Static Composting of Equine Mortality

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With the closing of equine slaughter facilities in the United States, carcass disposal is becoming an issue for the horse industry. Disposal options include rendering, which is expensive; on-farm burial, which is negatively associated with ground water contamination, foul odors, and zoning restrictions; or composting. This study examined the efficacy of static composting as an alternative for on-farm equine mortality disposal. Five equine mortalities were placed under compost within 48 hr of euthanasia. After a minimum of 60 d, piles were turned and combined; the single remaining pile was turned 6 and 12 mo later. Data collected included temperatures and observations for evidence of nuisances, bone and tissue status, and composting progress. All but one pile achieved an internal temperature of over 55° C for at least 3 d. One pile produced a significant odor easily associated with decomposing flesh, which disappeared within 10 d. Animal disturbance of one pile was noted. After 12 mo, most bones showed evidence of degradation, but only thin, flat bones were easily broken by hand. On-farm disposal of equine mortality can be accomplished using a static composting method. Although dissection enhances biodegradation, the ability to compost intact carcasses can make the process more appealing. Appropriate temperatures were achieved, and the amount of labor required and nuisances were minimal. However, a significant amount of bone remained after 12 mo and screening would be required before the product could be spread. Based on these results, on-farm static composting of equine mortality can be conducted successfully.

Static Composting of Equine Mortality

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Introduction

Due to expenses, zoning restrictions, and environmental impacts, concerns about mortality disposal are being addressed. Give current economic hardships, more cost effective routes of disposal are being investigated.

- Euthanasia costs may exceed $200.00
- Disposal of a 450 kg animal may exceed $300.00
- Neither of these considers medical expenses that may have been incurred prior to death of the animal

Other disposal options include:

- Burial: potential ground water contamination and zoning restrictions
- Rendering: some facilities won't take mortality when euthanasia solution is used
- Incineration: prohibitively expensive, also associated with air pollution[1]
- Composting

Composting can be done on-farm with minimal materials and equipment:

- Mortality
- Carbon source to serve as a base and insulating blanket
- Product to initiate the composting process
- Composting thermometer
- Vehicle equipped to turn the pile

In order to accomplish this, proper composting requires:

- Appropriate moisture content
- A proper carbon to nitrogen ratio
- Adequate oxygen [2]

When composting animal mortality, it is recommended that the piles **sustain temperatures of at least 55° C for at least three consecutive days** to kill pathogenic disease organisms. [1] Piles that are turned frequently allow for proper aeration and moisture levels, which keeps the composting process active and more rapid. The amount of labor involved can seem daunting, particularly at the thought of turning mortality, and may result in a lack of consideration for this process. **Static composting involves construction of a pile that does not require excessive labor** (i.e., turning or additional water), but the time to complete the composting process is extended.

Objective

This study examined the efficacy and potential of static composting as an alternative option for on-farm equine mortality disposal.

Materials and Methods

Mortality: Five equine mortalities were received from a state laboratory. **No pre-processing of the carcasses (dismembering) was performed**, and carcasses were placed under compost within 48 hr of euthanasia.

Pile Construction: Piles were constructed in December 2009, and January, April, and May of 2010.

- 46 cm base of woodchips placed below the mortality
- 25 cm of horse stall waste, consisting of manure, urine, and wood shavings, placed over the mortality
- Additional 25 cm of woodchips added over the entire pile
- Piles shaped in a pyramid to shed rainwater appropriately

Additionally:

- Initially, each carcass placed individually in contiguous piles
- Piles turned after 60 d and combined until only one consolidated pile remained; not turned again for 6 mo
- No water added to the pile beyond natural precipitation
- Piles located on ground with a slight slope and minimum distance of 90 m to nearest above-ground water source

Data Collection: Temperatures at 91 cm (36") were collected with a composting thermometer (REOTEMP, San Diego, CA). Data was collected every 3 d for 3 wk beginning 3 d after pile construction, then weekly for 2 mo, and finally monthly for 6 mo. Observations of the piles, including nuisances (odors, evidence of animals digging into the pile, etc.), bone and tissue status, and composting progress, were made when temperatures were collected and when piles were combined or turned.

Results

Temperature

- All but one individual pile exceeded 55° C for at least 3 d
- Temperatures over 55° C were maintained for at least 5 d
- One pile never achieved a temperature over 37° C, and one pile dropped below 55° C; when combined, temperature exceeded 55° C for over 2 mo
- Once all piles were consolidated, temperatures remained over 55° C for 3 mo
- When the consolidated pile was turned, temperatures again increased to over 55° C

- **Combined piles, which were larger, appeared to be better able to maintain higher temperatures for longer periods of time.**

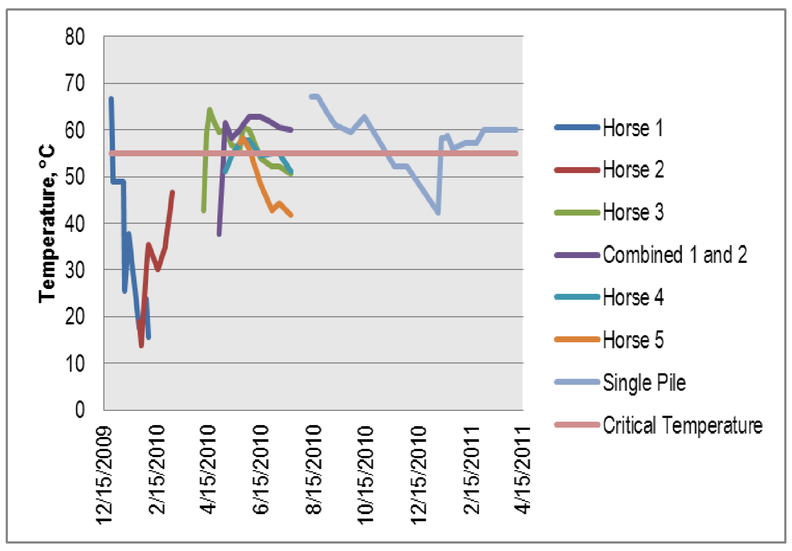

Figure 1. Temperatures in five compost piles containing large animal mortality. Changes in pile construction were implemented between Horse 2 and Horse 3, resulting in more appropriate temperatures.

Nuisances

- One pile produced a significant odor associated with decomposing flesh.
  - Odor disappeared within 10 d
  - Small pile, possibly resulting in lack of insulation
  - Excessive moisture in the form of a heavy, wet snowfall may have drenched the pile before composting process began
  - Changes made to pile design between Horse 2 and Horse 3; issue did not recur
- Animal disturbance of one pile, not associated with the odiferous pile, was noted
  - Exposed portions of carcass were re-covered with additional woodchips
  - Animal stopped returning to the pile after 7d

Figure 2. Completed consolidated pile containing five equine mortality.

Results

Bone Degradation

- One study found that after 9 mo composting, equine and bovine bones had degraded sufficiently to shatter and disintegrate easily by hand. [3]
- Even after 18 mo, the current study did not duplicate those findings.
- While most bones showed evidence of degradation, only thin, flat bones could be broken by hand.
- Long bones and vertebrae in particular were still substantial and showed no sign of breaking when banged against each other or a hard surface.

Figure 3. Bones collected from 5 composted equine mortality after 18 mo composting. Thin flat bones were able to be broken by hand, while long bones showed no sign of breaking when banged together.

Discussion and Conclusions

- Although dissection enhances carcass biodegradation, the fact that an intact carcass composts in the same manner can make the process more appealing to individuals considering alternatives for carcass disposal.

- Formation of larger piles appeared to enhance the composting process, suggesting a larger amount of woodchips during pile construction may be beneficial.
- The amount of labor required and nuisances were minimal. However, a significant amount of solid bone remained after 18 mo and the compost required screening before it was spread.
- **Based on these results, low-maintenance static composting of equine mortality can be conducted successfully.**

Future research projects could include:

- Fate of barbiturates used to euthanize animals
- Effect of anthelmintics on compost microbial biomass
- Effect of barbiturates on compost microbial biomass
- Effect of leaching of barbiturates on soil microbial biomass
- Effect of composting process on soil microbial biomass under the pile
- Impact of use of resulting compost on pasture or forage crop production
- Time required to fully decompose bones

Literature Cited

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