Successful Methods for Efficient and Safe Composting of Mortalities

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Over the past few years there have been many changes to the rendering landscape. There are fewer rendering companies, greater regulation of the industry, and increasing costs for on-farm pick up of mortalities. As producers look to alternative options to the traditional rendering company, the question of on-farm disposal starts to arise. One option for producers to consider is on-farm composting. Advantages to composting include increased bio-security from the standpoint of less traffic entering the farm, and the potential for mortalities to be handled and properly disposed of in a timely manner. In addition to limiting traffic and quick disposal, proper composting can destroy most pathogens, weed seeds, and insect eggs, while providing an environmentally sound and stable nutrient that can be utilized in a nutrient management program.

What is composting? Composting is an aerobic recycling process where micro-organisms break down organic material in a controlled environment to produce a stable product called humus. There are many ways to compost livestock mortalities. However, there are a few basics that are universal to all systems. The key to proper composting is providing aerobic or oxygen loving micro-organisms the proper environment to grow and rapidly break down the mortality.

The first component to composting is moisture. The ideal moisture range for composting is 40-60%. The rule of thumb is, if you can pick up a handful of material and squeeze, the material should hold together but not be so wet that water can be squeezed from the solids. If the compost is too dry, the decomposition time will be reduced and bacteria growth slowed. If there is too much moisture, there will not be enough air exchange and the bacterial type will change from aerobic to anaerobic. Anaerobic bacteria produce sulfur and ammonia-containing gasses that produce strong offensive odors.

The main ingredients to feeding the microbes are carbon and nitrogen. One of the key factors in proper composting is the carbon to nitrogen ratio. Optimum carbon to nitrogen ratio should be 25:1 with composting occurring as low as 10:1 and as high as 50:1. If carbon levels are too low you will notice high ammonia odors coming from the compost. The primary nitrogen source is the mortality so the carbon ingredient must be added. The carbon source is usually from a source called co-compost or bulking material. Common co-composting materials are: sawdust, chopped cornstalks, corn silage, chopped straw, woodchips, bedded pack manure, separated manure solids, chopped hay, and compost. There are many considerations when choosing a co-composting material, the first being availability. Beyond availability another thing to consider is the amount of carbon that can be provided, absorbency to handle any liquids that may be released in the process,

structure that it can provide to allow for proper oxygen exchange, insulating factor, and particle size. Particle size should be in the range of .25-1 inch. If compost is to be incorporated as the co-composting material, it should only be used as 50% or less of the co-compost material.

The final components to proper composting are temperature, oxygen and pH. As stated before, proper oxygen levels are needed to keep aerobic bacteria growing. The minimum amount of oxygen level needed is 5%. Bacteria and fungi needed for this process need a neutral environment at around a pH of 7, with a range of 5-10. Temperature is a key in the bacterial growth process and, as decomposition occurs, temperatures need to be at a range of 110-150° F. To destroy pathogens, the pile needs to be heated to 131°F for three consecutive days. When the pile temperatures drop below 112°F this can indicate it is time to turn the pile to add oxygen and stimulate bacterial growth.

There are many ways to structure the composting facilities. They can be permanent, such as a building with concrete walls or as simple as a static pile. They can be multiple stage or bin systems. However, loading all of these systems is very similar. Structures with walls will reduce the amount of co-compost needed. The basics to loading are to put down a layer of co-compost about 24 inches deep and in an area large enough so there is 24 inches of space between the mortality and the edge of the pile. Next is to lay the mortality on its side. At this point the abdomen may be lanced to reduce bloating in the composting process. Next is to cover the mortality with another 24 inch layer of co-compost. If you are going to add multiple mortalities at once, lay the mortalities in the pile so they are lying back-to-back. If they are layered, place a 10 inch layer of co-compost in-between the mortality layers. If the pile is outdoors, careful consideration should be taken to crown the pile so that rain and wind do not degrade the pile. When working with piles, fencing them in could be a consideration to prevent scavengers from disrupting the pile. Windrow systems are a good option if you have frequent mortalities. In a windrow system, mortalities are added end to end as they occur to create a long “windrow” of compost. Composting of mortalities takes about three months for most of the soft tissue to be degraded and may take up to a year to be completely composted. In most cases, the first heating cycle will be done at the three to six month mark and the pile is turned for a second heating. Temperature monitoring will indicate turning. After the second heating, the mortality will be reduced to a few brittle large bones. At this point the compost can be utilized as a soil supplement.

The site in which you place the compost facility or pile should be high and dry. Environmental consideration must be made. The site should be located outside of normal farm traffic, and still have easy access for equipment and be close to co-compost storage and water in case of co-compost material being too dry. Public perception and neighbor relations should also be considered.

More Information:

- *Composting Animal Mortalities*. Jorgensen. University of Wisconsin Cooperative Extension,
- *Composting Dead Livestock: new solution to an old Problem*. Iowa State University, 1999
- *Environmental Considerations for Composting Livestock Mortalities*. Harner, Kansas State University Extension,2006
- *Mortality Composting in Wisconsin* (ppt). Short. University of Wisconsin Cooperative Extension, 2000
- *On Farm Composting* – University of Guelph Ridgetown Campus, Ontario Canada, 2006
- *On Farm Composting of Livestock Mortalities.* Washington State Department of Ecology, Publication Number 05-07-034, 2005
- *Organic Burial Composting of Cattle Mortalities*. K. VanDevender, J. Penninton. University of Arkansas Extension 2004

Wisconsin Beef Information Center: http://fyi.uwex.edu/wbic/

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