

Clean Water Lines for Flock Health

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Providing a clean, safe and sanitized water supply is crucial in assuring flocks perform their best. However, before implementing a daily water sanitation program, it is important to thoroughly clean as much of the water distribution system as possible. Line cleaning is necessary before providing birds with sanitized drinking water because even low levels of sanitizer placed in dirty water lines can result in the biofilm sloughing off, which clogs drinkers so that water is restricted to the birds. Another impact of adding sanitizers to water intended for bird consumption is that the sanitizer can actually react with the biofilm and result in off tastes that back birds off water. Effectively cleaning the water system (including the drinker lines) helps remove biofilm and scale build-up that can act as a food source and hiding place for harmful pathogens such as *E. coli*, *Pseudomonas* or even *Salmonella*. Many disease causing organisms like *Salmonella* can live for weeks in water line biofilm resulting in a continuous source of contamination. In addition, proper line cleaning can help prevent calcium deposits or scale build-up which can reduce pipe volume by as much as 70-80%. Yet the use of cleaning products present some dangers since, many of the popular water additive products such as acids and performance enhancers can create conditions favorable for the growth of yeasts and molds, if they are present. Yeasts and molds can actually thrive in low pH water resulting in a gooey slime that will clog drinkers and generally create disaster in water systems. The bottom line is water systems must be properly cleaned between flocks.

Where to Start

To assure lines are effectively cleaned, the first step is answering the following series of questions.

1. What is the water source?
Untreated well water (i.e. water that is not treated with any type of daily sanitizer product) is the most vulnerable to the formation of slime or biofilm in the drinker lines. While most municipal or rural water supplies contain a minimum of 0.2 ppm free chlorine which greatly reduces bacteria growth, poultry drinking water is handled differently (slow flow and warmed during brooding) from the water supply that goes to a home. Thus, it is unwise to assume that cleaning of drinker lines is not needed.
2. What is the mineral content of the water supply?
The minerals calcium and magnesium are the sources of scale, a hard white build-up. If the water supply contains more than 60 ppm of either or both these minerals and the water pH is above 7 then chances are good that there is scale in the water system that will have to be removed with an acid cleaner designed for nipple drinker systems. Other common mineral contaminants are iron, manganese and sulfur. Iron results in a rusty brown to red colored residue, while manganese

and sulfur can form black colored residues. Natural sulfur in the water should have a smell similar to a match head. If the water smells like rotten eggs, then the culprit is hydrogen sulfide. Hydrogen sulfide is a by-product of sulfur loving bacteria and the lines will need to be cleaned with a strong sanitizer. It might even be necessary to shock chlorinate the well. If the filters at the beginning of the water lines are rusty or black colored, then a strong acid cleaner should be used after the sanitizer flush.

3. What products have been used in the water system?

If additives such as vitamins, electrolytes, sugar based products, mineral based performance enhancers or weak concentrations of water acidifiers have been used frequently, then chances are a biofilm is present. Once a biofilm is established in a water system, it makes the system 10-1000 times harder to clean. It is important to play it safe and use strong sanitizer cleaners.

4. Have there been health issues flock after flock such as *E. coli*, necrotic enteritis or respiratory challenges that do not respond to good management, clean-out or down-time?

The culprit for these problems may be hiding and thriving in the water supply, particularly the water regulators and drinker lines. Cleaning with a strong sanitizer is definitely an option that might help.

Choosing a Product

After identifying the type of cleaning that will be most beneficial, the next step is to choose a product that will not damage the equipment. Currently there are several acid products that can be used for scale removal. Check with your local animal health product supplier for options. Just remember that in order for the product to be effective in removing scale, it needs to drop the water pH below 5 but should not drop the pH below 4 to prevent equipment damage. While a strong bleach solution might be effective in removing biofilm, the potential damage it can do to the regulators and nipple drinkers makes this a poor option and the same is true for many cleaners that might otherwise be good poultry barn disinfectants. Iodine is not very effective against biofilms so it makes a poor choice. Currently there are several sanitizer products available for cleaning drinker systems, but some of the most effective products which are not damaging to the drinker systems are the concentrated, stabilized hydrogen peroxides. The active ingredients in these products are different from over-the-counter hydrogen peroxide because the stabilizer keeps the sanitizer from converting to water and oxygen before it finishes the cleaning job. There are also several chlorine dioxide products available, but they are most effective if an acidifier is present which may require dual injectors or a way to safely mix the products prior to injection. A third product used by the industry is household ammonia. A quick test on algae showed that running one ounce of ammonia in every gallon of water was not nearly as effective as a 3% ammonia solution. However it is strongly recommended that the equipment manufacturer be consulted before using this. The most important fact to remember is biofilms or established growth of bacteria,

molds and fungus in water systems can only be removed with cleaners that contain sanitizers. It also should be a product and concentration that will not damage the equipment. Pay close attention to any product safety recommendations and follow them accordingly.

Cleaning the system

After the birds are removed from the house, it is time to clean the system. First flush the lines with water. Use a high pressure flush if available. This will remove any loose sediment from the lines. Also make sure the standpipes are working properly to assure any air build-up that may occur during the cleaning process will be released from the lines.

Next, determine how the cleaner will be injected. If a medicator is used, it may not provide the concentration of cleaner necessary, therefore use the strongest product available to overcome the dilute injection rate of the medicator. A very effective alternative is mixing the cleaner in a 55 gallon barrel and then using a small submersible pump (1/12th horse power) to pump the product either into individual lines or through the water tap where the medicator attaches to the water line. A third option is pumping the cleaner from the well room through a variable injection pump which will pump solutions stronger than a 1:128 rate. This is a good idea because it cleans the water lines going to the poultry house, which can be a source of contamination. This can be a bad idea if the distribution lines are very dirty since it will send the filth into the poultry house water lines and therefore will require extra flushing of the lines. Use this option only if there is a faucet in the poultry barn that can be used to flush the water lines before water reaches the nipple drinker lines. In a 400 foot poultry house it takes approximately 7 gallons of water per line. So eight 180 foot lines will require approximately 56 gallons of prepared cleaning solution. Once the drinker lines are filled with the cleaning solution, let it stand as long as possible with 72 hours being ideal. Also use a broom to sweep the nipple drinkers in order to get the cleaning product down into the drinkers. However check with the product manufacturer to assure this will not damage the equipment. After the lines are cleaned, if mineral build-up is an issue, then re-flush the lines with the acid cleaner.

Keeping the System Clean

Cleaning the water lines between flocks is only half the battle. Even with a thorough cleaning, if a significant number of bacteria, fungi or yeasts are still present, then the biofilm has the potential to return completely in 2-3 days. Therefore the last step is to establish a daily water sanitation program. This will benefit both the birds and the water system.

Quick Guide to Cleaning Water Lines

1. After birds are removed from house and before the litter is removed, flush all water lines with water. Make sure stand pipes are working.
2. Prepare a 3% cleaning solution.
 - Mix three gallons of hydrogen peroxide (ProxyClean, HydroLine Cleaner, or other stabilized concentrated hydrogen peroxide) into 97 gallons of water. (amount required for 500 foot long houses with 8 water lines)
(Every 100 feet of line holds 2.5 gallons of water)
 - Alternative cleaning solution is 2% CID 2000 or CID Clean mixed 1 gallon to every 49 gallons of water but leave in lines only 4-6 hours, flush then repeat process.
 - Connect 1/12th to 1/4th hp submersible pump to water line at medicator and pump the cleaning mixture into the lines.
 - Activate nipple drinkers with a broom or stick (try not to get product from lines on your skin) to assure cleaner goes into drinkers.
 - Leave product in lines for 24-72 hours or longer if time permits
 - Flush product from lines with clean water
3. Next descale water lines may be necessary for farms with hard water (more than 110 ppm of calcium and magnesium combined or iron, manganese or sulfur mineral buildup)
 - Fill lines with a solution of citric acid or other low pH product approved for use with water lines to achieve a pH of 5 and let stand in lines for 24 hours.
 - Acid preparation: Mix 4-6 packs of citric acid per gallon of water to make a stock solution (The more scale in water the more acid should be added to the stock solution). The final pH of the water should be less than 6 with 5 pH ideal for scale removal
4. Final flush
 - Prepare a bleach stock solution of 6-10 ounces bleach in a gallon of water
 - Use medicator to pump into lines at a rate of 1 ounce per gallon of water so that this is the last water to enter the lines
 - Make sure medicator is pumping in bleach stock solution as the acid is flushed from the lines
 - Leave in lines until right before birds are scheduled to arrive.
5. Start birds on fresh sanitized water with 2-5 PPM free chlorine residual at the end of the line or drinker farthest from chlorine injection. (Good starting point stock solution is 4 ounces bleach in a gallon of water) Add a second injector or medicator and inject an approved acid. It will enhance the effectiveness of the chlorine