

## Water Line Sanitation

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**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 programme. 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 Analysed

Analyse the water for 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 programme. These products will dissolve the mineral deposits in water lines and fittings.

### Step Two: Choose a Sanitising Cleaner

Choose a sanitising 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**.

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 Sanitising Solution

For best results, use sanitising 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 sanitising 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 30-38 litres of water to fill and clean 30 meters of 20mm water line. If the building is 150 meters long and has two water lines you should make up a minimum of 380 litres of sanitising 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/sanitiser 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 sanitiser normally used in the drinking water for the birds.

In the absence of a standard water sanitation programme add 113g of 5% bleach per litre of stock solution and proportion this stock solution at a rate of 7.5g per litre. This will provide 3–5 ppm of chlorine in the rinse water.

6. After cleaning, sanitising 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 sanitised 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 410g) in 3.8 litres of water. Proportion this stock solution at 7.5g per litre (0.8% or 1:128). Fill water lines and let stand for 24 hours. It is critical that water pH is below 5 for optimum scale removal.

2. Empty the water lines. Mix a stock solution containing 60-90g of 5% bleach per litre. Then refill the lines with clean water containing this stock solution proportioned at 7.5g/litre, (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 sanitiser [normal level of sanitiser equates to 30g per litre of 5% bleach of stock solution; proportion this stock solution at 7.5g per litre]. 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 sanitised, it is important to keep it clean. Develop a good daily water sanitation programme for your birds. **The ideal water line sanitation programme should include injecting both a sanitiser 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 40g per litre stock solution; proportion at 7.5g of stock solution per litre 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	101-300	>301
Ecoli	0		1
Pseudomonas	0		1

\* tvc = total viable count

### Other Sanitisers:

**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 sanitiser that dissipates rapidly providing no sanitising residual in the water system.

**Chlorine dioxide** is making its way onto the market as a poultry drinking water sanitiser, 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 gaining popularity as a water sanitiser. 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.
3. 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.

A 50% hydrogen peroxide product stabilised with silver nitrate is proving to be a very effective sanitiser 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 sanitisers) in the drinking water. **Chlorine will inactivate vaccines and reduce the effectiveness of some medications.** Resume use of chlorine and/or other sanitisers 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.

### About the Author



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 programme.

***Aviagen thanks Dr. Susan Watkins for her contribution to this article and for her work with the poultry industry on developing water sanitation programmes.***