

Two-Stage Poultry Mortality Composting – Daily Management Is Essential

Karl VanDevender
Professor -
Extension Engineer

Susan Watkins
Professor - Extension
Poultry Specialist

Jamie Burr
Live Production
EHS Manager,
Tyson Foods, Inc.

Background Information

Improper composting can lead to potential water quality concerns, increased pest populations, odor complaints, decreased biosecurity and animal husbandry concerns. Avoiding these concerns requires more than just covering mortality with litter for a while followed by land application. Successful results require proper management. This includes managing the temperature, moisture and ingredient mixture in the compost bins. The purpose of this fact sheet is to describe how a standard two-stage composter should be managed to ensure that mortality is converted into a desirable soil amendment while avoiding potential problems.

The four key ingredients for composting are nitrogen, carbon, water and oxygen. To supply these ingredients in the correct amounts requires the correct ratios of mortality, litter, additional carbon and water (Table 1).

Composting Procedures

Following the management procedures below should ensure that suitable ratios of ingredients are supplied. A key concept to keep in mind is that **it is better to add too much litter and/or extra carbon than to not have enough**. Also, if needed, poor ratio mixes can be turned, adjusted and started over. Finally, all mortality, litter and compost should be protected from the weather at all times to prevent contact with rainwater and contaminated water runoff concerns.

Loading and Managing the Primary Bin

1. **Place 1 foot of litter or cake on the bare concrete pad of a primary bin.** This layer provides a source of bacteria for the composting process. It also ensures that any liquids are absorbed, preventing seepage from the bin.

TABLE 1. Poultry Mortality Compost Ingredients and Weight Ratios

Ingredients	Weights
Mortality	1 lb
Litter or Cake – Using a higher proportion of litter or cake results in a better product.	2 to 4 lb
Additional Carbon Source – Rice hulls, wood shavings, straw, etc., can serve as a source of additional carbon or bulking agent. The amount of bulking agent needed tends to be less when cake rather than litter is used.	0 to 0.4 lb
Water – The mixture should be moist but not saturated. Ideally, the compost should feel damp but not wet.	0 to 1 lb

*Arkansas Is
Our Campus*

Visit our web site at:
<https://www.uaex.uada.edu>

2. **Add an additional 6-inch layer of rice hulls, straw or shavings.** Litter, with cake being preferred, may be used if desired and if it is not too wet.
3. **Add a single layer of birds so that none are closer than 6 inches from the sidewalls of the bin.** The single layer ensures the needed contact between the carcass and the carbon material. The 6-inch offset ensures no seeping of fluids through the bin walls.
4. **Spray or carefully pour water over the birds so they are wet but the material below them is not saturated.** The amount of water added should be adjusted based on the moisture content of the litter in the next step. This step may not be needed due to initial moisture levels in the litter and carcasses. If water is added, care should be used to not add too much which can result in water seeping from the bin.
5. **Cover the layer of birds with a 6-inch layer of litter.** The birds should be completely covered, and the 6-inch space between the birds and sidewalls filled with litter.
6. **Repeat Steps 3, 4 and 5 until the pile is not more than 4 to 5 feet high.** With most bins, this will be near the top of the bin walls.
7. **The final layer of litter should be increased from 6 inches to 10 to 12 inches.** The extra thickness of this last litter layer helps provide insulation and maintain temperatures.

During loading and after capping, bin temperatures should be monitored regularly. A long-stem compost thermometer is recommended. Temperatures should reach 130°-160°F within seven to ten days after capping. **Temperatures above 130°F should be maintained for at least five days.** Compost thermometers are available from various suppliers such as FarmTek, Gempler's and Forestry Suppliers, Inc.

If the temperature doesn't reach 130°F, then the pile should be opened and remixed to correct the ingredient ratio problem. To increase moisture, add water. To decrease moisture, add dry carbon material. Ideally, the compost mix moisture will be such that it will feel like a "damp sponge." After the moisture is adjusted and the material mixed, the bin should be reloaded making sure all carcasses are covered with at least 6 inches of litter.

Loading and Managing the Secondary Bin

After maintaining at least 130°F for more than five days, the primary bin can be moved to a secondary bin. Moving aerates the compost and starts another heating cycle to further decompose the

mortality. If possible, waiting until temperatures fall below 130°F helps ensure the bin is ready for turning. Ideally, when the compost is moved to the secondary bin, there should be no identifiable carcass parts or feathers, with the exception of a few larger bones. Larger birds and shorter time periods increase the likelihood of finding identifiable carcass parts. While turning the material into the secondary bin, water should be added as needed. Again, care should be taken not to add too much water. **After moving the compost to the secondary bin, a 6-inch layer of litter should be added to ensure any carcass parts are covered.** The temperature in the secondary bin should be monitored daily and should peak after seven days.

Thirty days after the last material is added to the secondary bin, it should be ready for reuse or land application. When being reused, it can replace up to ½ of the litter in the next mortality composting cycle. It has the advantage over raw litter because its higher composting bacterial populations enhance the composting process. Compost that is not reused should be land-applied according to a Nutrient Management Plan.

Management Check Points

- **The compost to be land-applied should only have very small identifiable bone fragments.** If whole bones are identifiable, then composting procedures need to be reviewed.
- **At no time should fluids seep from the primary or secondary bin.** If seepage occurs, dry material needs to be added to the compost. If significant, the seepage outside the bins should be absorbed with dry material, which is then properly disposed of or utilized. If the normal carbon source is used to absorb the moisture, it can be used as an ingredient in the next compost batch.
- **With proper management, composting will generate minimal odors and not attract animals such as wild birds, coyotes, skunks, cats, dogs and rodents.** This is an important point, because these animals can introduce disease organisms and pathogens onto the farm, increasing the risk of disease challenges in flocks.
- **Routine inspection, maintenance and record keeping should be practiced with composters.** Records should include the date, number and approximate size of mortality added. Ideally, after capping the primary bin, temperatures should be recorded to monitor decomposition and guide turning into the secondary bin. After turning material into the secondary bin, it should be monitored to verify that reheating occurs.

DR. KARL VANDEVENDER, P.E., is professor - Extension engineer, located in Little Rock, and **DR. SUSAN WATKINS** is professor - Extension poultry specialist, located at the University of Arkansas, Fayetteville. Both are employees of the University of Arkansas Division of Agriculture. **JAMIE BURR** is live production EHS manager for Tyson Foods, Inc., Rogers, Arkansas.

FSA1045-PD-9-11N

Pursuant to 7 CFR § 15.3, the University of Arkansas System Division of Agriculture offers all its Extension and Research programs and services (including employment) without regard to race, color, sex, national origin, religion, age, disability, marital or veteran status, genetic information, sexual preference, pregnancy or any other legally protected status, and is an equal opportunity institution.