COMPOSTING FACILITY

CODE 317

OPERATION AND MAINTENANCE PLAN

The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program. Operation and Maintenance (O & M) is necessary for all conservation practices and is required for all practices installed with NRCS assistance. The land user is responsible for proper O & M throughout the life of the practice and as may be required by federal, state, or local laws or regulations. The composting facility is a treatment component of an agricultural management system for the biological stabilization of organic material.

Operation is defined as operating the practice in compliance with all laws, regulations, ordinances, and easements and in a manner that is beneficial to the environment and will permit the practice to serve its intended purpose. Maintenance includes working to prevent deterioration of the practice, repairing damage, or replacing components that may fail.

Composting has been shown to reduce the populations of coliform bacteria to undetectable levels even in the primary compost. Salmonella is destroyed when proper heating is obtained. In poultry, Newcastle and Infectious Bursal disease viruses are destroyed also.

Operation

Composting is a biological process. It requires a combination of art and science for success. Hence, the operation may need to undergo some trial and error in the start-up of a new composting facility.

For proper poultry composting, correct proportions of carbon, nitrogen, moisture, and oxygen should be present in the mix. Common carbon sources are sawdust or wheat straw. It is desirable because of its bulking ability, which allows entry of oxygen. Other carbon sources that could be used are peanut hulls, cottonseed hulls, sawdust, leaves, etc. If lab testing of the litter or experience indicates that the carbon/nitrogen ratio is adequate (20-35:1 ratio), then litter alone should be sufficient for composting mortality as long as desirable bulking ability is achieved and moisture is properly managed. Moisture management is critical and must be maintained between 40 and 55 percent (Refer to Table 2).

Table 1. Recipe for Composting Broiler Mortality

INGREDIENT	VOLUME	WEIGHTS
Straw	1.0	0.10
Carcasses	1.0	1.0
Litter	1.5	1.2
Water	0.5	0.75

Compost Layering Procedure

1. The first layer is one foot of litter.
2. A 4-6 inch layer of carbon amendment (sawdust is preferred) is added according to the recipe.
3. A layer of carcasses is added. Carcasses shall be laid side-by-side and shall not be stacked on top of one another. Carcasses placed directly on dirt or concrete floors or against bin walls will not compost properly.
4. Water is added (uniform spray).
5. Carcasses are covered with a 6-inch layer of litter.
6. Begin next layer of carcasses with carbon amendment and repeat above steps.
7. When composter is full, cap the 6-inch layer with four additional inches.

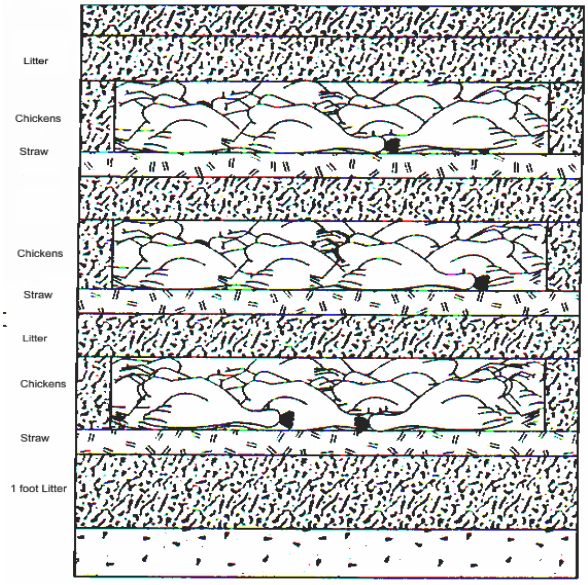

Table 2. Maintain the moisture content at 40 to 55 percent during the composting process as follows:

40 percent	Does not leave your hand moist when squeezed.
55 percent	Will allow about one drop of water to be released when squeezed.
>55 percent	If more than two drops drip from your hand, the material is too moist; therefore, add sawdust or dry carbon source.

NRCS, TN
April 2005

Temperature is the primary indicator to determine if the composting process is working properly. A minimum temperature of 130 ^{o}F. shall be reached during the composting process. A temperature of 140 ^{o}F. is optimum; however, temperatures may range up to 160 ^{o}F. If the minimum temperature is not reached, the resulting compost shall be incorporated immediately after land application or recomposted by turning and adding moisture as needed. Compost managed at the required temperatures will favor destruction of any pathogens and weed seeds. Good carcass compost should heat up to the 140° range within a few days. Failure of the compost material to heat up properly normally results from two causes. First, the nitrogen source is inadequate (example wet or leached litter). A pound of commercial fertilizer spread over a carcass layer will usually solve this problem. Secondly, the compost fails when too much water has been added and the compost pile becomes anaerobic. An anaerobic compost bin is characterized by temperatures less than 120°, offensive odors, and black oozing compound flowing from the bottom of the compost bin. In this case, a drier bulking/carbon amendment should be added to dry the mix. Then, the material should be remixed and composted.

It is possible, though unlikely, for the temperature to rise above the normal range and create conditions suitable for spontaneous combustion. If temperature rises above 170°F., the material should be removed from the bin and cooled and spread on the ground to a depth not to exceed six inches in an area away from buildings. Water should be added only if flames occur. If temperature falls significantly during the composting period and odors develop, or if material does not reach operating temperature, investigate piles for moisture content, porosity, and thoroughness of mixing.

After this first stage process, the material should be turned into a second bin and allowed to go through a second heat process. For larger birds, especially turkeys, a third turning may be necessary for complete degradation of the birds. Typically, the process can be considered "done" within 21-28 days from the time the compost is filled for broilers. For turkeys, the process usually requires about 60 days. After the heat process, curing period of one to three months is usually required before the material is stable.

Compost may be land applied after the secondary or tertiary composting. If any animal parts are still in the mix, the material must be incorporated. If immediate application is not possible, the material should be stored using the same requirements as that of stored litter in the Stacking Shed O&M statement.

Necessary operation and maintenance items for this practice include:

- **Inspect facility regularly and when the facility is empty. Replace deteriorated wooden materials or hardware. Patch concrete floors and curbs as necessary to assure water tightness.**
- **Roof structures should be examined for structural integrity and repaired as needed. Exposed metal components should be inspected for corrosion. Corroded metal should be wire brushed and painted as necessary.**
- **Closely monitor temperatures above 165^{o}F. Take action immediately to cool piles that have reached temperatures above 185^{o}F.**
- **COMPOST SHOULD NOT BE STORED WITH DRY MANURE!**
- **Flies, rodents, and other pests are seldom a problem with properly managed composter units. The solid structure of the bins, especially the concrete slab, discourages ground level pests and scavengers from raiding the bins. Most insect larvae are killed at 115 F., a temperature lower than that achieved during efficient composting. At certain times of the year, some flies may be observed on the bin walls. These may be controlled with an insecticide.**
- **Good management practices such as placing the carcasses 6 inches away from the sidewalls, monitoring the temperature to be sure that proper levels are reached, and completing the secondary stage of composting will go far in ensuring pathogen destruction throughout the mixture.**
- **The system is not designed for catastrophic losses resulting from excessive heat, collapse of buildings, loss from disease, etc.**
- **In the event of Catastrophic deaths – disease related, perform the following:**
  - **Notify State Veterinary Office.**
  - **Limit exposure to other birds.**
  - **Prevent visitation by unnecessary people.**
  - **Dead animals should be moved into an approved transport vehicle or an approved storage area or bin.**
  - **Record date of catastrophic deaths, number of deaths, method and location of disposal.**
- **In the event of catastrophic deaths – disaster related, perform the following:**
  - **Notify State Veterinary Office - Animal Emergency Response Coordinator immediately.**
  - **Notify the integrator or farm manager to remove useable animals.**
  - **Remove mortality from the barns/houses and dispose of mortality in accordance with an appropriate plan.**
  - **Record date of catastrophic deaths, number of deaths, method and location of disposal.**

Other:

Tract/Field No.:			
Landowner/Operator Name:		**Review Date:**	
Prepared By:		**Date:**	