



Best Environmental Management Practices

Farm Animal Production

Mortality Management

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Michigan State University, and
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Introduction

A few animals die because of disease, injury, or other causes in any confined livestock operation. The mortality rate is generally highest for newborn animals because of their vulnerability.

Catastrophic mortality can occur if an epidemic infects and destroys a large portion of the herd or flock in a short time, or if a natural disaster, such as a flood, strikes. There are also incidences when an entire herd or flock must be destroyed to protect human health or other farms in the area.

The purpose of this publication is to present options to manage normal, day-to-day mortalities. Several of the methods discussed may also be used for managing catastrophic mortality if scaled appropriately and accomplished under the direction and guidance of pertinent authorities. Planning for a catastrophic mortality event should include the study of appropriate regulations, locating a site for disposal, and having insurance to cover the cost involved.

Mortality Management Methods

Mortality must be managed for at least three reasons:

1. Hygiene
2. Environmental protection
3. Aesthetics

Acceptable ways for managing mortality include:

1. Rendering
2. Composting
3. Incineration
4. Sanitary landfills
5. Burial
6. Disposal pits

Of these methods, only the rendering, and composting methods recycle the nutrients. The other methods, in essence, waste the nutrients.

Rendering

Rendering recycles the nutrients contained in the carcasses of dead animals, most often as an ingredient in animal food, especially for pets. The outbreak of Bovine Spongiform Encephalopathy (BSE) or "mad cow disease" in the United Kingdom in 1986 led to restrictions on how rendered products may be used in the United States.

If dead animals are not preserved, they should be transported to a rendering facility within 24 hours. Preservation allows mortalities to be stored on the farm until amounts are sufficient to warrant the cost of transport for rendering. Freezing and fermentation have been used for preservation.

Proper bio-security measures must be utilized to minimize the spread of disease from farm to farm by rendering plant vehicles and personnel.

Table 1. Mortality management by rendering.

Advantages	Disadvantages
1. Conserves nutrients contained in the dead animals	1. Increases sanitary precautions to prevent disease transmission
2. Minimal capital investment unless preservation is used	2. Storage of animals is required until pickup
3. Low maintenance	3. Fees charged for pickup
	4. Rendering service may not be available

Composting

Composting is the controlled aerobic biological decomposition of organic matter into a stable, humus-like product, called compost. Decomposition is enhanced and accelerated by mixing organic waste with other ingredients in a manner that optimizes microbial growth. Composting mortality can be likened to aboveground burial in a biomass filter where most of the pathogens are killed by high temperatures.

As the microbial population consumes the most readily degradable material and grows in numbers, the temperature of the compost pile begins to rise. Efficient composting requires that the initial compost mix have:

- A balance source of energy (carbon) and nutrients (primarily nitrogen), typically with a carbon-to-nitrogen (C:N) ratio of 15:1 to 35:1.
- Sufficient moisture, typically 40% to 60%.
- Sufficient oxygen for an aerobic environment.
- A pH in the range of 6 to 8.

A number of methods are used to compost mortality. At this time in Michigan, only the passive composting method is acceptable.

Sizing the composting facility includes the following general steps:

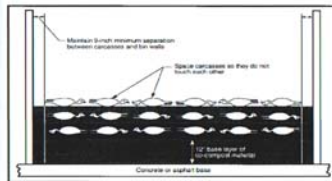


Figure 1. Compost bin diagram, layering of bulking material and carcasses.

1. Determine the average weight of the carcasses to be composted.
2. Determine the composting cycle times for the "design weight."
3. Determine the needed composter volumes.
4. Determine the dimensions of the compost facility including bin dimensions and number of bins or windrow size and area requirement.
5. Determine the annual sawdust requirements for the composting system.

Table 2. Mortality management by composting.

Advantages	Disadvantages
1. Conserves nutrients contained in the dead animals	1. High initial cost
2. Low odor	2. Labor intensive
3. Environmentally safe	3. Regular monitoring and maintenance is required
4. No need to store dead animals for utilization in finished compost	4. Cropland required

Incineration

Incinerating dead poultry and small animals is biologically the safest method. On the other hand, it can be slow, requires fuel and expensive equipment, and can generate nuisance complaints from particulate air pollution and odors, even when highly efficient incinerators are used. Incineration may require an air pollution permit. Check state and local regulations.

Table 3. Mortality management by incineration.

Advantages	Disadvantages
1. Sanitary	1. Nutrients contained in the dead animals are wasted
2. Final except for ashes	2. Initial cost
	3. Fuel and maintenance costs
	4. Potential air quality impairment

Sanitary Landfills

In some areas, disposal of dead poultry and/or animals in a sanitary landfill is permitted. Some states require special licenses to transport dead animals. *Again, check state and local regulations.*

Table 4. Mortality management using sanitary landfills.

Advantages	Disadvantages
1. Simplicity	1. Nutrients contained in the dead animals are wasted
2. No capital investment	2. Few landfills accept dead animals
	3. Transportation costs
	4. Not permitted in many areas

Burial

Burial is a common method of handling dead animals. In cold climates, burial is complicated by frozen ground. Some states allow burial only in situations of massive die-off. In general, do not bury carcasses:

- When conditions exist to create a potential public health hazard.
- At sites with permeable soils, fractured or cavernous bedrock, or a seasonal high-water table to prevent ground water contamination.
- Within a specified legal minimum separation distance from wells and surface water bodies.
- Inside the 100-year floodplain.



Table 5. Mortality management using burial.

Advantages	Disadvantages
1. Capital limited to land and excavating equipment	1. Nutrients contained in the dead animals are wasted
	2. Increases sanitary precautions to prevent disease transmission
	3. Storage of carcasses until burial may be necessary
	4. Land area becomes significant for large operations
	5. Impossible when ground is frozen

Disposal Pits

Of the methods utilized, disposal pits or lined pits are the least desirable method for managing mortality from an environmental protection perspective. Dead animals take a long time to decompose in a disposal pit because of limited aeration. Due to a high potential for groundwater contamination, adequate separation distance from drinking water supplies is necessary. *Check with appropriate regulatory authorities to determine if pits are legal in your area.*

References

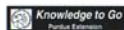
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About this Publication

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