The *Poultry Engineering, Economics & Management*
NEWSLETTER

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

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Avoiding Wet Floors

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Cold nights after warmer days often provide the perfect setup for condensation and sweating. This results in chronic wet floor problems, including poor air quality. Over the last few months we have been asked to come up with a list of key practices that can help growers avoid these problems. Avoiding wet floors is a coordinated management effort that should be practiced year round.

1. Manage litter properly between flocks. Many wise poultry growers who have fewer problems with wet floors will tell you they work at it year round. In particular, you need to start thinking about getting your litter ready for the coming flock on the day that you sell chickens. At catch time, the litter that is in the house is still very warm and will retain its heat for several days. This heat has the ability to help drive out moisture and ammonia if managed correctly. As soon as the flock sells, close the house so that this heat is not wasted. Keeping in-house temperatures as high as 85°F in between flocks with only a small amount of minimum ventilation during warmer mid-day hours will help moisture and ammonia dissipate from the floor and be exhausted from the house during the down time.

If you have caked litter in the house, remember that caked litter is about 45% moisture and is an ammonia generator. So removing cake between flocks is the same as removing water, and will make the job of moisture management easier for the next flock. It is important to get every last bit of cake out even if a little hand work is necessary around posts, under fans, and in all corners. Try especially to get all of the cake out of the brood area. Rototilling should not be done. It is counterproductive and can actually create more problems. Rototiling breaks cake into thousands of pieces, all generating ammonia. One of the keys to good litter management is to get the cake out but disturb the litter pack as little as possible. Rototilling or running a caking machine too deep only adds oxygen to the manure and microbial atmosphere that exists in the litter pack, thus helping generate ammonia.

Under normal conditions, a complete broiler growout generates several inches of manure each flock. The majority of cake from this manure is under drinker lines and at sidewalls. Run the cake machine no deeper than the cake, usually 2-5 inches, and only in areas where cake is found. Then continue to maintain the house closed up with only minimum ventilation fans running to exhaust the moisture and ammonia. Even adding a little heat in between flocks would be a good idea. You are driving out ammonia and moisture when you keep the temperature in the house in the mid-80s.

2. Manage drinkers to prevent spillage. One major cause of wet floor problems is poor drinker management. It is critical to have the drinker lines set at the correct height based on bird size or age. This will help minimize spillage and water wasting. Water pressure is

High relative humidity and high litter moisture cause poor air quality and slick conditions in the house, which hurt flock performance in many ways, including causing poor paw quality, a signficant economic factor in the chicken industry today.

also very important. Before new chicks arrive, remember to reset the drinker water pressure from where it was at end of the previous growout. You might need to start out a new flock at 3 to 4 inches of water line pressure to be certain of having good flow and no air locks in the system. After the first three or four days, you can back off this pressure to just floating the ball. This lower pressure will not affect water availability or consumption for at least 3½ to 4 weeks. At that age pressure can be increased to be sure the flock is getting enough water. Check with your service tech for your company's specific recommendation. It's also important to replace old drinker systems or nipples as they begin to leak. Even low pressure in the standpipe will not prevent hundreds of gallons of water from dripping onto the floor. Keep regulators clean, leak-free and free from built-up dust. A leaking regulator will not control water pressure properly, which can lead to heavy caking. Putting excess water on the floor through mismanagement of drinker height and pressure is a real contributor to wet floors.

3. Make sure that you have enough litter or bedding material. New bedding should be dry, and at least 3 and if at all possible 4 inches of litter are needed. Remember that soil temperatures of a dirt floor are typically in the mid-50s. You need 3-4 inches of good bedding depth to insulate the birds from the cold dirt floor and provide a good starting environment. Many a broiler company has seen growers that have cleaned houses out and replaced the old litter with less than 3 inches of new shavings. In actuality these growers would have been better off to keep the old litter than to replace it with inadequate bedding.

Maintaining an even, level bedding or litter pack is also very important. In putting down new litter or removing cake or cleaning up wet spots, you may end up with thin litter in some locations. The problem is that uneven litter in the house means you are likely to have uneven drinker and feeder line heights. This can lead to serious management issues, including air-locks in the drinker lines, excess water spillage, and non-uniformity in the flock.

4. Seal up all air leaks. Seal up all cracks, curtain openings, tunnel inlets, and any other place unwanted air comes in. One of the keys to a dry broiler house is to recognize that when cold air comes into the house through any opening other than a ceiling or sidewall air inlet during minimum ventilation, it will fall directly to the warmer floor and cause condensation and caking. This is why we see so much cake against sidewalls, around tunnel inlets, and around tunnel fans. Managing the house in such a way to have all air coming through the air inlets properly will eliminate a good bit of this cake. In our visits through the poultry belt in the last 90 days we have seen many different levels of housing. Houses that have extremely wet floors are often very loose, air-leaky poultry houses. Some of the problem houses could be tightened up significantly using a $60-$70 jug of spray foam and about 4 hours of labor. Sealing air leaks improves ventilation efficiency; but the main reason that we really push for this is to stop cold air from falling on the warm floor and causing cake.

5. Manage perimeter inlets and static pressure properly. The purpose of inlet door management is nothing more than to force the air inlets to do good air mixing, making certain the cold air being pulled into the house does not drop directly to the floor. If the air is warmed before it hits the floor, it has great ability to remove moisture from the house. This is another key to having a dry poultry house.

Most 42x500 broiler houses have somewhere in the neighborhood of 60 inlet doors spread around the perimeter of the house. Typical poultry house designs allow for pulling air through these inlets using up to about 4 tunnel fans before moving into tunnel ventilation. Operating 4 tunnel fans through the inlet doors is power ventilation. At this point in our management with 4 tunnel fans running and all 60 inlet doors in use we are at the maximum capacity for the inlets. What many people don't realize is that during brooding or when birds are not very large and only one to two 48-inch fans are running, <u>we do not need and should not be using all 60 inlet doors</u>. With too many inlet doors operating for the number of fans running, the static pressure controller will not be able to open the doors wide enough for them to function properly. You want the inlets to open about 1 to 1½ inches for ceiling inlets and 2 to 3 inches for wall mounted inlets. Inlets running less than one inch in the clear opened will not be good nozzles to throw the incoming air high across the ceiling for good air mixing.

It would be nice to set the inlets on the first day of a growout and never have to touch them again until catch. <u>This is impossible</u>. The number of inlets in use must be matched with the amount of cfm that will be used for minimum ventilation. The exact number of inlets that should be used is very dependent on the tightness or looseness of your house, but a good rule of thumb is about 15 inlets per 48 inch fan or 7 inlets per 36 inch fan. Assuming half-house brooding, a good starting point would be to use one 48 and one 36 for brooding, latching closed all the inlets in the back of the house and every other inlet in the brooding chamber, so actually using only 15 inlets. Adjustment should be made at turnout and another adjustment should be made at about 21 to 28 days, depending on the weather, when usually you need to shift out of minimum ventilation into power ventilation.

For more information on inlet management, see our newsletter #39 at www.poultryhouse.com.

6. Use stirring fans. The stir fan is a mechanical way of taking the hot air from the ceiling of the house and moving it to the floor, where it will pull moisture from the litter. More than 70% of the water that birds consume is defecated onto the floor. As birds grow from day one to catch, your moisture removal process must keep up with the

CALCULATING MINIMUM VENTILATION FAN TIMER SETTINGS

Typical Recommended Minimum Ventilation CFM/Bird Rates

Exact rates vary with breed and sex; check with company for specifics applicable to your operation. Rates given here are for outside temperatures from 30-60°F; lower temperatures call for slightly lower rates, and higher temperatures slightly higher rates.

WEEK	DAYS	CFM/BIRD
1	1-7	0.10
2	8-14	0.25
3	15-21	0.35
4	22-28	0.50
5	29-35	0.65
6	36-42	0.70
7	43-49	0.80
8	50-56	0.90

Fan Timer Setting Calculation

FIRST: Calculate the total cfm's needed.

Total cfm = cfm/bird needed times number of birds

Example: In week 2, with 0.25 cfm/bird needed and with 24,000 birds in the house,

0.25 cfm x 24,000 birds = 6,000 cfm needed

SECOND: Since we don't have a 6,000-cfm fan to run full time, we calculate the percentage of time fans need to run in order to average out at the total number of cfm's needed.

% of time = cfm needed divided by cfm capacity of fans

Example: Using one 36-inch fan (10,000 cfm) and one 48-inch fan (20,000 cfm), totalling 30,000 cfm,

6,000 cfm divided by 30,000 cfm = 0.20 (20% of time)

THIRD: Using a 5-minute timer, multiply % of time by fan timer cycle (5 minutes),

Example: 0.20 times 5 minutes = 1 minute on out of 5.

Recommended Timer Setting Adjustments for Conditions

Slight ammonia = +15 seconds
Heavy ammonia = +30 seconds
High Moisture = +15 seconds
High dust = -15 seconds

For more information on timer fan settings see our newsletter #15.

Caked litter retards drying and is an ammonia generator, so it's a good idea to take every opportunity to get this moisture out of the house.

Taking time to remove cake from under fans, around posts and in corners is well worth while to promote house dryness.

Wet, caked areas under this drinker line are most likely caused by leaking nipples or wrong water pressure – or both.

Keeping drinkers at proper height for bird size allows chicks to get enough water without risking spilling of excess water on the litter.

amount of moisture dropped on the floor. Stirring the air increases the efficiency of the moisture removal process, getting the water out of the litter so the ventilation system can move it out of the house. Stirring fans are especially important for older houses that are hard to tighten up enough to make minimum ventilation inlet doors work properly. But stirring fans also improve heating fuel efficiency, and with propane at $1.40 a gallon, most new houses are being equipped with stir fans.

7. Be sure to run enough exhaust fan time. If you can get the moisture out of the litter and into the air then the next step is to exhaust the moisture. Ventilation is the only way to take thousands of gallons of excess moisture out of a poultry house. The key is to run enough fan time to stay ahead of the moisture curve. Some rules of thumb for fan run time with respect to new litter are shown on page 3. Be sure minimum ventilation fans are clean and belts are tight. If they are not in top shape, you will not remove the moisture.

8. Maintain relative humidities between 50 and 70%. Check the relative humidity in your houses occasionally with a relative humidity sensor that can be purchased from Wal-Mart, Radio-Shack, or some other local source. Most hatcheries do their best to hatch chicks at between 50 and 70% RH, and it is in our best interest to try to place checks in a similar environment. The higher the relative humidity, the more moisture will be in the floor and will be present in the air. Of course, to keep heating costs to a minimum most growers tend to run the highest acceptable relative humidity, which is somewhere around the upper 60's. But when we get stretches of unusually warm weather during winter or spring, it is a good idea to put extra fan run time on your timers to pull the relative humidity in the houses down to the mid 50s or low 60s. Forcing the moisture to come out of the litter pack helps with the current flock and helps you get ready for your next flock. Remember what we are doing in this flock effects litter quality in the next flock. Relative humidities over 70% in broiler houses are an indication of too much moisture in the floor and in the house. Any time we look at houses with 75 to 80% relative humidity we will almost always see caked, wet floors and ammonia problems.

The Bottom Line

Remember we are in the chicken business to produce the maximum number of pounds of meat on the smallest number of pounds of feed possible. We are looking for maximum meat production with minimum input from feed and fuel. The best environment for the bird will be a dry uniform house environment from end to end and side to side. We hope that some of the tips mentioned above will help you maintain dryer floors this spring.

Thanks are extended to Blake Gibson for some of the material included in this newsletter.

ALABAMA COOPERATIVE Extension SYSTEM

The Poultry Engineering, Economics and Management Newsletter provides up-to-date information on topics of interest to poultry production personnel, focusing on most effective and efficient uses of modern technology and equipment, with a special emphasis on economic implications. The Newsletter is published six times a year, or as needed to address emerging or special issues. Contact: Jim Donald, Extension Biosystems Engineering, 228 Corley Bldg., Auburn University, AL 36849-5626, (334) 844-4181, fax (334) 844-3548, jimdonald@aces.edu. Published by:

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