

ANR-804

ALABAMA A & M AND AUBURN UNIVERSITIES

# Mini-Composters in Poultry Production

In 1992, Alabama ranked second in the nation in broiler production and produced approximately 900 million broilers, valued at nearly \$1 billion. The poultry industry generates nearly half of every agricultural income dollar in Alabama, and current research estimates that production will expand 20 percent within the next 3 years.

While Alabama's poultry industry produces 18 million broilers every week, it generates 800 tons of carcasses weekly, as well. Every broiler production facility must face the reality of dead birds. Disposal of dead birds could be a serious environmental problem that may limit future expansion of the industry in Alabama.

## Disposal Methods And Environmental Concerns

Producers most commonly use burial pits for the disposal of poultry carcasses. However, when residue remains in pits after years of use or in soils with high groundwater tables, reduced surface and groundwater quality is a serious potential problem. In some states, such as Arkansas, legislation has been enacted to prohibit the use of burial pits.

Incineration is biologically the safest method of disposal. However, it is slow, expensive, and generates nuisance complaints even when highly efficient incinerators are used. Incinerators also generate particulate air pollution.

Concern over possible environmental damage and newly imposed local, state, and federal water and air quality regulations make alternative disposal methods of interest to the producer. Dead-bird composting is one such alternative that the state Veterinarian's office, state and local health departments, the Alabama Department of Environmental Management, and the Soil Conservation Service (SCS) have approved.

## Poultry Carcass Composting

Testing and adoption of composting as a method for the disposal of poultry carcasses began

in Alabama in the late 1980s. Since 1989, Alabama poultry farmers have constructed more than 500 freestanding carcass composters. Poultry producers have readily accepted the composting of poultry carcasses, but operating the composter requires a tractor with loader for loading, turning, and removing the compost.

Because large broiler farms—those with more than two poultry houses—use tractors and loaders in their farming operations, they have adopted poultry carcass composting. On the other hand, small broiler farms—those with only one or two broiler houses—do not have tractors or loaders and have not adopted composting. About 50 percent of the 6,000 Alabama broiler farms fall into this last category.

## Small-Scale Composting

In other states small-scale producers have constructed mini-composters for use in the broiler house. Researchers at the University of Delaware tested simple, single-stage composters (Scarborough, et al., 1992). These small composter bins were placed within the confines of the broiler house, and carcasses, straw, caked litter, and water were added daily. In Alabama, however, most producers usually place mini-composters outside of the broiler house.

Mini-composting works well for grow outs of approximately 7 weeks. If producers are growing large birds, added capacity may be required.

## Building The Mini-Composter

The simplest design for a mini-composter consists of a wooden box to hold dead poultry and other composting materials. The portable compost box developed at Auburn University is 4 feet by 4 feet and 4 feet high with removable side panels. The box is constructed from pressure-treated lumber with 1/2-inch air spaces between side boards (figure 1).

The box can handle normal bird mortality (two to four carcasses per thousand per day). An



Figure 1. Small-scale composting boxes with fronts removed.

average 20,000-bird house requires four to five compost boxes to handle normal bird mortality. Small-scale composting cannot accommodate the carcasses from larger die-offs. Larger die-offs require other disposal methods.

While mini-composters were originally designed to be used inside the poultry house, in Alabama compost boxes are placed under a small structure separated from the poultry house (figure 2). Cost estimates for the structure and compost boxes do not exceed \$1,500 for a two-house operation.

A number of programs are available to help poultry producers reduce the cost of building composting structures. Contact the local Conservation District office, the USDA Agricultural Stabilization and Conservation Service (ASCS), or the SCS about cost-share funds for the construction of composters.

### Operating The Composter

For successful operation, the composter must be properly loaded. First, place a 6- to 8-inch layer of manure cake (litter) in the bottom of the box. Then add an appropriate amount of straw, according to the composting formula, to aid in aeration and to provide a source of carbon (see table). After these two layers, add ingredients according to the formula, beginning with a layer of carcasses, then a layer of litter. Be sure to keep the carcasses at

least 6 to 8 inches away from the sidewalls of the bin. This will eliminate fly and odor problems. The litter is readily available as caked or uncaked material from the floor of the broiler house. If the litter is dry, you may need to add water to it.

### Formula For Dead Poultry Composting.

Material	Parts By Weight
Poultry Manure (Litter)	2 to 3
Straw	1/10
Poultry Carcass	1
Water (Add sparingly.)	0 to 1/2

For the next and all subsequent layers, begin with straw; then add carcasses and manure, in that order. As the grow-out proceeds, add successive layers of material to the box. After you add the last layer, place the final cover or cap of a double layer of manure over the top. Do not add water to this final cap (figure 3).

**NOTE:** The purpose of the straw is to add air voids and allow aerobic decomposition of the mixture. Many producers who use caked material have successfully composted without straw, but the individual producer must decide whether or not to use straw. You can achieve good temperatures without straw; however, proper management of the box becomes much more important.



Figure 2. Mini-composting structure with compost boxes.

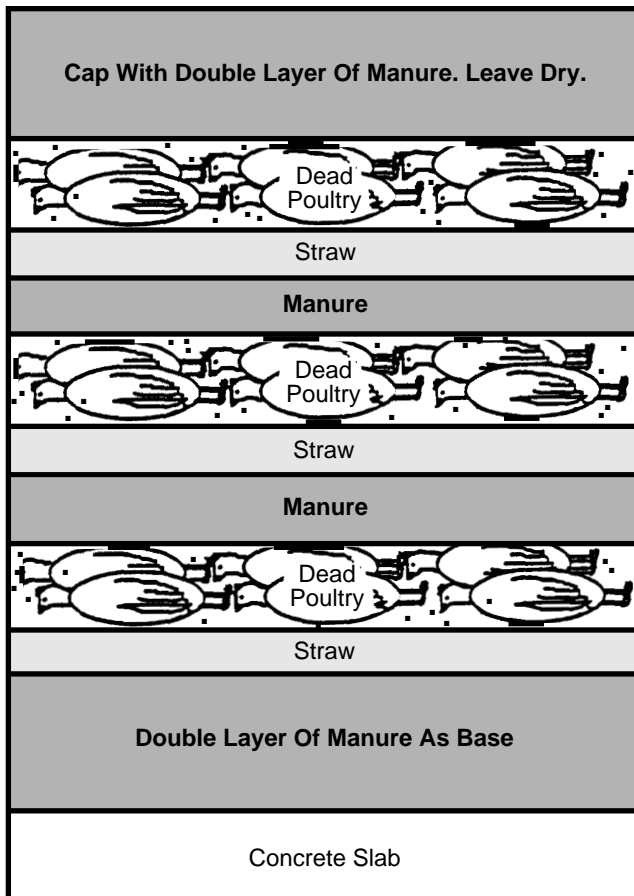


Figure 3. Layering of ingredients in composter box.

When adding additional water for composting, keep in mind the moisture content of the litter. The moisture content of poultry litter or cake may vary from 20 to 40 percent depending on the source. In small-scale composting, adding water to achieve a 50- to 60-percent moisture content is much more important than in large-composter management.

Monitor the temperature in the compost bin with a 20-inch, probe-type thermometer. After a few days, temperatures increase rapidly because of bacterial action, rising to 130° F or greater. After 7 to 10 days, the pile reaches its high reading of 130° to 150° F, which helps stabilize the compost. Once temperatures begin to decrease, you can easily move the composted material to storage.

## Land Application Of Compost

Compost is stored in a weather-protected structure until proper time for land application to meet field or forage crop needs. Nutrient content of compost will vary depending upon the amount and nutrient content of the manure, the age of the compost, and the method of storage.

The rule of thumb for nutrient content of compost is as follows:

Moisture	28.0 percent
Nitrogen	1.9 percent
P <sub>2</sub> O <sub>5</sub>	2.3 percent
K <sub>2</sub> O	1.6 percent

To be land-applied like fertilizer, compost must meet crop needs through a balanced nutrient content. Compost should be applied as close to planting as possible and should be incorporated with normal soil tillage operations.

## Conclusion

Alternative methods for the disposal of poultry carcasses are limited, and mini-composting presents itself as a desirable environmental and economic option. Applied research conducted at Auburn University in the early 1990s demonstrated that small-scale composting puts an effective

and simple composting system within the reach of virtually every poultry producer.

The mini-composter fills the need for a small, simple composter that can process complete grow-out mortality on small to medium-sized farms. The operation is simple, yet highly effective, and construction costs are reasonable. Mini-composters may also be useful in periods of light mortalities on larger operations.

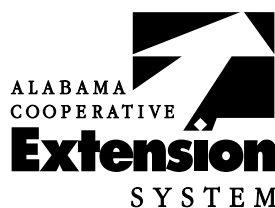
## References

Conner, D. E., J. P. Blake, J. O. Donald, and J. S. Kotrola. 1992. *Composting Poultry Carcasses: Microbiological Safety*. Proceedings: 1992 National Poultry Waste Management Symposium, pp.418-423.

Donald, J. O., and J. P. Blake. 1990. *Dead Poultry Composter Construction*. Circular ANR-604. Alabama Cooperative Extension Service, Auburn University, AL.

National Poultry Waste Management Symposium Committee, Auburn, AL.

Scarborough, J. N., D. H. Palmer, and T. H. Williams. 1992. *Composting Structures For Dead Poultry Disposal*. Circular EQ-4. University of Delaware Cooperative Extension, Newark, DE.



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