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Avoiding Electrical Catastrophe

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Spring is in full bloom and summer is coming. In the Broiler Belt, that means thunderstorms followed by (or alternating with) sweltering hot weather. Either case can be a broiler grower's worst nightmare – IF the grower is not prepared! As springtime, when it's not storming, usually brings moderate weather, it's a good time to prepare your farm for the electrical challenges that are likely to come. There are just three major kinds of preparation a grower needs to make to be ready for these challenges: 1) Making sure the farm's electrical system can reliably handle a continuous full load situation with everything running; 2) Making sure that generators and other backup and alarm systems are ready; and 3) Making sure all electrical system grounds are in good condition.

Will my farm's electrical system handle a continuous full load situation with everything running?

Having all tunnel fans, feed motors, lights, cooling pumps, and feed augers running at the same time can really test an electrical system. Most of the time poultry farm electrical systems operate at very low capacity. When the electrical system on a hot day is running at or even beyond its designed capacity is the worst possible time to encounter an electrical problem. If an electrical panel overheats, a main breaker trips, a disconnect fuse burns out, or a loose connection fails, catastrophe is likely, even if the main and backup power supplies are in perfect working order. This means that every electrical component in the system must be capable of handling a full load test. If you have never had an electrical inspection conducted on the main electrical components on the farm or it has been a while, then now is the time to do it. Our goal here is to make sure there are no "weak links" in the system. A few hundred dollars spent on preventative maintenance could save many thousands of dollars in the event of a major electrical failure.

Automatic Transfer Switch – The brain of the transfer switch is probably the electronic component on the modern poultry farm most frequently damaged by lightning or by power surges.

If this electronic control is damaged or any part of it fails, the only way to transfer power if needed is to do it manually. Every person on the farm must be trained to be able to transfer power manually if needed.

Since the transfer switch only works in an emergency, and since damage or component failure may not be evident, it is very important to test transfer switches along with the backup generator on a weekly basis.

Inspection by a qualified electrician, including checking and tightening all wire connections and contacts, is recommended at least once a year. A lost connection in a transfer switch will result in devastating losses in hot weather.

What components should be inspected? In order of priority (at minimum): the main farm disconnect breakers and wire connections, transfer switch wire connections, the breakers/fuses and wire connections in the main disconnects to each house, main control room panel breakers and wire connections and the breakers in the main panel(s). Don't forget the ground connections too. How important is all this? Just remember that in an emergency situation in hot weather with large birds, finding and repairing an electrical system "weak link" that has failed is extremely dangerous and difficult to execute before birds are lost. It is well worth while to have a qualified electrician to find and fix the weak links before disaster strikes.

Are all generators and transfer switches, alarms, and backup controls and sensors ready to go?

Poultry growers need to ask themselves "Am I prepared for an interruption in electrical power?" There is one sure way to find out – turn your power off. If a poultry grower is unwilling to walk up to the main disconnect for his entire farm, while birds are in the houses and a high percentage of equipment is running, and turn utility power off without hesitation – then that grower needs to start thinking about why he is unwilling to throw that switch. After all, handling that loss of utility power is exactly what growers are asking their backup systems to be able to do 24/7/365. If a grower is not comfortable doing that, they need to contact a reputable electrician and have the farm's backup electrical systems examined closely and corrective repairs made promptly.

Generator and Transfer Switch: A grower may say "My generator automatically exercises weekly; I don't have to do a kill test." Most generator systems do automatically go through an exercise on a regular schedule. However, many of these systems exercise only the generator and do not transfer all the house power to the generator system during that exercise period. They are only testing the ability of the generator to crank and run, not necessarily the ability of the system to handle the farm electrical load. Even on systems that do transfer the power, it is most often tested in the morning and often for only a short time. As morning temperatures are often cooler and not all house equipment – fans, cool-cells etc. – may be running, a true test of the "worst-case scenario" is seldom done.

It's recommended that the system be tested at least once every flock, either manually or automatically, by transferring power to the generator while all the equipment that is expected to be running that flock is turned on. This test should last at least an hour to allow for the generator so see all electrical fluctuations it may be called upon to handle during an extended outage. Doing this test when utility outage is not expected allows for any deficiencies to be found and addressed without risking bird loss. If nothing else, a grower could always turn on all the fans and lights while the houses are empty and then perform a kill test and let the generator handle the load for an extended period. And, don't forget that generators must be fully serviced at least one time every year.

Alarms: Power outage alarms should be tested frequently. It is recommended that they be tied into the first fan breaker on the distribution panel and should respond to the loss of a single leg of 220v. Also, most alarm systems now can be expanded to monitor the generator. If the generator starts to run, then an alarm is sent/sounded. This can be a valuable management tool. If the grower is off farm during a normal exercise time and knows that the generator was supposed to exercise at 2:00 pm on Monday but he doesn't get the alarm call, then he immediately knows the generator needs attention. Also, if an alarm for generator run is received at any other time, the grower knows that his farm is on backup power and appropriate action should be taken. If your generator system does not have such an alarm already, contact the alarm company, as most can add such.

As for in house temperature alarms, most growers tend to use them as a "final warning device." However, alarms are too often set at levels for hot or cold temperatures far outside bird comfort temperatures. If a house has a target set point of 80°F and the high temp alarm is set at +20 degrees and the low temp at -20 degrees, the birds

Grounding System: The first defense in the event of a lighting storm is to make sure the entire farm grounding system is properly installed and maintained. Our goal is to achieve the least amount of resistance to ground as possible in the electrical grounding system – by National Electrical Code, 25 ohms or less. Previous farm tests show many farms have grounds closer to 150 ohms or more and need repairs. We often find loose connections, corroded ground rods, and cut ground wires during farm inspections. Solid acorn style connectors make a much better connection to the ground rod and are recommended over two-piece clamps. The grounding system should be inspected yearly by a trained electrician. Don't forget to make sure the generator frame is grounded too. We recommend adding additional ground rods to farms that have had previous lightning damage as a first step toward protecting the farm from the next lightning storm.

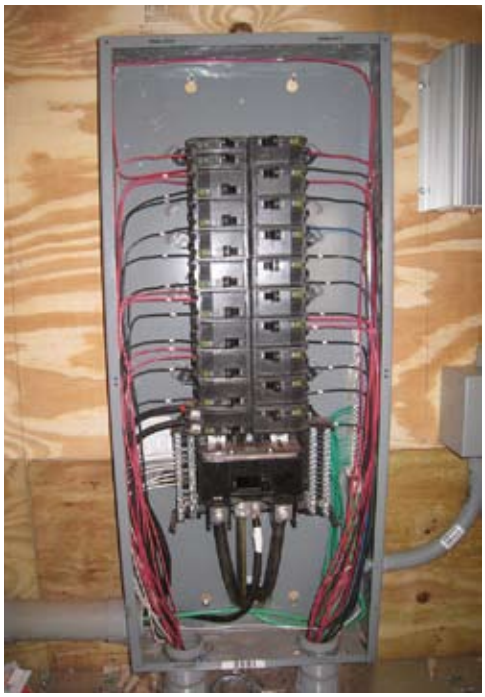
will have suffered serious performance setbacks if not mortality before the alarm would ever go off. Growers need to learn to use the alarms as a management tool. For instance, if the weather outside is mild and birds are middle age and the set temperature is 80°F, set the alarm for plus or minus 8-10 degrees, letting the alarms help you.

Backup Controls or Thermostats: Whether a house has an integrated backup that works with the controller, digital temperature sensors or manual dial thermostats, these systems must be tested. The quickest way to test the system is to turn off the controller breaker, killing power to the controller. Once again, if a grower is hesitant to perform this test, something may be wrong that needs to be addressed. Backup systems should be wired so that they will always override the controller if their temperature settings are reached. Their temperature set points should be close enough to the desired controller settings that if the house gets into a backup situation, the birds inside would see little change in their environment. It is not uncommon to go into a normally functioning house that is in full tunnel mode with the backups set properly and find that the first half of the fans are actually running on the backup thermostats. If this is not the case, it is probable that the backups are either not wired correctly or that they are not set close enough to be functional.

Generator: Generators must be fully serviced once a year and should be exercised weekly for at least an hour, actually transferring power and running the farm to ensure they can handle the full hot weather electrical load of the entire farm for as long as needed. Power outages typically last for only a few minutes, but at times can last for days.

A general rule of thumb for a dual fan back-up thermostat would be to have that thermostat set at 5 degrees above the hottest fans on-temp set point. For example, if Fan 5 & Fan 6 are wired on Backup #3, Fan 5 controller on-temp setting is 70°F and Fan 6 controller on-temp is 72°F, then set Backup #3 on-temp at 77-80°F. It is always recommended to have multiple backup thermostats in the system. Two fans per thermostat is the most recommended setup, giving the grower reasonable environmental control in case of computer controller loss. Having more than two fans come on per backup thermostat can be problematic and, if necessary, should be confined to the last fans to come on. Advances in controller backup systems have addressed some of these concerns by giving the grower the capability to switch multiple back-up fans on or off as bird age/set temperature requires. The downside to this type system is growers now have to be sure they actually turn those backup switches on at the right time. Tunnel inlet and cool-cell systems should also be on a separate backup control/thermostat, set similarly to the fans on-temp set point at 5-10 degrees above their respective controller temperature settings.

Manually controlled backups, whether dial type or digital MUST BE ADJUSTED REGULARLY! This cannot be overstated, as the failure to do so is responsible for a high percentage of catastrophic bird losses every year. Growers might set the backups when they get chicks and then never reset them as the flock progresses. Often growers turn backups off between flocks and forget to turn them back on. Also, they get turned off then raised/moved up out of the way of the clean-out equipment, shavings truck or chick trailer and never get let back down. Such occurrences have caused multiple whole house losses of birds. For curtain sided houses, curtain drops should be tested between each summer flock to ensure winches are not locked and the curtains actually drop when power is lost. Backup controls and thermostats must be checked before every flock and adjusted as required.



Main House Panel: This panel is of critical importance. If a main panel breaker, feeder wire connection, or bus bar to breaker connection is lost for any reason the entire house is at stake. Both power company and backup power sources can be operable but if the main house panel fails there is no way to get power to the house. Each electrical component in this panel should be thoroughly inspected by a trained electrician once per year. If this panel gets hot or a breaker inside keeps tripping that means you have an electrical problem that needs to be addressed immediately.

Is my grounding system in good shape?

Grounding wires, rods, clamps, and frame grounds for generators are all extremely important components of a farm's electrical system, especially for preventing damage from lightning or power surges. While checking grounds should be part of a regular electrical inspection by a qualified electrician, growers should also regularly check grounding points themselves to help insure the security of their backup system. Ground rods should be driven deep into moist earth, the connectors should be tight on both ends and copper ground wires free from damage. Copper ground wires must be sized per National Electrical Code requirements. It is recommended that 8 ft long x 5/8 inch diameter copper clad ground rods be used, with solid acorn style grounding lugs that tighten with a bolt instead of the two-piece pipe clamps. In testing over the last six years is has been found that most two-piece clamps loosen over time and are more prone to failure.

Another important point is to make sure the generator frame is grounded to a ground rod, either the main one at the shed or a rod by itself. It is often found that the generator itself will only be grounded through the neutral back to the transfer switch. Without a frame ground, the chance that a lightning strike that hits the transfer switch will also damage the computer controller on the generator greatly increases. If both of these electronic control devices are damaged by lightning, it is possible that the grower would have absolutely no way to get power to his house. Growers that have had the misfortune of lightning damage should ensure that their grounding system is thoroughly inspected and upgraded if needed. The integrity of any surge protection equipment is based on ensuring a low resistance path to ground.

The Bottom Line

Even minor electrical malfunctions can result in flock performance losses worth several hundred dollars, and if electrical systems aren't regularly inspected and maintained, more or less frequent losses in this range can be expected. The major threat, however, is that an electrical weak link that might have cost $100 or so to find and fix will bring on catastrophic losses.

For example, if an electrical malfunction occurs in a house with 22,000 birds at 6.5 pounds, 143,000 live weight pounds can be lost. At $0.055 per pound, that is a $7,865 loss to the grower. Company losses could be in the $3 or more per bird range, given current feed and chick costs.

Since qualified electricians can be hired for about $75 per hour (rates vary), most electrical components are fairly inexpensive, and most electrical weak links can normally be found and corrected in just a few hours, it is a very wise business decision to make that investment in having a qualified electrician perform a routine farm electrical inspection once a year.

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