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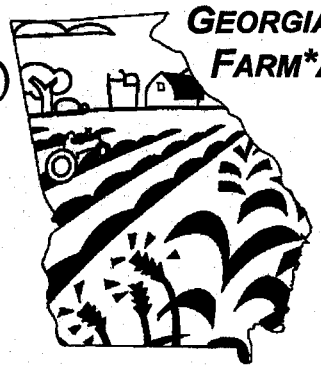

FARM ASSESSMENT SYSTEM

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 your 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 Service 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, skip the question. Once you have decided on the most appropriate answer, look above that description to find your rank number (4,3,2 or 1) and enter that number under the "RANK" column. The entire assessment should take less than 30 minutes. A glossary is on page 15 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**
PERMITTING FOR POULTRY MORTALITY COMPOSTING FACILITIES					
Permitting for composting facilities	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.	Producer does not have a *composting* permit from the state veterinarian.	
SIZING COMPOSTER					
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.					
Compost bin capacity ***(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.	
COMPOST FACILITY DESIGN AND CONSTRUCTION					
Roof and floor design	*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 do not have an *impervious* floor.	*Compost* bins are not covered and sit directly on the ground.	
Fire Safety	*Compost* facility has fire protection equipment on site and water access to water.	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.	

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
COMPOSTER OPERATION					
Employee training in dead bird composting methods	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* re-ceive limited training on dead bird *composting.*	Employees associated with *composting* re-ceive no training on dead bird *composting.*	
Composting procedures	Are outlined in an easy-to-follow recipe, available to all composters, which de-scribes 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.*	
Microorganisms responsible for composting are supplied by	A double layer of fresh active (warm) *litter/litter cake* with 40-60% moisture, reactivated litter or active compost.	A double layer of dry *litter*/dry *litter cake*, or less than a double layer of active *litter/litter cake.*	Less than a double layer of dry *litter* or dry *litter cake* used as starter.	No starter used.	
Carcass placement	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 side walls.	No attempt is made to keep carcasses away from top or sides of bins.	
Filling birds	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, bins area capped off with a double layer of litter.	Birds are sometimes left uncovered overnight.	Less than two volumes of *litter cake* are added for each volume of birds or less than 1.5 parts by weight of litter per bird weight.	When compost bin is filled to a height of 4 to 4 1/2 feet, *compost* is either left uncapped, or is capped with less than a double layer of *litter.*	
How is the moisture content of compost determined?	Moisture meter.	Estimated by hand.	Estimated visually.	No attempt made to monitor or adjust moisture.	

POULTRY MORTALITY COMPOSTING PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
Compost temperature and measurement	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.	
When compost is turned	*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.	
Compost stack height	Compost (primary or secondary) never stacked higher than 5 feet.			Height of either primary or secondary *compost* sometimes exceeds 5 feet.	
Aerating compost	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).	
Presence of flies, vermin or foul odors associated with composting activities	Never	Occasionally	Usually	Always	
COMPOST DISPOSAL/LAND APPLICATION					
Soil testing of compost application site	Yearly	Every 2 years.	Every 3-5 years.	Less frequently than every 5 years.	
Phosphorus level of soil compost application site	Low	Medium	High	Very High	

POULTRY MORTALITY COMPOSTING PRACTICES

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
Application rates	*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 application areas 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.	*Compost* applied to cropped lands at rates that exceed 2.5 tons/acre/application, or exceed 5 tons/acre/year or materials applied to uncropped lands at any rate.	
Application timing	According to accurate *nutrient* accounting or NMP, Never applied in wet conditions.	Based on when crop is at growth stage that usually needs fertilizing. Try to avoid applying in wet conditions.	Based on convenience. When manure cleaned out of houses, and *compost* are available. Try to avoid applying in wet conditions.	Based on convenience. When *litter* cleaned out of houses and *compost* are available. Often applied when soil is wet.	
Application areas	All areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwell-ings or sinkholes and have slopes of 15% or less. Or all areas are approved by an NMP.	Most areas are more than 25 feet from rock outcrops, 100 feet from surface water sources, wells, dwell-ings or sinkholes and have slopes of 15% or less. Or most areas are approved by an NMP.	*Litter* is occasionally 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 have slopes greater than 15%.	*Litter* is routinely 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%.	
Record keeping	Complete records kept on farm applications and *nutrients* leaving farm through sales or giveaways.	Partial records kept on farm applications and *nutrients* leaving farm through sales or giveaways.	Partial records kept on farm applications but no records on *nutrients* leaving farm.	No records kept.	
Calibration	*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.	

Number of Areas Ranked _____
(Number of questions answered. There are a total of 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 Determined to Be at Risk

Low risk practices (4s) are the best composting practices and should be your goal. Low to moderate risk practices (3s) provide reasonable management practices. Moderate to high risk practices (2s) often provide inadequate protection in a specific area. High risk practices (1s) are inadequate and are the least desired composting practices. High risk may indicate potential risk in disease transmission, fire hazards and/or threats to water resources.

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 needed or "level of risk" and give attention 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 waste management plan.

Use the rankings total and the total number of areas ranked on page 6 for your *Composting* Risk Ranking.

RANKINGS TOTAL	÷	TOTAL NUMBER OF AREAS RANKED	=	COMPOSTING RISK RANKING
_____	÷	_____	=	_____

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 more 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.

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_B 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, this is not recommended for dead bird composters. A roof ensures all-weather operation and helps control rain, snow, runoff and percolation 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 compaction 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 temperature 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_2) and moisture (H_2O). 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 *Litter*	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 to 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 com-

poster. (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 ingredient and carcasses follow. Keep adding layers until compost height approaches 4 to 4½ 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.

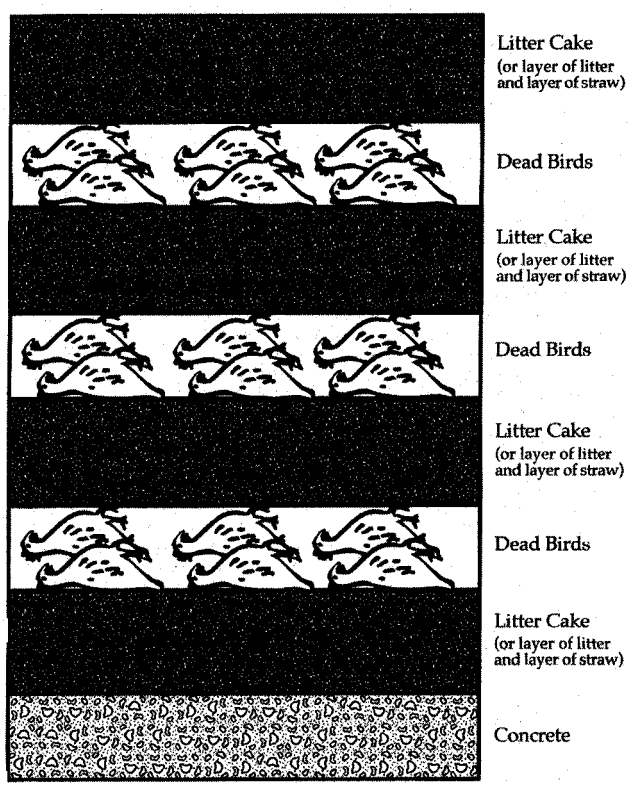

Figure 1: Composter Bin

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 moister 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 two to three large pieces when the hand is opened. If a 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 thermometer is used daily to measure and plot temperature 8 to 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 *compost.*

When oxygen becomes limited, the temperature of the compost begins falling. By the time it drops to 130°F (about 7 to 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 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 remix and aerate it so that a faster, more complete breakdown of the *compost* occurs. Allow material to "cas-

cade" 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 to 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 temperature (determined by daily monitoring) drops from 150° to 130°F (7 to 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:** 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 hulls to trap oxygen and promote heating.

- **Delmarva (small bin):** The front wall of these 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

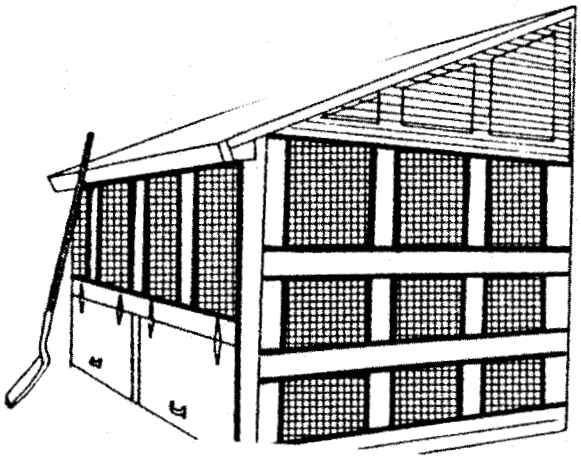

Figure 2. Package Composter

bin composters are 8 to10 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.

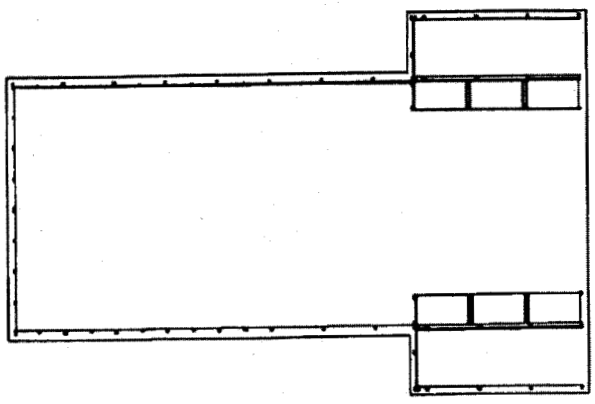

Figure 3. Small Bin Composter—Plan View

- **Big bin (adaptation of the Delmarva):** 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 to 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 to 12 feet wide and 20 to 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.

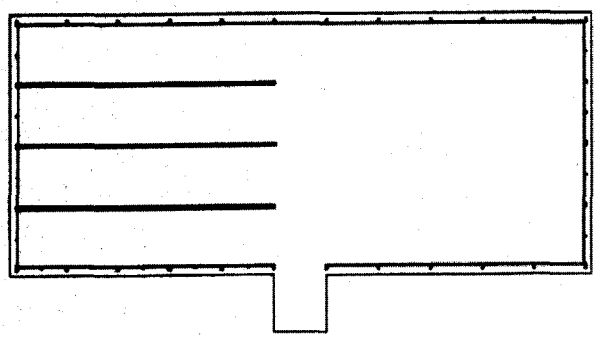

Figure 4. Big Bin Composter-Plan View

- **Minicomposter:** 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.

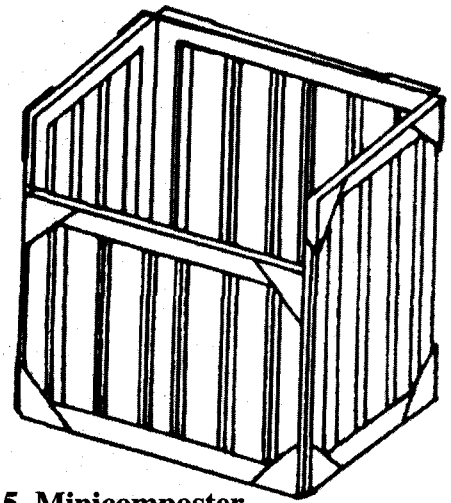

Figure 5. Minicomposter

LAND APPLICATION

Poultry mortality compost is a *nutrient*-rich material. This material can benefit the farm if it is protected adequately 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 form 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 eutrophicatio in surface waters.

A sound *nutrient management plan* begins with the kind 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 application, crops to be grown, the area of land needed to utilize available *nutrients* and the method and 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 neare fields can result in excessive *nutrient* loading rates to the soil and possibly cause water quality problems.

At this writing, there are no state of Georgia regulations governing the land application of poultry *litter*. However, some counties do have regulations. Contact your county extension office to determine if such regulations exist.

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 their 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 not to exceed 5 tons per acre per year, with no more than 2.5 tons/acre in each application or according to a site-specific *nutrient* management plan.

Vehicles must be covered or tarped for transporting poultry *compost* on state or federally maintained 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, vegetative 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 of 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 *compost* can vary greatly. For more information about calibration of waste-spreading equipment, contact your county extension office.

NOTES:

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.

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: Here: 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 on poultry production practices.	University of Georgia Four Towers Building Athens, GA 30602	706-542-1325
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 Rd. Oakwood, GA 30566	770-535-5996
US Poultry & Egg Association	General information on the poultry industry.	1530 Cooledge Rd. Tucker, GA 30084	770-493-9401
Poultry Water Quality Consortium	Environmental concerns related to poultry production.	TVA, Suite 4300 5700 Brainerd Rd., 6100 Bldg. Chattanooga, TN 37411	423-855-6470
Georgia Department of Agriculture General Field Forces	Questions regarding dead bird disposal.	Georgia Department of Agriculture, Capitol Square 19 Martin Luther King Jr. Dr., Suite 134 Atlanta, GA 30334	404-656-3649
Farm Service Agency (FSA, formerly the Agricultural Stabilization and Conservation Service)	Agricultural conservation programs.	(See local directory)	
Agricultural Pollution Prevention (P^2AD)	Opportunities for pollution prevention in poultry operations.	BAE Department Driftmier Engineering Center Athens, GA 30602	706-542-2154 or 404-651-5120
Cooperative Extension Service, County Extension Office	Information on nutrient management	(See local directory)	
Natural Resource Conservation Service	Information on the construction of composting facilities.	(See local directory)	

PUBLICATIONS:

State Soil and Water Conservation Commission
P.O. Box 8024
Athens, GA 3063

- Agricultural Best Management Practices for Protecting Water in Georgia

University of Georgia, Cooperative Extension Service
Athens, Georgia 30602

- Georgia's Ground Water Resources, Bulletin 1096
- Well Head Protection for Farm Wells, Circular 819-3
- Animal Waste and the Environment, Circular 827
- Poultry Waste, Georgia's 50 Million Dollar Forgotten Crop, Leaflet 206
- Calibration of Manure Spreaders, Circular 825
- Land Application of Livestock Manures, Leaflet 378
- Composting Poultry Mortalities, Circular 819-5
- Poultry Composting Facilities, Circular 828
- Facilities for Storing and Handling Broiler Litter, Newsletter

Poultry Water Quality Consortium
TVA, Suite 4300
5700 Brainerd Rd., 6100 Building
Chattanooga, TN 37402-2801

Poultry Water Quality Handbook

NOTES:

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The Georgia Farm Assessment System is a cooperative project of the Pollution Prevention Assistance Division, Georgia Department of Natural Resources, the University of Georgia, College of Agricultural and Environmental Sciences, Cooperative Extension Service, the State Soil and Water Conservation Commission and the USDA, Natural Resources Conservation Service

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