NM1422 (Revised)

Animal Carcass Disposal Options

Rendering • Incineration • Burial • Composting

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Animal mortality losses are a normal part of livestock and poultry production facilities.

Producers may have losses due to disease, accidents, inter-animal competition or natural disasters such as flooding or blizzard. They need to think about mortality management before a death occurs to avoid having problems after the fact.

The producer is responsible for disposing of these mortalities within 48 hours in an environmentally acceptable manner. Carcass abandonment is not considered an acceptable disposal practice.

Safe disposal of carcasses is an important issue for day-to-day, routine management of livestock and poultry mortalities to prevent disease transmission and to protect air and water quality.

Therefore, carcass disposal remains one of the major problems facing livestock and poultry producers.

Owners and operators of animal feeding operations (AFOs) have several options for disposing of mortalities, including rendering, incineration, burial and composting. Each option has a set of advantages and disadvantages that must be considered during planning for and prior to mortality disposal.

Producers must take special precautions with the disposal of diseased animals because states may have stricter and different mortality handling and disposal requirements pertaining to certain infectious diseases.

The following is a brief discussion of each disposal option. Contacting your local regulatory agency to determine what regulatory requirements may need to be met before adopting any of the following options also is helpful.

NDSU EXTENSION SERVICE
September 2017

Rendering

Rendering is the process of converting animal carcasses to pathogen-free, useful byproducts such a feed protein. In the process of rendering, the carcasses are exposed to high temperatures (about 130 C or 265 F) using pressurized steam to ensure destruction of most pathogens. However, rendering poses biosecurity concerns due to the transportation of livestock mortalities to multiple locations en route to the rendering plant (Fonstad et al., 2003).

The rendering market has changed in recent years because the price of meat and bone meal has decreased and the use of many rendered byproducts has been eliminated due to concerns related to transmissible bovine spongiform encephalopathies (BSE or mad cow disease).

Since 2005, cattle infection with the BSE disease has had a highly negative impact on the industry. The Food and Drug Administration (FDA) requires removal of brain and spinal cord specified risk material (SRM) from rendered products intended for animal food.

The vertebral column and spinal cord of cattle 30 months and older are considered to be SRM. This makes rendering animal carcasses harder and more expensive. This FDA regulation is aimed at protecting against the transmission of transmissible spongiform encephalopathies such as BSE, but rendering facilities charge additional fees for the processing requirement.

In addition, rendering might not be an option for some producers, depending on location, type and volume of mortalities. In North Dakota, in the case of any infectious or contagious disease, a carcass must be disposed of within 36 hours or transferred to a licensed rendering plant.

However, large distances between rural areas and rendering plants and the lack of a timely pickup service of dead animals from farms are the biggest challenges for using rendering as a mortality disposal method. In many areas, the numbers of rendering facilities are limited and in many cases are declining due to increased costs and biosecurity risks associated with transporting mortalities (Glanville et al., 2009).

Incineration

Incineration is the thermal destruction of carcasses by auxiliary fuel such as propane, diesel or natural gas. Modern incinerators reduce carcasses to ash and generally are biosecure. Incineration requires a great deal of energy, compared with other disposal methods, and is not considered a viable economic disposal option due to cost and labor.

Incineration is a preferred method for managing small carcasses (for example, poultry and swine), but often large carcasses and/or a large number of mortalities cannot be handled due to the small incineration capacities (mostly are limited to less than 300 pounds per head) of most on-site farm incinerators.

The capital cost of incineration may be a limiting factor for some producers, but poultry and small-livestock producers may find incineration to be a convenient option to dispose of mortalities as they are generated, eliminating the need for temporary storage.

However, regular cleaning and maintenance are required to keep the incinerator functioning properly. Also, incinerators must be loaded and operated according to the manufacturer's recommendations. Odor nuisance complaints generated due to a poorly functioning incinerator are common.

Burning carcasses in a pit on the site is an acceptable method of disposal in North Dakota. Open-pit or open-pile burning should be a method of last resort.

Consider personnel and property safety and choose a proper location away from the public view. Refer to the "Burial" section on choosing an appropriate location. Be sure the carcass is burned as soon as it is discovered and it burns completely.

North Dakota state law requires anthrax-infected carcasses be incinerated or buried at least 6 feet deep on the same site where they died if possible. Find the complete procedure in the NDSU Extension publication "Anthrax" at *www.ag.ndsu.edu/publications/livestock/anthrax*.

Hogs that have died from hog cholera or swine erysipelas also must be burned on site within 36 hours.

A dry and absorbent base material (for example, hay or straw, finished compost, sawdust) can be used to capture liquid draining from the composting pile (Auvermann, 2006).

The bulking material, such as cornstalks and tree trimmings, needs to provide porosity and structure to a compost pile; therefore, manure is not the ideal choice. Manure may be used if enough bedding is incorporated with it.

Carcasses are layered in the bin with a suitable carbon source between each layer. Make sure no part of a carcass is exposed; otherwise, predators will be attracted to the site. Typically, a minimum 12- to 16-inch layer of co-composting material around all sides of the carcass will discourage predators, control odors and eliminate flies. As a general guide, 3 to 5 cubic yards of co-composting material is required for every 1,000 pounds of carcass (Auvermann et al., 2006). Roughly, the total carbon = pounds of birds × 1.5.

Materials are turned using a bucket loader. The turning operation mixes the composting materials and enhances passive aeration. Typically, turning frequency should be based on pile temperature, and turning should occur when the compost pile temperature exceeds 140 F or drops below 90 F.

Pile or Windrow Composting

A conventional pile and windrow composting system is a better method for large animals (for example, mature cattle or pigs).

Piles and windrows for mortality composting usually are constructed in the open on a compacted soil (for example, clay soil) or a concrete floor to control water infiltration. In pile or windrow composting, typically walls and roofs are not used to ease access for loading, unloading and mixing of the pile or windrow from all sides **(Figure 3, Page 6)**.

Windrows are aerated primarily via natural air movement or passive air movement (Rynk, 1992). A conventional composting pile is managed vigorously in the beginning to maintain aerobic and thermophilic conditions (greater than 105 F) to encourage rapid rates of decomposition, elimina- tion of objectionable odors, and the destruction of pathogens and weed seeds (Wilkinson, 2007).

However, during mortality composting, piles are left undisturbed during the first stage of composting (phase I) to ensure soft tissue is decomposing properly.

For small- and medium-sized carcasses (for example, poultry, pigs, sheep) the active composting period (phase I) may be up to three months before the pile is turned (Keener et al., 2000). However, for a large carcass (mature beef and dairy cattle, horses or other large animals), the active composting phase may be up to six months (Auvermann, 2006). Following the active composting phase, additional time (days to weeks, depending on composting conditions) may be needed for small- and medium-sized carcasses to complete decomposition (phase II), while large carcasses may require months.

Turning the pile mixes the materials and rebuilds the porosity of the windrow. However, frequent turning of an active compost pile during a disease outbreak may increase the risk of generation and release of airborne particulates that can carry infectious microbes (Xu et al., 2009). Small-scale turning typically is done by a front-end loader or bucket loader, but large-scale turning is done by a tractor-assisted windrow turner.

Small and medium-sized carcasses can be placed in layers in windrows, but large carcasses (for example, cattle, horses) need to be placed in a single layer **(Figure 3)**. Place the mortality on the base material. Cover the carcass with 8 to 10 inches of bulking material and cover that with another 1 to 2 feet of cover material (same as the base material) to make up the cover. The cover material may settle or be disturbed by wind, so be sure to check the pile periodically. If you notice excessive odors, add more cover material to the outside of the pile. Due to placement and handling limitations of large carcasses, composting may not be practical to consider during a massive infectious disease outbreak.

Placing a fresh (warm) carcass in a compost pile will help speed the decomposition process versus placing a cold carcass in the pile. Also, starting a fresh compost pile in the winter will add significantly to the time needed to finish composting a large carcass because of the additional time the microorganisms will take to produce adequate heat. Nonetheless, wintertime composting is still a viable option as opposed to digging into the frozen ground.

Summary

Producers have several options for disposing of carcasses, including rendering, incineration, burial and composting. The choice of disposal options depends on location, availability of raw materials or equipment and services, affordability and limitations on properly protecting the environment.

Carcass composting is considered one of the best disposal options due to its greater affordability, better biosecurity and low inputs and investment requirements, but composting needs proper management for complete decomposition and to ensure that objectionable odors are not generated. Complete destruction of pathogens and weed seeds occurs by maintaining thermophilic conditions during the active composting period.

If done properly, composting animal carcasses is an environmentally safe disposal option to manage emergency mortalities that do not require very high temperatures for complete destruction of transmissible diseases such as BSE.

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500-7-09; web-9-17