

PoultryPractices

Oklahoma Cooperative Extension Service

A newsletter for poultry producers and poultry litter applicators...



Reducing Ammonia Losses from Poultry Litter

Poultry House Ventilation Fan Maintenance and Energy Savings

New Comprehensive Tool for Poultry Waste Applicators

Give us Your Feedback Via On-Line Survey

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Editor's Column

In this issue, we illustrate practices that can reduce manure ammonia losses during storage and land application. Poultry house fan maintenance options are explored for improving house ventilation and optimizing energy efficiency.

We also introduce a new record keeping tool designed to assist Oklahoma poultry litter applicators and ask for your input on this publication via a brief on-line survey.

For publications, regulatory information, and upcoming classes, visit your local county Extension office or poultrywaste.okstate.edu where you can also obtain an electronic version of this newsletter.

Josh Payne

Reducing Ammonia Losses from Poultry Litter: Storage and Application Strategies

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Microbial breakdown of nitrogen compounds such as uric acid, which is excreted by poultry, leads to the release of ammonia, a colorless, highly irritating alkaline gas. Poultry litter pH, moisture content and temperature all play an important role in the rate of ammonia volatilization (loss to atmosphere) with an increase in volatilization observed by increasing any of these variables. Litter treatments and proper ventilation are commonly employed in poultry houses to reduce ammonia emissions, offering an improved environment for both birds and growers. However, once litter is removed from the poultry house, what practices can be applied to reduce ammonia losses during storage and application? This is an important question for applicators since ammonia emissions from land-applied manure are a loss of valuable nitrogen fertilizer and can contribute to air quality issues. A few strategies to help reduce ammonia volatilization and retain manure nitrogen levels are briefly discussed below.

Covered storage: Keeping manure dry by providing proper coverage or storage helps reduce ammonia loss. If exposed to rainfall events, litter moisture content can increase which increases litter microbial activity. This coupled with high litter pH and temperature leads to increased ammonia emissions. In Oklahoma, state law requires that stacked poultry litter be properly covered or bermed to prevent nutrient runoff during rainfall events.

Incorporate: Incorporation of manure into the soil can significantly reduce ammonia losses. Although this practice may be more applicable in a tilled crop setting, a recent technological advancement for use in pasture or no-till crop settings is the Poultry Litter Subsurfer developed by USDA. This implement allows for the subsurface application of litter. Studies have shown that this practice lowers nutrient runoff and ammonia emissions by at least 90% while increasing forage yields. It is important to incorporate the manure as quickly as possible to avoid ammonia losses during stacking.

Timing: Avoid application during hot, dry and windy conditions. These factors all contribute to increased ammonia emissions. If possible, apply during cool, calm weather which may be in the morning and evening. Application before a light rainfall can greatly reduce ammonia loss by transporting soluble nitrogen into the soil matrix.



Poultry House Ventilation Fan Maintenance and Energy Savings

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Poultry house ventilation is typically the second largest energy cost behind winter propane heating. Modern tunnel ventilation houses require numerous large fan systems to provide year-round ventilation and to cool the flocks in the summer. Normal wear and the dirty environment these systems operate in can result in a surprising loss of system efficiency and an associated rise in operating costs. Maintenance is a time consuming activity but the payoffs can be significant – as we will discuss here. The following are areas that a poultry producer should be checking and maintaining to maximize efficiency and save on energy costs.

Dirty Fans and Shutters

Dust becomes airborne easily and adheres to many surfaces. The accumulation is high where these materials are forced on or over objects. Any surface around the high air velocity of the ventilation fans will accumulate dust and dirt at an alarming rate. This is especially a problem for fan blades, shutters and safety screens. The accumulated dirt causes turbulence and restricts the openings resulting in higher back-pressure for the fans to fight against. As a consequence the overall efficiency of the fan system (CFM/Watt) drops dramatically. As individual fans become less efficient, they pull the same or more power but move less air. This, in turn, causes the controller to turn on more fans. So, during periods where partial loads are needed, more fans than necessary are running. Under full load conditions, the ventilation requirements may not be fully met resulting in stress on the flock. Various studies estimate up to a 40% loss in air flow with the first 1/8 inch of accumulated dirt on fan systems.

Fan Belt Wear and Tension

It might seem that a fan belt is either working properly or it isn't. It's not that simple. The first problem might be that the belt tension is not correct and is slipping some percentage. This can also happen if the belt is old and hard. If you can see cracks on the inside of the belt, it's time to replace it (see Figure 1). Correctly tension good condition belts with either an idler pulley or manually with a friction bolt. Belt tension is usually not much (around 5 pounds pressure).

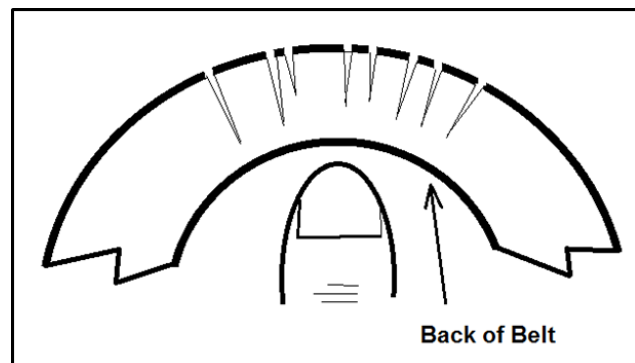
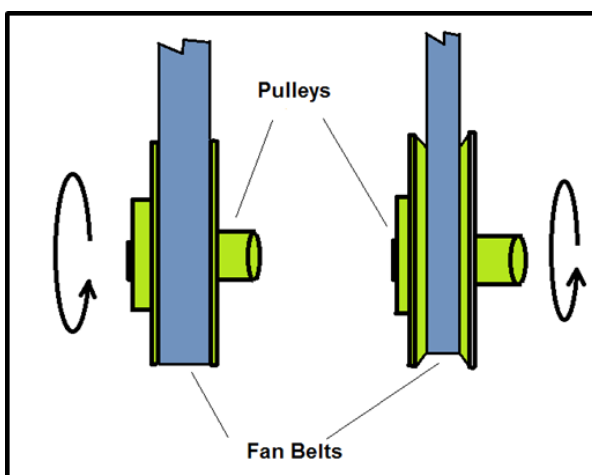


Figure 1. Pressing on back of old belt reveals cracks.



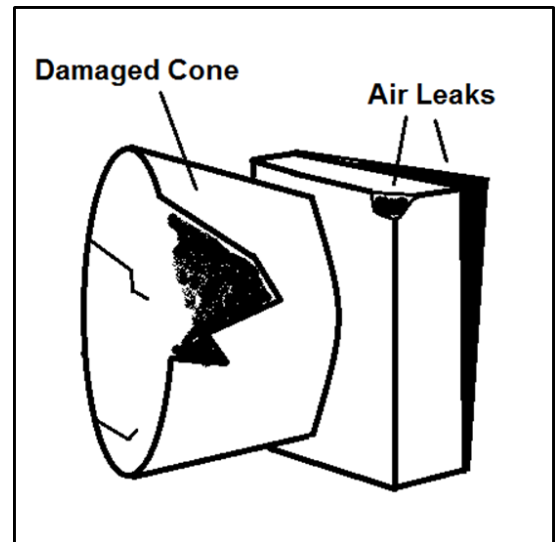
Another problem is caused when the belt sinks into the pulley (see Figure 2). This can result from the metal pulley notch widening over time or the belt narrowing from wear. Either situation can effectively reduce the diameter of the pulley which causes the pulley and fan to run slower. This also causes the air flow to decrease and affects the ability of the fan to do its job – additional fans may turn on to meet ventilation or temperature requirements. Studies estimate an average loss of 20% of air flow capacity due to belt wear and tension.

Figure 2. Comparison of new pulley and belt (left) to worn pulley and belt (right).

Damaged Shrouds and Large Air Leaks

To be the most effective at moving air, fans must have special coverings that direct the air into and out of the fan. On the outlet sides of the fan these devices use large cones or nozzles to increase the efficiency of the fan. These cones are attached to the poultry house via an airbox that also covers the fan motor. Any damage to the outlet cones or airboxes reduces the effectiveness of the fan especially where this results in large air leaks (see Figure 3). Another source of fan leakage is where the fan airbox is connected to the wall. Daylight showing through where the fan unit is connected to the wall inside the building is usually a very bad sign.

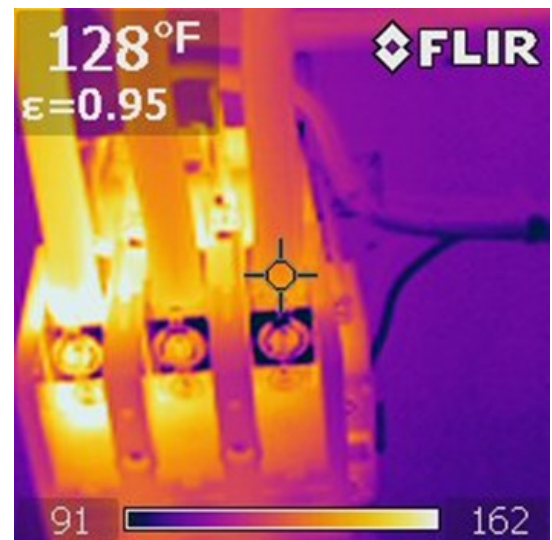
Figure 3. Damaged fan exhaust cone and multiple air leaks.



Loose Electrical Connections

Loose electrical connectors will sometimes not let full current pass which will lower the performance of fan motors. Again, more fans may need to come on to satisfy ventilation requirements. In a three phase motor system a loose connection in a phase leg can burn out and ruin a motor fairly quickly (see Figure 4). Finally, loose electrical connections can heat up due to the higher resistance of the connection. This heating in turn can cause even higher resistance which causes higher additional heating, increasing the risk of fire. Poultry house dust and construction in general is flammable and electrical fires could be catastrophic.

Figure 4. Infrared thermal photo of hot loose connection on three phase fuse box .



Summary

You paid for the energy, so you might as well get all you can out of it. On a large poultry house, inefficiencies can cost hundreds or thousands of dollars per year. Keeping the poultry house fans and associated equipment in good shape and operating correctly is simply protecting your investment. As always, feel free to contact OSU Cooperative Extension Service with any questions.

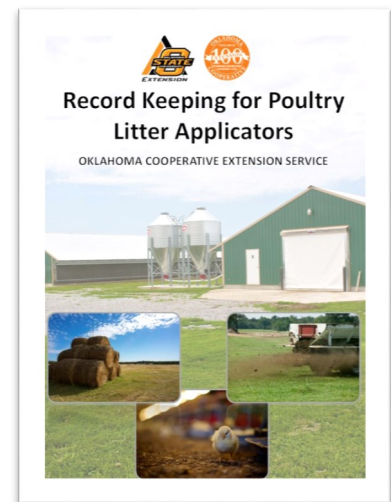
The Oklahoma Cooperative Extension Service offers publications and fact sheets on a wide range of ag-related topics. These are available on-line at facts.okstate.edu or from your local county Extension office.

Comprehensive Tool Now Available for Poultry Waste Applicators

OSU Extension recently compiled a new resource manual, "Record Keeping for Poultry Litter Applicators." Designed to assist applicators with the record keeping process, it includes blank record forms, calculation spreadsheets, maps, regulatory information and nutrient management fact sheets in one easy-to-use resource. The book is spiral bound with a plastic cover so it can travel to the field, allowing applicators to complete records on-the-go, with everything at their fingertips.

The manual was introduced at continuing education classes earlier this year and will be fine-tuned as needed, based on feedback received. The response so far has been very positive, from both applicators and ODAFF inspectors.

If you have not yet picked up a guide, be sure to get one at the next poultry waste management education class you attend or contact your local county extension office to request a copy.



Give Us Your Feedback!

This is the 8th issue of Poultry Practices, and since its beginning in 2011 we have all worked hard to make it a helpful and enjoyable publication. The sentence at the top of every issue sums it up: "A newsletter for poultry producers and poultry litter applicators..."



As we prepare to head into our 5th year of publication, we'd appreciate your help. Please take a few minutes to complete a short on-line survey about the newsletter. You may type in the website address below or, if you have a smart phone capable of scanning QR codes, simply scan the code to access the survey.

Although your responses are anonymous there will be an option to provide us with your email address if you would like to receive advance copies of future newsletters, via an email link. Thanks for reading Poultry Practices, and for your help in making future issues even better!

Scan code with your smart phone
to access survey.



OR

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your website browser.

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