



Applied Poultry Engineering News

Evaporative Cooling Pad Maintenance

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Tunnel ventilation has quickly become an industry standard for broiler housing. High velocity ventilation air flow that produces a wind chill effect on broilers is enhanced by additional cooling of warm outdoor air as it is drawn through evaporative cooling pads. The effective cooling that occurs can be limited by the condition of your pads. As outdoor temperatures rise, growers need every degree of cooling they can get to maintain bird production.



Why Spend Time Maintaining Pads?

Proper cooling pad maintenance can keep your system operating at high efficiency. A properly operating cooling pad system will maintain bird performance during hot weather. Cooling pads are a significant investment and the time spent maintaining pads will result in increased pad life. Properly maintained pads also allow maximum return from the investment in tunnel ventilation equipment. It is worth your time to maintain your pads.

The Key Aspects of Pad Maintenance

Whether you are maintaining 2" thick spray-on (fogging) pads or 6" thick recirculating (recirc) pads there are some basic areas that maintenance must address. Cooling pad efficiency is limited primarily by two contaminants. Excessive mineral deposits, primarily calcium, accumulate as water evaporates and crystallizes causing scale. Organic fouling, primarily algae, occurs as nutrients combine with water on pad

surfaces. These contaminants can shorten pad life and reduce cooling efficiency.

Pad maintenance is especially important at regular intervals such as the beginning and end of the cooling season. Maintenance is also required on a weekly and even a daily basis. As with most all equipment, a small investment of maintenance effort can be done over time or maintenance can be neglected, leading to early pad failure and high replacement costs.

Prior to the Cooling Season

Inspect pads that have been out of service during winter prior to hot weather. Pad sections that are warped or bowed will not allow uniform water distribution and should be replaced. Warped pads also create air gaps between pad sections allowing hot air to enter without being cooled. Check both sides of your pads for damage by rodents who may have chewed holes in the pad material. The bottom of pads should be supported and not sitting in the drain gutter.

Spring and Fall Season Pad Cleaning

Cooling pad systems should be thoroughly flushed, cleaned and disinfected at least twice a year to maximize their performance and life. The first pad cleaning should be done before hot weather requires their use (mid-June on Delmarva). A final cleaning should be done in the fall as the cooling season ends. These cleanings are primarily to remove scale. Scale, which is largely calcium deposited on the pad after pure water evaporates, crystallizes on pad surfaces and will clog (foul) the pads. Clogged pads reduce airflow through the pads and decrease cooling. Cleaning procedures for recirculating and spray-on pads are similar.

Recirculating Pads

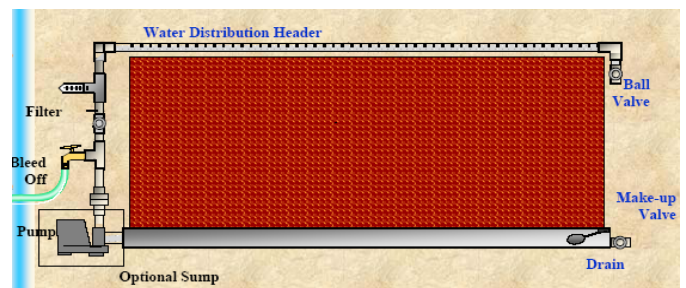
While pads are dry, use a soft bristle brush to very gently remove debris from the pads. Brush with a motion in the direction of the corrugations. If you appear to be causing damage to your pads, stop immediately.



Gently loosen scale with a soft brush.

Following brushing, allow the pump to operate to thoroughly wet the pads. Apply a cleaner such as AquaMax™ or SanI-Kleen™ using a garden hose with a “Miracle-Grow” bottle-type sprayer attached until the pad is saturated. Allow the cleaner to remain on the pads at least an hour. A common cleaning cycle would be to apply the cleaner during the evening, then rinse it off the next morning using a garden hose with low pressure. Use caution not to damage pads with excessive water pressure. Cooling pads are basically wet cardboard. Applying too much force during cleaning can easily tear them.

Drain and replace all water from the system. Make sure to empty water from the sump and any reservoirs. A chemical such as Evap 100™ (BioSentry, Inc.), Physan 20™, (Maril Products, Inc.), Green-Shield™ (Whitmire Research Laboratories), or Triathlon™ (Olympic Horticultural Products) should be added to control algae. Filters should be cleaned at this time.



Typical recirculating evaporative pad system.



Storage tanks should have contaminated water drained and replaced with fresh water.

Spray-On (Fogging) Pads

While pads are dry, use a soft bristle brush very gently to remove debris from the pads. Brush with a motion in the direction of the corrugations. Rinse the pads using a garden hose.

Turn on water to the system. Check for clogged nozzles by noting areas of dry pad. Clean nozzle screens if necessary. Do the water lines require height adjustment to properly wet the entire pad area?



A spray-on pad that is obviously not wetting the entire pad area.

Thoroughly wet the pads. Mix water and an

appropriate chemical cleaning solution. Use a garden-type sprayer to apply the cleaning solution to the pad surface. After allowing the cleaning solution to remain on the pads for an hour or overnight depending on how dirty the pads are, use a garden hose to rinse the pads. Do not damage the pad material with excessive water pressure.

Weekly Pad Maintenance

Water filters in the pad system should be cleaned weekly. Clogged filters can reduce water flow in a system by up to 50%!



Clogged filters should be cleaned to allow proper water flow to evaporative pads.

During the cooling season, an algaecide should be added to the sump of a recirc pad system on a weekly basis. If algae are not a problem on pads, a half-strength dose of algaecide can be used. Do not use bromine or chlorine (swimming pool tablets and bleach) on pads in any form. They will severely damage the pads! Similarly, an algaecide should be applied to spray-on pads with a sprayer every week.

Daily Pad Maintenance

Pads should be given a quick inspection every day for dry spots, proper water flow and obvious structural damage.

When using recirc pads, run water for 10 minutes to flush debris from the system prior to cooling each day. When cooling is no longer needed, dry pads completely by turning off water and running fans for 30 minutes. Pads should be completely dried once per day.

Keep an eye on the static pressure while cooling pads are operating. An increase in

static pressure using the same number of fans indicates pads are clogged.

Practices to Avoid Scale Buildup

Bleed-Off

As pure water evaporates from recirc pad systems, contaminants such as calcium that don't evaporate, are left behind in higher concentrations. Calcium buildup is the main cause of scale on pad surfaces. Bleed-off is the planned removal of contaminated water and replacement with fresh water. The rate of bleed-off recommended is 1 gallon per hour per linear foot of pad length. Bleed-off is usually done by using a side discharge pipe and valve. A conductivity meter is used with some systems to activate bleed-off when mineral content in water becomes high. Other systems use a timer to control automatic dumping of water. If you don't bleed-off daily you should flush and refill your system with water once a week.



Scale accumulating on the edge of pads.

Water Flow

If scale appears to be a problem on pads, increase the quantity of water flowing to the pads. A 6-inch thick recirc pad should have a flow rate of at least 0.75 gallons/minute per linear foot of pad length. For example, an 80 foot long recirc pad requires 60 gpm of water.

Most recirc pad systems have an open top to help growers check water pressure and distribution over the length of the distribution pipe. Check the distribution pipe regularly for clogged water distribution holes and that water flow is even over the entire pipe length. Clean and flush the pipe regularly.



A water distribution pattern on a pad showing less water along the pad length from a clogged distribution head.

Practices to Avoid Algae Buildup

Algae must have light, nutrients and moisture to sustain growth. Algae growth on pads will clog pads and can provide mold and bacteria a home from which to spread disease. Growers should follow practices that limit an evaporative pad's exposure to light and nutrients to limit algae growth.



Severe algae growth has almost completely clogged this pad. Don't ever let your pads get this bad!

Limiting Light on Pads

Pads can be shaded using greenhouse shade cloth. Shade cloth also filters airborne nutrients from impacting on pads.



Shade cloth shields pads from sunlight.

Do not use translucent hoses, pipe or storage tanks. Make sure storage tanks are covered and not open to light and air.

Limiting Nutrients on Pads

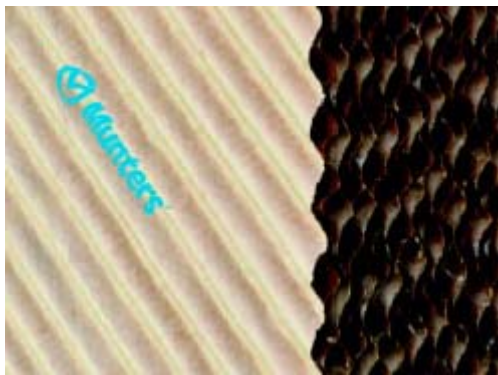
Nutrients fuel algae growth. Use water from deep wells or a public water supply. Pond water or shallow wells are often high in nutrients. Don't use phosphate based detergents to control scale on pads. These detergents degrade to form phosphate nutrients. Rotten pads decompose to create nutrients for algae and should be removed from the system. Use care when mowing grass, harvesting grain, handling feed or tilling soil near cooling pads. These functions all generate organic nutrients that cause algae growth if blown onto pads.

Moisture

Keep pads wet during the day. Don't use timers to control water application to pads. Frequent wet/dry cycles increase scale formation and will prematurely wear out pads. However, pads need to be dried completely every 24 hours to stop the growth of bacteria and mold. Turn off the water flow to pads about 30 minutes prior to reducing ventilation rates at night.

Algae Resistant Edge Coatings

Evaporative pads are available with a black rubberized edge coating applied to the outer inch of pad. This coating resists algae growth, increases pad durability and extends pad life. The increased durability allows the pad to be washed and "lightly scrubbed" without sustaining damage.



Rubberized edge coating adds to pad durability and resists algae growth.

Chemical Use on Pads

Chemicals should not be used more frequently than recommended on pads. Their overuse will dry out and corrode pads. Chemicals should never be used on a daily basis. They are not a substitute for proper pad management practices such as using bleed-off, supplying proper water quantity and quality, and timely pad cleaning. Overuse of chemicals or using improper chemicals can destroy wood and metals that comprise the support structure of an evaporative cooling system. Use only chemicals recommended for cleaning evaporative cooling pads and follow the doses recommended.

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Chemicals for Algae Control on Evaporative Cooling Pads

(From Aerotech, A Munters Company)

Chemical Name	Company Address	Chemical Family	Manufacturer's Recommended Dose
Evap 100	BioSentry, Inc. 1481 Rockmountain Blvd. Stone Mountain, GA 30083 (770) 723-9211 (800) 788-4246 www.biosentry.com	Quarternary Ammonia and Tributyltin Oxide	4 oz. per 100 gal. water for initial dose, 2 oz. per 100 gal. water weekly thereafter.
Green-Shield	Whitmire Research Labs. 3568 Tree Court Lnd. Blvd. St. Louis, MO 63122 (800) 777-8570 www.wmmg.com	Quarternary Ammonia	1 oz. per 6 gal. water
Physan 20	Maril Products, Inc. 320 West 6 th Street Tustin, CA 92780 (714) 544-7711 (800) 546-7711 www.physan.com	Quarternary Ammonia	1 tsp. per 15 gal. water
Triathlon	Olympic Horticultural Prods. 772 Ledford Lane Smithfield, VA 23430 (757) 373-8440 (800) 659-6745 www.olympichort.com	Quarternary Ammonia	1 oz. per 30 gal. water Treat every other week.