

GEORGIA  
FARM\*A\*SYST



FARM ASSESSMENT SYSTEM

## COMPOSTING POULTRY MORTALITIES

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### PRE-ASSESSMENT:

#### Why Should I Be Concerned?

Farmers are concerned with soil and water quality. With a rapidly expanding poultry industry and equally rapid urban growth, it is becoming more difficult for farmers to safely dispose of poultry *mortalities*\*.

An acceptable system for the disposal of dead birds is essential to any well run poultry operation. Current practices include incineration, burial pits, land filling, digestion/fermentation, rendering and *composting*. *Composting* of dead birds is a more recent disposal alternative that is environmentally sound. This process converts dead birds into a humus-like material that can be spread on land for crop utilization and/or soil improvement. This relatively inexpensive method of dead bird disposal is rapidly gaining acceptance in the poultry industry.

#### Assessment Objective

Unlike the other Farm \*A\*Syst assessments that focus on farmer stewardship and the environmental soundness of facilities and management practices, this assessment focuses on your *composting* facilities and procedures to ensure that the process prevents health risk or soil and water contamination. This assessment should be used in conjunction with the Broiler or Layer Production Farm \*A\*Syst assessments that address other environmental concerns pertaining to your operation.

#### How Does This Assessment Improve the Composting Facility On My Farm?

- This assessment is designed to ensure that your *composting* facilities, tools and techniques are part of a sound waste management plan.
- If you are a contract farmer, it is recommended that you involve your integrator in this farm assessment. Your company has recommendations on carcass disposal and *litter* clean-out pertinent to this process.
- Do not make any management changes based on this assessment that may affect your animals without consulting you integrator.
- You are encouraged to complete the entire document.
- The assessment should be conducted by you for your use. If needed, a professional from the Georgia Cooperative Extension or one of the other partnership organizations can provide assistance in completing the assessment.
- You are encouraged to develop an action plan.
- Farm \*A\*Syst is a voluntary program.
- No information from this assessment needs to leave your farm.

\* Words found in italics are defined in the glossary.

## ASSESSMENT:

### Assessing Your Poultry Mortality Composting Practices

For each category listed on the left, read across to the right and circle the statement that best describes conditions on your farm. If a category does not apply, for example, if you always spread litter immediately after cleaning out and thus never store litter on your farm, then simply skip the question. Once you have decided on the most appropriate answer, look above the description to find your rank (4, 3, 2 or 1) and enter that number in the “RANK” column. The entire assessment should take less than 30 minutes. A glossary is on page 14 to clarify words found in italics throughout this assessment.

POULTRY MORTALITY COMPOSTING PRACTICES					
	Low Risk (rank 4)	Low-Mod Risk (rank 3)	Mod-High Risk (rank 2)	High Risk (rank 1)	Rank
<b>PERMITTING FOR POULTRY MORTALITY COMPOSTING FACILITIES</b>					
<b>Permitting for composting facilities</b>	Producer has a permit from the state veterinarian that accurately describes composting procedures and type of facility being used.	Producer has a permit, but facilities and/or procedures have changed slightly since permit was issued.	Producer has a permit, but facilities and/or procedures have changed significantly since permit was issued.	<i>Producer does not have a composting permit from the state veterinarian.**</i>	
<b>SIZING COMPOSTER</b>					
This applies if composting is your only means of dead bird disposal. If another method is used to dispose of dead birds, this amount could vary.					
<b>Compost bin capacity</b> (See page 7 for capacity)	Capacity of both primary and secondary composters meet or exceed peak disposal requirements.	Composters can handle 75% of peak disposal requirements.	Composters can handle 50% of peak disposal requirements.	Composters cannot handle 50% of peak disposal requirements.	
<b>COMPOST FACILITY DESIGN AND CONSTRUCTION</b>					
<b>Roof and floor design</b>	Compost bins have a roof with an overhang to prevent rain from reaching compost and an impervious floor.	Compost bins have a roof without sufficient overhang to prevent rain from reaching compost and an impervious floor.	Compost bins have some covering but no impervious floor.	Compost bins are not covered and sit directly on the ground.	
<b>Fire Safety</b>	Compost facility has fire protection equipment on site and water access.	Producer has access to nearby fire protection equipment.	Producer has a water supply on site but no plans for fire protection.	Producer has no plans for fire protection, equipment or access to water.	

*\*\* These conditions are in violation of state and/or federal law.*

## POULTRY MORTALITY COMPOSTING PRACTICES

	<b>Low Risk (rank 4)</b>	<b>Low-Mod Risk (rank 3)</b>	<b>Mod-High Risk (rank 2)</b>	<b>High Risk (rank 1)</b>	<b>Rank</b>
<b>COMPOSTER OPERATION</b>					
<b>Employee training in dead bird composting methods</b>	All employees associated with composting are thoroughly trained in dead bird composting procedures.	Employees who regularly compost are thoroughly trained in dead bird composting procedures.	Employees associated with composting receive limited training on dead bird composting.	Employees associated with composting receive no training on dead bird composting.	
<b>Composting procedures</b>	Are outlined in an easy to follow recipe, available to all composters, which describes amount, order, placement and treatment of all ingredients being composted.	Recipe is used, but does not contain all needed information.	Operator has a quality recipe for compost, but recipe is seldom used.	Operator either does not have a compost recipe or never uses a recipe for composting.	
<b>Microorganisms responsible for composting are supplied by</b>	A double layer of fresh active (warm) litter or litter cake with 40-60% moisture, reactivated litter or active compost.	A double layer of dry litter or dry litter cake, or less than a double layer of active litter or litter cake.	Less than a double layer of dry litter or dry litter cake used as starter.	No starter used.	
<b>Carcass placement</b>	Carcasses are never placed closer than 6 inches from sidewalls or top of bins.	Carcasses are never placed closer than 6 inches from bin sidewalls, but are sometimes left uncapped overnight.	Carcasses are sometimes placed within 6 inches of bin sidewalls.	No attempt is made to keep carcasses away from top or sides of bin.	
<b>Filling birds</b>	Birds are covered daily with at least a double layer of litter cake or 1.5 parts by weight of litter for each volume/weight of birds. When full, bin area capped off with a double layer of litter.	Birds are covered daily with less than two volumes of <i>litter cake</i> for each volume of birds or less than 1.5 parts by weight of litter per bird weight.	Birds are covered daily with varying amounts of litter.	Birds are not covered <b>or</b> compost bin is filled to a height of 4 to 4 1/2 feet and <i>compost</i> is either left uncapped, or is capped with less than a double layer of litter.	
<b>How is the moisture content of compost determined</b>	Moisture meter.	Estimated by hand.	Estimated visually.	No attempt made to monitor or adjust moisture.	

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## POULTRY MORTALITY COMPOSTING PRACTICES

	<b>Low Risk (rank 4)</b>	<b>Low-Mod Risk (rank 3)</b>	<b>Mod-High Risk (rank 2)</b>	<b>High Risk (rank 1)</b>	<b>Rank</b>
<b>Compost temperature and measurement</b>	Probe type thermometer is used daily to measure and plot temperature 8-10 inches into the center of compost pile. Temperature rises to 130-150°F within 2-4 days after the bin is capped off.	Temperature is measured daily but takes a week or more to reach 130-150°F.	Temperature is measured, but not daily, and never reaches 140°F.	Temperature is not measured or never reaches 130°F or sometimes exceeds 160°F.	
<b>When compost is turned</b>	Compost in the first bin has undergone at least 7-10 days of composting after being capped off, and the temperature has peaked (130-150°F) and begun to fall.	Temperature in the first bin has peaked and begun to fall, but compost is turned less than 7 days after compost was capped off.	Temperature in the first bin has not peaked and begun to fall.	Producer either has only one primary bin, and therefore has no way to dispose of birds once this bin is capped off, or producer does not measure temperature.	
<b>Compost stack height</b>	Compost (primary or secondary) never stacked higher than 5 feet.	_____	_____	Height of either primary or secondary compost sometimes exceeds 5 feet.	
<b>Aerating compost</b>	In a timely manner, compost is cascaded using loader bucket or otherwise reaerated while being loaded into secondary bin.	Compost is moved to secondary bins, in a timely manner, but no attempt is made to reaerate compost.	Compost is moved, and reaerated, but only after odors and fly breeding are obvious.	Compost is never moved from primary to secondary bin(s).	
<b>Presence of flies, vermin or foul odors associated with composting activities</b>	Never.	Occasionally.	Usually.	Always.	

## COMPOST USE/LAND APPLICATION

<b>Soil testing of compost application site</b>	Yearly.	Every 2 years.	Every 3-5 years.	Less frequently than every 5 years.	
<b>Phosphorus level of soil compost application site</b>	Low.	Medium.	High.	Very High.	

## POULTRY MORTALITY COMPOSTING PRACTICES

	<b>Low Risk (rank 4)</b>	<b>Low-Mod Risk (rank 3)</b>	<b>Mod-High Risk (rank 2)</b>	<b>High Risk (rank 1)</b>	<b>Rank</b>
<b>Application Rates</b>	Compost applied to fields at rates that meet crop nutrient requirements based on a nutrient management plan (NMP). Litter and soils are tested.	Compost applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in the application areas are tested.	Compost applied to cropped fields at rates that do not exceed 2.5 tons/acre/application, and do not exceed 5 tons/acre/year. Soils in the application areas are not tested.	Manure and compost are applied to cropped lands at rates that exceed 2.5 tons/acre/application, or exceed 5 tons/acre/year; or these materials are applied to uncropped lands at any rate.	
<b>Application timing</b>	According to accurate nutrient accounting or NMP. Never apply in wet conditions.	Based on when crop is at growth stage that usually needs fertilizing. Avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses and compost is available. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses and compost is available. Often applied when soil is wet.	
<b>Application areas</b>	All areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings, or sinkholes and have slopes of 15% or less. Or all areas are approved by a NMP.	Most areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwellings, or sinkholes and have slopes of 15% or less. Or most areas are approved by a NMP.	Several areas are less than 25 feet from rock outcrops, or less than 100 feet from surface water sources, wells, dwellings, or sinkholes, or have slopes greater than 15%.	Manure nearly always spread over areas that are less than 25 feet from rock outcrops, or less than 100 feet from surface water sources, wells, dwellings, or sinkholes, or that have slopes greater than 15%.	
<b>Record keeping</b>	Complete records kept on farm applications and nutrients leaving farm through sales or giving away.	Partial records kept on farm applications and nutrients leaving farm through sales or giving away.	Partial records kept on farm applications but no records on nutrients leaving the farm.	No records kept.	
<b>Calibration</b>	Nutrient application equipment calibrated to proper application rate before each application. Uniform application over the area is assured.	Nutrient equipment calibrated annually. No effort to assure uniform nutrient application over the area.	Use custom nutrient hauler and applicator that does not calibrate equipment, or calibrates equipment less than once a year.	Never calibrate nutrient application equipment or ask custom applicator about calibration procedure.	

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**Number of Areas Ranked \_\_\_\_\_**

(Number of questions answered, if all answered, should total 22 questions.)

**Ranking Total \_\_\_\_\_**

(Sum of all numbers in the "RANK" Column)

## ASSESSMENT EVALUATION:

### What Do I Do with These Rankings?

#### STEP 1: Identify Areas That Have Been Determined to be at Risk

Low risk practices (4s) are ideal and should be your goal. Low to moderate risk practices (3s) provide reasonable protection. Moderate to high risk practices (2s) provide inadequate protection in many circumstances. High risk practices (1s) are inadequate and pose a high risk for causing environmental, health, economic, or regulatory problems.

**High risk practices, rankings of “1” require immediate attention.** Some may only require little effort to correct, while others could be major time commitments or costly to modify. These may require planning or prioritizing before you take action. List all activities identified as “high risk” or “1s” in the recommended action plan. Rankings of “2s” should be examined in greater detail to determine the exact level of risk and attention given accordingly.

#### STEP 2: Determine Your Composting Risk Ranking

The Composting Risk Ranking evaluates your composting practices for safe environmentally sound disposal of dead birds. It ranks a producer’s composting facilities, tools and techniques and identifies areas that may be a risk to a sound water management plan.

Use the ranking total and the total number of areas ranked on page 5 for your *Composting* Risk Ranking.

<b>RANKING TOTAL</b>	<b>÷</b>	<b>TOTAL NUMBER OF AREAS RANKED</b>	<b>=</b>	<b>COMPOSTING RISK RANKING</b>
_____	÷	_____	=	_____

#### COMPOSTING RISK RANKING .....LEVEL OF RISK

3.6 to 4 .....Low Risk

2.6 to 3.5 .....Low to Moderate Risk

1.6 to 2.5 .....Moderate Risk

1.0 to 1.5 .....High Risk

This ranking gives you an idea of how your *compost* practices might be affecting disease transmission, fire hazards and threats to water resources, as well as the soundness of your waste management plan. This ranking should serve only as a very general guide, and not as a precise diagnosis since it represents the average of many individual rankings.

#### STEP 3: Read the Composting Facts Portion of this Assessment

While reading, think about how you could modify your practices to address some of your moderate and high risk areas. If you have any questions that are not addressed in the composting facts section of this assessment, consult the references in the back of this publication or contact your county extension agent for some information. **This assessment should be used in conjunction with the Broiler or Layer Production Farm \*A\*Syst Assessment.**



## COMPOSTING FACTS:

*Composting* is a natural, biological process by which organic material is broken down and *decomposed* because of the bacteria and fungi that digest the organic material and reduce it to a stable humus. The principles of *composting* are quite simple: just provide the microorganisms with an environment conducive to their growth—a balanced diet, water and oxygen.

**In order for composting to be successful as a method of dead bird disposal, the following must take place:**

- All birds must be decomposed beyond recognition.
- Risk from disease transmission must be eliminated.
- Fire hazards must be minimized.
- Any threats to water resources must be prevented.
- Flies must not present a nuisance.

### Permitting for Poultry Mortality Composting Facilities

All methods for the disposal of dead animal carcasses require permits from the Georgia Department of Agriculture (GDA). Growers must submit a written request to the state veterinarian at the following address:

**Georgia Department of Agriculture  
Animal Industry**  
19 M.L King Jr. Drive  
Room 106  
Atlanta, GA 30334  
404-656-3671

The letter requesting the permit should state the name that the producer wants to appear on the certificate of compliance and describe the *composting* procedures and the type of facility to be used. It must also include the producer's pit number, if he or she has one. If this is a new farm, this should be stated at the time of request.

If the producer plans to have a *composting* facility inside the poultry house, approval from the poultry contracting company is required. A form is

available from the Georgia Poultry Federation.

Interested growers should first contact their local Natural Resources Conservation Service (NRCS) to obtain information on *composting* and *compost* facilities.

*Composting* procedures (or recipes) developed by the Cooperative Extension Service (CES), NRCS, Farm Service Agency (FSA), or the Resource Conservation Development Council (RC&D) must be used.

## COMPOSTER CAPACITY

In order to meet peak disposal requirements, *compost* facilities must be properly sized.

### Primary Bin Capacity:

The total minimum volume of the primary bins of composters can be calculated from the expression below:

$$V = B \times (M/T) \times W_B \times 2.5$$

- **V** is the total minimum volume in the primary bin in cubic feet
- **B** is the total number of birds on the farm
- **T** is the days of flock life
- **W<sub>B</sub>** is the average market weight of the birds in pounds
- **M** is the percent *mortality* expressed as a decimal (example 5% = 0.05)
- The factor of 2.5 in this equation represents 2.5 cubic feet of composter volume required per pound of dead birds.

### Secondary Bin Capacity:

The total volume of the secondary bins should be the same as the primary composter capacity.

## COMPOST FACILITY DESIGN AND CONSTRUCTION

### Roof Design

Some materials are composted outside. However, a roof ensures all-weather operation and helps control rain, snow, runoff, and percolations which can be major concerns. In order to prevent

excessive moisture in *compost*, the roof over *compost* bins must extend sufficiently to protect the *compost* from blowing rains.

## Floor

An *impervious* (waterproof) floor with a weight bearing foundation (able to withstand the weight and force exerted by farm machinery used in operating the *compost* facility) is recommended to ensure all-weather operation and to secure the composter against rodents, dogs and other nuisances. An *impervious* floor also will help dispel questions about contamination of the groundwater and other surrounding areas. A concrete apron, sloped away from the primary bins is recommended. This provides an all-weather surface for equipment and operation.

## Fire Safety

Temperatures of 140-150°F are often reached in composters within a few days after a bin is capped off with *litter*. Excessive height and compacting increase the chance that the temperature in the composter will exceed 160°F. Temperatures this high are conducive to spontaneous combustion.

One *stacking house* in Georgia and at least one other in Virginia burned from spontaneous combustion. Temperatures should be monitored daily and fire extinguishers and water should be readily available to guard against this hazard. If smoldering begins to occur, *compost* should be removed immediately.

## COMPOSTER MANAGEMENT AND OPERATION

The requirements for proper and complete *decomposition* of dead carcasses are reasonably simple, but proper management is essential. *Decomposition* of the dead carcasses and *litter* depends upon microbial activity. The greater the microbial growth, the faster the carcasses decompose. Anything that slows down microbial growth lowers the temperature of the *composting* material and slows the *composting* process. The more rapid the microbial growth, the greater the heat output and tempera-

tures of the *composting* mass and the more rapidly the mass breaks down.

## Employee Training

All farm workers involved with *composting* poultry mortalities should be trained in *composting* procedures. Workers lacking training should not be involved in *composting* dead birds.

## Recipe for Ingredients That Go Into Compost

The essential elements for the microorganisms involved in *composting* are carbon (C), nitrogen (N), oxygen (O<sub>2</sub>), and moisture (H<sub>2</sub>O). If any of these elements are lacking, or if they are not provided in the proper proportion to one another, the microorganisms will not flourish and will not provide adequate heat.

**Table 1. Original Recipe for Composting Poultry Mortalities**

Material	Parts by Weight (lbs)
Dead Birds	1
Chicken <i>Litter</i>	1.5
Straw (wheat preferred)	0.1
Water	0 - 0.5

**Table 2. Litter Cake Recipe for Composting Poultry Mortalities**

Material	Parts by Volume
Dead Birds	1
Litter Cake	2.0 - 3.0
Water	0 - 0.5

## Procedures for Composting Poultry Mortalities

- Start by placing a double layer (usually 8-12 inches) of active *litter* or litter cake, with 40-60 percent moisture on the composter floor.



- This *litter* will supply bacteria and heat to start the process. This layer will also help in absorbing moisture if excess water is added to the composter. (The base layer should not be placed more than a few days prior to use for *composting* birds or it will cool as bacterial numbers reduce when moisture or oxygen becomes limited.)
- Unless *litter cake* is used which is bulky with much air-holding ability, a thin layer of peanut hulls, coarse shavings or straw is added next.
- A layer of dead bird carcasses is then added. The carcasses should be arranged in a single layer side by side, touching each other. Carcasses should be placed no closer than 6 inches from the walls of the composter. Carcasses placed too near the walls will not *compost* as rapidly, since the temperature is cooler near the walls.
- A layer of *litter cake* (40 to 60 percent moisture content) twice as thick as the layer of carcasses underneath or *litter* (1.5 parts by weight) is added next. This layer should be twice as thick as the layer of carcasses underneath.
- If only a partial layer is needed for a day's *mortality*, the portion should be covered with *litter*. The rest of that layer can be used with subsequent *mortality*.
- A small amount of water may be needed after each layer. If much water is required, the *litter* is too dry and probably low in live bacteria.
- After completing the initial layer, subsequent layers of either *litter cake* and carcasses or *litter*, bulking ingredients and carcasses follow. Keep adding layers until *compost* height approaches 4 to 4 1/2 feet. **Do not exceed 5 feet.**
- Cap off with a double layer of *litter*, so that the height of *compost* in the bin does not exceed 5 feet. Excessive height increases the chance that the composter temperature will exceed 160°F which increases the risk of spontaneous combustion.

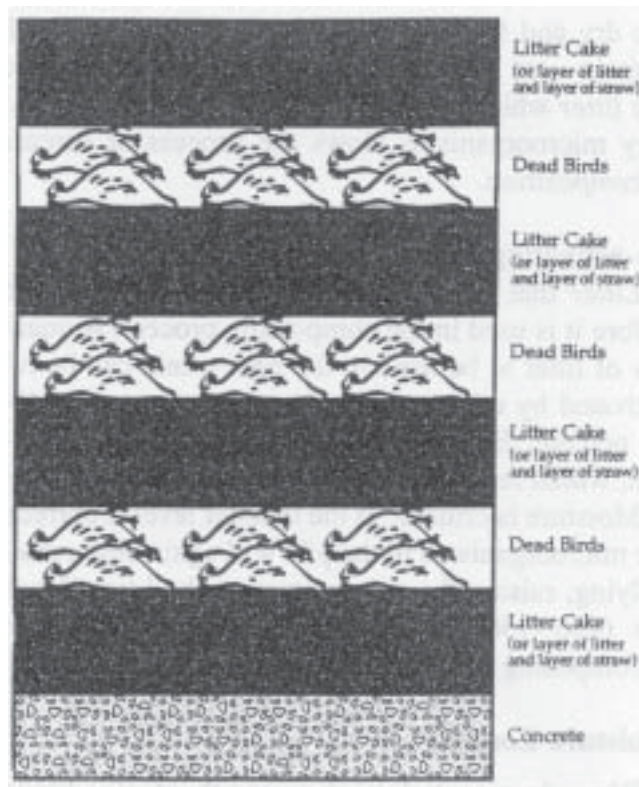


Figure 1. Composter Bin

Table 3. C:N Ratio

Ingredient	C:N Ratio
Birds	5:1
Litter	7:1 to 25:1
Straw	80:1
Peanut hulls	50:1
Shavings	300-700:1

If 2 parts by volume of *litter*, 1 volume of dead birds, and adequate bulking agent is either contained in the *litter*, or added prior to the carcasses, the C:N ratio should be adequate. If moisture and aeration are adequate, materials with lower C:N ratios usually *compost* at higher temperatures.

## Microorganisms

### Starter:

The microorganisms responsible for *composting* are initially supplied by active *litter* or *litter cake*. The microbes in the *litter* used in the *composting* process need to be kept alive and in sufficient numbers so that *composting* can begin

immediately to break down the carcasses and the *litter*. *Litter* that is too dry and too long removed from the house will contain very low numbers of microorganisms. Old dry *litter* which contains low numbers of the necessary microorganisms slows the process of carcass *decomposition*.

### **Re-activating Litter:**

*Litter* that is too dry or old should be activated before it is used in the *composting* process. A quantity of *litter* to be used in the next week can be reactivated by raising the moisture content up to 40-60 percent. Excessive moisture displaces the oxygen, which reduces the heating and causes seepage.

Moisture is critical. If the moisture level is correct, the microorganisms in the pile will again begin multiplying, raising the temperature of the *litter*. When hot (130-150°F), the *litter* is ready for use in decomposing carcasses.

### **Moisture Content:**

Water is essential to the growth of any living organism. *Composting* microorganisms thrive in moist but not soggy conditions. Desirable moisture content in the *composting* materials is between 40 and 60 percent. Excessive moisture displaces the oxygen, which reduces the heating and causes seepage. Too little will prevent microorganisms from reproducing to adequately high numbers.

*Compost* moisture can be accurately measured with a moisture meter. However, moisture content can be estimated by hand. The moisture content of *litter* used for starter or *compost* is about right, if when it is squeezed with the hand, it breaks into to three large pieces when the hand is opened. If water can be squeezed from the material, the moisture content is too high.

### **Temperature**

*Composting* begins as soon as the loading begins. Depending on the size of the primary cell and the number and size of carcasses, the loading time will vary. With active *litter*, a week's loading time may allow the lower levels to rise to 150°F by the time the cell is capped. A probe type thermom-

eter is used daily to measure and plot temperatures 8-10 inches into the center of the *compost* pile.

### **Destroying Pathogens:**

While three consecutive days at 130°F or more in the composter is adequate to destroy pathogens harmful to man and poultry, *composting* in the primary bin normally occurs over a 10 to 21 day period.

### **Monitoring Temperatures:**

Measure and record temperatures in each bin daily to ensure that dead birds have been pasteurized, to minimize the risk of spontaneous combustion and to determine when to turn the *compost*.

When oxygen becomes limited, the temperature of the *compost* begins falling. By the time it drops to 130°F (About 7-21 days after capping), the *compost* can be moved to a secondary cell. At a temperature of 150°F, the birds decompose about twice as fast as at 130°F. If the temperature of the *compost* reaches only 130°F, birds nearer the walls where it is cooler will decompose very slowly.

### **Bulking Agents:**

The *composting* product can be sustained at higher temperatures by using a bulking agent which makes the *compost* pile more porous and thus supplies more oxygen to the *composting* process. A coarse material, such as wood shavings, straw or peanut hulls will ensure more oxygen, allowing higher *composting* temperatures. Also, adding more *litter* or litter cake increases heating. If litter cake is used, little or no bulking agents are needed.

### **Compaction and Stack Height:**

Do not compact *litter* in deep layers and do not stack your *compost* higher than 5 feet. Temperatures of 140-150°F are often reached in composters within a few days after a bin is capped off with *litter*. Excessive height and compaction will increase the chance that the temperature in the composter will exceed 160°F. Temperatures this high are conducive to spontaneous combustion.

## Aeration and Moving Compost to Second Cell

The purpose of moving the product is to re-mix and aerate it so that a faster, more complete breakdown of the *compost* occurs. Allow material to “cascade” from the loader bucket to provide good turning and re-aeration as it is deposited in the secondary treatment area. The movement to a second cell will probably be necessary to get adequate *decomposition* if the birds exceed 4-5 pounds or if material is removed from below and added above (see package composters on next page).

The product temperature should again rise to 150°F within days. Delayed movement, poor aeration, poor mixing or moisture above 60 percent or below 40 percent will cause the mass not to heat properly.

Once the temperatures (determined by daily monitoring) drops from 150°F to 130°F (7-21 days), the product is ready to be used as a fertilizer.

## Flies and Odor

Flies and odor are not a problem where composters are operating properly. The heat destroys the habitat for flies and since the process is *aerobic* (in the presence of oxygen) very little odor is produced. Improved management is usually the best solution to odor and fly problems.

## Composter Types and Layouts

Composters presently used for dead birds consist of four types.

- **Package Composters (Figure 2):** These composters are commercially available. The composted by-products fall to the bottom of the composter down to the concrete slab where they are then shoveled by hand back to the top to compost new dead birds. A 5 gallon bucket of new *litter* material is normally added to each composter each week. A few operators will add a small amount of bulking agent such as peanut hulls or cotton seed to trap oxygen and promote heating.



Figure 2. Package Composter

- **Delmarva (small bin) (Figure 3):** The front wall of the bins consists of 2-inch thick boards which are mobile to help with filling and removing the material to be composted. The material in the composters is moved with some type of end loader or skid steer loader. Therefore, the width of the small bin composter must allow the loader bucket to get into the bin. Normally these small bin composters are 8-10 feet wide by 5 feet high and 5 feet deep. The depth is limited to 5 feet due to the reach required to drop the composted material into the secondary bin which is immediately behind the primary or small bin. Moving the material from the primary bin to the secondary bin after 10 to 21 days is common for Delmarva type composters to mix in oxygen in the mass to promote heating. The oxygen is added as the mixture is dropped or moved from the primary bin to the secondary bin.

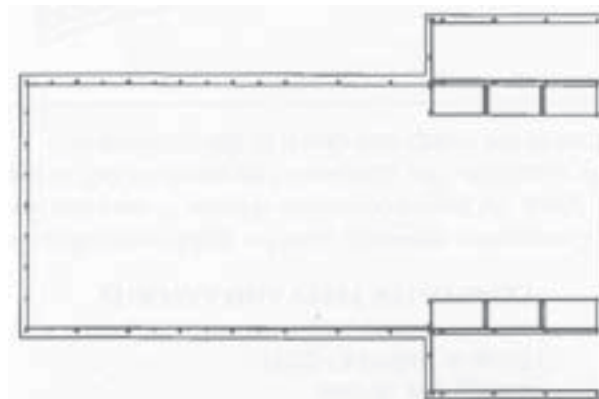
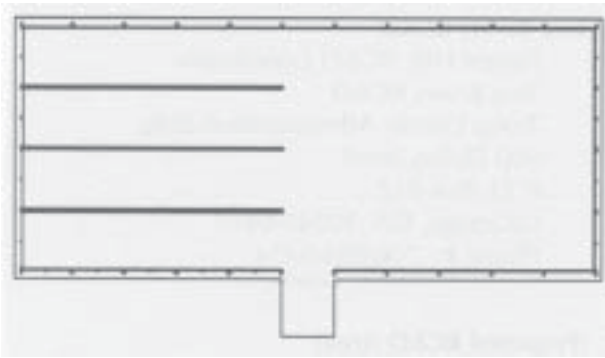


Figure 3. Small Bin Composter - Plan View

- **Big Bin (adaptation of the Delmarva) (Figure 4):** The big bin uses a primary bin which



does not have a removable front. In fact, the front is totally open and the *compost* material slopes back slightly with the front face of the composted material standing at an angle of about 70-75 degrees. The front face of the pile must slope back slightly because the material will not stand on a vertical angle since no front wall is present for support. Many larger growers prefer the big bin composters. The big bin type composter is normally 10-12 feet wide and 20-50 feet or more in length. The primary and secondary bin are usually side by side or parallel to each other and built like a bunker silo. The big bin composter, like the small bin type, is filled to a height of 5 feet.



**Figure 4. Big Bin Composter - Plan View**

- **Minicomposter (Figure 5):** The minicomposter is a type of composter which can be used inside the broiler house for the disposal of birds up to about 5 to 6 pounds. These may be as simple as four pallets tied together at the corners and lined with wire mesh to make a cubicle.



**Figure 5. Minicomposter**

## LAND APPLICATION

Poultry *mortality compost* is a nutrient-rich material. This material can benefit the farm if it is adequately protected and correctly land-applied. However, storage and application of this nutrient rich material can be a threat to farm water sources if not done properly.

Stored *compost* should be sampled and tested to determine its nitrogen, phosphorus and potassium content. These nutrient values, combined with the amount of *litter* or residue applied per acre, allow for determination of whether more commercial fertilizer should be added to meet realistic crop production goals.

A *nutrient management plan* (NMP) assists you in effectively using poultry *mortality compost* in an environmentally safe manner. Any situation where *compost* or animal waste is not effectively managed gives rise to potential pollution. Nitrogen in poultry *mortality compost* can be converted into the nitrate which can cause “methemoglobinemia” (blue baby syndrome) in infant humans and livestock. The phosphorus contained in *compost* can cause algal blooms and increase the rate of *eutrophication* in surface waters.

A sound *nutrient management plan* begins with the type and number of animals in the farm operation and includes every aspect of waste handling. It includes how the waste will be gathered and stored including how large the storage facilities need to be. It also specifies areas to be used for manure applications, crops to be grown, the area of land needed to utilize available *nutrients* and the method of timing of application.

For more information and assistance in developing your *nutrient management plan*, contact your local county Extension office, local Natural Resources Conservation Service or agricultural consultant.

The *nutrient management plan* (NMP) should identify the locations, acreage and types of crops or pasture to which any wastes are to be applied. An owner may have plenty of land for application of animal wastes, but some of it may be located a great distance from the poultry houses. The practice of spreading dead animal *compost* only on the nearest fields can result in excessive nutrient

loading rates to the soil and possibly cause water quality problems.

## Dead Bird Compost Application

Application rates, calibration and timing, and record keeping should be handled like manure. The Georgia Cooperative Extension Service, NRCS county offices and Georgia Department of Agriculture (GDA) can provide information on *composting* as well as other disposal methods. *Compost* should go through at least two decomposing cycles (primary and secondary treatment) before being land applied.

## Soil Testing of Application Sites

*Compost* can be sampled and tested to determine the nitrogen, phosphorus and potassium content. These nutrient values combined with values for manures, crop residues and starter fertilizer help determine whether more commercial fertilizer should be added for desired crop production.

All land applications of poultry *mortality compost* should be based on soil test, *compost* analysis, and realistic crop yield goals.

## Record Keeping

Keep records of the dates, quantity and specific application sites. If you sell the *litter*, keep a record of buyers, dates, amounts and the farm sites where buyers apply or use the *litter*. These records can assist you with management and protect you from liability.

## Application Rates

The best application rate depends on the crop being produced, the soil's nutrient content and the nutrient content of the applied material. Soil testing and *litter* nutrient analyses are recommended procedures for best determining *litter* application amounts. Application equipment should be calibrated for accurate and even distribution.

Poultry *compost* should be evenly distributed over application sites at a rate determined and listed in your *nutrient management plan*.

Vehicles must be covered or tarped for transporting poultry *compost* on state or federally main-

tained roads or any public road.

Your county extension office can provide more information on soil testing, *litter* analyses, equipment calibration, record keeping and other areas related to poultry *compost* land application.

## Application Timing

Surface land application of poultry manure and *compost* residue should not be undertaken when soil is saturated, during rainy weather or when rain is in the immediate forecast.

## Application Areas

Consider unique features of the farm and make your management plan specific for these features. Do not apply poultry *compost* to the surface and subsurface within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies, and dwellings. Grass, vegetation and/or forest buffer strips along stream, pond or lake banks are helpful in preventing nutrient runoff from adjacent fields and pastures.

Do not apply *nutrients* on slopes with a grade more than 15 percent or in any manner that will allow *nutrients* to enter the waters of the state.

## Calibrating

Calibration of waste application equipment, such as irrigation systems, tank wagons and manure spreaders is needed to ensure safe and efficient distribution of waste materials. Equipment should be calibrated and rechecked at least once during the application period since the consistency of the *composts* can vary greatly. For more information about calibration of waste-spreading equipment, contact your county Extension office.

## **GLOSSARY:**

**Aerobic:** In the presence of oxygen or air

**Cake Litter:** Clumps or larger pieces of poultry manure and bedding that are removed from the litter surface using a de-caking machine. Cake usually results from the presence of excessive moisture.

**Compost:** Organic residues that have been collected and allowed to decompose.

**Composting:** A controlled process of decomposing organic matter by microorganisms.

**Cost Sharing:** A program in which Consolidated Farm Service Agency (formerly the Agricultural Stabilization and Conservation Service) pays a percentage of the costs of a project, facility or effort.

**Decomposition:** The breakdown of organic materials.

**Eutrophication:** The process by which increasing *nutrients* in a water body promotes plant over animal life, often creating conditions with very low oxygen in the water.

**Impervious:** Incapable of being penetrated by water or other liquids.

**Leaching:** The removal of soluble substances from soils or other material by water.

**Litter:** A mixture of poultry manure and bedding material.

**Mortality:** Birds that died during production.

**Nutrients:** Elements necessary for plant growth, such as **nitrogen (N)**, **phosphorus (P)**, and **potassium (K)**.

**Nutrient Management Plan:** A specific plan designed to manage animal manures and mortalities so that the most benefit is obtained and the environment is protected.

**Stack House (Shed):** A structure designed and built for the storage of poultry manure or *compost*.



## ***ACTION PLAN:***

An action plan is a tool that allows you to take the needed steps to modify the areas of concern as identified by your assessment. The outline provided below is a basic guide for developing an action plan. Feel free to expand your plan if you feel the need for detail or additional areas not included. Consult the list of references on the next page if additional assistance is needed to develop a detailed action plan.

Area of Concern	Risk Ranking	Planned Action to Address Concern	Time Frame	Estimated Cost

## REFERENCES:

CONTACTS AND REFERENCES			
Organization	Responsibilities	Address	Phone Number
Poultry Science Department	Information of poultry production practices.	University of Georgia Poultry Science Building Athens, GA 30602	706-542-1827  <a href="http://department.caes.uga.edu/poultry">http://department.caes.uga.edu/poultry</a>
Georgia Poultry Federation	General information on Georgia's poultry industry.	P.O. Box 763 Gainesville, GA 30503	770-532-0473
Georgia Poultry Improvement Association, Inc.	General information on Georgia's poultry industry.	P.O. Box 20 4457 Oakwood Road Oakwood, GA 30566	770-535-5996  <a href="http://www.gapoultrylab.org">www.gapoultrylab.org</a>
US Poultry & Egg Association	General information on the poultry industry.	1530 Cooledge Road Tucker, GA 30084	770-493-9401  <a href="http://www.poultryegg.org">www.poultryegg.org</a>
Poultry Water Quality Consortium	Environmental concerns related to poultry production.	6100 Building Suite 4300 5720 Uptain Road Chattanooga, TN 37411	423-855-6470  <a href="http://www.poultryegg.org/PWQC">www.poultryegg.org/PWQC</a>
Georgia Department of Agriculture General Field Forces	Questions regarding composting dead birds.	Georgia Department of Agriculture, Capitol Square 19 MLK Jr., Drive, Suite 134 Atlanta, GA 30334	404-656-3665  <a href="http://www.ag.state.ga.us">www.ag.state.ga.us</a> Click "animal industry" and then "livestock/poultry"
Farm Service Agency	Agricultural conservation programs.	(See local directory)	<a href="http://www.fsa.usda.gov">www.fsa.usda.gov</a>
Agricultural Pollution Prevention Program	Opportunities for pollution prevention in poultry operations.	BAE Department Driftmier Engineering Center Athens, GA 30602	706-542-2154 1-800-685-2443 404-651-5120  <a href="http://www.agp2.org">www.agp2.org</a>
Cooperative Extension Service, County Extension Offices	Information on nutrient management	(See local directory)	<a href="http://www.ces.uga.edu">www.ces.uga.edu</a>
Natural Resources Conservation Service	Information on the construction of composting facilities.	(See local directory)	<a href="http://www.nrcs.usda.gov">www.nrcs.usda.gov</a>

## ***PUBLICATIONS:***

**State Soil and Water Conservation Commission**  
**P.O. Box 8024**  
**Athens, GA 30603**  
**(706) 542-3065**  
**[www.gaswcc.org](http://www.gaswcc.org)**

- Agricultural Best Management Practices for Protecting Water in Georgia

**University of Georgia, Cooperative Extension**  
**Athens, GA 30602**  
**(706) 542-8999**  
**<http://caes.uga.edu/publications>**

- Georgia's Ground Water Resources, Bulletin 1096
- Well Head Protection for Farm Wells, Circular 819-13
- Calibration of Manure Spreaders, Circular 825
- Land Application of Livestock and Poultry Manure, C 826
- Composting Poultry Moralities, Circular 819-15
- Poultry Composting Facilities, Circular 828
- Georgia Farm\*A\*Syst: Improving Drinking Water Well Condition, Bulletin 1152-03

**Poultry Water Quality Consortium**  
**6100 Building**  
**5720 Uptain Road**  
**Chattanooga, TN 37411-5681**  
**(423) 855-6470**  
**[www.poultryegg.org/PWQC](http://www.poultryegg.org/PWQC)**

- Poultry Water Quality Handbook

## ***NOTES:***

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*The Georgia Farm Assessment System is a cooperative project  
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the State Soil and Water Conservation Commission and the  
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