

Management Guidelines for Windrowing Litter Between Flocks

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The following guidelines represent the current (2009) information for in-house windrowing of litter between flocks. This information is based upon research and observations during the past few years on Delmarva and other regions of the country. The procedures may be modified in the future as more experience is gained with this litter management technique. Furthermore, the guidelines are based mostly on Delmarva broiler production practices, housing, litter management, climate and formation of piles using windrowing equipment. Modifications to these procedures may be needed for other regions of the US and with other species of poultry.

1. The ideal time to start in-house windrowing of litter is the first flock following a total cleanout. If starting with built-up litter, it might be best to implement windrowing during warm or moderate weather to minimize the challenge with controlling ammonia during the initial windrowed flock.
2. Windrowing should be implemented **within 2 days** following bird movement. If the litter is dry (~20%) it may be beneficial to close the houses prior to windrowing to minimize moisture loss.
3. One must manage litter depth in the range of 3 to 6 inches. If depth exceeds 8 inches, a portion of the litter should be removed at least on an annual bases. This may be done in spring or fall and when there is adequate storage for the litter, land available for spreading according to nutrient management plans or other suitable alternative uses for the litter.
4. If caking exceeds 3 feet wide and/or 3 inches thick under the nipple lines, it may be necessary to re-crust the house after the windrowing process. During cold weather it may be beneficial to remove this excessive cake before building the windrows.
5. When starting with built-up litter that has an excessive hard pan, windrow the loose litter and either remove the hard pan from the house or break it up sufficiently for incorporation into the windrow. In cold weather, it would be best to remove this hard pan from the house. In warmer weather and with dry litter, the hard pan may be incorporated into the windrow as an added source of moisture. Since it has been suggested that one of the benefits of windrowing is exposing the dirt floor to the atmosphere on a regular bases, as much as practical, removing all litter and hard pan from the floor is generally recommended.

6. The optimum windrow size is ~18 to 24 inches high and conical shape. This size windrow heats rapidly, is easy to turn and allows maximum moisture and ammonia release. The number of windrows per house will depend on litter depth and house width. All litter, including that under the windrow base should be turned and go thru the heating process.
7. From a pathogen reduction standpoint the goal is to reach at least 130 F and maintain these temperatures for a minimum of 3 to 5 days. Approximately 3 days after constructing the windrows the piles should be turned. Turning exposes the cooler portion of the pile to the higher temperatures. It is important to monitor and record temperatures daily. An inexpensive digital thermometer with a 1 foot long probe inserted into the top of the pile is one option for monitoring windrow temperatures. Since temperatures vary at different depths and piles vary in height, for consistency purposes, it may be helpful to place the temperature probe at 50% of the pile depth.
8. For farms with a significant disease challenge, it would be best to remove all litter from the sidewalls and corners and incorporate this litter into the windrow. Any undistributed litter under the windrow base should also be incorporated during the turning process. A wash down prior to windrowing incorporates the pathogen-laden dust into the pile and adds moisture, aiding in increased compost temperatures and pathogen kill. Additionally, for farms with a significant disease challenge, it may take 2 consecutive windrowing events (flocks) to break some diseases (ie. dermatitis) and the disease may re-appear if the litter is not windrowed for 2 consecutive flocks.
9. A **minimum** of a 10 day layout is often needed to implement the windrowing procedure. Windrowing should be avoided if there is inadequate layout time as sometimes occurs during summer flocks or in extremely cold weather with wet litter that does not allow adequate conditions for moisture and ammonia removal.
10. It is best to turn windrows at least once, and several times if possible. Turning helps release moisture and ammonia, may increase pile temperatures, reduce cake and increase the percentage of pathogen kill in the litter mass. If time permits, turning windrows on a 2 to 3 day cycle may be a consideration.
11. If caking or moisture is excessive, re-crusting the house after leveling the litter may be required particularly in cool weather.
12. If piles are formed with a skid-steer as sometimes required for pole houses, turning may not be an option. These larger piles tend to take longer to reach desired temperatures in the core of the pile. Although the amount of cake is often reduced by as much as 50% in the windrowing process, the house will need to be re-crusting after leveling the litter.

13. Within an hour darkling beetles will start migrating to the surface of a freshly windrowed pile. An ideal time to get maximum beetle kill may be to apply a quick-kill insecticide to the windrows within the first 12 hours after pile formation. Also, band application along the sidewalls should be considered if this litter is not incorporated into the windrow. If scheduling insecticide application immediately after pile formation is not an option, the regular pre-placement treatment can be used. There may be an opportunity to decrease the frequency of insecticide application since windrowing aids in reducing darkling beetle populations.
14. Closing houses following windrowing to retain house temperatures will have little impact on windrow temperatures! More important, in a closed house there will be very high (and dangerous) levels of ammonia, carbon dioxide and moisture. For solid-sidewalls houses during warm and moderate weather, several tunnel fans should be run continuous with air being pulled thru the inlets. In colder climates it may be necessary to reduce air flow by running minimum ventilation fans set on timer or thermostat. Ventilation to **remove ammonia and moisture** should be provided from the day of windrowing until chick placement. When the windrows are being turned, maximum ventilation should be provided to help remove the moisture and ammonia as it is being released from the steaming piles.
15. All operators should wear a respirator with ammonia filters when constructing, turning and spreading windrows.
16. The windrows can be spread out and leveled with a blade, skid-steer and/or windrowing equipment. Box blades and windrowing equipment with an adjustable skid to get consistent depth works well. It is critical adequate time be devoted to get the litter level. Leveling the piles at least 4 days prior to chick placement is generally recommended. When the layout schedule permits, leaving the windrows piled for a minimum of 7 days, and 10 day if possible, may promote additional ammonia and moisture volatilization losses.
17. To minimize the potential for high ammonia levels in the subsequent flock following windrowing, it is **essential** to follow the steps previously mentioned. Higher levels of litter amendment (~25% more) may be required particularly in cool weather to suppress ammonia. Litter amendments should not be applied within 2 days after leveling the piles. Higher ventilation rates may also be needed during brooding to control ammonia when first initiating a windrowing program. Ammonia control tends to be more manageable after the first or second flocks once starting the windrowing program on built-up litter. Failure to control ammonia during the brooding period can result in poor performance and partially defeat the benefits of the windrowing program!