

Department of Animal Science

MANAGEMENT OF NIPPLE DRINKER WATERING SYSTEMS

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Nipple drinker systems have become the standard for most of the poultry industry. When managed properly, bird performance and litter quality are excellent with nipple systems, and they save labor by eliminating the chore of cleaning open-type drinker systems of the past. Although labor is greatly reduced with nipple drinker systems, that does not mean they require less management. If anything, nipple systems require more management and attention to detail than systems of the past. Improper management resulting from mistakes in water line height and regulator pressure can have a detrimental impact on broiler performance and litter quality. Birds consume approximately twice as much water as feed (on a pound for pound basis), and both feed and water consumption steadily increase as a flock ages.

Water consumption

Water is the most important nutrient consumed by an animal. A bird can survive several weeks without food but only a few days without water. The purpose of the broiler drinker system is to provide sufficient water for optimum performance while maintaining dry litter. It is important to know how much water broilers consume on a given day. Water is sometimes used to provide medications, vaccines, vitamins and electrolytes to broilers. It is essential to be able to predict consumption to ensure that each bird receives the proper amount of such substances. In addition, growers that monitor daily water consumption can compare current consumption rates with past flocks to identify potential disease or management issues indicated by a drastic change in consumption.

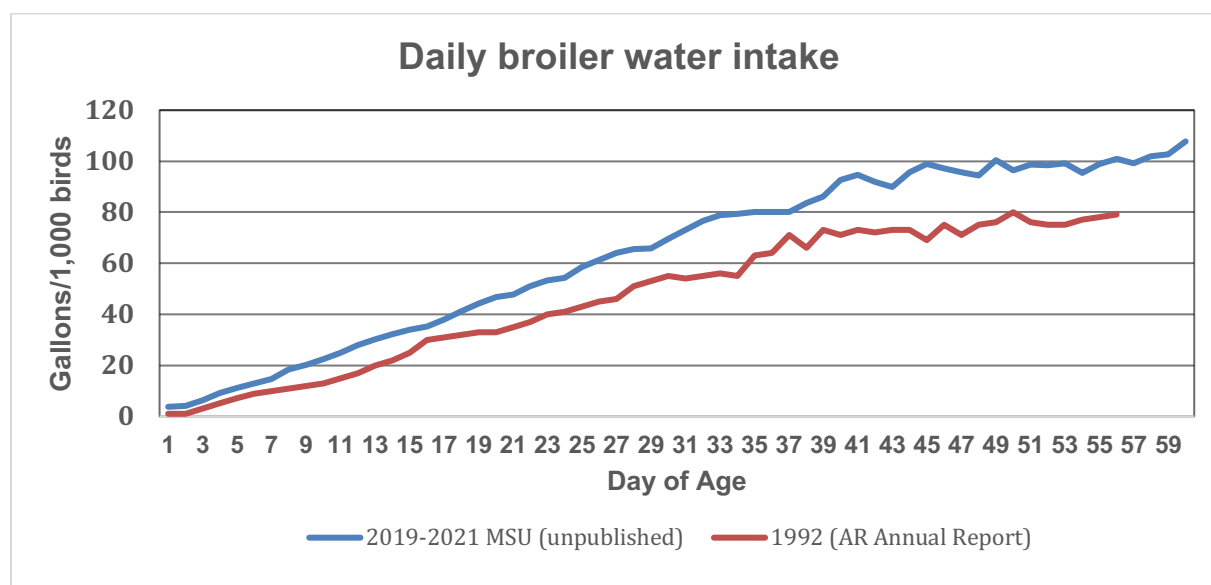
Water consumption continues to be one of the simplest and most effective tools a grower can use to monitor flock performance. It should gradually and continuously increase as the flock ages but don't be alarmed if usage remains unchanged for a day every now and then. However, if water usage remains unchanged or decreases for more than a day or two, growers should attempt to identify the culprit because, most likely, something is wrong. A checklist of possible issues include:

- 1) Drinker line height is too high or too low
- 2) Pressure at the regulator is incorrect for the age of the birds
- 3) Air locks in the drinker system
- 4) Clogged water filters reducing water flow

- 5) Nipples clogged or not triggering because of scaling or contaminants in the water supply
- 6) Feed changes (grower to finisher or finisher to withdrawal) or birds out of feed
- 7) Water treatments/additives that may have changed the taste of the water
- 8) Dramatic change in light intensity in the house
- 9) Diseased or ill birds
- 10) Too many birds per nipple drinker (resulting from migration or high bird placement numbers)

Bird genetics have changed dramatically over the last few decades. As a result, broilers drink considerably **more water today than broilers of 30 years ago**. Compare broiler water intake from 30 years ago to broiler water intake today (Figure 1). Water intake of 56-day-old broilers in 1992 was roughly 80 gallons per 1,000 birds. Water intake of 56-day-old broilers today is roughly 100 gallons per 1,000 birds. This puts extra demand on the drinker system to deliver the increased water supply that modern broilers require to meet their genetic potential. And it must be delivered in a manner that does not waste water or put excess moisture in the litter which can cause footpad dermatitis.

Figure 1. Comparison of broiler water intake today and 30 years ago (1992).



Nipple drinker management

What aspects of drinker management should growers pay close attention to in order to avoid wasting water? The three most common problems are:

- 1) Nipple leakage
- 2) Improper drinker line height
- 3) Improper drinker line regulator pressure

Nipple systems rely on pressure regulators to control the amount of water birds receive when the nipple mechanisms are activated. **Pressure on the regulator must be adjusted regularly as the flock ages.** Pressure is low when the chicks are small so that water will flow easily from the

nipples at the slightest touch. As the birds grow, pressure is gradually increased so that more water will flow upon nipple activation. Adjusting the pressure once per week is usually sufficient. However, pay special attention to line pressure as the birds approach market age. Too much pressure often leads to wasted water and leaky nipples and can make it more difficult for the nipple to properly shut off the water flow. On the other hand, too little pressure may limit water consumption by the birds at the far end of the line for water. Carefully monitor sight tubes at each end of the line and be sure the pressure is near equal at each end. If the water column in the tubes is not approximately equal at each end, this could indicate a pressure issue, levelness issue or an obstruction in the water line.

Nipple height must be adjusted as often as needed. At chick placement, the nipple pin should be at eye level. At day two and beyond, adjust the height so that the bird's head is at a 45-degree angle to the nipple. This may mean a few clicks on the water line winch handle daily. There are a variety of different nipple drinker systems in use in the poultry industry today and nipples from different systems may trigger differently, changing the height the nipples need to be in relation to flock age. Growers should check with their service technician or drinker manufacturer to learn how their drinker system's nipples operate and how to match that to flock age.

Drinker lines that are too high or too low will impact how much water a bird consumes and how much is wasted in the litter. **The most common problem growers make is failing to make proper adjustments to water line height at the appropriate time.** Modern-day broilers grow extremely fast and height adjustments must be made daily to maintain optimal conditions. Birds should never be able to drink while sitting down, yet this is often the case. In such a situation, much of the water the bird triggers from the nipple ends up on the floor and contributes to wet litter and poor paw quality. Having drinker lines too low not only results in water wastage into the litter but will impact bird performance as well because wet litter leads to higher ammonia volatilization.

Drinker lines that are too high can also have serious negative effects on bird performance. Reaching too high for water will cause the birds to peck at the nipple instead of activating it as intended, resulting in increased water wastage. Large height adjustments (2-3 inches all at once) instead of a few clicks on the winch handle each day will result in stress on the birds as they attempt to adjust to the large height increase. **Monitor water intake each day on the controller.** Intake should gradually increase each day. If it plateaus or goes down after lines are raised, the lines may have been raised too much.

Common issues

Air locks can be a serious problem, especially when chicks first arrive and water pressure is set low. **Air locks occur in high spots along the drinker line.** Adjust the cable drops as needed to maintain a level line. Using a yard stick to assist with leveling may be beneficial. To help reduce air locks, raise the regulator end of the drinker line slightly so that any air in the system can escape through the riser tube. It may be beneficial to raise the regulator end of the line a foot or so for a few seconds when you walk the chickens to allow locked air to escape. Use the support pipe or bar above the drinker line to raise the system and not the regulator itself. This will lessen the risk of breaking the water line.

Be sure the water supply is filtered at the control room before entering the drinker lines. Check the filters at least weekly for issues such as iron precipitation, sand or sediment build up, mineral deposition, and bacterial contamination. Poor water supply quality may require chlorine treatment, pH adjustment or sand filter installation. Poultry drinking water supplies should be analyzed to determine mineral content, pH and possibly bacterial load, especially if performance issues recur flock after flock.

It is not uncommon to see caked litter accumulate under drinker lines. Often the problem is leaking nipples, improper pressure or improper drinker line height. Better management may fix improper pressure and line height issues but leaking nipples may need to be replaced. **Nipples will not last forever** and wear on the metering pin and rubber gasket or O-ring will eventually take its toll and the nipples will start to leak. Harsh chemicals used to clean the water lines and remove biofilms may also damage the nipples. Consult your nipple manufacturer as to what cleaning products are safe to use. If certain lines are prone to caking, pinch those lines to roughly 4 feet and shut off the water supply to that line. Mark the level of water in the riser tube at each end of the line and wait 30 minutes. Keep the riser tubes clean so that the level of water in the tube can always be assessed. After 30 minutes, if the level of water in the riser tubes has not changed, the problem is likely associated with improper line height or pressure. Try decreasing the pressure slightly and raising the line slightly more than the others. If the water level in the riser tubes is lower after 30 minutes, the problem is likely related to leaking nipples. Seek out the troublemakers and repair or replace as needed.

Acids, sanitizers and biofilms

A strong acid cleaner capable of dropping the pH of the water to below 6 and that is also safe for nipple drinkers will be needed to cut scale buildup out of the water lines. However, acids sometimes seem to allow scale buildup in lines to break loose in chunks, partially clogging the system and preventing nipple drinkers from working properly. Check with your drinker manufacturer and local poultry supply store for the best options. But remember that **acids are not sanitizers**. Acids are only part of a larger, overall sanitation program, not the entire program. For example, if a **biofilm problem** is suspected, a good sanitizing cleaner that can dissolve the biofilm will need to be run before the acid. The acid will not be able to cut through the biofilm and, therefore, will be unable to remove any scale buildup that may exist.

Like acids, there are several sanitizing products available but some of the best appear to be the concentrated, stabilized hydrogen peroxide products. The stabilizer prevents the hydrogen peroxide from losing its strength as quickly by preventing it from converting to water and oxygen before its work is finished. Stabilizers also allow the product to last longer in stock solutions. Stabilized hydrogen peroxide works well on biofilms because it is a very good oxidizer and can hydrolyze (or dissolve) the biofilm. In addition, it is non-corrosive to the drinker system; quite effective on bacteria, fungi and viruses; and can break down algae to a degree that it passes through nipple drinkers without causing nipple clogging or sticking issues. However, the stabilized hydrogen peroxide products are not as user friendly as some less effective products and are somewhat harder to find at the local grocery store. Local poultry or animal health supply stores will likely be the only place that carries these products.

Biofilms are a difficult problem to address. A biofilm is a complex community of bacteria, fungi and algae encased in an extracellular polysaccharide that often harbors organic

contaminants. Put in less complicated terminology, biofilm is slime, a breeding ground for microorganisms that physically protects the microorganisms from antibacterial agents. Biofilm development is rapid in slow-flowing water systems where adequate nutrients are present (such as nipple drinker systems in poultry houses). Also, some hard water supplies contain minerals that can form scale, an attachment point for sediment and biofilms inside of drinker lines. In any case, biofilm growth can be stimulated when poultry growers run organic additives in poultry drinking water lines (Jell-O, Kool-Aid, Gatorade, vitamins, electrolytes, sugar water, stabilizers, antibiotics and so forth).

It must be emphasized that many organic drinking water additives are a biofilm food source. This food supply promotes microbial growth that can decrease the effectiveness of medications and vaccines dispensed through the drinker lines. Consequently, this results in poor feed conversion and increased mortality, carcass downgrades and condemnations. **Once established, a biofilm makes the water system much more difficult to clean and keep clean.** Even when the biofilm is removed, it can quickly return in as little as two to three days unless an adequate clean water program is in place or if you 1) do a poor initial cleaning job, 2) don't keep the water supply sanitized, or 3) run an additive through the water system that serves as a biofilm food supply.

Water line sanitation

Household bleach is likely the most used water sanitizer on poultry farms. However, simply using bleach does not mean it is being used effectively or that the water supply is sanitized. You must have the proper concentration of chlorine at the end of the water line farthest from the water source to ensure that bleach is effective. Many growers use chlorine test kits to measure parts per million (ppm) of chlorine at the end of the line. You should have **3 to 5 ppm of free chlorine** at the end of the line for your sanitation program to be effective. More than 5 ppm may be too strong and could cause the birds to decrease water intake and possibly damage the drinker system. Less than 3 ppm chlorine is too weak to properly sanitize the water supply.

Chlorine must have time to dissolve and produce hypochlorous acid for it to be most effective. Hypochlorous acid is 80 times more effective as a sanitizer than the hypochlorite ion present in bleach. Free chlorine is not considered effective unless it is 85 percent hypochlorous acid. Contact time is important; too short an exposure time and chlorine does not work as well. During periods of high water demand, contact time may be minimal which could impact chlorine's effectiveness. Growers have several **alternatives to bleach** that are also very good sanitizing agents, including 35 percent hydrogen peroxide, stabilized hydrogen peroxide products and chlorine dioxide.

Don't overlook the pH of your water supply. In general, birds do not like to drink high pH water. High pH water tends to have a bitter taste that birds are able to recognize and this may reduce consumption. **A reduction in water intake will mean a reduction in feed intake!** A pH above 8 will impact the ability of most sanitizers to perform at their best. A pH below 5 may affect intestinal health, create a bloom of algae or mold that thrives at low pH levels, and damage metal drinker system components. A **pH in the range of 6.2 to 6.8** appears to work well. If the pH of your water is above 7.0, lowering the pH may prove beneficial to overall flock performance.

Routine flushing is one of the simplest ways to help keep the water system clean. In addition to regular routine flushing, the system should also be flushed after any use of the medicator to prevent a food source for bacteria or other organisms from accumulating in the lines. Flush long enough to completely purge the lines. A general rule of thumb is to **flush one minute for every 100 feet of water line**. If you have a 400-foot house with approximately 200-foot water lines in each half, then each line should be flushed for about two minutes. A 500-foot house with 250-foot water lines in each half would require a 2.5- to 3-minute flush per line. In general, when the birds are gone, a higher level of cleaning and sanitizing products should be run into the water lines with a medicator or injector pump. Sweep the lines with a broom to trigger all the nipples and allow the product to sit in the lines for 24 to 72 hours. Then flush all the lines with fresh water and trigger the nipples once again to finish.

Check with your service technician, drinker manufacturer or your local poultry supply store concerning which products to use, at what concentrations and how long to leave the solution in the lines to avoid possible damage to the drinker system. Later, with birds in the house, a continual maintenance program should be followed with solutions at a less concentrated level than was used between flocks. Always **follow label instructions** on the products you use for protection of the birds and for your own safety. Some cleaning and sanitizing products are quite strong and can be dangerous if mishandled. Use protective clothing as instructed on the label and keep a Material Safety Data Sheet (MSDS) handy for products that you use.

Nipple drinker watering systems are the standard for the poultry industry today. Water consumption continues to be one of the simplest and most effective tools a grower can use to monitor flock performance. Have poultry drinking water analyzed and know what challenges the water supply presents. Water problems can be corrected but not without knowing what the challenges are that need to be addressed.

Reference

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