

VIRGINIA FARM*A*SYST

Virginia Farmstead Assessment System

Fact Sheet/Worksheet No. 10

Poultry Litter Management and Carcass Disposal



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VIRGINIA STATE UNIVERSITY

INTRODUCTION TO THE VIRGINIA FARMSTEAD ASSESSMENT SYSTEM

Water wells and springs are the most common sources of private household water for rural homesites and farmsteads in Virginia. However, activities related to these environments may contribute to contamination of the groundwater which so many rural residents depend upon for household water. For example, farm facilities such as chemical and fuel storage tanks, livestock and poultry holding areas, irrigation systems, and septic systems are sometimes located near the farmstead well or spring. Retail agribusinesses and enterprises such as nurseries, greenhouses and direct farm markets are unique operations that may have production, storage, and sales areas close to a water well which may be also exposed to the general public. Inadequate maintenance of well-head and farmstead facilities and/or poor farmstead management practices can contribute to contamination of groundwater and drinking water supplies. Rural residents need to be aware of threats to water quality and of measures that will reduce or eliminate contamination of household water supplies.

To meet these challenges, as a part of a nationwide effort, the Virginia Farm *A* Syst was developed. This voluntary, educational/technical program is mainly a preventive program designed to: (1) provide safe, drinking water and thereby protect the health of Virginia's rural residents; (2) reduce potential land owner liability due to groundwater contamination which may result from farmstead or retail agribusiness activities; and (3) maintain or enhance farm property values throughout Virginia.

The Farm *A* Syst program is designed to guide an individual through a step-by-step evaluation of factors such as soils and geologic properties of the site, well-head or spring condition, and farmstead management practices that may impact the quality of his/her groundwater/drinking water supply. The program participant can identify potential pollution sources, and make an assessment of pollution risks to existing water supplies. Based on identified risks, corrective measures and/or management practices can be selected to reduce the likelihood of contamination.

This assessment is conducted by using a series of fact sheets and worksheets. A fact sheet /worksheet set deals with a specific pollution factor or source such as household wastewater, chemical storage, etc. Fact sheets are explanatory materials that contain background information on factors that affect groundwater quality, and legal requirements which address water quality and environmental protection. Worksheets are provided to determine ranking of potential pollution risks for each problem described in the fact sheets.

Each worksheet consists of a series of questions related to a specific farmstead feature or management practice such as well-head condition, fertilizer/chemical use, soils and geology of the site, etc. Based on the response to each question, a numerical ranking which indicates relative groundwater pollution risks is calculated. These rankings can then be used as a guideline to identify and prioritize corrective measures that will reduce or eliminate the potential for groundwater/drinking water pollution.

Users of this package need only to select those fact sheets/worksheets which are applicable to his/her activities or specific situations. For example, those evaluating rural, non-farm, homesite water supplies may select Fact Sheets/ Worksheets No. 1 -No. 5. Fact sheets/worksheets that will be important to many agribusinesses are No. 1 - No. 7. Some farming operations may relate to all worksheets. It is strongly recommended that the fact sheet corresponding to each worksheet be reviewed before using the worksheet itself. After developing a good understanding of each fact sheet, it will take about 15-30 minutes to complete each worksheet except for Worksheet No. 1 (Soils and Geology). To accomplish the task one needs only a pencil and a simple calculator. Each worksheet provides directions for completing the task. In addition, all users will need Worksheet No. 13 (Overall Risk Assessment). Fact Sheet/Worksheet No. 14 (Management of Irrigation Systems) was developed as an addendum chapter to the original Virginia Farm *A* Syst package and can be used in a stand alone manner or incorporated into the Overall Risk Assessment (Worksheet No. 13) as part of a complete farm assessment.

The Virginia Farm * A * Syst package contains the following Fact Sheets and Worksheets:

Fact Sheet/Worksheet No. 1 - Site Evaluation: Groundwater, Soils & Geology	Fact Sheet/Worksheet No. 8 - Livestock and Poultry Yard Management
Fact Sheet/Worksheet No. 2 - Well and Spring Management	Fact Sheet/Worksheet No. 9 - Livestock Manure Storage and Treatment Facilities
Fact Sheet/Worksheet No. 3 - Household Wastewater Treatment and Septic Systems	Fact Sheet/Worksheet No. 10 - Poultry Litter Management and Carcass Disposal
Fact Sheet/Worksheet No. 4 - Hazardous Waste Management	Fact Sheet/Worksheet No.11- Milking Center Wastewater Treatment and Management
Fact Sheet/Worksheet No. 5 - Petroleum Products Storage	Fact Sheet/Worksheet No. 12 - Silage Storage and Management
Fact Sheet/Worksheet No. 6 - Fertilizer Storage, Handling, and Management	Worksheet No. 13 - Overall Risk Assessment
Fact Sheet/Worksheet No. 7 - Pesticide Storage, Handling, and Management	Fact Sheet/Worksheet No. 14 - Management of Irrigation Systems

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Poultry Litter Management and Carcass Disposal

*Fact Sheet No. 10 was developed by Eldridge Collins, Biological Systems Engineering Department, Virginia Tech. Worksheet No. 10 was modified by Eldridge Collins, based on material from the Arkansas Farm*A*Syst package.*

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Nearly all broiler, pullet, and breeder operations grow the birds on concrete, wooden, or earthen floors. A 2-to 6-inch layer of wood shavings, peanut hulls, or other bedding material is used as an absorptive base. The manure and bedding mixture is commonly called litter, and it is removed one or more times a year and replaced with fresh bedding material. Most broiler operations produce 1.1 to 1.4 tons of litter per 1,000 birds. For a flock of 18,000 to 20,000 birds, this amounts to between 22 and 34 tons of litter per flock.

Poultry litter and carcass residues are nutrient-rich materials which can benefit the farmstead. Broiler litter is often used as a feed supplement for cattle. However, improper litter storage, improper disposal of carcasses, or improper land application of litter or compost residues can threaten farmstead water sources with nitrate and bacterial contamination.

The total nitrogen content of fresh poultry litter is usually 3 percent or more on a moist weight basis (20 to 30 percent water). This results in the litter containing two-thirds to one ton of total nitrogen for each flock of 18,000 to 20,000 birds. As much as 25 percent of the total nitrogen contained in fresh litter can be fairly mobile and subject to leaching. Manures can provide nearly half of overall fertilizer needs, or about one-fourth after allowing for storage and handling losses. The amount of nutrient loss depends on the method of handling and management involved. If done properly, maximum fertilizer value can be maintained while reducing the risk of water contamination.

Stored litter and compost residue materials can be sampled and tested for nutrient value to determine how much nitrogen, phosphorus, and potassium they contain. This nutrient value information, combined with the amount of litter or residue applied per acre, makes it possible to determine whether additional commercial fertilizer is needed to meet realistic crop production goals.

Several carcass disposal options are available to Virginia poultry producers. Specific guidelines and considerations for any of these disposal methods can be obtained from the Virginia Department of Agriculture

and Consumer Services Division of Animal Health - Bureau of Veterinary Services.

I. LITTER MANAGEMENT

Proper management of litter in the poultry house will reduce the need to remove litter between flocks and will aid in developing a cleanout schedule that allows direct application of manure to cropland without intermediate storage. Greater efficiency is obtained if manure can be directly applied at the proper time because handling costs are less and nitrogen will be more efficiently utilized. The primary key to good in-house management of litter is to keep the litter DRY. Wet litter, aside from being undesirable from the standpoint of bird health, creates a condition where more nitrogen is released from the litter in the form of ammonia.

Two primary factors relate to good litter conditions: proper heating and ventilation and selection and operation of bird watering systems to minimize spillage on the litter. Any common type of watering system can be used effectively if maintained properly. Careful adjustment of height, water depth, and other operating factors will help assure minimum spillage onto the litter. Reducing water spillage will:

- save water,
- improve bird quality,
- improve production environment,
- reduce ammonia release from litter,
- reduce volume of wet manure cake, and
- extend time between litter cleanout.

Dollars spent on proper selection and use of water systems and attention to good management provide economic and environmental returns to all phases of bird and litter management.

II. LITTER STORAGE

Storages are classified into three main types: temporary or "stockpiling;" open, and; permanently roofed. Each type provides flexibility for the producer, either for utilizing litter for fertilizer or cattle feeding in his/her own operation, or for holding litter until such time as it can be sold or donated to someone else. The storage method must protect litter from rainwater or snow melt; stockpiling of uncovered litter on the soil for periods of more than several weeks before application on cropland can lead to a five-fold reduction of nitrogen in the manure compared to good storage practices. The nitrogen lost may be leached into groundwater or washed into surface drains or streams. Cover is usually provided by a plastic, or other membrane, covering, or by a roofed structure. Adequate storage capacity should be provided so that land application can occur at the time when crops need nutrients.

Storage sites should be located on high ground that has good surface drainage, is not subject to ponding or flooding, and is located at least 100 feet from flowing streams or drainage ways. Avoid normally wet areas and other areas that tend toward running or standing water. Where a concrete base is not used, stockpile on an impermeable base such as well-compacted clay to minimize leaching into soil and groundwater table. A minimum of 4 feet (vertical) is recommended between the base of the pile and the seasonal high groundwater table. Storages should not be located closer than 100 feet, and downslope from wells or other sources of drinking water. Any downslope surface water sources within 100 feet of the stack should be protected by a grass filter area.

When properly located and managed, or if protected by diversion works, storages will not have runoff or leachate. However, if runoff or drainage from the storage occurs, it should be routed to a runoff retention pond for later land application, or into an infiltration terrace at least 100 feet long, or into an overland flow-filter area that is at least 50 feet long and seeded with fescue, orchardgrass, or other suitable variety recommended by local Extension or NRCS personnel. Infiltration areas must be maintained by clipping and weed control to maintain their effectiveness which depends on good grass cover and root systems.

To control diseases and to avoid the threat of spreading fire should spontaneous combustion occur within the storage pile, storages should not be located closer than 150 feet to dwellings or production houses. Practice recommended fly and rodent control around the production houses and in the vicinity of the storage

area. Bird carcasses should not be added to litter storage piles; use only accepted dead bird disposal practices.

If the litter is to be temporarily in open storage and/or stockpiled, it should be covered with plastic sheeting (6 mil minimum thickness) held in place with old tires, by burying the edges of the sheeting, or by other anchoring systems. If this practice is used often, a reinforced, ultraviolet resistant cover will last longer and may be a good investment. Sites should be selected carefully, as described earlier; location near windbreaks will help protect the plastic covering. Compacting of litter is not necessary, but more manure can be stored in a smaller area and with less plastic sheeting if compaction is provided. Sheeting must be applied with care to prevent tearing. Anchor sheeting by laying the edges across a small trench approximately 12 inches deep and backfilling with soil. Lay used tires over the sheeting, similar to methods used on bunker silos, to prevent loosening and damage in the wind. It is preferable to leave the pile sealed until all litter can be spread or otherwise utilized.

III. LAND APPLICATION OF LITTER

At present, there are no regulations governing the land application of poultry litter in Virginia. It is recommended that a site specific farm nutrient management plan (NMP) be developed through the assistance of Virginia Cooperative Extension, or the Virginia Department of Conservation and Recreation-Division of Soil and Water Conservation (DSWC).

The following guidelines are recommended for inclusion in the NMP and for voluntary implementation by the farm owner:

- The manure spreader should be well calibrated to achieve accurate and even distribution of the litter.
- Poultry litter should be evenly distributed over application sites at a rate not to exceed 5 tons per acre per year, or according to a site-specific land management plan, with no more than 2.5 tons/acre in each application. (As a rule of thumb, 30 acres is required for one 16,000 square foot house per year).
- Manure should not be applied in fall and early winter for spring crop production unless cover crops are planted. Schedule manure clean outs just before crops need nutrients, or have adequate storage for these periods.

- Surface land application of poultry waste should not be undertaken when soil is too wet, frozen, or covered with snow, during rainy weather, or when precipitation is in the immediate forecast.
- Poultry waste should not be applied on slopes with a grade of more than 15 percent or in any manner that will allow waste to enter state waters. Follow a site-specific land management plan, especially if there are unique features to consider.
- Surface and subsurface application of poultry waste should not be made within 50 feet of streams, ponds, lakes, springs, sinkholes, or rock outcrops, and not within 100 feet of wells or other water supplies, or according to a site-specific land management plan.
- Records should be kept by the farmer of the dates, quantity, and specific sites where litter is applied. If the litter is sold, a record should be kept of who buys the litter, the dates, the quantities, and the farm sites where litter is applied or utilized.
- A manure analysis of the litter should be obtained. The appropriate application rate depends on the crop and on the nutrient content of the soil before the application is made, as well as the nutrient content of the waste material. Soil testing and manure nutrient analyses are recommended procedures for best determining poultry litter application amounts.

The local Virginia Cooperative Extension Office, NRCS, or DSWC can provide more information on soil testing, litter analyses, equipment calibration, record keeping, and other areas related to poultry litter land application.

IV. DISPOSAL OF POULTRY

The Virginia Department of Agriculture and Consumer Services-Bureau of Veterinary Services (VDACS-BVS), is responsible for regulations regarding the disposal of dead animal carcasses. The following are currently approved disposal methods:

- Composting
- Rendering
- In-ground pits (presently discouraged)
- Incineration
- Burial

Composting of poultry carcasses has become the method of choice for disposal of normal mortality losses on Virginia poultry farms. There are several different versions of composters available, but they must all meet the following requirements:

1. Must be practically odorless.
2. Must operate at temperature high enough to destroy pathogenic bacteria (150°F).
3. Must provide for complete decomposition of carcasses-only minimal amounts of feathers and bones remaining.
4. Must be adequately protected from flies so that larvae are not a problem.

Composter design can vary considerably and still work well. However, experience indicates that certain features are common to all good composters.

ROOF:

Some materials are composted outside. However, this is not recommended for dead bird compost. A roof ensures all-weather operation, and helps control rain, snow, runoff, and percolation which can be major concerns.

FLOOR:

A concrete floor is recommended to assure all-weather operation, and to secure the composter against rodents, dogs, and other nuisances. An impervious floor also will help dispel concerns about contamination of the groundwater and other surrounding areas. An optional concrete apron, sloped away from the primary bins, is recommended. This provides an all-weather surface for equipment and operation.

BUILDING MATERIALS:

Specify preservative pressure-treated lumber or other rot-resistant materials which resist the biological activity of composting. Use hot-dipped galvanized nails which resist rusting.

ACCESS TO PRIMARY BINS:

A method is needed to enclose and confine the compost mixture, but allow access with a bucket loader for efficient handling with farm equipment. One technique that works well is to construct channels on the sides of front bin posts using angle iron or wood cleats. Treated boards can then be slipped into the channels to

form a front wall, or "gate," as layers are stacked in the bin. Conversely, the boards can be removed after the composting is completed to give access to the bin with a bucket loader.

Remaining options, such as rendering, in-ground pits, incineration, and burial are not as highly recommended because of potential for groundwater contamination. It is very likely that in-ground pits will soon be removed from the approved methods list.

Additional information on dead poultry composting is available from your local Virginia Cooperative Extension Office in VCE Publication 442-037, "Composting Dead Poultry."

The VDACS-BVS should be contacted when catastrophic die-off occurs on a farm. Such cases require special permission and supervision of disposal.

GLOSSARY

Poultry litter management and carcass disposal These terms may help you make more accurate assessments when completing Worksheet No. 10. They may also help you clarify some of the terms used in Fact Sheet No. 10.

- Compost:** Organic residues that have been collected and allowed to decompose until they are stable.
- Composting:** A controlled process of decomposing organic matter by microorganisms.
- Decomposition:** The breakdown of organic materials.
- Leaching:** The removal of soluble materials from soils or other material by water.
- Mobile:** Has the ability to move or be moved (in the case of nutrients, usually with water).
- Nutrient:** Usually referring to those elements necessary for plant growth-nitrogen (N), phosphorus (P), and potassium (K).
- Residue:** The material that remains after decomposition.
- Stacking Shed:** A structure designed and built for the storage of poultry litter.

V. ABANDONED SITES

Abandoned poultry houses or old earthen poultry foundations can be threats to farmstead water sources. A complete discussion of how to deal with these sites is given in Fact Sheet No. 8, Livestock and Poultry Yard Management (Section V).

CONTACTS AND REFERENCES

For additional information, consult the Virginia Farm*A*Syst Resource Directory. For assistance in sampling, interpreting results, and dealing with remaining problems, contact your Cooperative Extension or Natural Resources Conservation Service office.

For additional information, you may contact your local Virginia Cooperative Extension or Natural Resources Conservation Service office, or the Virginia Department of Conservation and Recreation-Division of Soil and Water Conservation Office.

WORKSHEET NO. 10 POULTRY LITTER MANAGEMENT AND CARCASS DISPOSAL

How will this worksheet help you protect your drinking water?

- It will take you step by step through your drinking water well or spring condition and management practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water.
- It will provide you with easy-to-understand rankings that will help you analyze the "relative risk" to your drinking water well or spring.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

Follow the directions below.

Note: You will probably want to make a print-out of this worksheet to complete it.

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that best describes conditions on your farmstead. (Skip and leave blank any categories that don't apply.)
3. Then look above the description you circled to find your "rank number" (4, 3, 2, or 1) and enter that number in the blank under "your rank."
4. Directions on overall scoring appear at the end of the worksheet.
5. Allow about 15-30 minutes to complete the worksheet and figure out your risk rank.

LITTER AND POULTRY COMPOST STORAGE

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RISK NUMBER
Storage Method	Litter or compost is stored in a non-leaking stacking shed with a concrete floor.	Litter or compost is temporarily stacked on a restrictive surface (concrete, 6-mil plastic, clay layer, etc.) at least 100 feet downslope from the well or spring. Stacks are protected from rainwater by a 6-mil plastic cover. Surface water is diverted around the stacks.	Litter or compost is routinely stacked at least 100 feet downslope from the well or spring, but is exposed to rainwater and/or surface water.	Litter or compost is stacked less than 200 feet from the well or spring and is exposed to rainwater and/or surface water.	

LAND APPLICATION OF LITTER AND POULTRY COMPOST

Application areas	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RISK NUMBER
Applicaion rate	Litters, composts, and soils are tested. Material applied to fields at rates that are just high enough to meet crop nutrient requirements based on a nutrient management plan. Commercial fertilizer application rates are adjusted accordingly.	Litter/com-post applied to cropped fields at rates that do not exceed 2.5 tons/acre/year. Soils in application areas are tested yearly for nitrogen, phosphorous, and potassium.	Litter/com-post applied to cropped fields at rates that do not exceed 2.5 tons/acre/applica-tion, and do not exceed 5 tons/acre/year. Soils in application areas are not tested.	Litter/com-post applied to cropped fields at rates that exceed 2.5 tons/acre/application, or exceed 5 tons/acre/year, or these wastes are applied to uncropped lands at any rate.	
Application timing	According to accurate nutrient accounting or NMP. Never apply on frozen or saturated soil, within 3 weeks of planting or in on winter cover crops.	Based on crop nutrient demand. Avoid applying in wet conditions.	Based on convenience. Sometimes apply when soil is wet or frozen.	Based only on litter cleanout schedule.	
Applicaion areas	All areas are more than 50 feet from rock outcrops, surface water sources and sinkholes, 100 feet from wells or springs, and have slopes of 15% or less. All areas are approved by a nutrient management plan.	Most areas are more than 50 feet from rock outcrops, surface water sources and sinkholes, 100 feet from wells or springs, and have slopes of 15% or less. Most areas are approved by a nutrient management plan.	Several areas are less than 50 feet from rock outcrops, surface water sources and sinkholes, 100 feet from wells or springs, or have slopes of 15%.	Litter is nearly always spread over areas that are less than 50 feet from rock outcrops, surface water sources, and sinkholes, 100 feet from wells or springs, or that have slopes greater 15%.	
Calibration	Waste application equipment is calibrated to proper application rate before each application and checked at least once during the application period. Applications are made uniformly over the areas.	Waste applica-tion equipment is calibrated before each application, but not rechecked during the appli-cation period. No effort made to assure applying waste uniformly over the area.	Use custom applicator and assume calibra-tion of equip-ment. Or cali-brate your equip-ment only once a year.	Never calibrate waste applicaition equipment or ask custom applicator about calibration procedure.	
Record keeping	Good records kept on farm applications and wastes leaving farm through sales or giving away.	Fair records kept on farm applica-tions and wastes leaving farm through sales or giving away.	Fair records kept on farm appli-cations, but no records on wastes leaving farm.	No records kept.	

CARCASS DISPOSAL					
	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	RISK NUMBER
Disposal method	All carcasses are collected and treated in a well-designed and functioning compost bin.	Carcasses are disposed of by an approved non-compost method according to guidelines provided by the Bureau of Veterinary Services, Virginia Department of Agriculture and Consumer Services.	Carcasses are buried in pits.	Carcasses are piled on the ground or thrown into gully or ravine. (An illegal practice!)	_____
Use this total to calculate risk rank:				Rank Number Total:	

CALCULATE RISK RANK

Step 1:

Sum up the rankings for the categories you completed and divide by the total number of categories ranked. Carry your answer out to one decimal point.

Rank Number Total _____ ÷ No. of categories ranked _____ = Risk Rank _____

Risk Categories

3.6-4.0 = low risk

2.6-3.5 = low to moderate risk

1.6-2.5 = moderate to high risk

1.0-1.5 = high risk

This ranking gives you an idea of how your well or spring management practices as a whole might be affecting your drinking water. Later you will combine this risk ranking with other farmstead management rankings in Worksheet No. 13, "Overall Risk Assessment." This ranking should serve only as a very general guide, not a definitive indicator of contamination. Because it represents an averaging of many individual rankings, it can mask any individual rankings (such as 1's or 2's) that should be of concern (see Step 2.).

Step 2:

Look over your ranking for each category:

- Low-risk practices (4's): ideal; should be your goal despite cost and effort.
- Low-to-moderate risk practices (3's): provide reasonable groundwater protection.
- Moderate-to-high-risk practices (2's): inadequate protection in many circumstances.
- High-risk practices (1's): inadequate; pose a high risk of polluting groundwater.

Any individual rankings of "1" require immediate attention. Some concerns you can take care of right away; others could be a major-or costly-project, requiring planning and prioritizing before you take action. Note the activities that you identified as 1's to be listed later under "High-Risk Activities" in Worksheet No. 13.