Planning Considerations for Dairy Cattle Mortality Management by Composting

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Declining availability of rendering service, and growing public concern about the groundwater pollution potential of on-farm burial, led to development of composting procedures for management of broiler and turkey mortalities in the late 1980s. Word of successful application in poultry production eventually led to adaptation of similar practices for swine carcass disposal in the mid to late 90's, and in the beef and dairy industries in the late 1990's and early 2,000's.

Composting methods used for on-farm mortality management are low-cost and low-management versions of composting practices typically used for industrial waste management. Unlike industrial processes—which focus on minimizing decomposition time and maximizing market value of the compost—the objectives of on-farm mortality composting are to decompose animal tissues sufficiently to safely apply them to agricultural land—much the same as manure—while minimizing operating costs and management requirements.

Composting of large dairy animal carcasses is begun by laying down a 24-inch thick base layer of dry absorptive crop residue such as ground cornstalks, ground straw, or dry feedlot manure. A layer of carcasses is placed on top of the absorptive base, and covered with 18 to 24 inches of the same material used in the base. Carcasses are roughly 65% water—which will be released during decomposition. The thick base layer is necessary to prevent release of odorous leachate. Material placed between and over the carcasses plays a different role—retaining heat and moisture which are essential for good levels of bacterial activity; and shielding the pile from excessive precipitation and intrusion by insects and birds.

For carcasses weighing more than 500 pounds, a single layer of carcasses is recommended. It can be tempting to try to stack large carcasses to save floor space, but this usually results in wet and odorous piles that have a tendency to collapse during the early phase of decomposition resulting in exposure of partially decomposed carcasses, odor, and insect problems. Layering of calf carcasses is practical, but be sure to put 6-12 inches of absorptive material between the layers—

and between the carcasses in each layer—to absorb excess moisture. For pile stability and ease of loading, total pile height generally does not exceed 5-6 feet.

The composting process is sensitive to moisture levels that are too high or too low. In Iowa's humid climate, excessive wetness is the most common problem. Since carcasses themselves are 65 percent water, it doesn't take a great deal of precipitation to cause excessive pile wetness, a condition that slows decay and causes odor problems. For this reason, it is recommended that composting in Iowa be done in roofed bins that protect the pile from precipitation during wet seasons.

In cases of catastrophic animal loss caused by fire, flood, or disease, unsheltered windrows are usually the most practical emergency composting option. Piles are formed into long narrow "windrows" that increase the potential for natural ventilation and drying of the piles. During wet weather, consider using heavy tarps to prevent pile saturation and the leachate and odor problems it causes. If tarps are not available, use extra thick base and cover layers of dry material to temporarily absorb and hold excess precipitation until it can evaporate from the pile.

In field research conducted for the Iowa DNR and USDA by Iowa State University, emergency composting in unsheltered windrows proved effective in heat treating and decomposing 1,000 pound cattle carcasses during all seasons of the year. With cover and base layers of sufficient thickness, odor emissions were negligible and inoffensive (usually characterized as smelling like straw or cornstalks), and the total amount of N added to the soil beneath the windrows was only 10 to 25 percent of the total amount of N that would have been added to the soil had the carcasses been buried. Furthermore, the soil contamination that did occur was mainly in the top 3 feet of soil where subsequent uptake of N by crops is possible, rather than 5 to 6 feet below ground as is typical for burial.

Producers who use composting say the things they like about it include: flexibility to handle carcasses of all sizes; timely disposal during hot weather; and it can be done with typical farm equipment such as a skid loader, tractor loader and solid manure spreader. Negative aspects of composting include the need for relatively large quantities of base and cover material (7 to 8 cubic yards of ground straw or cornstalks per 1,000 pounds of carcasses in bin composting, and as much as 12 cubic yards per 1,000 pounds for emergency windrow composting of large species). Use of finished compost as a cover material can help reduce cover material quantities somewhat.

Composting also takes longer than other disposal options. During warm weather, soft tissue decomposition of 1,000 pound cattle can take 4 to 5 months in unturned piles. If begun during very cold weather, soft tissue decompositions times for large carcasses can extend to 10-12 months. If faster decomposition is desired, turning the piles usually helps. Finished mortality compost for large carcasses usually contains bones that do not break down quickly. The end product must ultimately be disposed of, usually by applying it to cropland much like solid manure. The N and P content of mortality compost is usually quite low unless dry manure is used in the composting process.

For more detailed information on emergency cattle composting research and procedures, visit the project website maintained by the Agricultural & Biosystems Engineering Department at Iowa State University.
www.abe.iastate.edu/cattlecomposting