

NEWSLETTER

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

Auburn University, in cooperation with the U.S. Poultry & Egg Association

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Fan Belts, Pulleys, Shutters, Cool Pads – And Profits

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Each summer we have the opportunity to visit many poultry houses under full tunnel conditions. While many growers do a good job of routine maintenance on their houses, there are still plenty of folks who just won't take the time or don't see the value of keeping their air moving and evaporative cooling equipment in top shape. Many poultry newsletters have been written on this topic and many more will follow. The fact is, those growers that take proper care of fans, fan belts, pulleys, shutters and cooling pads will be rewarded for their time and effort in increased meat production, better feed conversion, and lower mortalities. This newsletter explains the importance of maintaining air-moving and cooling equipment and points out the most important things you should be doing to keep birds growing fast in hot weather.



What's wrong with this picture (that would cost a grower money)? See inside for answer.

How Important?

The chart below shows how important air velocity is for getting maximum broiler performance. The data, from research done at Mississippi State University by Dr. Berry Lott, especially demonstrates the effect on birds of being grown at 600 fpm vs. 400 fpm. The low wind speed house was 0.30 lbs per bird lighter by week 7. For example, 0.30 lbs x 20,000 birds x \$0.05 per bird nets \$300 per house in added weight. And that's without taking the improved feed conversion into account.

Notice also that these birds were not being reared in optimum thermometer temperatures. The research setup was designed only to test how important wind-chill cooling is, with temperatures controlled at 77°F during the night and 86°F during the day, and no evaporative cooling was used. In other words, at these temperatures, wind-chill effect alone was adequate to get good performance if air velocity was high enough. When temperatures go above the mid-80s, you definitely need the additional real temperature drop from evaporative cooling to keep birds growing fast.

What happens in hot weather if good air velocity is maintained but the evaporative cooling system is neglected and doesn't perform as designed? Analysis of other research done by Dr. Lott indicated that if groups of birds were grown at the same wind speed, but with one group at a constant 81°F and the other at a constant 86°F, the birds grown at the higher temperature would be about 20% lighter in weight. In real

Air Velocity = Weight Gain

Research at Mississippi State shows how high tunnel air velocity translates into weight gain. Starting from the same point, male broiler birds were reared from 3 weeks to 7 weeks in still air, 400 fpm air, and 600 fpm air. Each batch of birds was kept in a controlled 24-hour cyclic temperature of 77-86-77°F, simulating summer weather conditions.

		Week 4	Week 5	Week 6	Week 7
		-----Body Weight Lbs-----			
Air	0	2.96	4.24	5.32	6.10
Velocity	400	3.00	4.44	5.81	6.92
(fpm)	600	3.02	4.49	5.92	7.22

world summertime conditions, of course, we aren't likely to see a constant round-the-clock overtemperature. These studies do, however, provide a basis for a reasonable expectation that a cooling system allowing temperature to run +5°F warmer than normal during the heat of the day (slightly less than one-third of 24 hours) would be likely to cost us about 6% of the birds' body weight.

How much would that cost the grower? In a house growing 20,000 birds to 7 lbs, we would produce 140,000 lbs of meat. A 6% loss in weight would be 8,400 lbs. At \$0.05/lb grower pay that is a \$420 per house price for not keeping cool pads in top shape. There would also be a loss due to a drastic reduction in feed conversion, which we are ignoring here for the sake of this simplified example.

Conclusion: The only way to get top bird performance is to maintain both good air velocity and good cooling.

Fan Maintenance

Fan rpm's and air movement (cfm's and velocity) are directly related. A fan turning 10% slower in rpm's moves 10% less air. A fan turning 15% slower moves 15% less air than normal. And it's the fan belt and pulley that determine fan rpm. As a fan belt wears, it becomes thinner and rides deeper in the pulley than when new. The effect is exactly the same as installing a smaller motor pulley: the fan rpm speed is reduced. The same thing happens with a worn pulley, of course. Note: Tightening a worn belt does not cure the problem. Field studies have found a surprising number of farms where growers have kept fan belts tight but the fan rpm's have been reduced because the pulleys and the belts were worn.

How serious a problem is a 10% loss in air velocity? For example, if a house has 10 fans in good condition and the air speed in the house is 600 fpm, the estimated wind chill cooling will be 15 degrees F (see wind-chill figure on facing page). A 10% reduction in rpm's will result in 540 fpm wind speed, which produces about 12 degrees of wind chill cooling, a significant 3-degree loss.

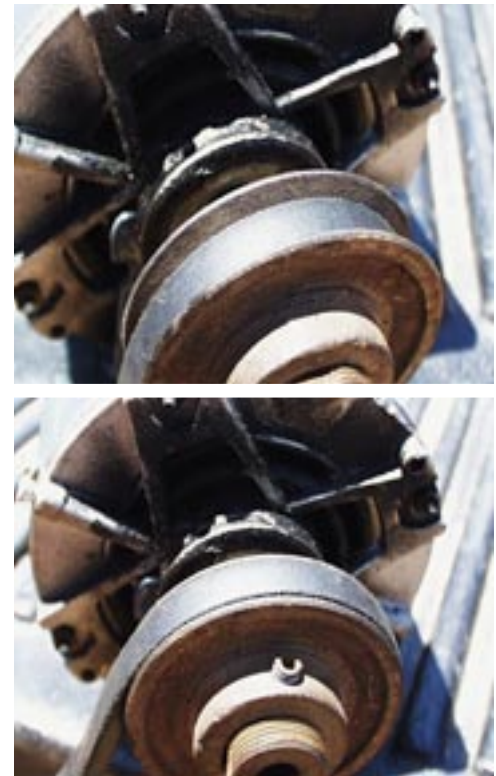
Another important fan maintenance item is cleaning fan shutters and blades. Research shows that if shutters and blades are allowed to become caked with dust, fan performance can be cut by as much as 30%. This means that fans delivering 600 fpm when clean may deliver only 420 fpm when they are dirty.

These are realistic numbers. Without proper fan maintenance, conditions will be nowhere near optimum and bird growth rate and feed conversion will be greatly hurt. Check and clean fan blades and shutters on a weekly basis. Replace belts and pulleys before they have an effect on rpm's.

Evaporative Cooling Maintenance

Like fans, evaporative cooling systems are expensive items that pay off by helping keep birds in optimum growth conditions. But you can't get the benefits you paid for unless you do what's needed to keep your cooling pads operating at top efficiency. Following is a list of the most important items to keep up with.

1. The first step in getting maximum cooling from pads is to get the house tight and get all incoming air going through the pads. Hot outside air that leaks in through cracks works against the pad cooling system. Find and seal all house air leaks. Curtain flaps help minimize air leaks around curtains, so that houses run cooler in summer and save gas in winter.
2. The second step to get good pad cooling is to make sure that pads have 100% wetted surface area. Any dry area on a pad is the same as any other air leak in the house, allowing hot air to come in without being cooled. This means it is imperative to check pad plumbing, and especially the distribution header holes in recirculating systems, to make sure water is flowing properly and you have completely wetted pads to get the cooling you need. If you have a spray pad system, be certain also that worn or clogged nozzles are cleaned or replaced, so that 100% of the pad area is kept wet.



When pulleys or belts are worn, thin belts ride low in the motor pulley, as shown in top photo above. Result: blade rpm's are greatly reduced, thus robbing cfm's, air speed and wind chill cooling. Belts should be tight and ride high in the motor pulley, as in bottom photo, to achieve maximum fan rpm's and best wind-chill and evaporative cooling.

Chart shows approximate wind chill cooling for birds above 5 lbs weight in 85°F air. Note that the curve is not a straight line. At higher wind speeds a slight loss in fan performance causes drastic changes in bird cooling. A 10% drop in air velocity, from 600 fpm to 540 fpm, will reduce wind-chill cooling effect from 15 to 12 degrees.

Wind-chill effect at 85°F

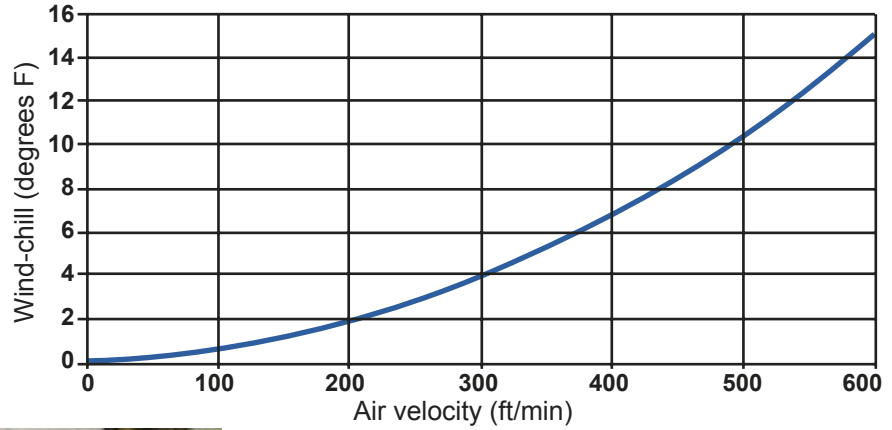


Photo at left shows how dirty fan blades and shutters can get in just a short time. Build-up of dust and dirt on shutters and blades can reduce fan performance by as much as 30% in real world applications.



Photo at right is a close-up view of a fan blade that has not been cleaned for several weeks. The dust and dirt build-up changes the aerodynamics of the blade and puts additional drag on the blade, severely reducing fan performance.



For most efficient and effective pad cooling, pads must be thoroughly wet. For recirculating pad systems, it is important to check headers regularly to be certain there are no plugged holes in the discharge pipe. Photo at left above shows properly functioning header. Right photo shows a thoroughly clogged pad. Flushing pads with water and using one of the widely available cleaning products helps prevent pad clogging. Clogged pads raise static pressure, reduce fan cfm's and wind speed, and reduce both real and wind-chill effective cooling.

3. Like fan blades and shutters, cooling pads will get dirty and must be kept clean to work at top efficiency. The required maintenance is to check and if necessary unclog the pad flute holes. One of the best ways to unclog channels in a cooling pad is just to spray a lot of water on them. Use normal water pressure only. High pressure systems can cut or damage pads. Several products are available that help loosen dirt on pads. These are normally sprayed onto the pads with a garden type sprayer and allowed to soak. Then loose material can be flushed out with just plain water. Be certain that whatever material you use to clean your pads does not contain chlorine and is approved for use on the pads.

4. In addition to collecting dirt and dust, pads can also become clogged with algae. If you see green growth, use a manufacturer approved cleaning agent only. Do not use chlorine or bromine to control algae growth on your cooling pads. If you are not sure about a product, do not use it. Contact the manufacturer of your pad for assistance in selecting a cleaning agent. Dump the water from the sump tank at least one time every two weeks to keep algae from growing in the sump.

5. Another item that helps prevent algae growth and keeps water flowing properly is to clean water filters weekly. Filters prevent dirt, bugs, and other foreign debris from making their way into the water distribution header. They are often the source behind your pads not being wetted thoroughly by clogging up the holes in the header. Filters that are clogged greatly reduce the amount of water flowing to the pad, which can reduce cooling as well as reduce the life of your pads.

6. Cooling pads need to be dried out at least once each day after being used. At night when you are not using the pads turn them off between, say 10 pm and 9 am, so that they are allowed to dry at night before use again.

7. If you have in-house foggers, you need to make sure all nozzles are clear and in good condition, and that pressure regulation and fogging coverage are adequate.

Bottom Line

The good money you have paid for quality fans and evaporative cooling equipment will largely go to waste and give you little or no return unless you make sure the equipment is maintained to operate at top efficiency. In the heat of summer, you can easily lose several hundred dollars per house in just a few weeks if you let fans and shutters get dirty, don't check and replace worn belts, or fail to see and correct an evaporative cooling problem.

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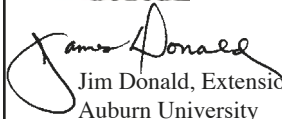
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