

Annual Smith-Lever Project Report

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Report Information	
Project Title	Assessing the Fate of Drugs in Livestock Mortality and Manures
Fiscal Year	2012

Section I. General	
<i>Check the box adjacent to all applicable Program Work Areas for this project.</i>	
	Administration & Organization Support
	Agriculture/Natural Resources Business Management
	Agriculture/Natural Resources Producer Energy
<input checked="" type="checkbox"/>	Agriculture/Natural Resources Production Practices
<input checked="" type="checkbox"/>	Biodiversity and Natural Resources Protection
	Bioenergy
	Climate Change
	Community
	Community Energy
	Consumer Energy
	Decision Makers/Policy Education
	Family
	Food Resource Management
	Food Safety
	Food Security and Hunger
	Healthy Eating and Active Living
	Producer Alternatives and New Ventures
<input checked="" type="checkbox"/>	Waste Management
	Water Resources
	Youth

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Section II. Project Status

1. Progress Summary (milestones, activities, lessons learned, etc)

With the decline of the rendering industry, disease issues, ban on use of downer cows and rules to halt the sale of horses for slaughter, environmentally safe and sound practices for disposal of horses and livestock mortality are limited. Improper disposal of carcasses containing veterinary drugs has resulted in the death of domestic animals and wildlife. Composting of mortalities has been performed successfully to reduce pathogen levels, nutrient release and biosecurity risks.

Properly built mortality compost piles deter scavenging by wildlife and other animals.

Composting is a self-heating, aerobic process that accelerates the degradation of organic materials by the successive action of a diverse group of microorganisms, including mesophiles, thermophiles, bacteria, actinomycetes, and fungi. Due to the temperatures reached, and the activity of the microorganisms, composting results in the destruction of pathogens in manure and carcasses. However, pathogens are not the only concern in manure and carcass composting. There is concern that drugs used in the livestock industry in feed and for health or for euthanasia may not degrade and will persist in compost, soil and/or leachate, causing threats to the environment and humans. Two classes of drugs commonly used in the livestock and horse industry include barbiturates for euthanasia and non-steroidal anti-inflammatory drugs (NSAID) for relief of pain and inflammation. The first and second years of this study were dedicated to quantifying the concentration of sodium pentobarbital (a barbiturate) and phenylbutazone (an NSAID) in liver samples placed in the compost pile, in the compost itself, in the soil on which the compost pile was built and in leachate coming out of the compost pile. This information has been previously reported.

In year 3 of this project, the focus was on the fate of anthelmintics in manure composting. Anthelmintics are chemical formulations used to control external and internal parasites such as ticks, flies, lice and worms. The most commonly used is Ivermectin (a macrocyclic lactone) which is highly lipophilic, and following administration is stored in animal fat tissue from where it is slowly released, metabolized and excreted, primarily in the feces. Concern has been raised that the use of anti-parasitic agents in livestock may adversely affect harmless or beneficial organisms which breed in or feed on dung as concentration in the feces can stay high for 40 days. Since macrocyclic lactones are susceptible to aerobic biodegradation in soils, it would be expected to be susceptible to degradation in a compost pile as well. On September 16, 2011, a compost pile was built using manure and bedding cleaned from the stalls of 60 horses that had been dewormed according to label instructions. Over the following 183 days, manure only, manure plus bedding, compost, and soil samples were taken and Ivermectin was quantified. In addition, soil microbial activity, in the form of potentially mineralized nitrogen, was assessed to see if Ivermectin in the organic material has any adverse effect on the soil microorganisms.

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2. Expected & Observed Impact/Outcome (economic, environmental, and social)

Analysis from the first 2 years of this study indicates that NSAIDs and barbiturates do degrade during the composting process. Analysis from the 3rd year indicates that anthelmintics also degrade during the composting process and compost piles built from manure containing anthelmintics have no ill effects on the soil microorganisms under the pile.

The results of this 3 year trial have been instrumental in helping to educate farmers and livestock owners on best management practices for mortality and manure disposal in order to comply with environmental and CAFO rules, keep domestic and wild animals safe, and helping to improve neighbor relations. It has also been instrumental in educating USDA APHIS veterinarians on the use of composting as a disposal method allowing them to be able to recommend it as a best management practice. The acceptance and use of this technique has helped with carcass and manure disposal economics as it is a very low cost and available option. The understanding that the end-product can be used, either on farm fields or for planting trees, shrubs and ornamentals, without harm to humans, animals and the environment is invaluable. This information has been widely spread in publications, conferences, web pages and directly with agencies that develop policy. A video and fact sheet for horse owners; Horse Mortality: Carcass Disposal Alternatives: <http://cwmi.css.cornell.edu/horsefs.pdf> and Natural Rendering for Horses – Composting Horse Mortality Video: <http://hdl.handle.net/1813/29538> were developed and distributed. There are 3-4 states that CWMI is working with which are conducting similar research to verify all results.

3. Multi-State Activities (if none, leave blank)

State	Nature of Activity
PA	Development of educational materials in the form of a fact sheet and video is complete.
PA, ME, MI, IA, TX	4th International Symposium on Managing Animal Mortalities, Products, By-products and Associated Health Risk was held on May 21-24, 2012 in Dearborn, MI.
OK, ND	Working with OK State to conduct trials.
VA	Conducted courses and worked with VA DOT on trials related to leachate movement. Worked with VTech, extension and state employees
MT	Conducted a compost course for regulators and composters on manure and mortality
WV	Worked with NRCS and WVDOT to train Department of Transportation personnel correct procedures for composting road-killed animals.

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PA, ME and NE states	Conducted a NESARE funded train the trainer reaching 120 trainers and over 1000 people from subsequent trainings

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Section III. Project Deliverables

4. Publications (magazine, journal, etc)

Please input your publications in standard citation format. (<http://www.library.cornell.edu/resrch/citmanage/mla>)

Schwarz, M., Bonhotal, J., Bischoff, K., Ebel, J. "Fate of Barbiturates and Non-steroidal Anti-inflammatory Drugs During Carcass Composting" *Trends in Animal and Veterinary Sciences Journal*, In Print.

Bonhotal, J., Schwarz, M., Williams, C., Swinker, A. Horse Mortality: Carcass Alternatives. Cornell Waste Management Institute. 2012.

5. Communications (video, web site, etc)

Include: Title (or URL if applicable), media type, your role, intended audience, and estimate usage.

Natural Rendering for Horses - Composting Horse Mortality. Cornell Waste Management Institute. DVD, 2012. <<http://hdl.handle.net/1813/29538> or http://www.youtube.com/watch?v=HXJ30jXUx_I>.

Cornell Waste Management Institute. "US Mortality and Butcher Waste Disposal Laws Map." Cornell University, 2012 update. <<http://compost.css.cornell.edu/mapsdisposal.html>>.

6. Presentations (in-service, workshop, trainings, etc)

Include: Title, date, duration, your role, constituency, and number of attendees.

American Academy of Veterinary and Comparative Toxicology Conference. Fate of Drugs in Composting, October 1, 2011, 40 minutes. Invited speaker. Veterinarians, 42.

EDEN Conference, Portland, Knowledgeable, Ready and Able, October 13, 2011, 60 minutes, Extension educators, 65.

State University of NY at Buffalo college class. Large Scale Composting, October 19, 2011, 1 hour. Invited speaker. College students, 85.

Roxbury, NY Community Radio 91.3 FM. Mortality Composting, January 23, 2012, 15 minutes. Invited radio interview. Farmers, public listening area. <http://thefarmhour.wordpress.com/>.

Emergency Response/Mortality Composting Conference. Mortality Management, March 28, 2012, 2 hours. Invited speaker. Farmers, government officials, veterinarians, 50.

NYS DOT Mortality Management Meeting. Composting Roadkill, April 25, 2012, 1 hour.

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Invited speaker. NYS Department of Transportation employees, 120.

Virginia Department of Transportation Meeting. Composting Roadkill, May 9, 2012, 2 hours. Invited speaker. VA DOT employees. 50.

4th International Symposium on Managing Animal Mortalities, Products, By-products and Associated Health Risk: Fate of Barbiturates and Non-Steroidal Anti-Inflammatory Drugs During Carcass Composting, May 21-24, 2012. CWMI worked with other professionals from 5 states to convene this conference and also presented the results of the 3 year study. Educators, researchers, government and non-governmental organization personnel, private industry and students. 147 participants from 7 countries.

2012 Carcass Management Workshop. The Environmental Impacts of Carcass Disposal, August 30, 2012, 6 hours. Convened and taught. Conservation districts, NRCS, USDA APHIS, farmers, 60.

7. Other (policies, procedures, manuals, etc)

none

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Section IV. Terminating Projects Only

8. Project Conclusion (Summarize the entire project's impact, outcome, etc)

Because of the results of this project, composting as a means of disposal of mortalities and as a manure management technique is being accepted more globally. The worry over safety issues of lingering residual animal health pharmaceuticals has been addressed and compost can be safely used. Comments made by attendees of the 4th International Symposium on Managing Animal Mortalities, Products, By-products and Associated Health Risk indicated that both government officials and educators are much more willing to promote the use of composting as a disposal tool. The educational materials created from the results of this project have already been widely used in trainings/off the web and will continue to be used by many. Education of farmers and horse owners on these issues helps them comply with environmental and CAFO rules, provides a low cost option for disposal and improves neighbor relations.

9. Other External Funding to Continue Program? (If yes, please specify)

Source:	none
Amount:	