

# Integrated Livestock Management

## Composting

With the increasing cost of whole animal removal, and the prohibited use of animal meat and bone meal as a feed source, producers are looking at different techniques for whole carcass disposal. One alternative is composting. Composting utilizes old feedstuff and manure to create the proper environment for microorganisms to speed up the natural decomposition process. In the right composting environment, decomposition of a mature dairy cow carcass will take approximately six to eight months leaving only a few small bones, which will shatter easily when passed through a manure spreader. When done properly, composting will kill most any plant or animal pathogen, and is non-odorous.

## Materials Needed

### Moisture

Moisture content of the composting pile is crucial. If there is too little moisture, the bacteria needed for the decomposition process will not survive. On the other hand if there is too much moisture, the pores needed for the movement of oxygen will be replaced by water. With little oxygen bacteria that produce relatively little odor are replaced by bacteria that produce highly odorous byproducts. The moisture content should be maintained between 40 and 60%. If moisture can be squeezed from a handful of composting material it is too wet and probably needs to be mixed with drier material.

### Co-composting Material

Certain materials can be used to reduce the attractiveness of the carcass to insects and rodents, increase movement of oxygen throughout the compost pile, and to absorb excess liquid produced by the decomposing carcass. Materials such as wood chips, ground cornstalks, straw, or old feedstuff help keep the compost porous, while smaller materials like sawdust help absorb the liquid. These materials also are a carbon source needed to sustain the microbes. You may want to use a combination of these materials to allow optimal oxygen passage while absorbing any excess liquid.

### Carbon and Nitrogen

The microbes in the compost need carbon and nitrogen to function properly. The optimal carbon to nitrogen (C: N) ratio is 25:1, which will keep odor to a minimum and allow the best microbial growth. As stated above good sources of carbon are also your CO-composting material, sawdust, woodchips, cornstalks, old feedstuff, and straw. Nitrogen is obtained from the manure. Due to the expense of carbon and nitrogen analysis, temperature and odor are good indicators of the C: N ratio. If there is a strong ammonia odor from the pile the ratio may be too low and more carbon is needed. On the other hand if there is no odor, the moisture levels are within normal limits, and there is slow decay there may not be enough nitrogen. In this case you may want to add more nitrogen, i.e. manure.

### Heat Retention

Heat is an important byproduct of the microbial activity. Optimal temperatures within the compost range from 110 to 150 degrees F. This high temperature promotes the growth of heat-loving bacteria, which promote rapid decay. Another benefit is that the high temperatures (131 degrees or above for at least 72

hours) kill most disease-causing microorganisms. Temperatures over 160 degrees is detrimental to the heat-loving bacteria and will retard the decaying process.

### **Decreasing Composting Time**

Reducing the carcass to smaller pieces will improve the rate of composting by increasing the ratio of surface area to volume. The carcass can be cut into parts by hand or could be processed through a grinding machine such as a manure slinger. Assure that equipment used to handle or cut dead animals is NOT used to handle animal feeds.

You may consider skinning the animal. This will improve the rate of composting and the hide can be sold if there are not too many holes or defects in the hide. To find out more information about selling hides contact:

- Nation Byproducts, Denver (303) 295-7551
- Southwest Hides, Scottsbluff (308) 635-0060
- Fort Morgan Byproducts (970) 867-5970

## **Facilities Needed**

### **Site Selection**

The location of the compost pile should be easy to access, allow convenient handling of the carbon and nitrogen sources, away from any animals on the property, and away from any water source and neighboring residences. Proper drainage is needed to prevent pooling of any water, with an ideal slope of 1-3%. An all weather surface, such as compacted soil, asphalt, concrete, or other impermeable material, must be used for composting. This is to ensure that composting can be done year round and to prevent contamination of surface and underground water supplies.

A 1-2' berm should be created around the composting site to hold any runoff, especially after a large storm. Large straw or cornstalk bales can be also placed around the pile to keep out pests and to absorb any runoff.

## **Construction**

Construction should begin by placing a plastic liner 10-12 feet wide and the length of the pile. Next, place a 1 to 1.5 foot layer of composting material (manure and carbon source) on top of the plastic. A general recommendation of a 50:50 ratio of manure to carbon should be used. Lay the carcass flat on top of the composting layer. Next, add some water. The pile should be moist but not soaked. Finally, completely cover the carcass with 8 to 12 inches of the compost mixture. Repeat layers until the pile is about 6 feet high. Place a thermometer 2.5 to 3 feet into the pile to measure the internal temperature. The core temperature should reach 145 degrees in 3 to 4 days. After about 2 weeks, the pile will be reduced in size and can be turned. Windrow

Although you can use a front-end loader, a composting windrow turner is ideal. The windrow turner completely turns the composting pile, aerates, and breaks up the carcass speeding up the decomposition process.

Make sure that the carcasses are completely covered after turning. Be sure to create a berm around the area to prevent any runoff from getting to any water supply.

## **Windrower**

## Regulations

If you are composting your mortalities from your farm, on your property, composting regulations do not apply - no permit or certificate of designation is needed. The finished compost can then be freely distributed offsite. One needs to check county regulations and ensure that the composting operation does not create odor, affect water quality, or create a public nuisance.

If the mortalities are gathered and taken to a separate facility (property that is not contiguous) you must apply for a certificate of designation (permit). The certificate will require an operations plan, closure and postclosure plan, and financial assurance. Also the local governing body may require additional conditions on the certificate.

Colorado composting regulations are available at the Hazardous Materials and Waste Management Division's [website](#). Select Regulations Pertaining to Solid Waste Disposal Sites & Facilities [2] (you will need Adobe Acrobat Reader to view this document, which may be downloaded from the same website). Composting regulations are in section 14 of the document.

## Suggested Guidelines for Composting

The following are guidelines taken from the Iowa Department of Natural Resources Rules for On-Farm Carcass Composting. You should check with your local officials to find out if there are specific rules and/or permits that you need for your area.

- Dead animals should be added to the composting pile within 24 hours of death and covered with sufficient composting material.
- Composting should be done in a manner that prevents access by any animal.
- Runoff and odor should be prevented.

## Wet windrow

- Dead animals should not be removed from the composting pile until all flesh, internal organs, and other soft tissues have decomposed.
- Composting needs to be done on an all weather surface of compacted soil, asphalt, concrete, or similar material that will permit accessibility during all times of the year and that will prevent ground water contamination.
- Composting must be done outside of wetlands, or the 100 year flood plain and at least 100 feet from private wells, 200 feet from public wells, 500 feet away from inhabited residences, and at least 100 feet away from any water sources.

## Helpful Tips:

- Although recycling of compost material is encouraged, be sure to add some fresh carbon material, i.e. sawdust, to the pile to create a biofilter.
- Avoid depressions on the top of the pile that could collect rainwater. The excess water may cause odor and draw in pests.
- An unused open-front barn may be perfect for composting.
- Place a fence around the pile to keep out pests.
- Add new mortalities immediately to the pile. Composting works best on fresh material and not on material that is already decaying or frozen.
- Carcasses should not touch one another. There should be at least one foot of composting material surrounding the carcass on all sides.

- Remember convenience. The area must be easy to access in order to turn the pile and to add new carcasses.
- Biosecurity - You should consider having your personnel work at the compost pile at the end of the day after the other animals are handled. After you have worked with the compost be sure to use proper hygiene before interacting with other animals or people.