

Summer is Coming— Prepare Broiler Houses Now

The combination of summer temperatures and humidity in Mississippi can be dangerous for poultry flocks in the state. Poultry growers should plan ahead for the long, hot Mississippi summers.

There are a number of steps growers can take to prepare for the hot weather. Most of these steps work better (for both you and your birds) if done before July or August. Some may require a small expense (such as new fan belts), but most only require an investment in time. Certain steps are time-consuming or require the fans not to be running. Therefore, they must be done before hot weather arrives and while birds are still small, or in between flocks. **Plan ahead and do preventive maintenance projects EARLY.** There will be plenty of other issues that require your immediate attention on a daily basis once hot weather arrives.

Air Speed is Critical

The growing US demand for large broilers (8½- to 9½-pound range) often makes minimizing **heat stress on these larger birds the top priority** for broiler growers throughout the summer period. Broiler chickens today do not perform well in heat-stress situations. Modern, tunnel-ventilated broiler houses will provide adequate house conditions if they are well maintained and properly managed. However, the 400 ft/min air speed down the house that was fine just a few years ago is no longer sufficient. Many modern tunnel houses are capable of a minimum 600–700 ft/min (some may manage 800–1,000 ft/min), and all of it is needed with today's larger broilers.

Fans, and plenty of them, are what allow 600–700 ft/min (or greater) air speed. They are the first line of defense against higher summer temperatures. However, to generate an air velocity of 600 ft/min, the number of tunnel fans required depends on their air-moving capacity at a static pressure of 0.10 inch (Czarick, 2007a). Determining the number of fans based on a lower static pressure will reduce the available air speed. In addition, any fan is only as good as its belt. Loose belts cannot spin the blades at the

maximum revolutions per minute and add wear to the pulley. In most situations, **fan belts should be replaced once a year**; replace them more often if they ride low in the pulley (**Figure 1**).



Figure 1. Fan belts should ride flush with or slightly above the top of the pulley.



Figure 2. Belt-drive fans have bearings and grease fittings that need grease twice a year.



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Fan blades and shutters also must be kept clean. Numerous field studies indicate that **dirty shutters can reduce airflow by as much as 30 percent**. Also, don't forget the bearings. A dry bearing requires more power to turn. This results in a loss of fan efficiency and shortens the life of the bearing. Lubricate bearings twice per year (spring and fall) if they have a grease fitting and are not sealed. Some bearings are sealed and do not require lubrication. However, you should remove the protective guard or shutter and use a grease gun to **manually grease any bearings and grease fittings (Figure 2)** twice a year.

Especially when growing larger birds, having **enough air speed** is critical. But just as important is having a **uniform air speed** from side-to-side and end-to-end of the house. Only about a third or more of your birds will receive adequate cooling if you have 700 ft/min air speed down the center of the house but only 300–400 ft/min near the side wall. It is better to have 600 ft/min throughout the house than to have 750 ft/min in the center and 350 ft/min near the sidewalls.

Smooth, solid sidewalls work better than curtain-sided houses or solid wall houses with exposed posts. Smooth, solid sidewall houses usually have less than 20 percent variation in air velocity between the sidewalls and the center of the house, whereas most curtain-sided houses have variations in air velocities ranging from 30 to 50 percent (Czarick, 2007a). This is because exposed posts create an uneven surface that tends to force air off the sidewall and greatly reduce air velocity along the walls. Wall-mounted space furnaces will have the same effect. Anything other than a smooth wall surface will significantly reduce air speed over birds near the sidewalls.

Check the Cool Cell System

Uniform air speed is critical, but during extremely hot weather, you need a second line of defense: the cool cell system. To provide the most benefit, you must maximize the amount of wetted pad surface the air passes through. Dry pad area allows hot air to pass directly into the house and reduces the cooling effect of the wetted pad area (Donald et al., 2002).

Preventive maintenance on the pad system is just as important as fan maintenance. Clogged pads force the fans to work harder, reduce the wind-chill effect, and reduce cooling. The flutes should be free of dust, cobwebs, and especially mineral deposits. Mineral buildup over time can eventually ruin a set of pads, and the only solution will be to replace them (Figure 3). Once the pad is wet, it needs to stay wet throughout the day until evaporative cooling is no longer needed at night. Allowing the pad to dry out too often decreases the cooling effect and allows for increased mineral deposition on the pads as the water evaporates and minerals are left behind.



Figure 3. Mineral buildup clogs cool cell pads.

Make sure the holes in the distribution header pipe along the top of the pads remain free of debris. Regularly check them to keep them clean and open. Flush the distribution line before charging the system in the spring to remove any dirt or debris that may have accumulated over the winter. **The entire pad should get wet when the distribution header pipe is operated.** Dry streaks on the pad indicate a problem with uniform water distribution. Dry streaks also mean hot air is entering the house without being cooled, decreasing the effectiveness of the cool cell system. Direct sunlight on the pads and distribution line may result in excess algae growth that can plug the distribution holes or the pads. Houses today are often built with roof overhangs that cover the pads and distribution system to help reduce algae growth. **Use filters** on the pad system to help minimize debris that can clog the holes in the header pipe. Regularly perform preventive maintenance on these filters.

The flutes (holes) in the pads must be kept open. Flutes in the pads are notorious for collecting dust and cobwebs. Don't make matters worse by blowing grass clippings from your mower or brush hog toward the pads. Always aim the discharge away from the pads to keep clippings from being sucked into the flutes and restricting airflow.

Keeping the flutes open is sometimes just a matter of spraying water on them with a garden hose. **Do not use bleach** or any product containing chlorine to clean the pads. Strong chlorine solutions will destroy the cellulose material that most pads are made of. **Do not use high pressure** for cleaning because it will likely damage the pads. For extremely dirty pads, commercial products can help cut and loosen dirt. These are applied with a three-gallon pump-up garden sprayer. However, always check the label to make sure the product is approved for use on the pads.

Heat Dissipation and Static Pressure

Birds must be able to dissipate about **12 Btu of heat per hour per pound** of body weight if they are to maintain their comfort level (Donald et al., 2012). As the air temperature near the bird increases above what is comfortable, its ability to dissipate heat from its body surface is decreased, forcing the bird to rely more on panting to cool itself. Panting should be avoided as much as possible. Typically, at a comfortable temperature, **birds will lose about 5 Btu of heat per pound per hour from their body surface and about 7 Btu through breathing.** Birds will increase their breathing rate and start panting as the air temperature rises above what is comfortable. If the air temperature reaches such a high level that panting can no longer maintain a normal body temperature, the bird's internal body temperature will rise. This results in severe heat stress and will lead to mortality if the situation cannot be corrected with supplemental cooling (Donald et al., 2012).

It's important to know what the static pressure is in the house with all the tunnel fans running. This is especially true in steel truss or high ceiling houses that have had baffle curtains installed to improve the air velocity. The **static pressure should never be more than 0.12 inch** (Czarick, 2007b). If it is, the fans have to work too hard. Many controllers today can monitor static pressure at least in one location. However, you may not know what the pressure is at various locations down the house.

It's important to know the pressure 20–30 feet past the pads and 20–30 feet past the last baffle curtain. The reading near the last baffle curtain will likely be higher, but it shouldn't be too much higher. If you have a reading of 0.04 inch near the pads and 0.10–0.12 inch near the last baffle curtain, it is possible the baffle curtains are too low and need to be raised a foot or so. This should increase air velocity down the house and reduce the static pressure, relieving some of the workload on the fans and improving house conditions.

If the pressure is high at or near the pads, you have other serious problems. The pads may be dirty or clogged with mineral deposits. You will need a magnehelic pressure gauge (Figure 4) and some plastic tubing to measure static pressure in various locations throughout the house. These can usually be purchased for less than \$100, or your service tech may carry such items.

Take Advantage of Nighttime Cooling

Don't overlook the potential for nighttime cooling. Running fewer fans at night may save a little electricity, but it is a lost cooling opportunity and could be costing you significant performance losses. One reason for this is relative humidity. Humidity is much higher at night (usually between 80 and 95 percent). However,



Figure 4. Pressure gauges measure static pressure inside poultry houses.

even at night, regardless of air temperature, birds rely on evaporation of water off their respiratory system to cool themselves.

High humidity makes it much more difficult for the bird to accomplish significant evaporative heat-loss off the respiratory system because the air it breathes in is almost as saturated as the air it breathes out. If you maintain high air movement at night by running additional fans, you can increase the amount of heat loss and reduce the bird's need to cool itself (Fairchild and Czarick, 2005).

In addition, as the temperature drops at night, there is a larger difference between air temperature and the bird's body temperature. This makes it easier for air movement to pull heat away from the bird and lower its body temperature. As its body temperature drops at night, the bird will regain the appetite it lost during the hot part of the day. However, increased feed intake will lead to increased heat production and the need to maintain increased air movement late into the night to provide optimum cooling (Fairchild and Czarick, 2005). Obviously, running more fans later into the night will use extra electricity, but the increased bird performance should more than offset the additional power costs.

Don't Forget the Generator

Finally, **run your backup generator each week for at least 30 minutes.** Be on the farm when it runs, or check the hour meter to make sure it actually did run; don't just assume it ran. Check the fuel level regularly and keep the tank at least half full (two-thirds is better). If the generator won't start or runs out of fuel

when you need it most, disaster is only a few minutes away! Summer heat and humidity are stressful on Mississippi poultry flocks and growers. **Fans, cool cell systems, and emergency backups** should be checked and ready long before summer heat and humidity arrive. Take every precaution to ensure that you have done all you can to protect your flocks and maximize potential summertime returns.

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