LSU AgCenter
Research & Extension

Poultry Production Best Management Practices (BMPs)

endorsed by

Louisiana Department of Agriculture and Forestry

USDA NRCS

Farm Bureau Louisiana

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Why BMPs Are Important to Louisiana

In Louisiana we are blessed with beautiful and abundant waters to enjoy fishing, hunting, boating or just relaxing on the shore of a lake, river or bayou. Most of the water in Louisiana's rivers and lakes comes from rainfall runoff. As this runoff travels across the soil surface, it carries with it soil particles, organic matter and nutrients, such as nitrogen and phosphorus. Agricultural activities contribute to the amount of these materials entering streams, lakes, estuaries and groundwater. In addition to assuring an abundant, affordable food supply, Louisiana farmers must strive to protect the environment.

Research and educational programs on environmental issues related to the use and management of natural resources have always been an important part of the LSU AgCenter's mission. Working with representatives from the agricultural commodity groups, the Natural Resources Conservation Service (NRCS), the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Farm Bureau Federation (LFBF) and the Louisiana Department of Agriculture and Forestry (LDAF), the LSU AgCenter has taken the lead in assembling a group of Best Management Practices (BMPs) for each agricultural commodity in Louisiana.

BMPs are used by agricultural producers to control the generation or delivery of pollutants from agricultural activities to water resources of the state, thereby preventing degradation of surface and groundwater.

Introduction

Poultry production is the largest animal industry in Louisiana. It consists of a vertically integrated broiler industry and a commercial egg industry. The broiler industry is the largest in both numbers and income. Most commercial broiler production is in 10 of the northern parishes.

In poultry production, there are issues of special concern to the environment. Therefore, these Best Management Practices (BMPs) focus on three main areas: Nutrient Management, Pesticide Management and Mortality Management. Each area is discussed and the environmental concerns associated with them identified. Possible alternative practices are introduced that, when implemented, reduce the impact of poultry production on the environment.

References are made to specific NRCS production codes that are explained in the text. More detailed information about these practices can be found in the NRCS Field Office Technical Guide (FOTG), which can be found in all Soil and Water Conservation District Offices, all NRCS field offices and on the NRCS web page. Additionally, under voluntary participation by the producer, technical assistance to develop and implement a farm-specific Conservation Plan is available through the Conservation districts, NRCS field offices and the LSU AgCenter parish offices.

poultry BMPs

The following additional conservation practices apply to poultry production. The practices and the NRCS production codes are listed.

Filter Strips

(NRCS Code 393)

These are strips or areas of vegetation for removing sediment and other pollutants from runoff. Areas are on the lower edge of fields or above conservation practices such as terraces or diversions or on fields adjacent to streams, ponds and lakes.

Field Borders

(NRCS Code 386)

These are strips of perennial vegetation established at the edge of fields. They control erosion and protect edges of fields that are used as "turnrows" or travel lanes for farm machinery.

Grassed Waterways

(NRCS Code 412)

These are natural or constructed channels that are shaped or graded to required dimensions and established in suitable vegetation for the stable conveyance of runoff. They are designed to convey runoff without causing erosion or flooding and to improve water quality.

These production practices are not covered in detail in this publication, but they are important in poultry operations. For more information on these practices and how to implement them, contact your local NRCS or Conservation District Office.

NUTRIENT MANAGEMENT

Introduction

A sound soil fertility program is the foundation upon which a profitable farming business must be built. Agricultural fertilizers are a necessity for producing abundant, high quality food, feed and fiber crops. Using fertilizer nutrients in the proper amounts and applying them correctly are both economically and environmentally important to the long-term profitability and sustainability of crop production. The fertilizer nutrients that have potential to become groundwater or surface water pollutants are nitrogen and phosphorus. In general, other commonly used fertilizer nutrients do not cause concern as pollutants.

Because erosion and runoff are the two major ways nonpoint-source pollutants move into surface water resources, practices that reduce erosion or runoff are considered Best Management Practices (BMPs). Similarly, practices that limit the buildup of nutrients in the soil, which can leach to groundwater or be picked up in runoff, and practices that ensure the safe use of agricultural chemicals also are considered BMPs. In general, soil conservation and water quality protection are mutually beneficial; therefore the BMPs described here are the best means of reducing agricultural nonpoint source pollution resulting from fertilizer nutrients.

Nitrogen

Nitrogen (N) is a part of all plant and animal proteins. Therefore, human survival depends on an abundant supply of N in nature. Approximately 80 percent of the atmosphere is nitrogen gas. Most plants cannot use this form of nitrogen, however, and supplemental nitrogen must be supplied through the soil. A crop well supplied with N can produce substantially higher yields, on the same amount of water, than one deficient for N. Furthermore, properly fertilized crops use both N and water more efficiently, thus improving environmental quality and profitability.

Supplemental N is necessary on almost all non-legume crops in Louisiana for maximum profits. Producers should follow N recommendations based on Louisiana research. These recommendations take into account maximum economic yield potentials, crop variety, soil texture and area of the state. Nitrogen recommendations from the LSU AgCenter are usually ample to provide optimum economic yields.

Decomposition of organic matter results in simpler inorganic N forms such as ammonium (NH_4^+) and nitrate (NO_3^-). These forms of N are soluble in soil water and readily available for plant uptake. The ammonium form is attracted to and held by soil particles, so it does not readily leach through the soil with rainfall or irrigation water. Nitrates, on the other hand, are not attached to soil particles and do move downward with soil water and can be leached into groundwater or run off into surface waters.

Excessive nitrate concentrations in water can accelerate algae and plant growth in streams and lakes, resulting in oxygen depletion. Nitrate concentrations above a certain level in drinking water may be hazardous to the health of some animals or human infants.

Phosphorus

Phosphorus (P), like nitrogen, is essential for plant growth. Naturally occurring P exists in a phosphate form either as soluble inorganic phosphate, soluble phosphate, particulate phosphate or mineral phosphate. The mineral forms of phosphorus (calcium, iron and aluminum phosphates) are low in solubility. The amount of these elements (calcium, iron and aluminum) present in reactive forms varies with different soils and soil conditions.

The immediate source of phosphorus for plants is that which is dissolved in the soil solution. Phosphate is absorbed from the soil solution and used by plants. A soil solution containing only a few parts per million of phosphate is usually considered adequate for plant growth. Phosphate used by plants is replaced in the soil solution by soil minerals, soil organic matter decomposition or applied fertilizers.

Algae bloom

Phosphate is not readily soluble. Most of the ions are either used by living plants or adsorbed to sediment, so the potential of their leaching to groundwater is low. That portion of phosphate bound to sediment particles is virtually unavailable to living organisms, but it becomes available as it detaches from sediment. Only a small part of the phosphate moved with sediment into surface water is immediately available to aquatic organisms. Additional phosphate can become available slowly through biochemical reactions, however. The slow release of large amounts of phosphate from sediment layers in lakes and streams could cause excessive algae blooms and excessive growth of plants, thereby affecting water quality.

Nutrients will be used to obtain optimum crop yields while minimizing the movement of nutrients to surface and groundwater (NRCS Production Code 590). A nutrient management plan should be developed for the proposed crop by using soil analyses from approved laboratories.

Nutrient Application Rates

Nutrient application rates will be based on the results of a soil analysis.You should select only those materials recommended for use by qualified individuals from the Louisiana Cooperative Extension Service, Louisiana Agricultural Experiment Station, certified crop advisors, and certified agricultural consultants and/or published LSU AgCenter data.

Soil testing is the foundation of a sound nutrient management program. A soil test is a series of chemical analyses that determine the levels of essential plant nutrients in the soil. When not taken up by a crop, some nutrients, particularly nitrogen, can be lost from the soil by leaching, runoff or mineralization. Others, like phosphorus, react with soil minerals over time to form compounds that are not available for uptake by plants. Soil testing can be used to estimate how much loss has occurred and to predict which nutrient(s) and how much of that nutrient(s) should be added to the soil to produce a particular crop and yield. Soil tests should be taken at least every three years or at the beginning of a different cropping rotation.

Recommended Practices

1. Test soil for nutrient status and pH to:

• determine the amounts of additional nutrients needed to reach designated yield goals and the amount of lime needed to correct soil acidity problems;

• optimize farm income by avoiding excessive fertilization and reducing nutrient losses by leaching and runoff;

• identify other yield-limiting factors such as high levels of salts or sodium that may affect soil structure, infiltration rates, surface runoff and, ultimately, groundwater quality.

2. Base fertilizer applications on:

• soil test results

• realistic yield goals and moisture prospects

• crop nutrient requirements

• past fertilization practices

• previous cropping history

3. Manage low soil pH by liming according to the soil test to:

• reduce soil acidity

• improve fertilizer use efficiency

• improve decomposition of crop residues

• enhance the effectiveness of certain soil-applied herbicides.

4. Time nitrogen applications to:

• correspond closely with crop uptake patterns

• increase nutrient use efficiency

• minimize leaching and runoff losses

5. Inject fertilizers or incorporate surface applications when possible to:

• increase accessibility of fertilizer nutrients to plant roots

• reduce volatilization losses of ammonia N sources

• reduce nutrient losses from erosion and runoff

6. Use animal manures and organic materials:

• when available and economically feasible

• to improve soil tilth, water-holding capacity and soil structures

• to recycle nutrients and reduce the need for commercial inorganic fertilizers

7. Rotate crops when feasible to:

• improve total nutrient recovery with different crop rooting patterns

• reduce erosion and runoff

• reduce diseases, insects and weeds

8. Use legumes where adapted to:

• replace part or all of crop needs for commercial N fertilizer

• reduce erosion and nutrient losses

• maintain residue cover on the soil surface

9. Control nutrient losses in erosion and runoff by:

• using appropriate structural controls

• adopting conservation tillage practices where appropriate

• properly managing crop residues

• land leveling

• implementing other soil and water conservation practices where possible

• using filter strips

10. Skillfully handle and apply fertilizer by:

• properly calibrating and maintaining application equipment

• properly cleaning equipment and disposing of excess fertilizers, containers and wash water

• storing fertilizers in a safe place

Comprehensive Nutrient Management Plans (CNMP)

Both the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) are encouraging a voluntary approach to handling nonpoint source pollution issues related to animal agriculture. The implementation of Comprehensive Nutrient Management Plans (CNMP) by all poultry producers will ensure that the nutrient value of the poultry litter is managed in an environmentally friendly fashion by either (1) properly using litter on the land based on its nutrient value or (2) transferring the litter to an alternative use program.

Poultry litter is an excellent source of organic nutrients that can be incorporated into most farming operations when properly managed. For poultry producers, the proper management of litter is a major consideration in their daily operations. Whether the material is used as a nutrient source on land controlled by the producer, provided as a nutrient source on other lands or is offered as a material in an alternative use process, the proper management of the litter is essential. Storage, transportation, application, disease prevention and proper documentation are just a few items that need to be factored into the litter/manure management decision-making process.

Developing a Comprehensive Nutrient Management Plan

A CNMP is a strategy for using plant nutrients wisely to enhance farm profits while protecting water resources. It is a plan that looks at every part of your farming operation and helps you make the best use of manures, fertilizers and other nutrient sources. Successful nutrient management requires thorough planning and recognizes that every farm is different. The type of farming you do and the specifics of your operation will affect your CNMP. For example, CNMPs on farms that do not have animals will not require as much detail as those that do. The best CNMP is one that is matched to the farming operation and the needs of the person implementing it.

Filter strip

The Parts of a CNMP

A CNMP takes into account how nutrients are used and managed throughout the farm. It is more than a nutrient management plan that looks only at nutrient supply and needs for a particular field. Nutrients are brought to the farm through feeds, fertilizers, animal manures and other off-farm inputs. These inputs are used, and some are recycled, by plants and animals on the farm. Nutrients then leave the farm in harvested crops and animal products. These are nutrient removals. Ideally, the amount of nutrient inputs and removals should be roughly the same. But, when nutrient inputs to the farm greatly exceed nutrient removals from the farm, the risk of nutrient losses to groundwater and surface water is greater. When you check nutrient inputs against nutrient removals, you are creating a mass balance. **This nutrient mass balance is an important part of a CNMP and important to understand for your individual farming operation.**

BMPs are also very important to a successful CNMP. BMPs, such as soil testing and manure analysis, help you select the right nutrient rate and application strategy so that crops use nutrients efficiently. This not only reduces nutrient losses and protects the environment, but it also increases farm profitability. BMPs may include managing the farm to reduce soil erosion and improve soil tilth through conservation tillage, planting cover crops to use excess nutrients, or using filter strips and buffers to protect water quality. Preventive maintenance, record keeping, mortality management and emergency response plans also must be included in a CNMP for livestock and poultry operations.

The Basic Steps

CNMPs consist of six major parts: evaluation of nutrient needs, inventory of nutrient supply, determination of nutrient balance, mortality management, preventive maintenance and inspection, and an emergency response plan.

Evaluation of Nutrient Needs

Maps and Field Information

You will need a detailed map of your farm. The map should include:

- farm property lines
- your fields with the field identification
- the location of all surface waters such as streams, rivers, ponds or lakes
- direction of surface flows
- arrows showing the direction that streams or rivers flow
- a soils map, if available

This map will serve as the basis for the entire plan, so each field should have a unique identification. In addition to the map, prepare a list of the crops to be grown in each field with a realistic yield goal for each crop. Most of this information is available at your local USDA Farm Service Center.

Locate Critical Areas

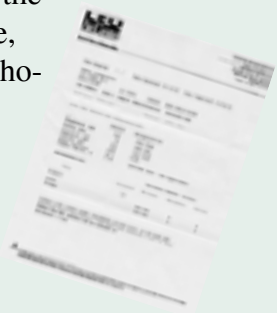
Certain areas on your farm such as streams and rivers, wellheads, lakes or ponds are sensitive to nutrient overload. You should create buffer zones around these areas on your map where nutrient use will be reduced or eliminated. By buffering these areas, you can reduce water quality problems. Areas such as roads, off-site dwellings and areas of public gatherings should also be noted on your map. To reduce odor complaints, you may want to limit the use of manures near these types of areas.

Soil Testing

Complete and accurate soil tests are important for a successful nutrient management plan. You will need soil tests at least every three years to determine how much nutrient addition is needed. The needed nutrients can be supplied from commercial fertilizer and/or organic sources. Be sure to take representative soil samples and have them tested by a reputable laboratory familiar with Louisiana soils and crop production. Your county agent can help you submit samples to the LSU Soil Testing Laboratory.

Determine Nutrients Needed for Each Field

Once you have set realistic yield goals and you have your soil test results, you can determine the nutrients your crops will need. The amount of nutrients needed should be based on your local growing conditions. At a minimum, the amounts of lime, nitrogen, phosphorus and potassium should be listed in the plan for each field. Most soil and plant analysis labs will give you recommended application rates based on the soil test results. Your county agent can help you with this.



Inventory of Nutrient Supply

Many of the nutrients needed to grow your crops are already present on your farm in the soil, in animal manures or in crop residues. Knowing the amounts of nutrients already present in these sources is important so that you do not buy or apply more nutrients than needed.

Determine the Quantity of Nutrients Available on Your Farm

Supply planning starts with an inventory of the nutrients produced on the farm. Animal manure is an important source of nutrients. The quantity of manure collected and stored, either dry or liquid, should be determined. An inventory should be performed of any other by-products available, such as mortality compost, lagoon sludge (if lagoon cleaning is planned), crop residue nutrients or nitrogen from legumes. This information will allow you to balance your nutrient purchases with what is available on your farm for the realistic production potential of your crops.

Nutrient Analysis

Animal manure and other organic products are not all the same as far as nutrient content is concerned. A nutrient analysis of these products tells you their nutrient content so you can match this with soil test recommendations and determine application rates. The lab results will help you determine how much of the nutrients in the manure will be available to your crops. The amount credited to the nutrient budget should be based on plant available nutrient levels, which may be substantially different from the total nutrient content. Your parish Extension office has information on manure and litter testing.

Determining Nutrient Balance

Balance Between Supply and Need

Once you have determined both the supply and need of nutrients for each of your fields, a critical aspect of CNMPs is balancing the two. This can be done in several ways. Most CNMPs are developed based on nitrogen, but other factors such as phosphorus or metals could control how much poultry litter or manure you can put out under certain conditions. A phosphorus index is being developed to help producers determine when nutrient management based on phosphorus is advisable. If your crop acreage is small in relation to the number of animals produced, the nutrient balance will allow you to evaluate how much manure or litter you may need to move off your farm to avoid over-application of nutrients.

Can the Nutrient Supply on Your Farm Be Managed or Changed?

After evaluation of the nutrient supply on your farm and the nutrient needs of your crops, you may find that the balance of nutrients is not ideal. You may have more of one or more nutrients (usually phosphorus) than you need. Many management practices can change the nutrient balance. These include:

- **changes in storage practices**
- **adjustments of animal feeds**
- **modification of treatment methods**
- **chemical amendments**

For example, you may be able to reduce nutrient losses in your manure treatment and/or storage system. Sometimes reducing nitrogen losses can make manures a better-balanced fertilizer for your crops. In addition, animal diets can sometimes be changed to reduce nutrient excretion in their manure. Enzymes can be added to the animal's diet to reduce nutrients in the manure. Phytase is a supplemental enzyme that allows better use of the phosphorus already present in grains, so less phosphorus has to be added to the animal's diet.

Manure Storage

Manure storage is critical since it affects both the quantity and quality of nutrients that will need to be land applied or exported from the farm. The storage structures and design capacities need to be identified as part of a CNMP. These structures also need to be managed to prevent nutrient losses and to protect water quality.

At the time a litter/manure clean-out operation is conducted, the litter/manure is often required to be placed in storage. Although litter storage does present an additional expense, it is a useful tool in a comprehensive Litter/Manure Management Plan. Litter/manure storage facilities can be divided into two basic categories, temporary structures and permanent structures. It is desirable to have a permanent structure for litter/manure storage.

Whether the structure is temporary or permanent, the siting of the facility is important. The following general guidelines should be implemented in siting and construction of a litter storage facility:

- easy access and terrain that keeps site grading to a minimum
- a 100-foot buffer strip should be maintained from wet areas, drainage ditches, streams, rivers, ponds, lakes or other surface water bodies
- permanent structures should have a base or floor of concrete or impermeable clay

- permanent structures should be designed in accordance with the USDA NRCS guidelines or the equivalent
- temporary storage should be covered with plastic or similar material to prevent runoff

Litter stored for three months or longer should be kept in a permanent storage facility. Litter that is used in a land application program and is applied directly from a poultry production house during a clean-out operation does not need a storage facility but should be handled in an environmentally sound manner.

Manure Application to Fields

Land application is the most common, and usually the most desirable, method of using manure because of the value of the nutrients and organic matter. Basic requirements of the manure management plan to ensure that material applied on the land does not cause pollution include (1) calculations to determine the proper amount of manure to be applied to meet, but not exceed, crop nutrient needs and (2) land management practices to prevent runoff and erosion of material applied to crop or pasture lands.

Manures should be applied near the time when crops need nutrients by using calibrated spreaders or irrigation equipment. Solid

or slurry manure should be incorporated into the soil when appropriate. Incorporation or mixing into the soil greatly reduces losses of nitrogen to the air and keeps more in the soil where it is needed. This also reduces potential odor emissions.

Some nutrients applied in excess of crop needs can accumulate in the soil and, at certain levels, may cause water pollution. High soil phosphorus levels have been linked to negative water quality impacts. On such fields, application of manure may need to be reduced or stopped to remove excess phosphorus from the soils through crop uptake.

Proper land management following manure application can reduce runoff and loss of nutrients to overland flow. Conservation practices that should be included as part of a land application plan are conservation tillage, grazing management, buffers and other practices that will prevent runoff, erosion and the washing of organic matter and nutrients from fields. Taken together with nutrient management, these practices will help to ensure that the right amounts of nutrients are applied to the field, that the nutrients stay on the field and that any potential pollutants that might be washed from the field are captured before they reach a stream or lake.

Poultry producers should keep records of the amount of manure removed from poultry houses, when the manure was removed and how it was used; the amount stored, the dates of storage and how it was used; and, when applied to fields under the producer's control, the amount applied to each field, its nutrient content and the date of application. The amount of manure transported to others should be recorded along with the date, amount and person receiving the manure.

Identify Alternative Uses for Excess Manures

If your manure production exceeds on-farm nutrient needs, you should identify alternatives to land application of your manure. Potential options include selling manures to other farmers, composting manures for use by homeowners or possibly selling it to other off-farm users.

When transporting litter/manure to an alternative use location, to a land application site or to any other location using public roads, trucks or other vehicles shall be covered and/or be contained well enough to prevent loss of material.

Mortality Management

A complete CNMP should identify how livestock or poultry mortalities will be managed. This should include:

- estimated amounts of normal mortality
- methods of disposal or use
- plans for dealing with catastrophic mortality events

The Louisiana Department of Agriculture and Forestry Livestock Sanitary Board regulates mortality disposal; all plans should meet its requirements. Approved methods of disposal are discussed in the Mortality Management section of this publication.

Preventive Maintenance and Inspections

Keeping good, detailed records that help you monitor your progress are essential to determine if your CNMP is accomplishing your goals. You should keep all results from soil, plant and manure tests and examine how they change with time because of your management practices. Also, keep records on crop yields, manure production, manure exports, nutrient application rates, timing and application methods. Keep detailed schedules and records on calibration of spraying and spreading equipment, maintenance of pumps and other machinery, and inspections and current capacities on manure storage facilities. When you have a major change in production, update your plan to reflect these changes.

Emergency Response Plans

The final aspect of your plan should include the procedures to be followed in an emergency. This should include actions taken to contain or manage any unauthorized discharge of manure or wastewater, a list of the proper authorities to notify when certain events occur and any authorizations necessary to obtain essential equipment or access to neighboring properties during these events. It should also outline a plan for training new employees in these procedures.

Where Can You Obtain Information Needed for Your CNMP?

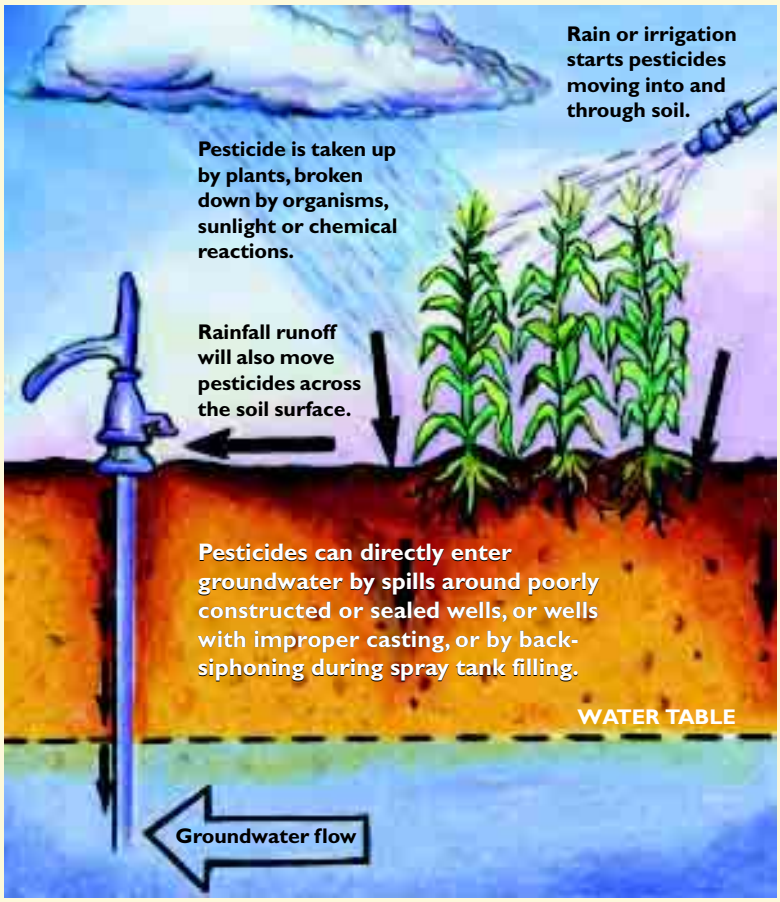
The LSU AgCenter, the USDA Natural Resources Conservation Service, the Louisiana Department of Agriculture and Forestry, certified crop advisors or other private consultants can help you in developing parts of a comprehensive nutrient management plan.

A CNMP is a good tool to help you use on- and off-farm resources more efficiently and to prevent future problems. A successful CNMP will help you obtain the maximum profit while protecting the environment.

Pesticide Management and Pesticides

Introduction

To preserve the availability of clean and environmentally safe water in Louisiana, contamination of surface and groundwater by all agricultural and industrial chemicals must be prevented. Some sources of contamination are easily recognizable from a single, specific location. Other sources are more difficult to pinpoint. Nonpoint source pollution of water with pesticides is caused by rainfall runoff, particle drift or percolation of water through the soil. Pest management practices will be based on current research and extension recommendations. By using these recommendations, you will follow environmentally sound guidelines for using pesticides.



Soil-incorporated systemic pesticide

Pesticide is carried into and through soil. Movement through soil is affected by soil and pesticide properties and amount and timing of water. Pesticide residue and by-products not absorbed are broken down into the groundwater.

Movement with groundwater – additional breakdown generally slowed, but depends on chemical nature and groundwater.

Pest Management Procedures

Pesticides will be applied only when they are necessary for the protection of the crop. The pesticide will be chosen following guidelines to assure that the one chosen will give the most effective pest control with the least potential adverse effects on the environment.

Water quality, both surface and ground, will be protected by following all of the label recommendations and guidelines dealing with water quality.

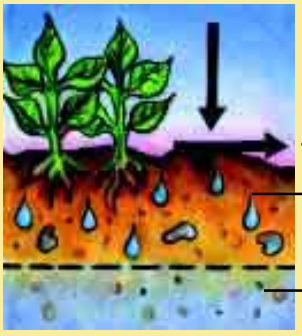
- All label statements and use directions designed specifically to protect groundwater will be closely followed.
- Specific Best Management Practices designed to protect surface water will be closely followed.
- Erosion control practices (such as pipe drops, etc.) will be used to minimize runoff that could carry soil particles with adsorbed pesticides and/or dissolved pesticides into surface waters.

Pesticide Application

Management practices such as the pesticide selected, the application method, the pesticide rate used and the application timing influence pesticide movement. Pesticides should be applied only when needed to prevent economic loss of a crop.

In pesticide application, "the label is the law." Using chemicals at rates higher than specified by the label is ILLEGAL as well as an environmental hazard because more pesticide is exposed to erosion, runoff or leaching. Poor timing of a pesticide application also can result in pesticide movement into water sources, as well as give little control of the targeted pest.

Certain areas on your farm such as streams and rivers, wellheads, lakes or ponds are sensitive to pesticides. You should create buffer zones around these areas where pesticide use will be reduced or eliminated. By buffering these areas, you can reduce water quality problems. Areas such as roads, off-site dwellings and areas of public gatherings should be identified. You may want to limit the use of pesticides near these types of areas.



The water table separates the unsaturated zone from the saturated zone (groundwater)

The following practices will be followed:

- Select the pesticide to give the best results with the least potential environmental impact outside the spray area.
- Application equipment will be selected with care and carefully maintained.

- The application equipment will be carefully calibrated at the beginning of the spray season and periodically thereafter. Spray according to recommendations.
- Spray drift will be minimized by following the label instructions and all rules and regulations developed to minimize spray drift (the physical movement of spray particles at the time of or shortly after application).
- Before a pesticide application is made, an assessment will be made of all of the environmental factors involved in all of the area surrounding the application site.

- Records will be carefully maintained of all pesticide applications, not just a record of Restricted Use Pesticides.

Pesticide Selection

When selecting pesticides, farmers should consider chemical solubility, adsorption, volatility and degradation characteristics. Chemicals that dissolve in water readily can leach through soil to groundwater or be carried to surface waters in rainfall or irrigation runoff. Some chemicals hold tightly to, or are adsorbed on, soil particles and do not leach as much. But even these chemicals can move with sediment when soil erodes during heavy rainfall. Runoff entering surface waters may ultimately recharge groundwater reserves. Chemicals that are bound to soil particles and organic matter are subject to the forces of leaching, erosion or runoff over a longer period, thus increasing the potential for water pollution.

The following practices will be followed:

- Selection will be based upon recommendations by qualified consultants, crop advisors and on the published recommendations of the LSU AgCenter.
- The selection of the pesticide to be used will be based upon its registered uses and its ability to give the quality of pest control required.
- The selection will also be based upon its impact on beneficials, other non-target organisms and on the general environment.

Pesticide Storage and Safety

Pesticide storage shed

Farmers and commercial pesticide applicators are subject to penalties if they fail to store or dispose of pesticides and pesticide containers properly. Each registered pesticide product, whether general or restricted use, contains instructions about storage and disposal in its labeling. The Louisiana Pesticide Law addresses specific requirements for storage and disposal. The applicator must follow these requirements carefully and ensure that employees follow them as well.

The recommended procedures do not apply to the disposal of single containers of pesticides registered for use in the home and garden. These containers may be disposed of during municipal waste collection if wrapped according to recommendations.

Storage sites should be chosen carefully to minimize the chance of pesticides escaping into the environment. Pesticides should not be stored in an area susceptible to flooding or where the characteristics of the soil at the site would allow escaped chemicals to percolate into groundwater. Storage facilities should be dry and well ventilated, and they should be provided with fire protection equipment. All stored pesticides should be carefully labeled and segregated and stored off of the ground. Pesticides should not be stored in the same area as animal feed. The facility should be kept locked when not in use. Further precautions include appropriate warning signs and regular inspection of containers for corrosion or leakage. Protective clothing should be stored close by but not in the same room as the pesticides because they may become contaminated. Decontamination equipment should be present where highly toxic pesticides are stored.

Exceptions for Farmers

Farmers disposing of used pesticide containers for their own use are not required to comply with the requirements of the hazardous waste regulations provided that they triple rinse or pressure wash each container and dispose of the residues on their own farms in a manner consistent with the disposal instructions on the pesticide label. Note that disposal of pesticide residues into water or where they are likely to reach surface or groundwater may be considered a source of pollution under the Clean Water Act or the Safe Drinking Water Act and therefore is illegal.

After the triple rinse procedure, the containers are then "empty" and the farmer can discard them in a sanitary waste site without further regard to the hazardous waste regulations. The empty containers are still subject to any disposal instructions contained within the labeling of the product, however. Disposal in a manner "inconsistent with the labeling instructions" is a violation of EPA guidelines and could lead to contamination of water, soil or persons and legal liability.

Emergency Planning and Community Right-to-Know

Farms that use pesticides may be "facilities" subject to the notification requirements of the law. Notification is also required for emergency releases of hazardous chemicals. Proper application of pesticides is not covered under this law. The community right-to-know provisions of the act require that material safety data sheets required under OSHA, as well as documents showing the location and amount of chemicals present at the facility (if the quantity exceeds the "reportable quantity"), be provided to the state and local emergency planning bodies and to the local fire department.

Agricultural Chemicals and Worker Safety

The EPA has general authority to regulate pesticide use in order to minimize risks to human health and to the environment. This authority extends to the protection of farm workers exposed to pesticides. All employers must comply with ALL instructions of the Worker Protection Standard concerning worker safety or be subject to penalties. Labels may include, for example, instructions requiring the wearing of protective clothing, handling instructions and instructions setting a period of time before workers are allowed to re-enter fields after the application of pesticides (Restricted Entry Interval).

Employers should read the Worker Protection Standard regulations governing the use of and exposure to pesticides. The regulations set forth minimum standards for the protection of farm workers and pesticide handlers that must be followed. The regulations include standards requiring oral warnings and posting of areas where pesticides have been used, training for all handlers and early re-entry workers, personal protective equipment, emergency transportation and decontamination equipment.

The EPA regulations hold the producer of the agricultural plant on a farm, forest, nursery or greenhouse ultimately responsible for compliance with the worker safety standards. This means the landowner must ensure compliance by all employees and by all independent contractors working on the property. Contractors and employees also may be held responsible for failure to follow the regulations.

The Occupational Safety and Health Act (OSHA)

The federal government also regulates farm employee safety under the Occupational Safety and Health Act (OSHA). OSHA applies to all persons (employers) engaged in business affecting interstate commerce. The federal courts have decided that all farming and ranching operations affect interstate commerce in some respect, regardless of where goods are produced, sold or consumed, and thus are subject to OSHA's requirements. In general, every employer has a duty to provide employees with an environment free from hazards that cause or are likely to cause death or serious injury.

In summary:

A. All label directions will be read, understood and followed.

B. The Louisiana Department of Agriculture and Forestry (LDAF) is responsible for the certification of pesticide applicators. All pesticide applicators in Louisiana must successfully complete a certification test administered by the LDAF. The LSU AgCenter conducts training sessions and publishes study guides in various categories covered by the test. Contact your county agent for dates and times.

C. All requirements of the Worker Protection Standard (WPS) will be followed, including, but not limited, to:

• *Notifying workers of a pesticide application (either oral or posting of the field), abiding by the restricted entry interval (REI).*

• *Maintaining a central notification area containing the safety poster; the name, address and telephone number of the nearest emergency medical facility; and a list of the pesticide applications made within the last 30 days that have an REI.*

• *Maintaining a decontamination site for workers and handlers.*

• *Furnishing the appropriate personal protective equipment (PPE) to all handlers and early entry workers and ensuring that they understand how and why they should use it.*

• *Assuring that all employees required to be trained under the Worker Protection Standard have undergone the required training.*

D. Pesticides will be stored in a secure, locked enclosure and in a container free of leaks, abiding by any specific recommendations on the label. The storage area must be maintained in good condition, without unnecessary debris. This enclosure will be at least 150 feet away and down slope from any water wells.

E. All uncontained pesticide spills of more than one gallon liquid or four pounds dry weight will be reported to the director of Pesticide and Environmental Programs, Louisiana Department of Agriculture and Forestry, within 24 hours by telephone (225-925-3763) and by written notice within three days. Spills on public roadways will be reported to the Louisiana Department of Transportation and Development. Spills into navigable waters will be reported to DEQ, Coast Guard, USEPA.

F. Empty metal, glass or plastic pesticide containers will be either triple rinsed or pressure washed, and the rinsate will be added to the spray solution to dilute the solution at the time or stored according to the LDAF rules to be used later. Rinsed pesticide containers will be punctured, crushed or otherwise rendered unusable and disposed of in a sanitary landfill. (Plastic containers may be taken to specific pesticide container recycling events. Contact your county agent for dates and locations in your area.)

G. All pesticides will be removed from paper and plastic bags to the fullest extent possible. The sides of the container will be cut and opened fully, without folds or crevices, on a flat surface; any pesticides remaining in the opened container will be transferred into the spray mix. After this procedure, the containers will be disposed of in a sanitary landfill.

H. Application equipment will be triple rinsed and the rinsate applied to the original application site or stored for later use to dilute a spray solution.

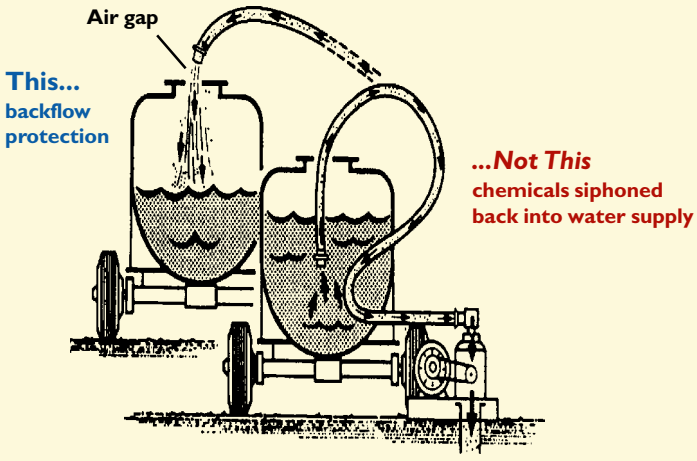
I. Mix/load or wash pads (NRCS production code Interim) will be located at least 150 feet away and down slope from any water wells and away from surface water sources such as ponds, streams, etc.

Wash pad with collection pond

The pads will be constructed of an impervious material, and there will be a system for collecting and/or storing the runoff.

J. Empty containers will not be kept for more than 90 days after the end of the spray season.

K. Air gaps will be maintained while filling the spray tank to prevent back-siphoning.



Management of Poultry Mortality

Dead broilers, from normal mortality alone, result in more than 200,000 pounds of carcasses to be disposed of weekly. A satisfactory system for disposal of dead birds and farm animals is necessary for sanitation, disease and odor prevention, and for environmental protection. Moreover, the Louisiana Livestock Sanitary Board requires that poultry producers have an approved method for disposing of dead birds. Poultry carcasses cannot be legally fed to hogs or alligators in Louisiana unless they are first cooked or rendered. A complaint to the Livestock Sanitary Board, the Department of Health and Hospitals (DHH) or the Department of Environmental Quality (DEQ) concerning non-compliance with these regulations will result in an inspection by the enforcement staff and possible fines and/or penalties.

Louisiana Department of Agriculture and Forestry (LDAF) regulations, specifically LAC 7:11771, state that dead poultry shall be disposed in the following manner:

- All commercial poultry producers are required to obtain a certification of approval for disposing of dead poultry from the State Veterinarian's Office, LDAF. Failure to obtain a certificate shall be considered a violation of the regulation. Certificates of approval are continuous, but subject to review and cancellation should the poultry producer fail to dispose of dead poultry in accordance with the regulation. The LDAF will be responsible for follow-up to ensure that all conditions and requirements are met.

- Dead poultry must be removed from the presence of the live poultry without delay. The carcasses, parts of carcasses and offal must be held in covered containment until disposal is made by one of the approved methods. In no instance, however, will the storage of dead poultry be allowed to create sanitary problems.

Commercial poultry producers shall be required to dispose of dead poultry by one of the following methods:

Composting

The design, construction and use of compost units must be approved by an authorized representative of the Livestock Sanitary Board. Design criteria for composting structures shall meet or exceed standards and specifications for composting structures contained in the USDA Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG). Composting of dead poultry and litter will be completed in accordance with management practices contained in the FOTG.

Incinerators

Incinerators shall be constructed in a manner and design capable of providing a method of disposal of dead poultry that prevents the spread of diseases.

The design and construction must be approved by an authorized representative of the Livestock Sanitary Board and shall meet state and federal air emission standards. Incinerators are subject to LAC33:III.2521 and LAC33:III.2531 discharge regulations. An air emission permit is required from DEQ for all incinerators. Prior to placing an incinerator into operation or using an existing incinerator, a permit must be on file with DEQ Permit Division. For questions about permitting of incinerators, contact Dick Lehr (225) 765-2723 or Annette Sharp (225) 765-0288 with the DEQ Small Business Assistance Program.

Rendering Plant

Dead poultry, parts of carcasses and poultry offal may be transported in covered containers to approved rendering plants. Poultry carcasses may be held on the premises of commercial poultry producers as long as the storage does not create a sanitary problem. All such methods of storage, modes of transportation and location of rendering plants shall be submitted to and approved by an authorized representative of the Livestock Sanitary Board.

Digesters

Poultry digesters may be used if the following conditions are met:

A. The design, construction, location and use of digesters must be approved by an authorized representative of the Livestock Sanitary Board.

B. The bacteria being used in the digester must be approved by an authorized representative of the Livestock Sanitary Board.

C. The digester must be maintained according to recommendations of an authorized representative of the Livestock Sanitary Board.

For more information about the disposal of dead poultry, contact the LDAF's Livestock Sanitary Board.

Management

From a management standpoint, the disposal method needs to meet several criteria. It should be convenient, sanitary, economical, practical, legal and socially acceptable. Place tightly covered containers for carcass accumulation at the entrance of each production house. Dead animals and birds should be removed from production facilities at least once each day, preferably more frequently, especially when disease conditions are present and/or temperatures are high. Empty these containers into disposal facilities at least every 24 hours to prevent dead birds from becoming a problem.

Improper methods of disposal include dumping carcasses in the woods, in a creek or feeding them to other livestock on the farm. These unacceptable practices cannot be permitted and are illegal.

Modern farm businessmen recognize the importance of having a sanitary means for disposal of dead birds and animals. They know that convenient, sanitary and fast disposal is imperative if they are to prevent diseases from spreading. Good waste management practices are essential if the poultry industry is to grow and thrive under today's environmental conditions. Properly used poultry wastes are a resource with minimal environmental effects. Improperly handled or used poultry wastes can degrade the environment, spread diseases and damage the favorable image developed by poultry producers.

Incineration

Incineration of dead birds and animals may be the quickest and most sanitary method of disposal. Wastes can be disposed of as fast as they accumulate, and the resulting stabilized residue does not attract scavengers or insects. Commercial units are available with oil or gas burners and are usually equipped with automatic timers. Barrels, stoves or homemade incinerators seldom meet air pollution control standards.

Incineration may be a problem with larger animals, depending on the size and availability of DEQ-approved incinerators.

Management recommendations include:

1. Purchase only approved incinerators.
2. Locate incinerators downwind from poultry houses and populated areas.
3. Remove ashes before each firing to assure proper performance, reduce maintenance and maximize incinerator life.
4. Clean grates, check burner jets and adjust the timer regularly to get a complete burn.
5. Protect the unit from the weather when not in use, if mobile, or construct a simple open metal structure to extend its life.
6. Maintain a distance of at least 4 feet or provide heat protection between smokestacks and wooden structures or trees because of the intense heat generated.

Incinerator manufacturers specify capacities of their equipment, usually in pounds per day to be incinerated. Refer to Table I below to determine the incinerator size to meet your specific needs.

When properly adjusted and operated, cost of incineration will vary with weight, moisture content, loading density and fat content. It is important not to overload the incinerator, because this will lead to incomplete incineration of the carcasses. An incinerator can be expected to last from five to seven years.

Rendering

Growers who live near a rendering plant could use this method. There are only a few rendering plants in Louisiana, and they are not generally available to growers. Some out-of-state firms also pick up carcasses for rendering. Rendering cost is estimated to be from 3.5 to 5.0 cents per pound. Assuming the plant is reasonably close, this method may be the most cost-effective. Besides the cost of fuel for delivery, there is a risk of picking up disease organisms on the vehicle at or near the plant and transporting them back to the flock. This disease risk is of great concern to the poultry industry.

Central drop-off facilities for rendering are being tried in other states. The central-facility approach may have real promise

Table I.
Expected Disposal Requirements For Poultry Flocks

Type of Poultry	Average Mortality Rate	Carcass Weight (Pounds)	Flock Size for 100 pounds/day
Egg Production-type Layers	1% per month	3-3.5	100,000
Egg Production-type Breeders	1% per month	3-3.5	100,000
Broilers	3% per cycle	1	200,000
Broiler Breeders	1% per month 3-3.5	6	50,000

if the disease transmission and sanitation problems can be overcome. Between pickups, dead birds must be secured in a closed area or container to prevent animals such as dogs or coyotes from removing them. Depending on frequency of pickup, they may need to be frozen to prevent decomposition and odors. Researchers and integrators are actively working to develop systems for the safe storage and transport of poultry carcasses for rendering.

Digesting

The Louisiana Department of Agriculture and Forestry regulates the construction and operation of digesters in Louisiana through the Livestock Sanitary Board. To use this method of mortality management, a permit is required. Contact the Livestock Sanitary Board for current regulations on the construction and operation of digesters.

Composting

Composting converts organic matter, such as dry poultry waste or dead chickens, into a more uniform and relatively odorless substance called humus or compost. Active composting is the controlled version of natural decay. By creating the right conditions, organic breakdown is accelerated, producing high temperatures that kill pathogens. It is receiving increased attention as more people search for less expensive alternatives to solid waste management.

Composting is a natural process in which beneficial microorganisms — bacteria and fungi — reduce and transform or change organic wastes into a useful end product — compost. Composting is considered an aerobic (oxygen-requiring) process. It will normally reduce the volume by 50 percent or more.

Dead poultry management is one example of an appropriate use of composting for preparation of a waste material for land application. The universities of Maryland and Delaware have been conducting research on dead bird composting since 1987. Their studies have shown that properly constructed and operated two-stage composters can destroy both heat-resistant and heat-sensitive poultry pathogens in less than two weeks. They have assisted in the construction and operation of dead bird composters on broiler farms in Delaware, Maryland and Virginia without disease or performance problems. Other states such as Alabama, Arkansas and Mississippi have had good results with composting. Louisiana has recommended and approved composting of dead birds since 1994.

Composter

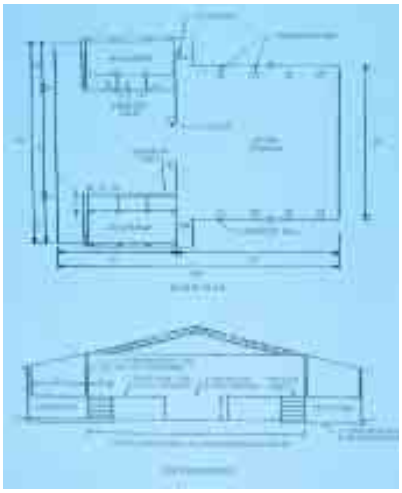
In dead bird composting operations, a prescribed mixture of dead chickens, manure, litter, straw, hay or rice hulls and water provide the necessary ingredients for speeding the process and changing the mixture to compost. The key factors for successful aerobic composting are a proper carbon to nitrogen ratio (about 23:1), the proper moisture content (about 55 percent) and an adequate supply of oxygen for the bacteria. Acceptable carbon to nitrogen ratios (C:N) are between 15:1 and 35:1. Acceptable moisture content ranges are between 40 percent and 60 percent. The carbon source may be rice hulls, wood shavings, straw, litter or similar material.

The microorganisms in the composting process are heat-generating. They may cause the temperature of the mixture to rise

as high as 170 degrees F. Typical temperatures are between 140 and 160 degrees F. Temperatures higher than 160 degrees F pose the risk of fire and should be avoided by turning the compost pile. The producer should monitor the temperature daily to make sure the composting process is proceeding properly.

The nitrogen content and the crude protein value of the material can be reduced as much as 40 percent through composting. This can be an advantage if the owner has a limited land area for spreading wastes and needs a way to reduce nitrogen application rates.

Composting reduces the weight, volume and moisture content of the original material. If the material is properly managed during the composting process, the final product will be a rich, uniform mixture suitable for pasture/field application or use in gardening and nurseries.



Composter size is based on broiler farm capacity, overall bird size at the end of the production cycle and mortality. The NRCS has recommended design specifications for dead bird composters.

Table II.
Number of first stage composter bins required based on number of broilers on hand (NRCS Specifications).

Farm capacity	Required cubic feet for first stage bins	No. of first stage bins (5' x 6' x 8')	Required cubic feet for second stage bins
20,000	480	2	480
40,000	720	3	720
60,000	960	4	960
80,000	1200	5	1200
100,000	1440	6	1440
120,000	1680	7	1680

A simple mixture of straw or hay, dead chickens, poultry litter, water and oxygen will produce the beneficial bacteria and fungi needed to convert these materials into an inoffensive, useful compost. Odors and insects have not been a problem in research studies when composters are properly operated. Tests on certain pathogens (such as *E. coli*) and on Gumboro and New Castle disease viruses prove that these pathogens do not survive the pasteurizing effects of composting. Once the weight and volume relationships of one day's dead poultry are determined, the other elements can be weighed according to the formula in Table III. Weigh the elements in buckets on scales the first day. On subsequent days, a loader can be used once the weight of a full loader/bucket is determined for each element except water. One gallon of water weighs about 8 pounds. Or, use a hose to deliver the correct amount of water based on a percolation test (the time necessary to deliver the required gallons through the hose). Some growers in Mississippi have found that no additional water is needed when litter is wet.

Table III.
Formula for dead poultry composting

Materials	Parts by weight
Poultry carcasses	1
Chicken manure, litter cake	1.2
Straw (hay) or litter	.1
Water (add sparingly)	.75

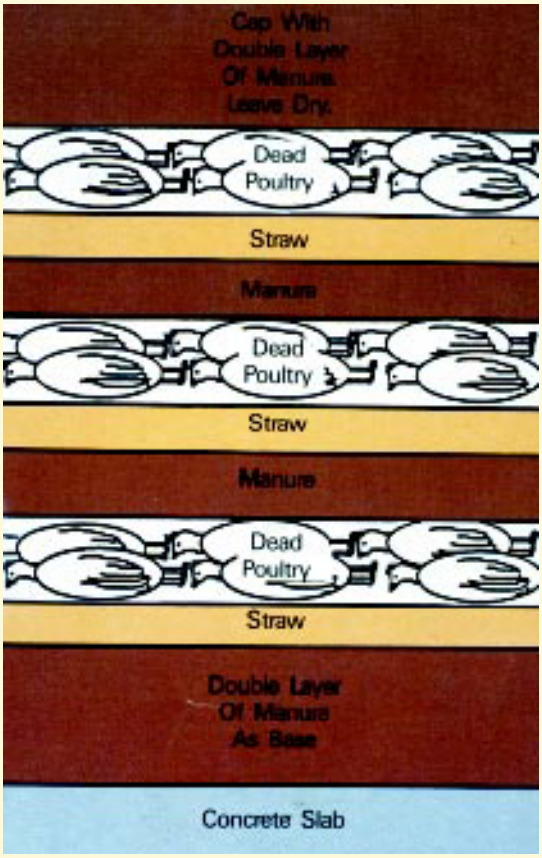
The mixture is placed in a primary bin in layers. A 1-foot layer of manure cake (litter) is first placed on the concrete floor of the bin. Then a 6-inch layer of straw/hay is added to aid in aeration and to provide a source of carbon. After these two layers, ingredients are added according to the formula, beginning with a layer of carcasses, a layer of litter, a layer of straw, then water (typically, 1 pound of water/2 pounds of carcass). This completes one batch. The second and all subsequent batches begin with a layer of carcasses, litter, straw and water, in that order. After the last batch is added, the final cover cap is a double layer of litter. Do not add water to this final cap. A small amount of fly bait may be added to each layer daily if flies become a problem. See Figure 1 for details on layering the ingredients.

During the composting process, the volume of the mass will reduce 25 percent to 30 percent, enabling the operator to add more material to the top of the bin.

Ideally, the composter will be sized so that the average day's mortality will equal one layer of dead chickens in the primary bin. Each subsequent day, layer the dead chickens and the other elements in the bin (manure, chickens, straw; manure, chickens, straw. See Figure 1). If the bin is too large to make a full layer in one day (when chicks are young, for example), a half or quarter layer can be formed, using extra litter to cover the exposed edge of the partial layer. Use only one layer of dead birds (over 1/2 pound/carcass) per layer.

Monitor the temperature in the compost pile with a 36-inch metal probe thermometer. The pile should reach 140 to 160 degrees F within a day or so, which pasteurizes the compost. After a week or so when the temperature starts to drop, move the material to the second stage bin or secondary alley for aeration and reheating. A skid loader both mixes and aerates the compost as additional compost from primary bins is added to the older compost in the secondary bin or alley. The temperature in the secondary bin will begin to rise as beneficial bacterial activity begins and will peak in five to 10 days. Monitor the temperature in Stage 2 just as in the primary stage. Be sure to check the moisture content of the pile if temperatures fail to rise.

Figure 1. Dead poultry composter bin layering



The final step is to store the pasteurized compost. Poultry carcass compost should be allowed to cure for approximately 30 days before applying to land. After removal from the secondary composting bin, stack or pile the compost no more than 7 feet high in a dry stack facility or pole barn or under a waterproof cover, and do not allow the compost to come into contact with any fresh manure, litter or drainage water. Curing allows further drying and aerobic decomposition. As a result, the pH of finished compost is generally around neutral, the C:N ratio decreases, the cation exchange capacity increases, the concentration of humus increases and nitrate-nitrogen formation takes

place. The pile is also recolonized by soil microorganisms. This gives the compost some disease-suppressing qualities. Curing may be considered complete when the pile temperature falls to near the temperature of surrounding air. At the appropriate time during the growing season, apply compost directly to the land. Work it into the soil, using the same guidelines as applied to poultry manure.

Loading and managing a composter sized for a broiler farm with a 100,000 to 130,000-bird capacity takes about 20 minutes a day over and above the time necessary to pick up the dead chickens.

Composter design can vary considerably and still perform well, but experience teaches that all good composters have certain common features:

Roof: Although some materials may be composted in the open, this does not work well with dead bird composting. A roof ensures year-round operation and controls rainwater and percolation, which can be major problems. Stormwater regulations will probably require roofs in the future.

Foundation: An impervious, weight-bearing foundation (preferably concrete) is critical to all-weather operation because the bottom of the compost pile may get wet and soggy and cause traction problems for equipment. A concrete foundation secures the composter against rodents, dogs, etc., and reduces contamination of the surrounding area.

Building Materials: Specify pressure-treated lumber or other rot-resistant materials because they resist rotting caused by alternative wet-dry cycles and will extend the life of the facility.

Composter Size: Capacity of the composter must be sufficient to handle average mortality. The NRCS recommendations for composter size are shown in Table II.

Thermometer: Monitoring the composting temperatures is very important in good management of a composting unit. A 36-inch probe thermometer is effective for monitoring temperature in typical composting bins.

The cost of materials for the composter, including the concrete pad, will range from $1,500 to $5,000 for a 40,000-bird operation. Total cost will depend on composter size, design and the cost of labor to construct the unit. Researchers in Alabama estimate the cost of composting dead birds at 2.1 cents per pound. The estimated useful life of a composting unit is 10 to 15 years. Detailed composter recommendations are available from the local NRCS, Extension Service office or Soil and Water Conservation District.

The nutrient content of the compost will vary, depending on the amount and nutrient content of the manure and litter, the age of the compost and the method of storage. Compost samples analyzed by the University of Delaware had the following average analysis on an “as-sampled basis”:

Moisture	**28%**
Nitrogen (total)	**1.85%**
ammonium nitrogen	**0.15%**
organic nitrogen	**1.70%**
P_2O_5	**2.29%**
K_2O	**1.56%**

A ton of compost with the above analysis would provide 37 pounds of nitrogen (N), 46 pounds of phosphate (P_2O_5) and 31 pounds of potash (K_2O). Because of variation in nutrient composition of composts, regular analyses for nitrogen, phosphorus, potassium, sulfur and micro-nutrients are desirable.

The value of applying this compost to agricultural land as compared to commercial fertilizer is about $23.40 per ton. This figure is based on 37 pounds of N at $0.20 per pound, 46 pounds of P_2O_5 at $0.24 per pound and 31 pounds of K_2O at $0.16 per pound.

As with any organic soil amendment, actual nitrogen availability to plants depends on method of application. If the compost is spread on the surface, most of the ammonia will volatize and pass off as a gas. If incorporated, most of the ammonia will be available for plant use. Phosphorus, potassium and micro-nutrients will remain for plant use.

Compost may be applied using conventional rear-delivery or side-delivery manure spreaders for covering large acreage. For application of compost as a top-dressing, broadcast cyclone-type applicators are used. To obtain maximum uniformity of application and reduce handling problems, compost should contain less than 40 percent moisture.

Land application of compost or any poultry waste, like application of fertilizer, must balance nutrient content with the crop nutrient needs based on regular soil tests and realistic yield goals. The biggest problem is over-application. This is not only wasteful, but it also can result in excessive levels of salts, nitrogen and phosphorus. Nutrients not taken up by plants can be lost to groundwater by leaching or to surface water through runoff.

To avoid excessive nutrient application, apply compost based on the nitrogen or phosphorus need of the crop and soil test results. Nitrogen in compost is not as readily available as nitrogen in fresh poultry litter because more is in the organic form and less in the ammonium and urea form. In general, 50 percent to 65 percent of the total nitrogen will be available during the growing season in which it is applied. Assume 75 percent of the phosphate and potash will be available. The rest will be available in following years.

Apply compost as close to planting as possible for row crops and annual crops, and incorporate with normal soil tillage operations. For perennial summer grass pastures and hayfields (bermudagrass and bahiagrass), apply in early spring and again in early summer if additional growth is needed. For cool-season perennial grass pastures and hayfields (fescue and ryegrass), make early fall and early spring applications. Based on the average analysis given earlier, and assuming 65 percent of the nitrogen will be available during the season, the following application rates may be appropriate. Contact your county agent for current recommendations.

Table IV. Suggested application rates of dead bird compost

Crop	Time of application	Tons of compost per acre
Corn	1-2 mos. before planting	7.5
Cotton	1-2 mos. before planting	3.2
Small grains (forage) & temporary winter grazing	before fall planting top-dressing in late winter	3.6 2.2
Summer pasture (bermuda, bahia)	early spring early summer	2.5[a] 2.5[a]
Cool-season pasture (fescue, ryegrass)	early fall late winter	2.5 2.5

[a]Double this rate for hay production.

Abnormal Death Loss

If a large number of poultry carcasses need to be disposed of because of weather-induced death (heat stress, etc.), flooding or condemnation, normal disposal measures are likely to be inadequate. In the event of the death of more than 1 percent of broilers or 0.5 percent of pullets or breeders over four weeks of age on the same premises within a 24-hour period (the death of which is not known to be caused by a contagious or infectious disease), the dead poultry may be disposed of by on-site burial. The State Veterinarian's Office must be notified immediately by telephone or facsimile if excessive mortality requires on-site burial.

General Farm BMPs

A. Water well protection -

Farm*A*Syst/ Home*A*Syst should be used every three years to determine potential threats to water wells. Threats identified will be ranked and measured to correct the most serious.

B. Used engine oil, grease, batteries, tires, etc.

1. Used engine oil should be stored in a waste oil container (tank or drum) until recycled.

2. Empty paint cans, anti-freeze containers, used tires, old batteries, etc., will be stored in a secure area until they can be disposed of properly.

C. Irrigation water quality

Irrigation water (surface and/or well) should be tested in the spring to determine the salinity (salt) level before flooding rice fields. Take samples to an approved laboratory for analysis.

D. Fuel storage tanks

Above-ground fuel storage tanks in Louisiana are regulated by the State Fire Marshal and by the EPA if surface water is at risk. Above-ground tanks containing 660 gallons or more require secondary containment. The State Fire Marshal recommends that some sort of secondary containment be used with all fuel storage tanks. This could include the use of double-walled tanks, diking around the tank for impoundment or remote impoundment facilities.

These practices are to be followed:

• Any existing above-ground fuel storage tank of 660 gallons or more (1320 gallons if more than one) must have a containment wall surrounding the tank capable of holding 100 percent of the tank's capacity (or the largest tank's capacity if more than one) in case of spillage.

• The tank and storage area should be located at least 40 feet from any building. Fuel storage tanks should be placed 150 feet and downslope from surface water and water wells.

• It is recommended that the storage tank be on a concrete slab to prevent any spillage from entering surface and ground water.

• The storage area should be kept free of weeds and other combustible materials.

• The tank should be conspicuously marked with the name of the product that it contains and "FLAMMABLE — KEEP FIRE AND FLAME AWAY."

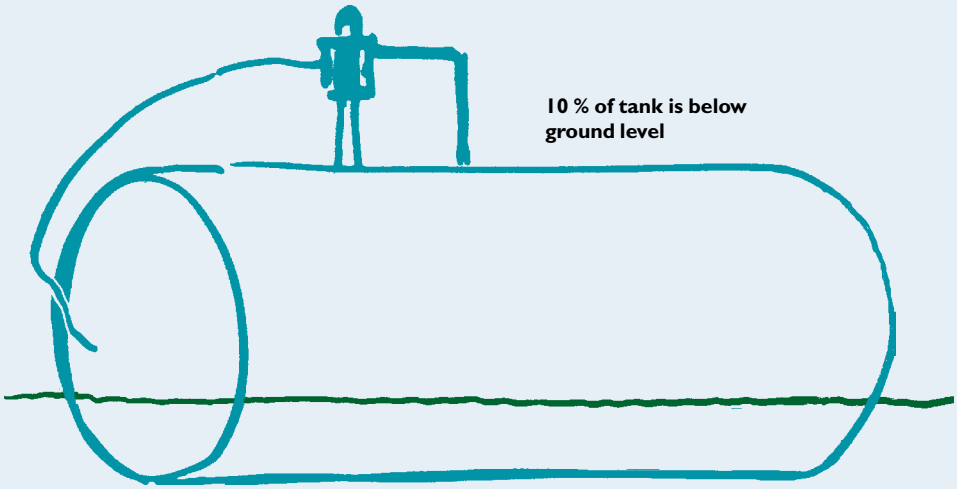
• The bottom of the tank should be supported by concrete blocks approximately 6 inches above the ground surface to protect the bottom of the tank from corrosion.

• If a pumping device is used, it should be tightly and permanently attached and meet NFPA approval. Gravity discharge tanks are acceptable, but they must be equipped with a valve that will automatically close in the event of a fire.

• Plans for the installation of all storage tanks that will contain more than 60 gallons of liquid must be submitted to the State Fire Marshal for approval.

• All tanks that catch on fire must be reported to the State Fire Marshal within 72 hours of the fire.

• Underground storage tanks are defined as containing more than 10 percent of their total volume beneath the soil surface. Underground tanks represent more of a problem than above-ground tanks, because leaks can often go for long periods without being detected. This poses a serious threat to groundwater sources in the vicinity of the tank. If you have an underground fuel storage tank, you need to contact the State Fire Marshal's Office for regulations affecting these storage tanks.



This tank would be classified as an underground fuel tank.

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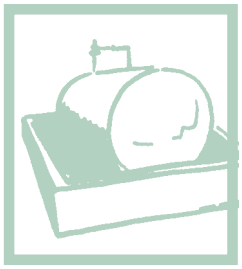

The complex nature of nonpoint pollution means programs designed to reduce its impact on the environment will not be easy to establish or maintain. Controlling these contaminants will require solutions as diverse as the pollutants themselves. Through a multi-agency effort, led by the LSU AgCenter, these BMP manuals are targeted at reducing the impact of agricultural production on Louisiana's environment. Agricultural producers in Louisiana, through voluntary implementation of these BMPs, are taking the lead in efforts to protect the waters of Louisiana. The quality of Louisiana's environment depends on each of us.

Visit our website:
www.lsuagcenter.com

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