

Poultry Engineering, Economics & Management

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

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Hot Weather: 5 Opportunities to Maximize Airflow and Cooling

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Hot weather is just around the corner and it is time to start thinking about how to make sure our tunnel ventilation and evaporative cooling systems are ready to produce maximum airflow and bird cooling. Many companies and growers, especially those raising large broilers, got caught with a heat wave last summer that resulted in high mortalities. The sad truth is that many, if not most, of those mortalities could possibly have been avoided. In this issue, we outline the key spring cleaning and maintenance tips to help you recognize and take advantage of too-often overlooked opportunities to get the full airflow and tunnel cooling needed to avoid unnecessary mortalities this summer. Here's the quick list:

Opportunity 1: Stop Hot Air Leaks

Opportunity 2: Service & Repair Fans

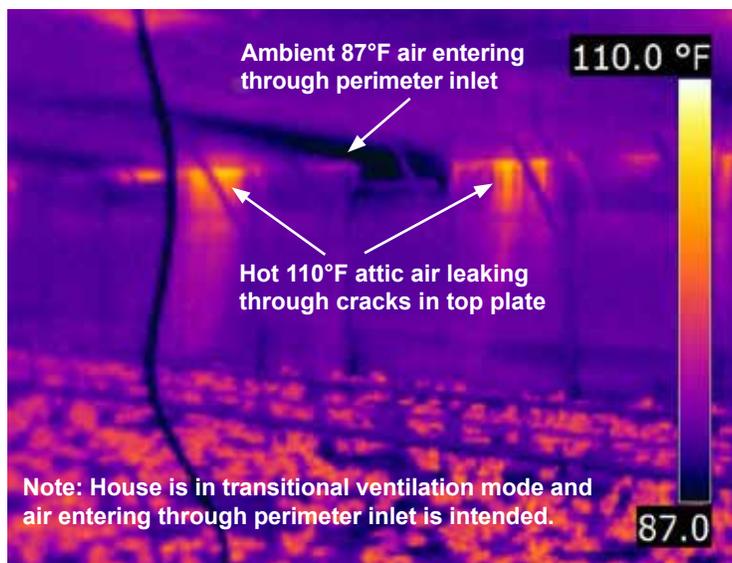
Opportunity 3: Get Full Inlet Openings

Opportunity 4: Clean Evaporative Cooling Pads

Opportunity 5: Stop Hot Air Bypassing Cooling Pads

#1: Stop Hot Air Leaks – Get the windspeed and cooling you paid for

During full tunnel, we want to force all air to enter through the tunnel inlets, flow down the house over the birds, and out the fans. Any outside air that leaks into the house between the tunnel inlets and the tunnel fans will hurt windspeed and add cooling load. Air leaks from the attic or through house structural gaps are also likely to be much hotter than ambient outside air. Any unsealed cracks or holes where sun is shining on roof or sidewall metal are likely to allow super-heated air, often well over 100°F, to enter the house,



This thermal image, taken during transitional ventilation, shows the difference between air entering a house through perimeter inlets at close to outside ambient air temperature of 87°F, compared to air coming from the attic just under the roof metal around the top 2x4 lumber plate at 110°F. These leaks are 23 degrees F hotter than ambient air. In really hot weather during full tunnel ventilation, air leaks of this kind will not just add extra load to the cooling system, but threaten seriously elevated mortalities.

Spray foam or caulk can help stop these solar heated air leaks.

putting a much heavier load on the cooling system. Visual inspection of attic inlets, attic access doors, ceiling material, perimeter inlets, man doors, and curtains can often reveal easily-sealed leak points. Follow-up smoke testing is well worth the trouble to identify and seal otherwise hard to find leaks, especially along sidewalls, foundation seals, and end walls. Few broiler houses, even relatively new ones, are tight enough to justify a grower passing up a springtime between-flocks opportunity to stop hot air leaks.

#2: Service & Repair Fans – Maintain full fan capacity to get maximum airflow

All fans used for tunnel ventilation must be thoroughly cleaned, inspected and repaired. Having clean fans is good, but cleanliness will not restore airflow lost because of worn parts. We often find clean tunnel fans that are overdue for major repairs and are keeping growers from getting maximum windspeed. Belts, tensioners, pulleys and shutters should be at the top of the list. Maintenance for a relatively new house is just as important as “old” house maintenance. A tunnel fan that has run (conservatively) 1,500 hours a year for 5 years has operated for 7,500 hours and the belts should have already been replaced a couple of times. Even in fairly new houses, we have been able to pick up over 100 fpm (feet per minute) in windspeed simply by changing belts and servicing belt tensioners on fewer than half of the house tunnel fans. In addition to doing maintenance ahead of hot weather, growers raising big birds should be inspecting fans for problems and cleaning shutters during the growout. This is especially important if in-house foggers are used. Fans provide the muscle power needed for maximum cooling. Don't let fans be the weak link in your cooling system.



Notice in the picture above that Fan A shutter is opened much more than Fan B shutter. This partially opened fan shutter on Fan B is a good indicator that the fan is not moving proper airflow and needs attention. The Fan B belt is worn down to approximately 50%. The rpm reading on the good fan on the left, Fan A, was 512 rpm and the reading on Fan B was only 419 rpm (19% slower). That is approximately 5,000 cfm reduction in fan output. Why is one fan belt more worn than the one next to it? This fan also happens to be the minimum and transitional ventilation fan in addition to being used for tunnel ventilation. Pay special attention to those fans that run more often and longer, as they will require more frequent service.

#3: Get Full Inlet Openings – Get more air moving under lower pressure

Tunnel doors and curtains must be inspected to make sure they are in the full open position when all fans are on. We find many damaged pulleys, broken strings, and broken cables that cause inlet air restrictions and reduced tunnel airflow. Less airflow means lower air speed and reduced cooling for the birds. It is a good idea – ahead of the cooling season and after doing cooling system maintenance – to place each house in the full tunnel mode with the tunnel inlets fully open and record the static pressure. Then if at any time during hot weather you find a house running under significantly higher pressure, you are likely to find an air flow restriction as the culprit. For example, a house that normally tests at 0.11 inches in full tunnel, and then suddenly approaches 0.15 inches in full tunnel during growout is showing you a sign that something is restricting airflow. Keep tunnel curtains moved out of the way in full tunnel.



Get all of the tunnel inlet opening possible during full tunnel ventilation. The tunnel curtain in this picture should be opened to at least 48 inches, but the top curtain flap and bunched up curtain at the bottom are restricting full airflow. Make sure the tunnel inlet curtains are pushed out of the way when the house is in full tunnel mode. Worn out pulleys, broken strings, and bunched up curtains can rob house airflow without much notice. For some growers there may be an opportunity to gain 50 fpm or more in windspeed by getting the full inlet opening.

#4: Clean Evaporative Cooling Pads – To get full cooling benefit

A typical 40-foot wide broiler house evaporative cooling system can evaporate over 5,000 gallons of water on a hot day in Alabama. A 66-foot wide house can evaporate over 11,000 gallons of water per day. It is easy to understand how mineral and dust buildup can quickly occur on the surfaces of 6-inch evaporative pad systems when this much water is being evaporated on a daily basis. This means growers must be aware of water quality and the need to replace pad system water in a timely manner. It is important to keep clean water in the system and to keep the screen filters in place and header holes unstopped to prevent fouling the evaporative cooling system. When the house needs maximum cooling, every square foot of pad must be wet. It is important that every evaporative cooling system have enough water flowing over the pads to keep dust and debris from drying onto the surface of the pads. As mineral concentrations increase and dust accumulates, this buildup can severely restrict the airflow through the evaporative pads. Once this buildup is allowed to dry and harden it can be difficult to remove without damaging the pads. Make sure the pads and system are thoroughly cleaned before adding chemicals. Follow the directions for cleaning as stated on the label. Inspect pads, flush header pipes and tanks, and replenish the system with fresh water on a routine basis. Evaporative cooling is essential along with good tunnel airflow to keep birds comfortable in hot weather.



These pads have substantial mineral and dust buildup collected on the outside surface that will drastically reduce airflow during tunnel ventilation. Cleaning dirty pads can be another opportunity to gain 50 fpm or more in wind-speed – in addition to getting better cooling.

Mineral and dust buildup must be removed and the water in the system flushed and replenished with clean water before adding any cleaner to the system. Follow the directions outlined on the label carefully to make sure the pads are not damaged during the cleaning process.

#5: Stop Air Bypassing Cooling Pads – Keep hot air off birds

Air that is allowed to leak into the plenum room (dog house) without passing through the wetted evaporative pads is a big problem. Any air that leaks through the ceiling of the plenum room just under the roof metal can be 130°F or more during the heat of the day. To stop that hot air from entering the house, plenum room ceilings must be insulated and air tight. We also often find air coming in above and below the recirculation system frames, around access doors, and the end walls of the plenum rooms. Gaps between pads are another too-often seen way hot air is allowed to enter the house. Any gaps must be closed up by pushing the pads to one side and adding additional pad or partial sections to fill the gaps. Take time to check the entire plenum room for possible air leaks that could be robbing the house of cooled air. You may well find an opportunity to gain several additional degrees of cooling.



This photo of an operating pad system with a section of pads missing shows one of the worst-case ways hot air is too often allowed to bypass the cooling system. Outside air that bypasses the pads is not only uncooled, it enters the house much faster than air that flows through the pads. Spring is the time to make sure all air enters through the pads this summer and birds get the cooling they need.

And, did you notice the tunnel inlet curtain covering close to a fourth of the tunnel inlet? Add that to the list!

The Bottom Line

Hot weather brings challenges that will test even the best growers. Growers who get the rewards of top flock performance pay close attention to the details in these 5 opportunities and understand that they complement one another. Getting maximum bird cooling performance requires all 5 out of 5 steps to be completed and maintained. Improving cooling by 1 or 2 degrees and windspeed by 100 fpm is a big deal in hot weather. For more details on what you can do to meet your goals this coming summer, visit our website at poultryhouse.com and watch our YouTube videos on Tips for Tunnel Cooling, House Tightness and Generator Service. And, to protect your bottom line, remember that a hot weather plan is only as good as the backup plan. If you have not already done so, now is the time to get your generator and electrical systems properly serviced, alarms tested, alarm batteries replaced, backups calibrated, and spare parts back in stock. These items are essential to keep flocks safe from disaster when the primary components fail, so don't take them for granted.

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