NRCS Natural Resources Conservation Service

In-House Pasteurization of Litter Waste Treatment

Conservation Practice Job Sheet 629

Build a windrow 2-3 feet high and conical shaped

Definition

The mechanical, chemical, and biological treatment of poultry litter to provide for extended reuse and timing of applying nutrients to crop needs.

Resource Management System

In–house litter pasteurization, litter amendments, and other management practices are all part of a system approach to reduce pathogens, air emissions, improve bird health, and reduce waste generation and storage issues.

This process allows for systematic partial house clean outs at strategic times rather than large volumes of litter with whole house clean outs. This will reduce manure storage needs, significantly reduce field stockpiling, allow for improved timing of manure removal to meet the nutrient needs of plants, and reduce potential off site surface and groundwater contamination.

Purpose

To use mechanical, chemical, or biological treatment processes as part of an agricultural waste management system:

1. Reducing the numbers of poultry and food borne pathogenic parasites (i.e. Salmonella spp., Escherichia coli, Campylobacter spp., Staphylococcus aureus, and parasites (i.e. coccidia) using elevated temperatures to kill microorganisms.
2. Reducing the potential of nutrient contamination of surface and groundwater sources by reducing the frequency of manure typically removed from houses and timing partial litter removals to the nutrient needs of plants. The goal is once a year to remove approximately 50% of the litter from the house annually.
3. Reduce pathogen exposure, leading to improved health and productivity.
4. Reduce litter insect populations, leading to decreased insecticide use.

Condition Where Practice Applies

Poultry production is the largest animal agricultural industry in Delaware. The large quantity of litter generated from the poultry industry has raised concerns with environmental regulators about how poultry litter is handled, stored, and utilized.

Bedding material has become a scarce and expensive commodity. Many poultry producers re-use the litter for extended periods of time (i.e. 3-5 years). One of the issues with re-used poultry litter is higher disease challenges. Pathogenic microorganisms associated with continued re-use of litter can cause serious infections that may lead to death of the birds and decreased growth rate and feed efficiency.

In the past, typically houses were cleaned out in the winter to avoid ammonia and pathogenic microorganism issues. However storage and timing was an issue. The large volume of manure removed resulted in field stockpiling of manure until the spring, when it was spread on the land and utilized by crops. The stockpiled manure led to water quality concerns associated with the leaching of nutrients to shallow water tables typical of the winter months.

Spreading out the windrowed pile

In re-used litter, there are also concerns with pathogenic microorganisms. They can be a potential source of food borne illness in humans and may be pathogenic to poultry, causing serious infections that may lead to the death of the bird. In-house pasteurization is a method using elevated temperatures to kill microorganisms. Research at Auburn University showed that maximum temperatures (130 F to 140 F) are reached within 24 hours of windrowing litter and temperatures dropped off after about 48 hours. This is long enough to kill most heat-sensitive pathogenic bacteria and viruses.

Process

The ideal time to start windrowing is the first flock following a total cleanout. If starting with built-up litter, it is best to implement during warm or moderate weather. Warmer outside air temperatures helps insure the ideal composting temperatures with the pile can be reached in less time.

Implement the windrowing process within 2 days following bird movement. Initial litter moisture requirements should be between 25 to 35%. The combination of elevated temperatures, gases generated during the heating process (ammonia and carbon dioxide), and microbial competition aid in pathogen reduction.

Turning the windrow at least once, insures temperature uniformity throughout the mass and is essential in reducing ammonia and moisture. Turning also exposed the cooler portions of the pile to higher temperatures.

Following the pasteurization process, the piles are broken down, and spread out using a skid-steer loader or tractor with blade. It is important to provide adequate ventilation in the houses, allowing ammonia and moisture to escape during the entire process.

If the amount of cake (crusts) is excessive, removing crust and allowing the house to dry out prior to the new flock arriving reduces moisture and ammonia levels. The use of chemical litter treatments to lower pH in the litter and bind ammonia early in the brood cycle is essential.

Operation and Maintenance

1. Inspect the litter profile in each of the 3 chambers of the poultry house to verify and record litter depth and condition prior to starting a long term litter management program.
2. Manage litter depth for windrowing at a depth of 4-6 inches. When litter is over 8 inches and contains hardpans, a partial cleanout is recommended. This should be done in the spring or fall and when there is suitable storage, land application, or other alternative litter uses. Unless excess cake exists, there is no need to crust out prior to windrowing as moisture is needed for the pasteurization process.
3. If a partial clean out is planned, this should be accomplished prior to the windrowing process. This can be accomplished by removing all litter from 50% of the floor area. Alternate litter removal form the center of the house first time, then remove from the sidewall the second time.
4. If the hardpan is encountered, use a skid steer loader to remove the hardpan. In some situations a sturdy piece of farm equipment i.e. chisel plow or row cultivator with

straight teeth, may be required to loosen this hardpan before removal.

5. If you plan to wash down the house, complete this process prior to windrowing litter.
6. Form windrows on each side of the house. Create two or more windrows the length of the house with recommended equipment (2-3 feet high and conical shaped). All litter, including that under the windrow base, sidewalls, and corners should be turned and go through the heating process.
7. Operators shall wear a respirator with ammonia filters during this and subsequent operations.
8. If darkling beetle is a problem, apply approved insecticide at approved rates, ideally within 12 hours after pile formation.
9. Record temperatures at 3 locations per house per day using digital thermometers with 8 inch or 12 inch probes. Insert the probe at the top of the windrow pile, the full length of the probe.
10. Windrow temperatures must be maintained for a minimum of 130 F for a minimum accumulated period of 3 days.
11. Turn the pile approximately 4 days after constructing the initial pile. Completely turn the pile, include the volume to the floor.
12. When the second windrowing operation has met the desired temperature guidelines, use a skid-steer loader or a tractor with blade to level out the litter and allow additional ammonia and moisture to escape. Removing the escaping ammonia and moisture using adequate ventilation is very important. Note: Depending on ambient weather conditions, the end doors should be open, ventilation fan set on timer, or a tunnel fan set on temperature. **Ventilation to remove ammonia and moisture should be provided from the day of windrowing until chick placement.**
13. Evaluate the condition of the litter for wet crust. If significant, these crusts shall be removed.
14. Allow the litter to dry out over 4 days prior to chick placement.
15. A minimum 10 day layout is needed to implement the windrowing procedure. Windowing should be avoided if there is inadequate layout time or in extremely cold weather that does not allow adequate conditions for moisture and ammonia removal.
16. Apply litter amendment at the specified rate.

Specifications

Specifications for this practice and been developed in cooperation with the University of Delaware Cooperative Extension. This job sheet was prepared in accordance with the NRCS Field Office Technical Guide and the Waste Treatment practice standard (629).

In House Pasteurization – Job Sheet

Landowner_____

Planner Certification
Planner certifies they have reviewed the Operation and Maintenance section of this job sheet with the producer Planner: _____Date: _____

Purpose (check all that apply)	
☐ Reduce field stacking by eliminating whole house cleanouts	☐ Reduce use of anti-microbial chemicals and insecticides
☐ Improving water quality by timing partial manure removal to the nutrient needs of crops and reduce crusting	☐ Extend the re-use of litter, reducing cake removal and storage
☐ Improve poultry health and productivity	☐ Reducing harmful pathogen levels

Client must make a statement regarding the depth and condition of the litter prior to beginning this practice

Depth of the litter: _____

Age of litter (report either # flocks or years since last total cleanout: _____

Amount of cake and wetness of litter: _____

Any hardpans found: _____

Hardpans removed: _____

Producer to record litter removed and destination

Crust out: Date_____ Tons _____ Destination _____
Crust out: Date_____ Tons _____ Destination _____
Partial clean out: Date _____ Tons _____ Destination _____
Partial clean out: Date _____ Tons _____ Destination _____

Certification

Producer self-certifies windrowing has been completed according to plans and specifications and agrees not to stockpile manure in fields longer then 14 days.

Producer:_____Date:_____

Temperatures Records							
Temperatures of Initial Windrow Event	**House__**	**House __**	**House__**	**Temperatures of Second Windrow Event**	**House__**	**House__**	**House__**
Day 1 section 1				Day 1 section 1			
Day 1 section 2				Day 1 section 2			
Day 1 section 3				Day 1 section 3			
Day 2 section 1				Day 2 section 1			
Day 2 section 2				Day 2 section 2			
Day 2 section 3				Day 2 section 3			
Day 3 section 1				Day 3 section 1			
Day 3 section 2				Day 3 section 2			
Day 3 section 3				Day 3 section 3			
Day 4 section 1				Day 4 section 1			
Day 4 section 2				Day 4 section 2			
Day 4 section 3				Day 4 section 3			

Additional Specifications and Notes: