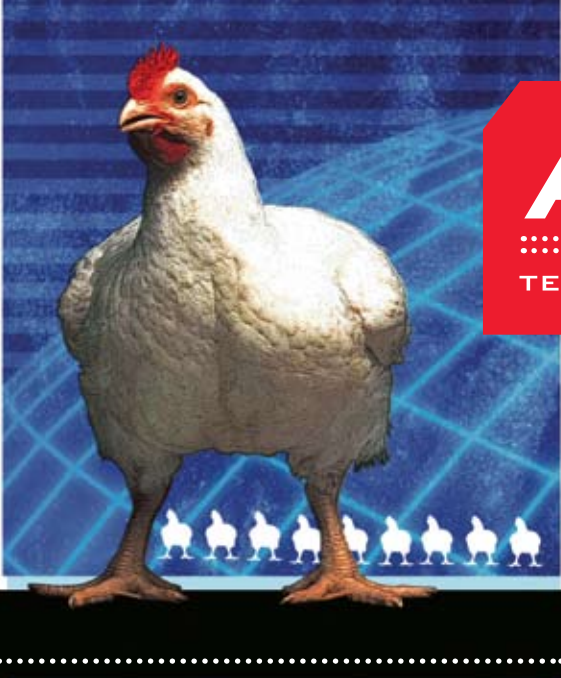


AVIATECH

TECHNICAL INFORMATION FOR THE BROILER INDUSTRY



Flocks are healthier and perform better economically when a daily clean water source is provided.

Providing a clean water source every day is essential to ensuring your flock's health and best economic performance. The water lines that carry the water to your birds are not transparent; it is not possible to see what is happening inside them. It is easy to forget about this part of the building when cleaning and disinfecting between flocks. It is important to make a note to clean the water system after every flock.

Successful water sanitation begins with a thorough water line cleaning program. The variability and dynamics of water systems create cleaning challenges, but these can be overcome with water quality information, a little effort and the right tools. Follow these guidelines and your birds will have a first-class water supply:

Step One: Have the Water Analyzed

Analyze the water for any scale-causing minerals: calcium, magnesium and manganese. If the water contains more than 90 ppm combined calcium and magnesium or 0.05 ppm manganese, you will need to include a "descaler" or an acid in your cleaning program. These products will dissolve the mineral deposits in water lines and fittings.

Step Two: Choose a Sanitizing Cleaner

Choose a sanitizing cleaner that can effectively dissolve any bio-film or slime in the system. Some of the best products for this job are concentrated hydrogen peroxide solutions.

Water Line Sanitation

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- VETERINARY MEDICINE



Prior to using any strong cleaners, make sure standpipes are working properly so air pressure build-up in the lines will be released. Consult equipment suppliers before using products to prevent unnecessary damage.

Step Three: Prepare the Sanitizing Solution

For best results, use sanitizing products at the strongest concentration recommended on the label. Most proportioners will only allow concentrations between 0.8 and 1.6% of the original material. If you need to use higher concentrations it is better to mix the stock solution in a large tank and then distribute without use of a proportioner. For example, if a 3% solution is required, mix three volumes of the cleaner with 97 volumes of water for the final solution.

An excellent sanitizing solution can be made up by using a 35% hydrogen peroxide solution. Mix this as described for a 3% solution.



Step Four: Clean the Lines

It takes 8-10 US gallons (30-38 liters) of water to fill and clean 100 feet (30 m) of $\frac{3}{4}$ inch (20 mm) water line. If the building is 500 feet (150 m) long and has two water lines you should make up a minimum of 100 gallons of sanitizing solution. Water lines should be designed so that they can be opened to drain completely when the cleaning is complete.

Follow these steps to clean the water lines:

1. Open water lines so they drain completely.
2. Begin pumping the cleaner/sanitizer through the water lines.
3. Watch the water as it leaves the drain line for signs of the product such as foaming or suds.

4. Once water lines are filled with the cleaner, close the tap and leave product in the lines for as long as the manufacturer recommends (over 24 hours if possible).

5. Flush cleaner from the water lines after the holding period. Water used to flush the lines should contain the level of sanitizer normally used in the drinking water for the birds.

In the absence of a standard water sanitation program add 4 oz (113 g) of 5% bleach per gallon (liter) of stock solution and proportion this stock solution at a rate of 1 per gallon (7.5 g per liter) of water. This will provide 3-5 ppm of chlorine in the rinse water.

6. After cleaning, sanitizing and flushing the system, the water supply should be fresh and chlorinated (3-5 ppm in the drinker furthest from the source). If using an Oxidation Reduction Potential (ORP) meter, the reading should be a minimum of 650.

7. Water lines from the water well to the poultry buildings should also be cleaned and sanitized between flocks. It is best not to flush these outside water lines through the water lines inside the buildings. Connect a water hose to the medicator faucet to drain the outside lines.

Step Five: Remove Mineral Build-up

After lines are cleaned, descaler or acid products can be used to remove the mineral build-up. Use products according to the manufacturer's recommendation. One product that can be used for this is citric acid.

1. Make a stock solution by mixing 1-2 packs of citric acid (1 pack contains approximately 15 ounces in one gallon of water [210 g in 23.8 liters]). Proportion this stock solution at 1 ounce per gallon or 7.5 grams per liter (0.8% or 1:128). Fill water lines and let stand for 24 hours. It is critical that the water pH is below 5 for optimum scale removal.

2. Empty the water lines. Mix a stock solution containing 8-12 oz of 5% bleach per gallon or 60-90 grams per liter. Then refill the lines with clean water containing this stock solution proportioned at 1 ounce per gallon or 7.5 grams per liter (0.8% or 1:128). Leave in the water lines for 4 hours. This concentration of chlorine will kill any residual bacteria and further remove bio-film residue.

3. Perform a final flush of the water lines, use water with a normal drinking water level of sanitizer (normal level of sanitizer equates to 4 ounces of 5% bleach per gallon or 30 grams of 5% bleach per liter of stock solution, proportion this stock solution at 1 ounce per gallon or 7.5 grams per liter). Continue flushing until the water in the lines contains no more than 5 ppm of chlorine when tested.

Step Six: Keep the System Clean

Once the system has been sanitized, it is important to keep it clean. Develop a good daily water sanitation program for your birds. The ideal water line sanitation program should include

injecting both a sanitizer and an acid. It is important to note that this procedure requires two proportioners or injectors, since acids and bleach should never be mixed in the same stock solution.

If only one proportioner or injector is available, then inject bleach (concentration of 5%) at a rate of 4 to 6 oz per gallon (40 grams per liter) stock solution; proportion at 1 ounce of stock solution per gallon (7.5 grams per liter) of drinking water.

The objective is to provide a clean source of drinking water with a continuous level of chlorine at 3-5 ppm at the end of the building furthest from the proportioner.

Suggested standard operating levels

Water limits per ml tvc*	Good	Acceptable	Unacceptable
Mains water supply	0-100	103-300	> 301
Ecoli	0		1
Pseudomonas	0		1

*tvc=total viable count

Other Sanitizers

Ozone (O3) is a very effective bactericide, virucide and chemical oxidant. Ozone will react with iron and manganese, making both more easily removable by filtration. It also works independent of pH and it can inactivate chlorine if they are used simultaneously. However, ozone is a point of contact sanitizer that dissipates rapidly providing no sanitizing residual in the water system.

Chlorine dioxide is making its way onto the market as a poultry drinking water sanitizer, partly because the application of chlorine dioxide has been resolved by new chlorine dioxide generation methods. Chlorine dioxide is as effective as chlorine, as a bactericide and even more effective as a virucide, and is also superior to chlorine for the removal of iron and manganese. It is not impacted by pH.

Final Notes:

1. Do not use acid as the sole method of water treatment since acids alone can cause bacterial or fungal growth in water systems.
2. Hydrogen peroxide is very aggressive and handling requires extreme care. A test on any components should be carried out before implementation of such a chemical. It is important to follow handling and usage instructions very closely to prevent damage to people and equipment.
3. Hydrogen peroxide is gaining popularity as a water sanitizer. PH and bicarbonate alkalinity play a major role in the effectiveness of hydrogen peroxide. Hydrogen peroxide can be stored onsite but it will deteriorate over time. It is a strong

oxidant but it does not provide any lasting residual. A 50% hydrogen peroxide product stabilized with silver nitrate is proving to be a very effective sanitizer and line cleaner that does not damage water lines.

4. When administering other products to your birds, it is a good idea to stop the inclusion of chlorine (and other sanitizers) in the drinking water. Chlorine will inactivate vaccines and reduce the effectiveness of some medications. Resume use of chlorine and/or other sanitizers after treatment is finished.

5. Water line sanitation can be governed by local regulations. Please check with local authorities and always follow the manufacturers' instructions. ⚠



Dr. Susan Watkins received her B.S., M.S. and Ph.D. from the University of Arkansas. She served as a quality control supervisor and field service person for Mahard Egg Farm in Prosper, Texas, and became an Extension Poultry Specialist in 1996. Dr. Watkins has focused on bird nutrition and management issues.

She has worked to identify economical alternative sources of bedding material for the poultry industry and has evaluated litter treatments for improving the environment of the bird. Research areas also include evaluation of feed additives and feed ingredients on the performance of birds. She also is the departmental coordinator of the internship program.

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Aviagen thanks Dr. Susan Watkins from the University of Arkansas for her contribution to this article and for her work with the poultry industry on developing water sanitation programs.

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