

Proposed Mortality Composting <sup>1</sup> Methods for Michigan

Dale Rozeboom, Dept. of Animal Science, Michigan State University Sue Reamer, Michigan Natural Resource Conservation Service

Introduction. Effective dead animal management is required of all farmers for protection under Michigan's Right-to-Farm law. Documentation of effective dead animal management is a required component of a comprehensive nutrient management plan (CNMP), which is required of concentrated animal feeding operations (CAFO's) under the Michigan Agriculture Environmental Assurance Program (MAEAP) or under the National Pollutant Discharge Elimination System (NPDES) permit program. Environmental concerns associated with composting without a constructed facility contributed to the limitations placed on farmers in Michigan's Bodies of Dead Animal Act (BODAAct). This is the law which regulates the disposal of animal tissues. To-date the BODA Act has stipulated that on-farm composting had to be done in a 3sided bin system with floor and roof. Static pile composting is composting done without a structure (bins, roof, walls, or floor), and is generally claimed to be a lower-cost composting arrangement for farms with large animal carcasses. Static pile composting, without a structure, has been approved by other states, but without data substantiating the environmental risk associated with leachate that may leave compost piles when exposed to precipitation. For approval of uncovered or static pile composting in Michigan, studies were funded<sup>2</sup> and conducted to measure the effluent pollutant concentrations and volumes from uncovered mortality compost piles.

**<u>Research</u>**. From late 2002 to early 2005, experiments involving the composting of mature dairy cow carcasses, laboratory columns (described below), and 25-year, 24-hour storm rainfall simulations were conducted to assess the potential water quality

impacts of large-animal mortality compost piles<sup>3</sup>. Various compost management options and composting stages were "rained on." Based on results from these studies, predictive models were developed to estimate the total pollution potential from an open-air, static pile mortality compost operation of a hypothetical 1000-cow dairy farm with a 5% annual mortality rate.

In large-scale open static piles with Holstein cow carcasses, storm rainfall simulations were applied (controlled mechanical application of predetermined amounts of rainwater), and effluent was collected from compost piles containing whole cow carcasses in three different controlled settings: 1) that passing through a perforated raised platform, 2) that in groundwater collected in constructed soil cells 3.9 ft beneath compost piles, and 3) that collected as runoff leaving compost piles along the soil surface. The results indicated that the majority of nutrients leaving mortality compost piles in effluent infiltrated the soil surface. Groundwater pollutant concentrations at 3.9 ft depth (sandy loam soil) were reduced as compared with effluent collected immediately after leaving mortality compost piles.

The laboratory column (see Figure 1) study used gravity flow through vertical PVC pipe containing one of four potential amendments (corn silage, bovine manure, grass clippings, hardwood sawdust). A simulated 25-year, 24-hour storm was applied to the surface of each column. Resulting effluent was collected and analyzed for potential pollutants. Total mass of N and P in effluent from corn silage, bovine manure, and grass clipping amendments were all at least 10 fold higher than hardwood sawdust effluent, which produced the lowest load for all nutrient parameters.

Models were developed to determine the surface water and groundwater quality risk associated with various amendment selections and various sizes of operations. Total pollution potential was estimated when using the following amendments: 1) fresh hardwood sawdust and recycled mortality compost together, 2) fresh hardwood sawdust and bovine manure together, 3) corn silage, 4) bovine manure, and 5) grass clippings.

(Continued on page 2)

What's Inside	
Proposed Mortality Composting Methods for Michigan p. 1 nichePort Producers Conference p. 3	This newsletter is edited by: Ronald Bates, MSU Extension Swine Specialist (517-432-1387) batesr@msu.edu & Kathy Lau, MSU Animal Science Office Assistant III Funded by The Animal Initiative Coalition Grant Program



The results of these models indicate that fresh hardwood sawdust alone would pose the least risk to surface water and groundwater of the amendments studied, while using corn silage as an amendment would likely pose the greatest risk. A 25-year, 24-hour storm event on a hypothetical 1000-cow dairy mortality compost site using fresh hardwood sawdust amendment was predicted to load as much P in runoff as 2.2 ha of fallow soil subjected to the same storm, and load as much inorganic N into the soil surface as a single family home septic system would in 1.1 years. However, the model predicts that these values would increase to 139.5 ha and 10.8 years respectively if corn silage were used as an amendment.

*Implications.* This research has influenced the proposed rules (and supporting documentation<sup>3</sup>) currently undergoing review, which will accompany the recently amended Bodies of Dead Animals Act (July, 2005). Two categories of farms are proposed in the new rules: those producing over 20,000 lb. of total dead animal tissue annually, and those producing 20,000 or less.

Farms producing over 20,000 lb. annually will be required to compost in or on a liner meeting the Natural Resource Conservation Service (NRCS) 313 Waste Storage Facility Conservation Practice Standard for liners (November, 2005). Although there are some variations, this can typically be accomplished on a concrete "pad" meeting certain criteria. At this type of site, all leachate and runoff from the "pad" must be collected, stored, and disposed of in a manner consistent with the environmental considerations discussed below. This "pad" method is the preferred method for all farms because following the appropriate standards ensures adequate environmental protection. This method also provides many management advantages, which may provide long term economic benefit. Existing concrete surfaces or structures may be used provide they meet the minimum criteria outlined in the 2007 Michigan Animal Tissue Compost Operational Standard<sup>4</sup>.

Figure 1. Column constructed of 14.2 cm diameter Schedule 40 PVC pipe with a cap on the bottom end. The PVC cap was drilled and tapped to receive a 1.9 cm threaded plastic fitting with barbs on the protruding end. Tygon<sup>™</sup> plastic tubing (1.9 cm id or od) ran from all columns into respective one-liter Pyrex<sup>™</sup> glass collection bottles that were put in an ice bath in coolers. Columns were held vertically by platform constructed of welded angle iron and plywood.

All compost leachate and runoff generated at the compost site during active composting and curing must be managed with at least one of the following:

- Reintroduced into the compost pile
- Diverted to a treatment system meeting the criteria in NRCS 635 Wastewater Treatment Strip Conservation Practice Standard (September, 2006)
- Collected and stored in a storage facility with a liner meeting the criteria defined in NRCS 313 Waste Storage Facility Conservation Practice Standard (November, 2005).

Farms producing 20,000 lb. or less annually may choose to compost on the soil surface of land used for crop production, provided the approved methods are used and the compost process is managed effectively. With the "no pad" method, collection of compost leachate is not required but leachate generated must not cause a violation of any other federal, state, or local laws. Treatment of the leachate by soil beneath the pile is acceptable. A compost cover fabric may be used in order to shed excess rainfall and reduce the generation of leachate from the compost pile. The site must not be directly above any subsurface field drains, as movement of nutrient rich runoff to surface waters from artificially drained crop land is a documented resource concern.

Animal operations accumulating less than 20,000 lb. of mortality annually must meet the following criteria;

- A new composting site must be selected for use annually. Composting may continue without the addition of any new tissue for a second year. A site may <u>not</u> be used again for 10 years.
- The site must be on land used in agricultural crop production with greater elevation. Runoff must be managed to prevent ponding in a low area from occurring. The runoff could be directed to a well vegetated area without causing erosion. Runoff or seepage from surrounding landscape that drains onto the site must be diverted away.

- Windrows should be made parallel to the slope so runoff can flow away from the site and prevent ponding on the uphill side of the windrow/piles.

Additional Siting Considerations. The composting site must be selected and/or graded to direct surface runoff away from the compost site and prevent leachate from contacting surface or ground waters. The site must be accessible year-round, in all sorts of weather. The composting pad surface must be able to withstand the movement and weight of a loader in wet conditions (spring, fall, and rain in winter with freezing and thawing). Consultation may be sought with Michigan State University Extension or Michigan NRCS for assistance in determining compost site, size, and a batching schedule. The location must minimize the impact of the facility on odor and other air quality issues affecting neighboring residences, as well as minimizing the impact of the facility on surface and ground water resources. Consider prevailing winds, property lines, recreational sites, aesthetics, and landscaping.

To minimize the potential for contamination of surface waters, composting sites should be located outside of floodplains. However, if site restrictions require location within a floodplain, the site should be protected from inundation or damage from a 25-year flood event. An unpermitted discharge to surface waters from the composting site due to precipitation events (either by overland, drainage tiles, or other mechanisms) is in violation of Michigan Law.

The location of the animal mortality composting facility should be consistent with the overall site plan for the livestock or poultry operation. Consider on-farm traffic patterns, and provide adequate space around the composting facility for loading, unloading, and mixing equipment access.

All composting sites must meet the following criteria:

- Well drained with a minimum setback of 200 ft from waters of the state (this includes: lakes, streams, wetlands, sinkholes, seasonal seeps, or other landscape features that indicate the area is hydrologically sensitive).
- A minimum of 2 ft above the seasonal high water table as defined by NRCS 313 Waste Storage Facility (November, 2005)
- A minimum of 200 ft from any well
- A minimum of 200 ft from the nearest non-farm residence

*Recordkeeping.* All farms will be required to maintain records of all dead animal tissue produced at the farm: start date of each compost batch, species, age class, and estimated weight to document pounds of dead animal tissue produced in any twelve month period, internal temperatures of each actively composting batch, and final disposition of cured compost (method, location, date, and volume).

*Summary.* Michigan State University research has shown that the effluent from uncovered compost piles containing animal tissue is an environmental water quality risk. Consequently, 2

categories of farms have been proposed in the new BODA rules providing for environmental protection: those farms producing over 20,000 lb. of total dead animal tissue annually, and those producing 20,000 or less. Future plans for on-farm mortality composting should give consideration to this limit. Final approval of the new rules and publication of the accompanying Michigan Animal Tissue Compost Operational Standard, which will contain greater detail than could be included here, is anticipated for late winter of 2007.

<sup>1</sup>Appreciation is given to Jerrod Sanders, M.S. 2004 Michigan State University, for sharing his knowledge and the details of his research work in the writing of this article. Jerrod is currently with the Water Quality Division, Michigan Dept. of Environmental Quality

<sup>2</sup>Michigan Animal Initiative Industry Coalition, Michigan State University, L&M Compost Systems, Inc., Ellis Endowment, Jones Farm Market, Ottawa County Dept. Environmental Health, Michigan Milk Producers Association, United Producers, Inc., Michigan Pork Producers Association, MDA Animal Industries Division, Kendale Farms, Dairy Farmers of American, Michigan Sheep Breeders Association, MDA Environmental Stewardship Division, Michigan Cattlemen's Association, Michigan Farm Bureau.

<sup>3</sup>Jerrod O. Sanders, Dale W. Rozeboom, Howard L. Person, Theodore L. Loudon, and William J. Northcott. 2005. Effluent nutrient attributes and water quality risk from storm events on bovine mortality compost piles. Proceedings Mid Atlantic Composting Association Conference, Sept. 21-23, Beltsville, MD.

<sup>4</sup>Compost Rule Committee. Anticipated publication 2007. Michigan Animal Tissue Compost Operational Standard.

## nichePork Producers Conference Beth Franz, Pork AoE Educator Cassopolis

Michigan State University Extension, Ohio State University Extension and National Pork Board have partnered to offer the 2007 nichePORK Producers Conference to producers that are currently producing or interested in producing for nontraditional pork markets. This one-day educational opportunity will be January 23<sup>rd</sup>, 2007 at the Ramada Conference Center in Bryan-Montpelier, Ohio. Registration for this conference begins at 8:30 a.m. and the official start of this day will begin at 9:00 a.m.

The nichePORK Producers Conference focuses on providing scientific based information to producers interested in niche markets and providing a product with attributes that are customer preferred and valued by the consumer. "The goal of the second annual Midwest Niche Pork Producers Conference is to continue to offer an educational and networking

(Continued on page 4)



- 2. Ron Bates, State Swine Specialist Michigan State University (517) 432-1387
- 3. Dale Rozeboom, Pork Extension Specialist Michigan State University (517) 355-8398
- 4. Barbara Straw, Extension Swine Veterinarian Michigan State University (517) 432-5199
- 5. Roger Betz, Southwest District Farm Mgt. Finance, Cash Flow, Business Analysis (269) 781-0784
- 6. Tom Guthrie, Southwest Pork Educator Nutrition and Management (517) 788-4292
- 7. Beth Franz, Southwest Pork Eduator Value Added Production; Youth Programs (269) 445-4438

All comments and suggestions should be directed to:

## MICHIGAN STATE UNIVERSITY EXTENSION



opportunity to current niche pork producers, as well as people who are exploring other market options," says Beth Franz, Pork Educator for Michigan State University Extension. "We have consumers that prefer and value certain qualities in their pork products; our job is to educate the producers that have developed or are willing to investigate these unique production practices in order to supply a product for those consumers."

Conference participants will be provided with a chance to learn progressive techniques used in niche farming, strengthen working bonds and networking between producers, open the lines of communication between neighboring states and improve the working relationship between industry experts and producers. Keynote speaker, Stan Ernst, marketing instructor and development economics professor for Ohio State University will open the conference with "Everything but the Squeal" Isn't Good Enough..... Finding Niches in Consumer Trends. This session will offer a look at dominant and emerging food consumer trends that could mean niche opportunities for pork producers and others in the food sector. Discussions about demographic patterns, cultural trends and willingness-to-pay studies will offer insight on where to put your marketing attention. During this session producers will be encouraged to "think like a consumer" as they look for new opportunities in meat markets.

Conference attendees will also hear from industry experts about research that explains consumer trends and buying potential. Breakout sessions will be offered throughout the day for participants to attend. Topics that will be offered during these sessions are: getting started in niche pork production, marketing a niche product, supply systems & producer marketing associations, grant availability for niche farmers and production costs associated with alternative finishing systems. Participants will also have the opportunity to hear from current niche pork producers, as they discuss how they develop and market their niche product.

Producers of any experience, size or interest are sure to benefit from this educational opportunity. Interested producers are asked to pre-register for this conference by January 16<sup>th</sup>, 2007. The cost to attend the nichePORK Producers Conference is \$30.00 for pre-registration and \$35.00 the day of the conference. The registration fee will cover materials, refreshments and lunch; the committee will not be able to guarantee a lunch reservation if participant is not preregistered. For further information or to register for this conference please contact Florian Chirra at (419) 636-5607 or by email at <u>Chirra1@postoffice.ag.ohio-state.edu</u> or by calling Beth Franz at the Cass County Extension Office (269) 445-4438 or by email at franzeli@msu.edu.