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AVOIDING HOT WEATHER PROBLEMS

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Temperatures in the broiler belt are bumping 100°F and it seems that the rain showers we are getting are only enough to increase the relative humidity and too brief to cool things down very much. Hot weather and high relative humidity mean that we need to get the maximum out of our poultry houses to ensure good bird cooling. Many U.S. poultry growers and managers have been calling or emailing the National Poultry Technology Center with questions related to maintaining maximum efficiency and cooling in hot weather operation. Following are our top recommendations for avoiding hot weather problems, based on the most common questions we receive.

Keep Up Regular Fan Maintenance

The tunnel fans are the heart of the tunnel ventilation system. Their job is to remove house heat and develop sufficient wind speed to remove sensible heat from the body of the bird. The first step in making sure you are getting maximum performance from a tunnel house is to be sure all tunnel fans are tuned up and running as efficiently as possible. Performing a thorough inspection of every tunnel fan and then correcting deficiencies is important to good operation of the fan and the house. Dirty tunnel fans or shutters, coupled with worn or slipping belts or fan pulleys, can easily cause a 20% or more drop in a fan's performance. A house full of suboptimal performing fans could drop the in-house full tunnel wind speed by as much as 100 feet per minute, which is about the airflow equivalent of turning two tunnel fans off in full tunnel mode. This would cause end-to-end house temperatures to go up, and also could decrease bird wind chill by more than 5 degrees F, depending on bird age. To make sure your fans deliver the airflow needed, inspect all fan belts, pulleys, and tensioners at least once per flock to ensure that the belts are held tightly to the fan motor pulleys, belts and pulleys are not worn, and tensioner pressure has not been compromised during operation. Fan motors, housing, blades, shutters, wire guards, and cones must all be cleaned between every flock. Fan bearings should be greased a minimum of two times a year, or per manufacturer recommendations.

Loose or cracked belts, as shown in photo at left, and worn belts or motor pulleys, as shown in photo at right, will all cause lowered fan rpm's and reduced house air flow. You don't want low fan rpm's, or loss of a fan from a broken belt, in the middle of a hot day. If belts or pulleys are worn, retensioning will NOT restore fan rpm's.

Keep Cooling Pads Clean

Wetted evaporative cooling pads catch insects, feathers, and other debris as air enters the cooling system. This trash can build up quickly during continuous use of the cooling system, restricting air flow through the pad just as though the inlet were blocked. Clogged pads place undue work load on the tunnel fans and cause them to operate at higher than normal static pressures. Pads should be inspected and kept clean during hot weather and periods of continuous system use. If the in-house static pressure has increased 0.01 inches or more in full tunnel ventilation mode with all fans operating, this points to a restriction in the ventilation system, and dirty pads could be the culprit. The inside, outside, and flutes of the pad are all important to the ventilation system and must be kept free from debris buildup.

Insects, dust, dirt, and dander can quickly clog evaporative cooling pads during summer months. Keeping the pads clean greatly improves airflow and bird cooling.

When it is time to service the cooling system use only pad manufacturer approved cleaners and algaecides in the system and on pads.

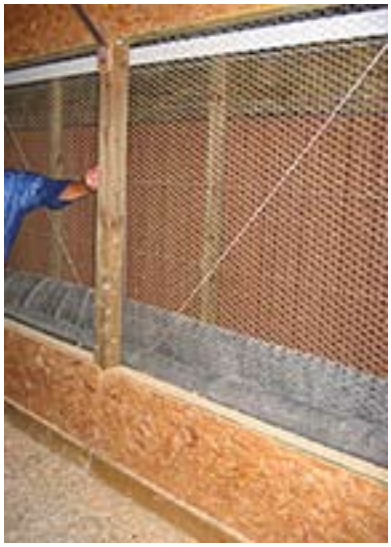
Dry streaks on pads usually mean distribution header holes are clogged and must be unstopped. Filters, strainers, and pump screens must be kept clean and checked on a weekly basis to make sure there are no additional restrictions placed against the cooling system pumps. Every square foot of pad should be wetted in full cooling mode to ensure that all air entering the house enters through wetted pad and not dry pad. It is also very important to maintain a fresh, clean water source during periods of high use.

Sumps of cooling systems need to be dumped between flocks and at least once a week or the equivalent in bleed off during hot weather growouts to maintain water quality. Recirculating dirty water shortens pad life and causes filters and header holes to plug up.

Avoid Restricting Air Flow

We often blame lack of wind speed or high static pressure in a tunnel ventilated house on the tunnel fans. The fact is, a lot of times it is the characteristics of the house, the inlet, or the equipment in the house that is the root of the problem. First, be sure you have enough cooling pad to do the job. A good rule of thumb is you need about one square foot of operating six inch paper pad for each 350 CFM of air installed on a house at a 0.10 static pressure. A house with eight fans that each move 26,250 CFM at 0.10 static pressure needs about 600 square foot of six inch pad (210,000/350 = 600). That works out to a 60 ft x 5 ft system on both sides of the house, or 75 square feet of pad per fan.

In high-ceiling houses, air deflector baffles placed lower than about 9 feet above the floor will restrict airflow too much, lowering wind-chill cooling and increasing fan static pressure.



There is a small leeway in that calculation, but if your numbers are more than 5-8% short you could have restricted air flow because you don't have enough pad area installed. After the air passes through the cooling pad we need to get it into the house with as little restriction as possible. Keep in mind that anything that increases the speed of the air entering the house, or makes it change direction, will increase static pressure on the fans. Every time we squeeze the air stream with a restriction we are adding more work load to the tunnel fans at the far end of the house.

In high ceiling houses that use deflector baffles to increase air speed and make air flow more uniform from side-to-side, we often see baffles improperly

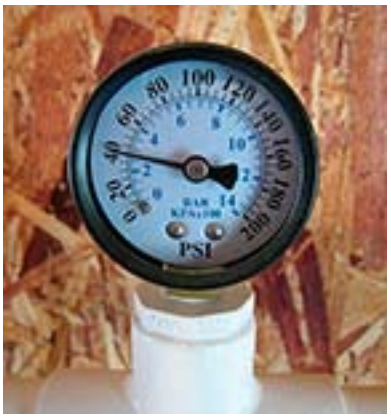
Tunnel curtains that bunch up and fail to drop below the bottom of the tunnel inlet opening will seriously interfere with airflow in the house. In this house, the top flap for the tunnel curtain is hanging down and obstructing the top of the inlet, so it is also restricting air flow (and raising static pressure).

installed, typically too close to the ground. In houses with low clearance deflector baffles (7.5 feet) we have seen increases in air speed and reduction in fan end static pressures by raising the deflector heights to between 9 and 10 feet from the floor. Keep in mind that to accurately measure the static pressures that fans are operating against in high ceiling houses with deflector baffles, we need to make the measurement with a magnahelic approximately 50 feet from the fan end.

Dirty evaporative cooling pads, as discussed above, can also be considered an air inlet restriction. The take home point here is that what looks like a fan problem might be a problem at the other end of the house.

Assure Adequate and Clean Water Supply

We have had multiple calls about water pressure and pipe sizing on farms since the outside ambient temperature has broken the 90's and stayed there. Much like electrical problems, insufficient plumbing problems don't show up until the system is operating at maximum capacity. This is often on some of the hottest days of the year and during the last week of the flock, just before birds are sold. Unless blockages, leaks or pump issues can be found to account for the problems, the most likely cause is either too small pipe sizing or inadequate water supply. In this case, not much can be accomplished until all of the houses on the farm are vacated.



Water pressure at the control room needs to be about 40 psi under maximum demand flow. If the water system cannot maintain good pressure under maximum demand, there is a problem to be found and fixed.

Plumbing systems for poultry houses should be designed to meet or exceed water demands on the whole farm on the hottest day of the year with market age birds. One way to see if the plumbing system is sufficient for maximum demand water use is to empty all water storage tanks on the farm and fill them all up at the same time to simulate a maximum demand scenario. If control room pressure drops much below 40 psi during this test, the water source (well or municipal) or supply plumbing lines could be insufficient to carry the maximum water demand of the farm.

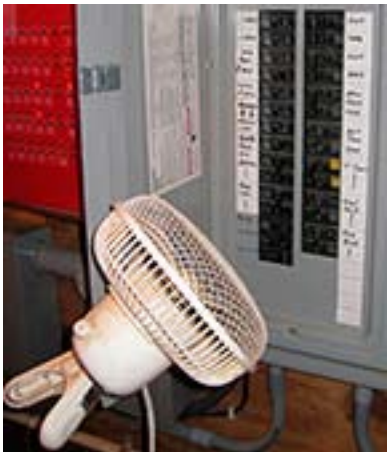
The designed maximum flow rate, in gallons per minute, varies based on the number and size of birds in each house and the amount and type of evaporative cooling system installed, the amount of tunnel fan installed capacity on the house, and the assumed maximum outside temperature and relative humidity. Since this design maximum demand is highly variable, the plumbing system should be custom designed for each farm. It is best to compare the measured water flow on the farm, in gpm, to the integrator's maximum demand requirement per house. It is important to be able to supply all evaporative cooling systems, as well as bird drinker systems and high pressure fogging systems at the same time. It is a good idea to test for plumbing problems prior to hot weather flocks so that if a problem is seen, a solution can be determined and the problem fixed without birds in the house. Maintaining a reliable back up supply source of water that is tied into the primary system is imperative for every poultry house during hot weather.

Monitor and Maintain Electrical Systems

Catastrophic bird losses will occur in less than 30 minutes in modern houses if we lose power in hot weather. Birds don't like heat and neither do electrical components. Panel boards, motors and wiring all heat up and are much more susceptible to failure in summer when it is hot and we are running at maximum capacity. Utility power is also subject to failure in hot weather. We cannot say enough about regular testing and servicing of the stand by generator, transfer switch, and the alarm systems that are installed on most modern poultry farms. This equipment is often overlooked, abused, and taken for granted, but it is your life line.

However, your standby generator is worthless if you lose a main house breaker. That's why it's important to monitor all electrical equipment on a regular basis. Over time, electrical connections can increase in resistance, causing them

An overheated breaker like the one shown in the infrared photo at left is big trouble about to happen. Pointing a fan at the breaker box is at best a mere band-aid until the electrician arrives. An infrared temperature gun is a relatively inexpensive and quick way to spot overheating equipment.



to heat up. An infrared temperature gun is a relatively inexpensive and quick way to spot overheating breakers or other gear. (See “Tools of the Trade” at www.poultryhouse.com.) If breakers are hot or are tripping often, we need a qualified electrician to tell us why they are hot and how to fix the problem.

If you are experiencing problems with fan motors in hot weather you might want to get a qualified electrician to take voltage and amperage readings on your tunnel fans while they are operating. A voltage reading taken when the fan is not running is not an indicator of the voltage that is present at the fan motor when it is running. The voltage test must be done under operational load. Too low voltage under load will cause a fan motor to draw higher amperage, which can cause motors to trip out, burn up, or fail prematurely. Too small a wire size for the length of the wiring run, which results in a large voltage drop in the wire itself, is a common cause of such problems. We see this most often in houses that have breaker panels installed at one end of the house and the fan motors installed at the other end of the house, so the circuit may be 500 or more feet long. You can have adequate voltage at the breaker box but by the time the electrical current reaches the fan motor there is sufficient voltage drop so that the fan motor is operating at low voltage. The proper cure for this problem is increasing the wire size to the motors, thus reducing the voltage drop.

The Bottom Line

When we spend our money for high quality fans and evaporative cooling systems to achieve good performance, we have to install them correctly and perform the necessary maintenance to keep them operating at their optimum levels. Of course, catastrophic losses from a total failure in a poultry house can be many thousands of dollars, and must be prevented at all costs. But even seemingly minor deficiencies or inefficient equipment performance can also add up. For a 4-house farm with 80,000 birds, a 0.1 pound per bird loss in catch weight amounts to a $400 or more loss to the grower, ignoring settlement position. On that same farm, having to run 2 additional fans for the last 3 weeks of a hot weather flock to overcome deficiencies will total $450 or more per flock at prevailing electric rates. Also, running houses at higher static pressures may create other problems down the road, such as decreased fan motor life, electrical overloads, and undue stress on ceilings. There is a definite payback for attending to the details outlined in this newsletter.

For information on related hot weather topics and more detailed information on the topics listed in this newsletter, visit www.poultryhouse.com and look for the following newsletters:

#41 – May 2006 - Keys to Top Evaporative Cooling Performance
#37 – October 2005 - Preventing Common Electrical Problems
#30 – July 2004 - Fan Belts, Pulleys, Shutters, Cool Pads – And Profits
#7 – September 2000 - Key Water Factors for Broiler Production

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: Jess Campbell, National Poultry Technology Center, 226 Corley Bldg., Auburn University, AL 36849-5626, (334) 844-3546, fax (334) 844-3548, jesscamp@aces.edu. Published by:

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