and outcomes would help MDT implement the results or findings of the research? How would you expect results to be used by MDT. Include work units within the Agency that would need to implement (use) the results. Examples of products are: specifications, manuals, processes, tools, training courses, additional resources needed, models, or updated designs.

This study will contribute to waste management strategies for CWD-affected deer carcasses and explore innovative uses of composting byproducts. By establishing thresholds for prion safety and providing practical applications for compost byproducts, this research addresses environmental and public health concerns while promoting sustainable practices.

7. IT Component: Most research projects produce and/or use data. If you think this idea would use or create data, the project has an IT component.

Yes No **Does this idea have an IT Component?**

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8. Cost Estimate - include assumptions and timeline to support the estimate.

Best guess would be about 180 K
Timeline:
• Year 1: Composting and detection limit analysis.
• Year 2: Application testing and risk assessment.
• Year 3: Data analysis and guideline development.

9. Sponsor. Your division administrator will become the sponsor of this idea. Please state what Division you are in and who is the Division Administrator.

Maintenance Division--Jon Swartz

10. Additional Information: What else would you like to share to elevate the importance of your problem statement? Include any additional information you think is relevant to the proposal. Key information could include units and personnel that were consulted during the development of the research idea, or any additional business units that would be beneficial to implementation.

This proposal aims to bridge the gap between environmental sustainability and public safety by providing evidence-based recommendations for the use of deer composting byproducts.

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