NC STATE UNIVERSITY

North Carolina Poultry Industry Joint Area Newsletter

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Time to Think About Hot Weather Management

Kenneth E. Anderson, Extension Poultry Specialist

As the summer weather becomes more prevalent with high temperatures and humidity, producers must begin looking at how to keep their birds cool. Hot weather can have a severe impact on poultry performance. Poultry producers should realize that high temperatures can affect production efficiency long before survival becomes a concern. Heat stress begins when ambient temperature climbs above 80EF., and is readily apparent above 85EF. When a bird begins to pant, physiological changes have already started within a bird's body to dissipate excess heat. At this point, anything that you do to help birds remain comfortable will help maintain optimum growth rates, hatchability, egg size, egg shell quality, and/or egg production.

General Hot Weather Management

A grass cover will reduce the reflection of sunlight into a poultry house. Vegetation should be kept trimmed so that air movement is not blocked. Shade trees need to be located where they do not restrict air movement.

Fans should be routinely maintained. Maintenance should include cleaning the fan and keeping pulleys and belts in good condition and properly adjusted. Poultry netting on sidewall or air inlets often will pick up enough dust to restrict air movement and should be cleaned on a regular schedule.

Keeping a reliable, clean and cool source of water in front of poultry is essential for birds to cope with high environmental temperatures. Placement of water pipes near the ceiling should be avoided. Draining a warm water line will allow cooler water to reach the waterer. Poultry operations should have a second well or access to an emergency source of water in case of failure of the primary water source.

Another factor which affects heat gain of a house is the condition of the roof surface. A shiny roof surface can reflect twice as much solar radiation as a rusty or dark metal roof. Roof surfaces should be kept free of dust and rust. Roof reflectivity can be increased by cleaning and painting with a metallic zinc paint, or by installing an aluminum roof. These practices are particularly effective for buildings that are under-insulated.

Equipment and Ventilation Techniques Used to Reduce Heat Stress

During the summer months when the temperature and humidity are high, proper poultry house ventilation is vital to insure the necessary removal of heat and the continued productivity of the flock. There are a number of components of poultry house ventilation systems. These include curtains, fans, fogging nozzles, evaporative cooling pads, timers, static pressure controllers and thermostats. Most ventilation systems can provide an adequate in-house environment when properly managed. If the system design and management fails to satisfy the flock's ventilation needs, stale and contaminated air can build up in the poultry house. Stale air and contaminants, including ammonia,

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moisture, carbon dioxide, carbon monoxide, and dust, can result in stress and depressed performance. Stress may impair the immune system and increase susceptibility to disease problems. To reduce stale air and contaminant problems, the producer must control air temperature, air speed, and relative humidity through ventilation management.

Natural Ventilation

Curtain-sided houses rely extensively on natural air movement. These houses work best when they are located away from obstructions such as other buildings or trees which block the natural air currents. To escape from total reliance on natural air movement, many producers have added circulation fans in curtain houses to increase air movement and body heat loss from the birds. Fans should be spaced to maintain air movement between fans and turbulent air movement around birds. Fans should be spaced about 25 to 30 feet between fans in curtain layer houses, and 40 to 50 feet in broiler houses, (depending on fan size). Circulation fans should be controlled by thermostats turning on at about 85EF.(or lower in hot weather) and off when temperatures drop below the setpoint (85^{o} F), to save energy. During periods of extended hot weather it would be advantageous to allow the circulation fans to continue running through the cool hours of the evening by turning thermostats down to 75^{o} F or even lower. This will lower in-house temperatures faster, providing the hens with a cooler environment in which to dissipate stored body heat.

Foggers reduce air temperature in the house on hot days (92-95^{o}F) with low humidity levels, especially during mid-day when humidity levels are lowest and temperature is highest. This is accomplished by injecting fine water particles into a warm environment. As the water vaporizes, heat in the environment is used, which in turn lowers the air temperature. When foggers are used, they should be operated on an intermittent basis or designed to avoid excessive water flow into the environment. If water flow through the foggers is excessive, humidity levels may increase to the point where bird evaporative heat loss is prevented. In addition, wet litter from excessive fogging can lead to performance and health problems. The appropriate water flow rate and timer settings will depend on the method of ventilation, ventilation rate, bird size, and outside conditions. Fogging systems in naturally ventilated houses are typically designed to provide 50 - 100 gal./hour of water flow.

Forced Ventilation

Forced ventilation systems move air entirely by fans in the building walls; this type of ventilation is also referred to as "controlled environment". Power ventilated houses can provide good, uniform air flow patterns under hot summer conditions by maintaining correct static pressure and avoiding air flow obstructions. Determination of how much air should be moved through the building is very important. This can be accomplished in two ways. A "rule of thumb" for calculating the minimum volume of air required per pound of body weight is given in Table 3 (not shown). The values in Table 3 can be used to determine the total fan capacity required in the house. However, the rates shown are minimum estimates, and worst case scenarios must be anticipated. For example, fan efficiency is greatly reduced if they are allowed to become excessively dirty thereby reducing the CFM pulled through the building. A second method is to calculate the interior volume of the house. Once this is done, a summer ventilation rate of one air exchange per minute can be calculated.

Negative pressure systems are designed to operate best with a static pressure of .03 to .08 in. of water. This pressure allows the air to travel from the air inlets along the ceiling, until it meets the stream from inlets on the opposite side of the house, and drops in the center of the house, creating air turbulence. The air then travels toward the exhaust. If the pressure is too low, the velocity of the air is reduced as it enters the building, resulting in the air flow dropping to floor level and traveling toward the exhaust fan. Conversely, if the static pressure is greater than .08 in. of water, the velocity of the inlet air is increased, but the volume of air moved is restricted and fan efficiency is reduced due to back pressure on the fan blades. This can result in pockets of stale air within the house with little or no velocity, which is detrimental in summer conditions. Dead air zones must be avoided by proper inlet placement and system management. The location and orientation of the inlets is the single most important factor influencing the air flow pattern inside the building.

Tunnel Ventilation

A new arrangement of ventilating poultry houses in the summer is tunnel ventilation. Simply put, this method involves moving air along the building axis from inlets to exhaust fans, which provides high air velocities. This

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in turn increases convective heat loss, reducing the effective temperature that the bird is feeling. Figure 2 (not shown) shows the effective temperature (wind chill) the bird is feeling at a given environmental temperature and air velocity. Research by Drury (1966), showed that most of the benefits of tunnel ventilation occur at an air velocity of 350 ft./min. This should be considered the minimum air velocity for most house designs. Tunnel ventilation systems do not operate on a static pressure. In fact, they work best when there is no pressure difference between inlets and the fans.

Evaporative Cooling with Power Ventilation

Both fogging nozzles and evaporative cooling pads are additional options which can be used in combination with power and especially tunnel ventilation. Evaporative cooling (cooling air by evaporating water) uses heat from the air to vaporize water. This method increases humidity but lowers air temperatures in poultry houses. Evaporative cooling can be effective in North Carolina during the hottest part of most days since that is when humidity is lowest. On rare occasions the humidity will remain high the entire day or immediately before or after a storm; evaporative cooling will be ineffective and should not be used during such conditions. Evaporative cooling pads utilize the same method of cooling as foggers, except that air is cooled as it enters the house. This reduces the problem of wet litter and allows evaporative cooling pads to be used on a continuous basis. Aspen Fiber and Corrugated Cellulose are two materials widely used as cooling pads and require scheduled maintenance to insure a long life. First, the pads need to dry out once each day of use. This is done in the early morning hours when the outside temperatures are lower. The drying allows the adhesive holding the pad together to maintain its integrity and also helps reduce the buildup of algae. To reduce the growth of algae, an algicide can be used in the water for the cooling pads. The algicides Calcium Hypochlorite, Ethylene Dichloride, and Ammonium Chloride can be administered at a rate of 6 oz./ 1000 gal. of water, applied once each week. In addition, the pads should be washed on a monthly basis to remove dust and sediment. The entire system should also be flushed on a monthly basis to remove the buildup of mineral salts and dirt which accumulates in the pipes and reservoir.

Evaporative pads constructed of aspen or cellulose ranging in thickness from 2 to 6 inches are being used in the industry in conjunction with power ventilation systems. These pads evaporate water at a rate up to 100 gal./min. (gpm)/100 ft^2 of pad on a hot, dry day and 200 gal./min.(gpm)/100 ft^2 of pad using tunnel ventilation on the same day. Fogging systems have also been used successfully in environmentally controlled poultry houses. Fogging systems which provide a reliable fine mist and have water filters (to keep nozzles from clogging), and a positive shutoff to prevent dripping can provide successful cooling without causing wet litter. The water pressure should be at least 100 pounds per square inch (psi)(preferably 200 psi) to achieve a fine mist. The quantity of water going through the fogging system and the number and placement of the nozzles are critical design considerations. A total flow rate of up to 1 gal./h per 1000 cfm of ventilation rate can be used in tunnel ventilated houses. The design of the fogging system is critical for tunnel ventilated houses. Cross lines of nozzles, which provide a "curtain" of fog across the house at various intervals, are fairly effective. Nozzles or lines of nozzles should be located closer together near the air inlets, then have increased spacings further along the house, ending 60 ft from the exhaust fans. Tunnel ventilated houses can use substantially more fogging capacity (50 - 100 % more) than naturally ventilated houses, due to the guaranteed air movement being able to carry the mist.

The value of a summer ventilation system should not be underestimated. If the summer ventilation system is operating properly, it can improve litter quality, reduce dust levels, and improve the flock's rate of gain or production levels. The key to operating any ventilation system is understanding how it works. In addition, a good maintenance program of cleaning, adjusting, and monitoring controls for the curtains or inlets will maintain system efficiency. Fans in any ventilation system should be frequently cleaned and lubricated, and fan belts should be periodically adjusted, especially during times of heaviest use. If foggers are used, they should be serviced periodically to insure a uniform fine particle fog is being generated. If questions arise concerning the operation of your ventilation system, consult your flock supervisor.

Roof Rats in Poultry Houses

Mike Stringham
Extension IPM Specialist

The roof rat, *Rattus rattus*, is commonly found in eastern North Carolina, and has become a more frequent pest in poultry houses within the last 3 to 5

years. About as long as the Norway rat, *Rattus norwegicus*, at 14 to 16 inches from head to tail tip, adult roof rats are more mouse-like in appearance than the heavier Norway rat. A more slender body, prominent eyes, proportionally large ears and a tail slightly longer than the combined length of their body and head distinguish them from other rat species. Their behavior is markedly different from that of the Norway rat as well. Unlike the Norway rat, these rodents seldom nest in burrows. The prefer attic spaces, and are just as happy scurrying around in insulation held in place with plastic sheeting as they are hiding in more conventional attic spaces. Roof rats will even nest high in the rafters or along the sills of open ceiling barns. Easily the most acrobatic of all the common rodent pests, roof rats are able to scurry along overhead cabling and water lines as they move through the poultry house. The roof rats are extremely secretive rodents, and may often go undetected until they have caused a great deal of damage in the poultry house.

General sanitation and exclusion practices are effective for rats and mice alike. Clean up all feed spills where possible inside and outside the buildings. Dispose of damaged eggs and/or mortality properly every day. Collect floor eggs every day as well. Limit entry points by sealing gaps around conduits, water pipes and feed lines where they enter the building. Repair damaged foundations and curtains; repair or replace damaged cooling pads. Be sure all entry doors are well fitted, and equipped with a heavy duty sweep or weather stripping as needed. Repair malfunctioning louvers at vents. Although none of these practices will eliminate rodents from your facility, they will help limit their access to food and water and simplify baiting efforts by reducing the areas of concentrated rodent activity in many cases.

Scouting and other practices for effective roof rat control require a sharp eye and a slightly different approach to baiting. First, don't underestimate just how secretive roof rats can be, and certainly don't assume that overhead areas behind plastic barriers, attic spaces, or even open rafters are rodent free. Look up. Look closely. Make a thorough examination of such areas on a regular basis. Look for fresh damage to plastic barriers and bits of insulation raining down from above or pushed into gaps along the eaves. *(continued page 5)*

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Roof Rats in Poultry Houses

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Examine louvered eave vents for rat droppings or other evidence of roof rats. Where overhead areas are accessible, climb up and look around. Be sure to bring a big, bright spotlight and look in the farthest, darkest reaches of the attic. If there is little or no insulation left, it is riddled with rodent tunnels, or piled up between ceiling joists in some areas while others are bare, suspect roof rat activity. Use pellet, single dose baits in the infested overhead areas. Watering stations filled with a solution containing one of several multiple dose rodenticides are also effective in overhead areas. Bait or water stations should be inspected and replenished as needed every few days until the roof rats are reduced. Block baits are very useful when nailed or wired near entry points near the ceiling. Finally, step up bait placements in all areas of the poultry house whenever it is vacant. Roof rats and other rodents will be forced to forage over wide areas when food and water are scarce. Down time between flocks is often the best time to make real progress in reducing any rodent infestation.

Neighbor Friendly Best Management Practices for Poultry Growers

Kathy Bunton
Area Specialized Agent, Poultry

With the ever increasing interaction between farmers and non-farmers, conflict over waste handling, pests, and odors is growing very quickly. Making sure you are always aware of your actions, and how what you do affects your neighbors, can make your life much easier in the long run.

Handling Litter

Numerous calls are received each year from poultry growers' neighbors complaining about how growers handle their litter. Litter is removed from the poultry house and piled outside, breeding flies and causing odors. Neighbors do not seem to realize that at some times, cleanout is not at the proper time for application, and the manure must be stored for a short period. If the manure must be stockpiled outside, remember to cover the pile with a tarp. If the litter stays dry, odors and flies will be minimized. The best practice is to have a manure storage structure, built to stop runoff and keep the litter dry. Also, remember that if litter is stockpiled--technically even for one day-- it must be at least 100 feet from a well, stream, pond, etc. If the litter must be piled for a short period, make sure there is a good vegetative cover between it and a stream.

Think before you spread! Where are you going to spread? If you are going to have to spread near a cluster of homes, spreading on a sunny day will allow the sun to start "sterilizing" the litter to stop the odor. If you spread during a wet period, the dampness, lack of sun, and heavy air will all work to intensify the odor. Equate odors with unhappy neighbors!

Think about where you spread. How close are you to your neighbors property line or house. Big clods of litter, or cake landing in your neighbors yard is not a good thing. Check the wind--dust from spreading can blow onto the neighbor's house, car, and if windows are open, into the house.

We have all driven behind trucks from which material is blowing and settling along the roadside. Feathers are unsightly! Clods of litter can actually damage an automobiles exterior. Cover your load. This is required by the state, and needs to be observed by farmers.

Litter Management and Flies

Possibly the most important thing for poultry farmers to remember in getting along with neighbors, actually pertains to litter management. If you can keep your litter dry, you will minimize odor, minimize ammonia problems with your birds, and minimize fly problems stemming from your operation. Prior to the use of nipple waterers, most litter was between 25 and 40 percent moisture. Now 15 to 20 percent moisture is more attainable.

Fly larvae need about 45 percent moisture to develop, so if you can keep the litter moisture level low there should not be many fly problems. If nipples leak, so that there is an isolated area in the poultry house with high moisture, there will be problems with flies developing. Spot spraying with a Larvadex type spray can treat the isolated wet areas in the house and help control flies on the farm, and in the neighborhood. Hatching egg producers should plan to have Larvadex added to the feed as soon as the pullets enter the laying house. Again, spot spraying with Larvadex will have an effect on fly numbers. It is very important to remember that dry litter means few flies and little odor!!

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Neighbor Friendly Best Management Practices for Poultry Growers

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Control Rodents

Not only do rodents spoil and eat feed intended for your birds, decreasing your feed efficiency and pay check, but they also harbor diseases that can be transferred from flock to flock. When birds are out of the house, particularly if the layout is long, rodents may go looking for a new source of food, in a new home. The new home might be that new house down the road from your farm. Have a plan in place for controlling rodents. Low rodent numbers will not only make your operation run better, but the neighborhood might be a much easier place in which to live.

Poultry Mortality

Improper disposal of poultry mortality is also a highly charged issue with neighbors. The visibility of carcasses and odors from pits, composters, or incinerators is sure to warrant complaints. Some mortality is always going to be present in a poultry operation, but it should not be visible. Do not throw the birds out the poultry house door and leave them there all day until you can dispose of them. If they are visible, people will complain. Do not leave them for your dogs (or the neighbor's dogs) to drag away.

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If you use a pit or a composter, vector control is very important. Dogs, raccoons, rodents, and fox can be a major problem if the pit or composter is not managed well. Carcasses should be covered with a foot of earth or nine inches of litter (in a composter) every day.

If you compost, keep track of temperature, and estimate moisture, to insure fast, hot composting action. One way to estimate moisture is that the compost should look and feel like a damp sponge, or like chewing tobacco straight from the pack--if it is not damp, add water. After the bin is filled, temperatures should reach 140-150 degrees F. Temperature will peak and come down. Once it has come down to about 120-125 degrees, turn the pile into another bin. Introducing air will start the pile to heating again, and finish decomposition. Two to three instances of air introduction may be needed to complete the composting action. If all is going well, after the bin is filled, turnings will occur every two to three weeks (watch the temperature as an indicator!).

If you use an incinerator, be sure to provide the correct amount of fuel when burning. Adequate fuel produces a fast, hot burning of the carcasses. If the carcasses smolder, burn slowly or incompletely, there will be smell. It is a good practice, if possible, to incinerate your mortality during the daytime, when the air is not so heavy. In the evening, the air cools and gets heavy. As the air gets heavy it stays near the ground, and odors intensify. This is when most neighbors complain about smelling the incinerator. The best recommendation in using an incinerator is to burn the birds as quickly and as hot as possible. If your incinerator has an afterburner, do not turn it off; the afterburner re-burns the smoke, removing many of the particles that cause odor. ***As always, consult your flock supervisor before making any management changes.***

Thanks to former Area Poultry Agent, Dr. Glenn Carpenter for contributing to this news article.

News from NC Poultry Federation

Robert L. Ford, Executive Director

The NC Poultry Federation held its first quarter Board meeting March 10, in Raleigh. Special guests included Dr. Sam Pardue, Head, NCSU Poultry Science Department; and Dr. David Marshall, NC State Veterinarian, NCDA&CS.

Dr. Pardue was proud to report that they had 30 applicants for this fall's entering freshmen. NCSU has hired Frank Bradley, retired mill manager from Southern States, to be the Project Manager for the campus feed mill. Dr. Pardue also announced a search is under way for an Assistant Professor of Poultry Science – Feed Mill Management and Feed Processing.

Dr. Marshall discussed NC's preparedness plan to combat Avian Influenza if it should rear its ugly head here in North Carolina. All state diagnostic labs have been busy helping to run pre-slaughter A.I. tests on all flocks. NC is ready with NPIP plans in place to contain and dispose of both low and high path breaks. A special emphasis will be placed on teamwork with the staff at NCDA &CS, USDA, industry responders, and NC's Department of Health & Human Services. He stressed to not let our guard down and to continue practicing strict biosecurity enforcement, especially at the farm level.

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News from NC Poultry Federation

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NCDA&CS Emergency Services team just completed a three-day Livestock Incident Roundtable. The purpose of this meeting was to share recent advancements and accomplishments in euthanasia and carcass disposal technologies.

The Federation has been busy tracking the hot immigration issues. We have joined a coalition to lobby for a guest worker provision. A new bill in the U.S. Senate addresses guest workers. The NCPF was in Washington April 4-5 to help lobby for passage of a bill that contains a provision to help keep our legal immigration work force intact.

The Federation attended an open forum that was recently held in Wilkesboro, NC to discuss the possibility of locating a litter burning facility that can produce electricity. This could provide an alternate source for growers to dispose of excess litter while at the same time getting compensated.

NCPF has joined another coalition that concerns two laws that have been around for sometime that could affect growers who are engaged in livestock and poultry production. One is the Superfund Law, (CERCLA) and the other is the Community Right to Know Act (EPCRA). We're currently working on ways to exempt poultry production from being harassed by these laws.

Our first annual Poultry Environmental Growers Award nominations are underway. The winners will be announced at our annual membership meeting and banquet scheduled for August 17, in Greensboro. The criteria for this award will be judged on a set of best management practices of being good stewards of our farming environment. After all, farmers were our first environmentalists.

For more information on how to become a member of the NC Poultry Federation, please give us a call or visit our web site: www.ncpoultry.org

NC Poultry Federation Upcoming Events

August 17	NCPF Annual Membership & Awards Banquet, Grandover Resort, Greensboro, NC
November 1	NCPF Hall of Fame Award Luncheon, Capital City Club, Raleigh, NC.

Important Factors in Water Quality to Improve Broiler Performance

Edgar O. Oviedo. Broiler Extension Specialist. Department of Poultry Science. North Carolina State University

Water quality is partially responsible for variations in broiler performance among growers within the same company that receive the same feed. Other factors include housing type, equipment, and general management. Water is the most critical nutrient to guarantee the best broiler performance. The quality of the water offered to broilers depends on several physical, chemical and microbiological parameters. Bacteria, molds, minerals and water additives interact in the water source, and within the pipelines and drinkers. These interactions complicate the management necessary to guarantee the best water characteristics for optimum broiler performance.

Water quality frequently changes from season to season in each location or area depending on the source. In North Carolina, water obtained from wells generally contains high levels of minerals leading to high water alkalinity and hardness. Several water samples obtained across the state from broiler farms experiencing flock performance problems additionally contained high levels of sodium, potassium and iron. These broiler performance problems were partially solved by installing softeners and specific filters for these minerals.

It is advisable to monitor water composition every six months and not only when the producer experiences poor flock performance. Samples for analyses should be collected at the point of water supply, before any treatment or additive is applied, after treatment or medications, and at the end of the pipeline. This sequential sampling helps to determine the dynamics caused by the current water management practices. Water quality changes inside poultry house due to the warmer environment that facilitates the rapid replication of microorganisms.

Sanitation and acidification are the practices that most growers implement to improve water quality for their broilers. It is important to understand that these are two different approaches that work together to improve water quality; however, one does not replace the other. Acidifiers alone cannot replace sanitizers that effectively reduce microbial loads of heavily contaminated water sources. To obtain an effective

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sanitation with chlorine requires that the water pH be between 6.0 and 7.0. Consequently, acidifiers should be applied to water with pH readings higher than 7.5, which is also associated with high alkalinity. The acid and chlorine should never be mixed together to create stock solutions, since these chemicals react and release dangerous gases. An inline pump with dual injectors can be used to add the acidifier stock solutions prior to the addition of the chlorine solution. Chlorine is not the only available sanitizer. Ozone, chlorine dioxide, hydrogen peroxide and iodine are also used in poultry production with excellent results.

Type and concentrations of disinfectants and acidifiers need to be modified according to the initial microbial load, mineral content and buffer capacity of the water to be treated. One method to evaluate a good sanitizer is using the oxidation-reduction potential (ORP). The ORP parameter measures the capacity of a sanitizer to be a strong oxidizer for destroying microorganisms or for reacting with some harmful minerals such as iron and manganese. ORP meters can be used to identify the appropriate amount of disinfectant to use for a specific water source. An ORP value in the range of 650 millivolts or greater indicates good quality water that can be effectively sanitized by 0.2 to 0.4 ppm free chlorine. Lower values close to 250 millivolts indicate heavy organic loads that will not be properly disinfected by chlorine. Excellent live broiler performance has been observed in farms that have water with ORP values close to 750 millivolts. Measuring ORP is better than using chlorine pool test kits. These kits do not distinguish between free and bound chlorine. This is important in water with high organic material content.

Water sanitation starts with a regular pipeline cleaning program to reduce the natural build-up of minerals, algae, molds, viruses and bacteria that are capable of forming bio-films. Daily water sanitation may not work when strong bio-films are established in the water lines. Citric acid, sodium hypochlorite, and quaternary ammonium compounds are some of the products used to clean water lines. Water lines can also be effectively cleaned by adding a 50% solution of hydrogen peroxide to the medicators to obtain a 1% solution in the pipeline and allowed to soak overnight. Independent of the product used to destroy the bio-film, it is important to completely flush out the dissolved materials. This material contains high levels of minerals, toxins produced by dead bacteria, algae, and free microorganisms that can be even more harmful for the new flock.

Acidifiers are used to keep water pH to less than 7.0 and help to reduce bacteria proliferation. It is common that acidifiers are added to drinking water of broilers for short intervals of one to three days at a time. However, in farms where the water pH is higher than 8.0, those days without pH control can negatively affect the efficacy of water sanitation. It is true that chickens can rapidly adapt to acid water (pH 3, 4, or 5), but constant drastic changes may affect their patterns of water and feed consumption and lead to sub-clinical intestinal problems.

It has been observed that lowering pH to less than 5.0 does not provide significant improvements in broiler performance. Overuse of organic acids such as citric and acetic acids can lead to reductions in water and feed consumption and lead to a depression in growth rate. This detrimental effect of excess acid is due to the strong taste that acids can give to water. Due to the natural buffering capacity of water and the interactions with minerals, it is recommended that producers monitor the pH of drinking water when using acidifiers at the manufacturer's recommended levels.

Water quality management is very important to guarantee broiler performance. Constant monitoring is required and not only when problems are observed. It is recommended that water samples be collected quarterly and for a very reasonable cost can be sent to the NC Department of Agriculture Laboratories for analyses. The information gained from these analyses including your pH, ORP and chlorine level readings can be used to determine the best management practices required for your specific water conditions.

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COOPERATIVE EXTENSION
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