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Critical Information for Improved Bird Performance Through Better House and Ventilation System Design, Operation and Management

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Managing Built-Up Litter in Broiler Houses

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One of the major challenges facing today's poultry grower is litter management. With high propane gas prices as well as tighter and more energy efficient houses, closer monitoring and better moisture and ammonia control practices are required. The introduction of attic air inlets used during brooding and in-between flocks to conserve fuel and promote drier litter is also another factor that is changing litter management practices.

The specifics of any house litter management program depend on several variables. Chief among these are:

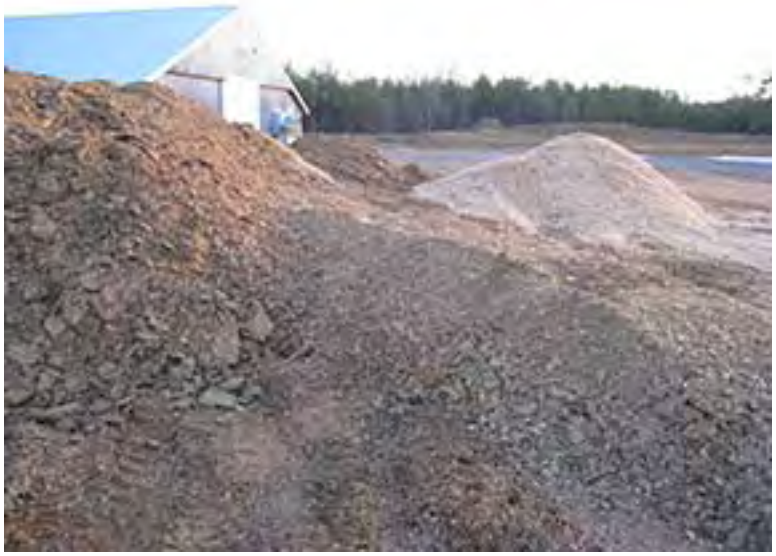
1. availability of new bedding,
2. ability to store/spread the cleaned out litter, and
3. the length of the down time between flocks.

These three factors are all interrelated from a cost and benefit to production standpoint. Understanding the relationship of these three variables from both technical and economic standpoints is crucial in deciding what can and should be done with the litter. Changes in management of any of the three variable factors have economic costs and benefits associated with the changes. The purpose of this newsletter is to outline the options growers have for managing house litter and to provide understanding of the cost and performance benefits (or penalties) that changes in conditions and management practices are likely to have.

Scenario: Annual Litter Renewal

If bedding material is reasonably priced, readily available and there is no restriction on removing it (or better yet, having someone who wants to buy it), the choice is clear. In most cases where this scenario exists, houses are totally cleaned out once per year, litter is spread on the land at recommended rates as a fertilizer and an ample supply of new bedding is placed in the house. The litter pack is decaked between flocks and the need to windrow or allow litter to go through a heat with this type of program is much less than it would be if conditions made annual renewal impractical or too expensive.

Litter management is one of the major challenges facing poultry growers today. Many growers are finding that problems of availability and pricing of fresh bedding, along with fewer options for disposal or use of spent litter, makes it impossible for them to do a complete cleanout every year. Thus growers often must find ways to grow birds successfully on built-up litter. The good news is that excellent tools and new litter management practices are available to help growers cope with the challenge.



Scenario: Managing Built-Up Litter

If clean, new bedding is not conveniently available or is too expensive, or if there are restrictions on removing and storing or making use of litter, the choice comes down to the best way of managing the litter to prolong its usefulness. The practice is known as growing birds on built-up litter.

In the built-up litter scenario, cake is removed and litter is conditioned between flocks, and occasionally some material is removed from the house to prevent the depth of litter from becoming excessive. When litter is not changed out or replaced on a regular basis, proper litter management becomes even more important to prevent flock performance losses caused by high ammonia levels or other poor environmental conditions. Growers should also realize that over time birds may be affected in non-obvious ways due to continuous exposure to a subclinical pathogen load (that is, harmful micro-organisms that affect bird health without causing obvious symptoms of illness). Growing birds on built-up litter thus requires careful attention and often special litter management methods during growouts and in the down time between flocks.

Guidelines for Down-Time Litter Management

There are several methods of conditioning or manipulating litter between flocks to improve environment and performance: in-house windrowing, tilling, decaking, using litter treatments, and extending between-flock downtime. Tilling and decaking require specialized equipment that most growers have used at one time or another; however, most growers do not own both. Windrowing can be done with specialized equipment or can be done with a loader or a tractor and an adjustable blade, but it takes time and practice to perform correctly. Litter treatments work well in reducing ammonia levels for the first couple of weeks of the growout; however, their effectiveness is dependent on the amounts of ammonia and moisture in the litter as well as the amount of treatment applied. Extended down time will allow the litter to dry and bring ammonia levels down, enabling litter treatments to be more effective. Of course if there are no birds in the house there is no revenue coming in; however, extending down time may sometimes be needed to prevent poor litter conditions from causing even greater losses. Further, studies have shown that windrowing along with extended down time can improve feed conversion by 1 to 2 points. Here are some basic guidelines that should be followed in down-time litter management:

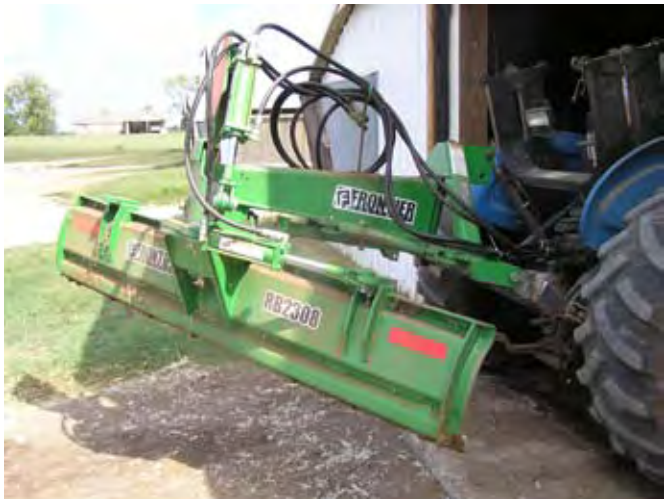
1. After the birds have been sold, remove the cake as soon as possible. Cake contains about 40% or more moisture and to get dry litter the cake must be removed. Run the decaker only where the cake is and run only deep enough to get the cake. Do not disturb the entire litter pack, get only the cake. Cake is like the cap on a coke bottle. The cake needs to be removed so the moisture and ammonia can be released. When decaking, it is important to get around the edges and in the corners. If the machine does not pull cake from along the sidewalls or the corners, it will have to done by hand. Leaving a 3-foot strip of cake around the edge of poultry house is leaving a lot of square footage that will produce excess ammonia and can cause problems.
2. If the litter is deep tilled or is disturbed down to the dirt pad, all the litter is being oxygenated, which increases microbial activity and greatly increases ammonia production. It is important that if the litter is deep tilled or if the decaker is run at a deep depth, that the litter be mixed (fluffed) or conditioned at least one other time a couple of days later. The purpose of this second pass with the machine at a shallower depth to fluff or mix the top portion of the litter pack is to speed up and promote the drying of the litter and help release ammonia. If a second pass of the machine is not made to do a final conditioning or mixing, there is a good chance that ammonia levels will be very high at the beginning of the next flock.
3. If there are health/production issues or if the litter has been in the house for a year, windrowing the litter and letting it go through a heat will help remove a significant amount of moisture and reduce the pathogen load in the litter, making the litter more desirable for the next flock. (Note that this practice may also increase house dustiness.) When windrows are spread out, there will be large amounts of ammonia and moisture released that pose management challenges. It is important that growers allow at least three days ventilating the ammonia and moisture out of the house after the windrow piles have been spread out. It may be necessary to make a second pass over the litter to further promote drying and ammonia release.
4. No matter which management practices are performed it is important during the time between flocks to keep the poultry house closed up and run timer fans during the day to remove moisture and ammonia from the house. If there are attic vents, run them during the day.
5. Preheat the house for birds as your integrator requires. When applying a litter treatment, follow the manufacturer's label as to when to apply it and how much. This will ensure the maximum effectiveness of the litter treatment.

Ventilation: Key to Litter Management During Growouts

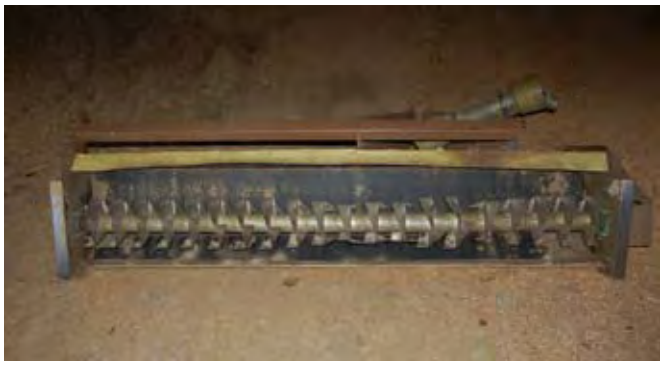
1. Proper minimum ventilation during the first 7-10 days of the flock is essential, <u>even when litter treatments are used</u>. Litter treatments do allow reduced minimum ventilation run times, which provides important cost savings

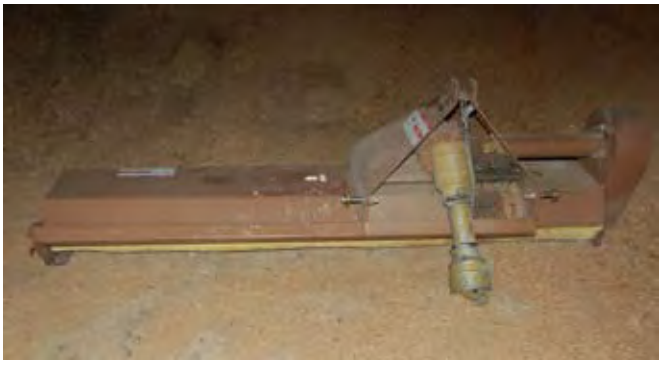
Caked litter contains between 40% and 60% moisture. When growing birds on built-up litter, it is essential to remove cake during the down time between flocks. Allowing caked litter to remain in the house will lead to high moisture and ammonia levels and will make litter treatments ineffective. To keep birds healthy and flock performance up, litter must be carefully managed.

The housekeeper is the most basic piece of litter conditioning equipment. Its purpose is to remove cake, leaving fines and dry material behind. A common mistake is running the housekeeper too deep and aerating the deep litter pack. Remove the cake and only the cake, and make sure to get around the edges and into all corners!



A six way blade is a basic, relatively inexpensive tool for windrowing. Windrowing litter and allowing it to undergo heating during down time is a good practice to reduce the pathogen load which otherwise can seriously affect flock health. Studies have shown windrowing to improve feed conversion by 1 to 2 points. After litter is spread again, allow at least three days ventilating the ammonia and moisture out of the house. It may be necessary to make a second conditioning pass over the litter to further promote drying and ammonia release.





A shallow-tine roto-tiller is an excellent tool for conditioning litter after decaking. Growers should be aware that tilling too deep can contribute to ammonia problems. This shallow tine tiller, which can be pulled behind a 40 hp tractor and do a typical house in less than an hour, is often used to depths of only 1 to 2 inches to mix and condition the surface after decaking.

(see Bottom Line, next page). However, failure to provide needed minimum ventilation will only decrease the effectiveness of the litter treatment. With increased brooding size, this is even more crucial.

2. During the balance of a growout, ventilation required to exhaust excess heat will usually adequately remove moisture also. However, growing birds on built-up litter requires extra care and monitoring to make sure litter moisture is not allowed to rise. The ventilation program in place during the growout has a tremendous effect on litter and if ventilation is inadequate the litter will be too moist. Having litter moisture over 25% will lead to higher ammonia production and an increase in litter pathogen load and will negatively affect bird health and paw quality. It is also important to realize that managing moisture during a flock will affect the litter quality for the next flock. To put it another way, the current flock's ventilation and water management will directly affect the next flock's litter moisture level and overall ventilation program.

The Bottom Line

If annual litter clean-out is not an option, good management practices that keep ammonia, moisture, and pathogens under control in built-up litter can yield significant pay-back. The major potential economic benefits are:

- Cost savings in delaying the purchase of new bedding material.
- Improved feed conversion of 1 to 2 points from extending down time and windrowing to reduce pathogen levels, ammonia and moisture.
- Reduced fuel costs resulting from lowered minimum ventilation run times made possible by use of litter treatments (along with decaking and other down-time practices that reduce litter moisture and ammonia).

Here is an example of possible fuel savings for a typical broiler house during cold weather which is provided with a litter treatment at a cost of $200: Reduced ammonia for the first week allows minimum ventilation run time (using either one 48-inch or two 36-inch fans) to be reduced from 90 seconds on to only 30 seconds on every 5 minutes. If the average inside/outside temperature difference is 40 degrees, propane consumption would be 21 gallons per day, or 147 gallons for the week. In an untreated house needing 90 seconds per 5 minutes of minimum ventilation, propane consumption would be 62 gallons per day, or 434 gallons for the week.

The litter treatment thus results in a net first week fuel saving of 287 gallons (434 minus 147), which at $1.75 per gallon amounts to $502.25. Subtracting the $200 litter treatment expense yields a $302.25 net benefit. Additionally, the reduction in ammonia as a result of the litter treatment will most likely improve flock performance, so any additional value of increased weights, better livability, and improved feed conversion need to be considered. In extremely cold conditions where the temperature difference is higher, even greater fuel savings will be seen.

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