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 answer 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) as compared to the water supply that goes to a home. Thus, it is unwise to assume that cleaning 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 required cleaner, 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 through a variable injection pump such as Qwik Mix or Mix Right which will pump solutions stronger than a 1:128 rate. Cleaning lines starting from the well is also is a good idea because it cleans the water lines going to the poultry house, which can be a source of contamination particularly since the larger the pipe, the more water passes through it and therefore the more nutrients are provided to the potential biofilm. 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. Every 100 feet of a half inch water line holds approximately 2.5 gallons of water. Therefore, in a 400 foot poultry house it takes approximately 9.6 gallons of water per line (380 feet of line divide by 100 feet so 3.8 x 2.5=9.6.) Eight 180 foot lines will require approximately 76 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/activate 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 gone, flush all water lines with plain water to loosen biofilm and remove any sediment. Make sure standpipes and drain hoses are working. Use safety glasses and plastic/rubber gloves.
2. Utilize the Qwik Blend Pump (attaches where Medicator connects to water line) to inject a 3% solution of ProxyClean, HydroClean, Siloxicide, CID 2000 or Sanidate.
    a. Determine amount of product to use:
    b. The Qwik Blend adds 4 ounces to each gallon of water so 1 gallon of product will treat 32 gallons of water.
    c. Every 100 feet of water line holds ~ 2.5 gallons of water
3. Flush product into each line
4. Activate nipple drinkers with a broom or by hand (wear gloves)
5. Leave in lines:
    a. Proxyclean, HydroClean or Siloxicide- 24 hours minimum; 48 to 72 hours is even better.
    b. CID 2000 or Sanidate- 4-8 hours
6. Flush cleaner from lines with water that contains a sanitizer level birds can drink
    a. Proxyclean-2-4 ounces/gallon-this is stock solution then administer with medicator at a rate of 1 ounce per gallon of water (1:128); Use the higher rate for dirty water, lower rate for cleaner water
7. For farms with hard water (more than 110 ppm combined calcium and magnesium)
    a. Skip step 4 and do the following
    - Fill lines with a solution of citric acid or other low pH product approved for use with water lines and let stand in lines for 24 hours.
    - Acid stock solution: 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. Mineral Clean or Proxor are excellent descaler products as well.
5. Final flush before new flock arrives. Will start birds on this.
    a. Prepare one of following stock solutions and add with a medicator or peristalic pump at a rate of 1:128
        - Bleach stock solution: 4-6 ounces bleach in a gallon of water
            - Goal: 2-4 ppm of free chlorine in the drinking water
        - Hydrogen peroxide stock solution: 2-4 ounces of product in a gallon of water
            - Goal: 25-75 ppm of H2O2 in the drinking water

6. Maintain water for first 7-10 days
    a. If starting birds on the chlorine solution, flush water lines once a day to get fresh sanitized water into the lines.
    b. IF using a stabilized hydrogen peroxide solution (Proxyclean), sanitizer should remain effective in water lines for up to 5 days but flushing in fresh product could still be beneficial if grower has time

DO NOT ADD CHLORINE WHEN ADMINISTERING VACCINES, MEDICATIONS, VITAMINS OR COPPER SULFATE, DO NOT MIX CHLORINE AND OTHER PRODUCTS IN THE SAME STOCK SOLUTION