THE UNIVERSITY OF GEORGIA
COOPERATIVE EXTENSION
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

Animal Production

GEORGIA FARM*A*SYST

FARM ASSESSMENT SYSTEM

LAYER PRODUCTION AND ENVIRONMENTAL MANAGEMENT

Adam Speir, Public Service Representative
Biological and Agricultural Engineering
Casey Ritz, Associate Professor, Poultry Science

PRE-ASSESSMENT:

Why Should I Be Concerned?

Nutrients *leaching* from improperly handled layer manure or mortalities can contaminate ground water. Poorly managed lagoons and egg washing operations can also contaminate surface and ground water. To properly use layer manure nutrients, apply fresh manure from 1,000 layers to 6 acres of cropland in two applications each year under normal cropping conditions. Exceeding that amount may result in nitrates leaching to ground water.

The manner in which manure is stored and land applied can make a big difference in its value as a fertilizer. Unprotected manure and improperly handled dead bird carcasses can pollute farm water sources and pose health threats to humans and animals.

How Does This Assessment Help Protect Drinking Water and Environmental Quality?

- This assessment allows you to evaluate the soundness of your farm and operational practices relating to your layer management practices.
- The assessment uses your answers (rankings) to identify practices at risk that may need to be modified to prevent pollution.
- The layer production facts gives an overview of sound environmental practices that may be used to prevent well water contamination.
- You are encouraged to develop an action plan based on your needs as identified by the assessment
- Do not make any management changes based on this assessment that may affect your birds without consulting your flock supervisor.
- If the birds on the farm are under contract, involve the contracting company in this farm assessment. The contracting company may have recommendations on dead bird carcass disposal and litter cleanout that may be pertinent to this process.
- The assessment should be conducted by you for your use. If needed, a professional from University of Georgia Cooperative Extension or one of the other partnership organizations can provide assistance in completing the assessment.
- No information from this assessment needs to leave your farm.
- Farm*A*Syst is a voluntary program.

** Italicized words are defined in the glossary.*

ASSESSMENT:

Assessing Your Layer Management Practices.

For each category listed on the left, read across to the right and find the statement that best describes conditions on your farm. If a category does not apply (for example, if you always spread litter immediately after cleanout and thus never store litter), 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. A glossary is on page 14 to clarify words found in italics throughout this assessment.

LAYER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
STORAGE & HANDLING OF MANURE, CARCASSES AND EGG WASH					
Manure storage	Manure stored under a roof on an impervious surface. (Slurry stored in a non-leaking pit.) Manure is protected from rainwater. Surface water is diverted around the manure.	Manure temporarily stored on an impervious surface without a roof. At least 100 feet down slope from the well.	Manure routinely stored at least 100 feet downslope from a well but is exposed to either rainwater or surface water.	Manure is stored less than 100 feet from the well and is exposed to either rainwater or surface water.	
Lagoon water *Lagoon water is usually contained in a closed system.*	Lagoon lined or on non-porous soil, located according to a site specific plan.	Lagoon lined or on non-porous soil at least 100 feet down slope from the well.	Unlined lagoon (soil type undefined) at least 100 feet down slope from the well.	Unlined lagoon (soil type undefined) less than 100 feet down slope from the well.	
Egg wash water *Egg wash water is managed by adding to manure, adding to lagoon water or treated in permitted spray fields, on a site-by-site basis.*	Spray field located at least 200 feet down slope from the well. Appropriate water treatment and adequate land capacity.	Spray field located at least 200 feet down slope from the well. Appropriate water treatment but less than adequate land capacity is available.	Spray field located at least 200 feet downslope from the well. Water is not treated and less than adequate land capacity is available.	Spray field located less than 200 feet down slope from the well. Water is not treated and less than adequate land capacity is available.	
Mortalities (dead bird) disposal	All dead birds are collected and treated in a well-designed and functioning composter.	Dead birds are disposed of by an approved, noncompost method according to guidelines provided by the Georgia Department of Agriculture.	Dead birds are disposed of in pits.	***Dead birds are disposed of by a non-approved method.*** **	

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

LAYER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
Application rates	Manure and compost are applied to fields at rates that meet crop nutrient requirements based on a nutrient management plan (NMP).	Manure and compost are applied to cropped fields at rates that do not exceed 3 tons/acre/ application, and do not exceed 6 tons/ acre/year. Soils in the application areas are tested.	Manure and compost are applied to cropped fields at rates that do not exceed 3 tons/acre/ application, and do not exceed 6 tons/ acre/year. Soils in the application areas are not tested.	Manure and compost are applied to cropped lands at rates that exceed 3 tons/acre/ application, or exceed 6 tons/acre/ year; or these materials are applied to uncropped lands at any rate.	
Soil testing of manure and compost application sites	Yearly.	Every 2 years.	Every 3 years.	Less frequently than every 3 years.	
Nutrient (N, P, K) budgeting	Based on waste analysis, soil test, and crop nutrient utilization information or done according to nutrient management plan (NMP).	Soil test used. No waste analysis. Nutrient value based on published estimates.	No waste analysis or soil test. Nutrient value based on published estimates alone.	No waste analysis or soil test or effort toward nutient accounting.	
Application timing	According to accurate nutrient accounting or NMP. Never apply 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 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.	
Application areas	All areas are more than 100 feet from surface water sources, wells, dwellings and have slopes of 15% or less. Or all areas are approved by a NMP.	Most areas are more than 100 feet from surface water sources, wells, dwellings and have slopes of 15% or less. Or most areas are approved by a NMP.	Several areas are less than 100 feet from surface water sources, wells, dwellings or have slopes greater than 15%.	Manure nearly always spread over areas that are less than 100 feet from surface water sources, wells, dwellings or that have slopes greater than 15%.	

LAYER PRODUCTION PRACTICES					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RANK
Calibration	Nutrient application equipment calibrated to proper application rate before each application and checked at least once during the application period. Uniform applicaiton over the area is assured.	Nutrient equipment calibrated before each application but not rechecked during the application period. No effort to assure uniform nutrient application over the area.	Use custom nutrient hauler and applicator and assume equipment is calibrated, or calibrate equipment only once a year.	Never calibrate nutrient application equipment or ask custom applicator about calibration procedure.	
Record keeping	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.	
AREAS AROUND POULTRY HOUSES					
Drainage and areas around layer houses	All areas without vehicle traffic have more than 90% vegetative cover. High traffic areas are paved or graveled. No visible soil erosion or surface drainage problems.	More than 50% of the area has established vegetative cover. Traffic areas are graveled. Few erosion or drainage problems.	Less than 50% of the area has established vegetative cover. Erosion and drainage problems are evident in traffic areas.	Area around layer house has less than 25% vegetative cover. Erosion gullies are evident in many areas.	

Number of Areas Ranked _____
(Number of questions answered, if all answered, should total 12)

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 or costly and may require planning or prioritizing before you take action. All activities identified as "high risk" or "1s" should now be listed in the action plan. Moderate-to-High risk rankings ("2s") should be examined in greater detail to determine the exact level of risk and attention given accordingly.

STEP 2: Determine Your Layer Risk Ranking

The Layer Risk Ranking provides a general idea of how your layer management practices might be affecting your ground and surface water or contaminating your soil.

Use the rankings total and the total number of areas ranked on page 4 to determine the Layer Risk Ranking.

RANKING TOTAL	÷	TOTAL NUMBER OF AREAS RANKED	=	LAYER RISK RANKING
_____	÷	_____	=	_____

LAYER 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 layer production practices might be affecting water quality and pasture health. This ranking should serve only as a general guide, not a precise diagnosis, because it represents an averaging of individual rankings.

STEP 3: Read the Information Section on Improving Layer Production Practices

When reading this, give some thought to 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 Layer Management Practices Facts portion of this assessment, consult the references in the back of the publication or contact your county Extension agent or NRCS District Conservationist for more information.

STEP 4: Transfer Information to Total Farm Assessment

If you are completing this assessment as part of a "Total Farm Assessment," you should also transfer your layer risk ranking and your identified high-risk practices to the overall farm assessment.

LAYER MANAGEMENT FACTS:

Reducing the Risk of Pollution by Managing Manure, Mortalities, Lagoon and Egg Water from Layer Operations

Poultry manure, compost from mortalities (dead birds), and lagoon and egg wash water are nutrient rich. Most of these materials benefit the farm if adequately collected, stored and applied to land. However, improper storage/management or treatment of dead bird carcasses and manure, and improper land application can threaten farm water sources.

Manure Management for Layers Consists of Three Major Regimes:

- Fresh manure either scraped or slurrified with water, then spread.
- Manure allowed to build up under high-rise poultry houses and periodically cleaned out (the house serves as a storage facility.)
- Self-contained lagoon systems where manure is flushed into the lagoon from which sludge is occasionally removed and land applied. If handled properly (in those operations that regularly spread manure), maximum fertilizer value can be maintained while reducing the risk of water contamination.

A *nutrient management plan* (NMP) effectively uses layer waste in an environmentally safe manner. Any situation where the waste is not effectively managed gives rise to potential pollution from animal waste. Layer waste can be a source of fecal bacteria. Nitrogen in layer manures can also be converted into nitrate-nitrogen. Runoff of phosphorus can cause excessive aquatic growth in surface water.

A sound nutrient management plan begins with the kind and number of animals in the farm operation and every aspect of waste handling. It includes how the waste will be gathered and stored and 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 Natural Resources Conservation Service, agricultural consultant or county extension office.

STORAGE AND HANDLING OF MANURE, DEAD BIRD CARCASSES AND EGG WASH WATER

Manure Storage and Composter Facilities

Those operations in which manure builds up are cleaned one to two times per year. The houses serve as the storage structure. Likewise, for those operations with lagoon management, the lagoon is a self-contained system that does not allow *nutrients* to leave. Layer houses where fresh manure is handled require regular clean-out and manure movement several times per week. Those systems usually have a loading and/or storage area at the end of the house into which manure and/or slurry are loaded and/or stored.

Manure should be stored under a roof. Slurry should be collected and stored in a non-leaking pit. Lagoons should be constructed according to a site-specific plan, but should generally be lined and/or located on nonporous soil. If done on-farm, *composting* dead bird carcasses can occur on the ground level

of high-rise houses. If not, composting dead bird carcasses should be done in a roofed structure with a concrete floor to protect compost nutrients from getting into ground water. *Cost sharing* may be available through state and federal agencies.

Composition

Replacement pullet operations, egg-type breeder facilities and nearly all egg operations manage birds in cages or on wire floors. In these operations, manure accumulates without added litter or bedding. In Georgia, an average laying hen produces an estimated 0.375 pounds of manure (75% moisture) per day. The average range of nitrogen (N), phosphorus (P) and potassium (K) in fresh manure, composted dead bird carcasses, lagoon and egg wash water appears in Table 1. Other nutrients such as calcium and zinc may be determined by analysis.

Table 1. Average Nutrient Value in Layer Waste

%	Manure & Composted Birds	Lagoon Water	Egg Wash Water
Nitrogen	1.5	0.15	0.25
Phosphorus	1.0	Trace	Trace
Potassium	0.5	Trace	Trace

Egg Wash Water

Egg wash water may be held in storage tanks or actually mixed with manure and moved out with the manure for land spreading. Spray fields for egg wash water may be permitted on a site-by-site evaluation basis.

Mortalities Disposal

The Georgia Department of Agriculture (GDA), which regulates the disposal of dead animal carcasses, currently approves the following disposal methods:

- Composting
- In-ground pits
- Incineration
- Burial/Landfill
- Digestion/Fermentation
- Rendering

All disposal methods require permits from the Georgia Department of Agriculture (GDA), 404-656-3671. Some disposal methods require a special application form.

Composting of poultry carcasses has proven to be very effective. There are several different versions of composters available.

All must:

- Be practically odorless.
- Operate at a temperature high enough to destroy pathogenic bacteria (>125 degrees Fahrenheit).
- Provide for complete *decomposition* of carcasses (only feathers and bones remaining).
- Be adequately protected from flies so that larvae are not a problem.
- Protect the compost area from vermin.

Some Georgia farms use a storage and treatment shed that has primary and secondary composting bins and ample room for temporary storage of broiler litter. These facilities allow ready access to the storage and compost bins. Materials can be added or removed as often as necessary for their intended treatment and land application.

LAND APPLICATION

Poultry Litter Application

At this writing, state regulations governing the land application of poultry litter are limited to layer operations that house 82,000 birds or more at any given time. Some counties have regulations. Contact your county Extension office to see if such regulations exist. A farm nutrient management plan (NMP) should be developed with Natural Resources Conservation Service (NRCS) or your county Extension office assistance.

The nutrient management plan 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 animal manures 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 and handling of compost follow the same recommendations as manure. The University of Georgia Cooperative Extension, NRCS county offices and GDA can provide information on composting as well as other disposal methods.

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 manure nutrient analyses are recommended for determining poultry manure application amounts. Calibrate application equipment for accuracy and even distribution.

Evenly distribute poultry manure and compost at a rate not to exceed 6 tons per acre per year, or according to a site-specific land management plan, with no more than 3 tons per acre in each application.

Vehicles hauling non-liquid manure should be covered or tarped for transporting poultry manure on state or federally maintained roads or any public road for more than one mile. Slurry must not drip or spill out of stray tubes or loading spouts.

Your county Extension office can provide more information on soil testing, manure analyses, equipment calibration, record keeping and other areas related to land application.

Soil Testing of Waste Application Sites

Stored or slurrified manure or compost residue material from dead bird carcasses can be sampled and tested to determine the nitrogen, phosphorus and potassium content. These nutrient values combined with manure or compost and applied per acre allow the determination of the amount of commercial fertilizer required for crop production.

Record Keeping

Growers who use waste materials as fertilizer or a soil amendment should maintain records of the analytical results, application rates and soil tests for each application site. Record keeping is a vital part of animal waste management. Recommendations for the land application of poultry litter should be based on actual laboratory analysis from a sample of your litter or manure.

Record keeping is needed to keep up with the management of the waste application system. The record keeping forms provided in this publication will help you document site-specific data. These forms will allow you to easily track your waste applications and provide you with an easy resource to ensure that you do not exceed waste applications in any fields.

Keeping accurate records, along with the implementation of proper management procedures provide evidence that you are managing your animal waste at a low risk to the environment and that your practices will not cause a negative environmental impact. Assistance with record keeping can be obtained from your local county Extension agent, USDA, Natural Resource Conservation Service (NRCS), or an agricultural consultant.

The following items should be recorded and maintained for a period of five years at the individual's farm.

- Waste application locations and rates
- Map of farm fields including waste application
- Fields and acreage
- Nutrient Management Plan
- Waste sample analysis
- Annual soil analysis for each field receiving waste applications
- Animal population

It may be beneficial for you to maintain the following additional records for verification of the conditions on your farm.

- Daily farm rainfall record
- Plant analysis
- Crop yields
- Surface water and ground water quality records

The forms on pages 11 and 12 can be used to maintain these records.

Application Timing

Do not apply poultry manure and compost to land when it is saturated, during rainy weather or when rain is in the immediate forecast.

Application Areas

Do not apply poultry manure to land surfaces and subsurfaces within 100 feet of streams, ponds, lakes, springs, sinkholes, wells, water supplies and dwellings. Apply according to a site-specific land management
plan.

Calibrating

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

ENVIRONMENTAL CONTROL

Air Quality

Air quality affects the health and well being of animals and their caretakers. Odor concerns are drawing increased attention as urban/suburban areas expand into traditional agricultural areas. Measures to reduce or minimize odors in layer houses include maintaining a low moisture content and chemical treatment of litter. Soil injection or incorporation of manure into the soil reduces odor problems associated with land application. Odor suppressants, counteractants, masking agents and numerous chemicals have also been used in animal production to reduce odors.

NOTES:

Manure Application Form

Farm:_____

Record Keeper: _____

Date	Field #	Crop Type	Field Size (acres)	Application Method[1]	# of Loads per field	Volume of Loads[2] (tons)

1. SI = soil incorporated (disked); BR = Broadcast (surface applied)
2. Can be found in operator's manual for the spreader. Contact a local dealer if you do not have your owner's manual.

Manure Application Solids Field Record
One Form for Each Field Per Crop Cycle

Tract # _____ Field # _____

Field Size (acres) = (A) _____

Farm Owner _____

Owner's Address _____

Owner's Phone # _____

From Animal Waste Management Plan

Crop Type _____

Spreader Operator _____

Spreader Operator's Address _____

Operator's Phone # _____

Recommended PAN Loading (lb/acre) = (B) _____

(1) Date	(2) # of Loads Per Field	(3) Weight of Loads[1] (tons)	(4) Total Weight (tons) (2) x (3)	(5) Weight Per Acre (tons/ac) (4) / (A)	(6) Waste Analysis[2] PAN (lb/ton)	(7) PAN Applied (lb/ac) (6) x (5)	(8) Nitrogen Balance[3] (lb/ac) (B) - (7)
			Crop Cycle Totals _____			_____	

Owner's Signature _____

Operator's Signature _____

Certified Operator (Print) _____

Operator Certification # _____

1. Can be found in operator's manual for the spreader. Contact a local dealer if you do not have your owner's manual.
2. See your animal waste management plan for sampling frequency. At a minimum, waste analysis is required within 60 days of land application events.
3. Enter the value received by subtracting column (7) from (B). Continue subtracting column (7) from column (8) following each application event.

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 at the end of this publication 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

GLOSSARY:

Layer Production and Environmental Management

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 the Natural Resource Conservation Service pays a percentage of the costs of a project, facility or effort.

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

Mortality: Birds that died during production.

Nutrient: Usually referring to those elements necessary for plant growth.

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.

REFERENCES:

CONTACTS AND REFERENCES			
Organization	**Responsibilities**	**Address**	**Phone number**
Agricultural Pollution Prevention (AgP2)	Opportunities for pollution prevention for farmers and others	Biological and Agricultural Engineering Department, University of Georgia, Driftmier Engineering Center Athens, GA 30602	706-542-9067
Poultry Science Department	Information on poultry production practices and environmental concerns related to poultry production	Poultry Science Building University of Georgia Athens, GA 30602	706-542-1325
County Extension Office	Information on nutrient management planning.	See local phone directory	1-800-ASK-UGA1
Georgia Poultry Federation	General information on Georgia's poultry industry	518 S. Enota Dr. NE Gainesville, GA 30501	706-532-0473
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 and Egg Association	General information on the poultry industry	1530 Cooledge Rd. Tucker, GA 30084	770-493-9401
Natural Resource Conservation Service (NRCS)	Information on the construction of composting facilities and litter storage structures	See local phone directory	
Georgia Egg Commission	General information on layers	P.O. Box 2929 Suwanee, GA 30024	770-932-4622

PUBLICATIONS:

State Soil and Water Conservation Commission
P.O. Box 8024
Athens, GA 30603
• Best Management Practices for Georgia Agriculture

University of Georgia, Cooperative Extension
Athens, GA 30602
• Poultry Mortality Composting Management Guide, Bulletin 1266
• Poultry Litter Sampling, Bulletin 1270
• Calculating the Fertilzer Value of Broiler Litter, Circular 933
• Calibration of Manure Spreaders, Circular 825
• Facilities for Storing and Handling Broiler Litter, Newsletter
• Poultry Litter Application on Pastures and Hayfields, Bulletin 1330
• Best Management Practices for Storing and Applying Poultry Litter, Bulletin 1230
• Litter Quality and Broiler Performance, Bulletin 1267
• Composting Poultry Mortalitites, Bulletin 1152-22
• Composting 101: How to Effectively Operate a Poultry Mortality Compost Bin, Electronic Bulletin 103
• Maximizing Poultry Manure Use through Nutrient Management Planning, Bulletin 1245
• Coexisting with Neighbors: A Poultry Farmer's Guide, Bulletin 1263

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

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Learning for Life

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