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Effective Chlorination

It is absolutely essential that turkeys receive clean fresh water at all times. One safe, inexpensive method of ensuring a clean water supply is through chlorination. Although many turkey producers chlorinate, many turkeys do not receive adequately chlorinated water to drink.

How Does Chlorine Work?

When a chlorine donor such as bleach, is introduced into water it dissociates into 2 parts

1. Hypochlorous acid (HOCl) which is a strong oxidizing disinfectant destroying most organisms in less than 2 seconds

2. Hypochlorite ion (OCl) which is a weak disinfectant and can take up to 30 minutes to kill organisms

pH	% HOCl	% OCl
4	100	0
5	99	1
6	96	4
7	75	25
7.4	52	48
7.5	48	52
8	22	78
9	7	93

Table 1 : Effect of pH on the Ratio of Hypochlorous Acid to Hypochlorite Ion

The effectiveness of free chlorine in water is dependant on the pH value. The ratio of HOCl to OCl is determined by the pH value of the water. Unfortunately the usual test for free chlorine records both HOCl and OCl components as free chlorine, so unless the pH value is also known it is impossible to tell the percentage of HOCl present.

Our general recommendation has always been to have 2 to 3 ppm of free chlorine in the end drinker. From the above information, it is clear that at a pH of 7 this is true but at a pH of 8 it isn't. At higher pH's the solution is to either use more chlorine to achieve 5 to 8 ppm of free chlorine or to acidify the water to lower the pH.

Testing for Chlorine

The kit should specify that it measures the free chlorine residual and not the total chlorine. Once chlorine has combined with other chemicals it is not effective as a disinfectant. If a test kit does not distinguish between free chlorine and chlorine combined with other chemicals, the test may result in an overestimation of the chlorine residual. The water running into the end drinker should be tested for free chlorine.

Where Oh Where Did The Chlorine Go ?

If insufficient chlorine is found at the end drinker, test a drinker at the front of the barn. If chlorine is present in the front and not in the back it most likely indicates that the water lines are heavily contaminated and that chlorine is being "used

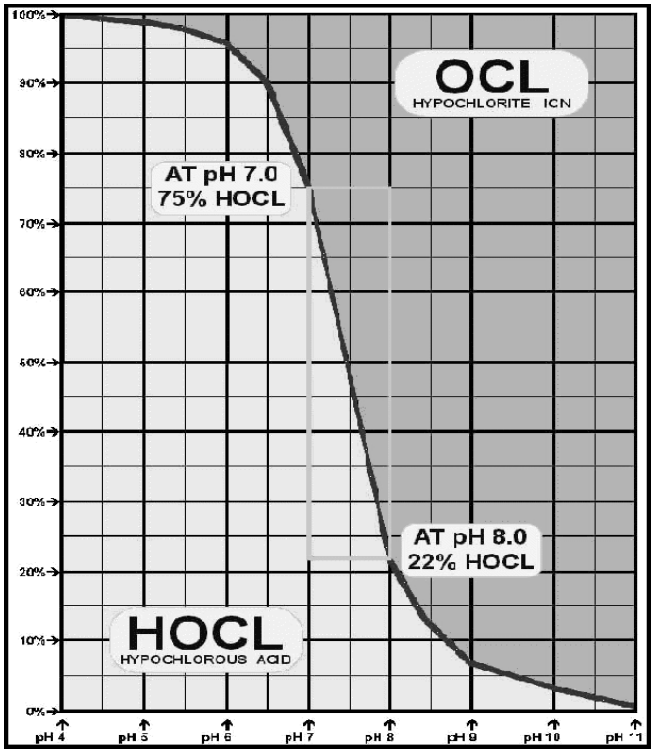
up" before it reaches the end drinker. It is important that the water lines be thoroughly cleaned and disinfected once the flock leaves and as part of the barn cleaning and disinfection program. If there is no chlorine in the front drinker either, likely causes include:

- Chlorinator not plugged in. The chlorinator may have been shut off prior to and during vaccination and not turned back on again.
- Mechanical problem with the chlorinator. It appears to be pumping but isn't doing it effectively.
- Pail is empty or there is no lid on it. Remember: chlorine evaporates and disappears quickly when exposed to the air.
- Source of water is highly contaminated. Wells should be tested twice annually. If high levels of coliforms are found the well should be shock chlorinated. This is recommended after construction of a new well or if improvements are made.
- Addition of medication to water may affect the chlorine reading.

Effective water sanitation cannot occur if the correct level of free chlorine is not present in the end drinker. The only way to ensure that this is happening as expected is to check the ppm of free chlorine and the pH of the water on a regular basis. Testing is inexpensive and the information gained is very valuable. How can you correct a problem if you don't know that one exists? If inadequate chlorine is present, bacteria present in the drinking water will not be killed. Under ideal conditions, bacteria can multiply, doubling every 20 minutes. In this way a single bacterium could increase to over 2 million within seven hours. This rate is increased in slow moving warm water – which is the situation in brooding barns where we house our most susceptible birds. Birds of any age that are exposed to high levels of bacteria, must divert the energy and resources that would have been used for growth to fight off the challenge. If this is not successful the bird becomes sick or dies.

In order to maximize performance of any flock, they must continuously receive clean, quality water. Chlorination can be a very effective method of achieving this and preventing the overgrowth of bacteria and slime which cause birds to become sick. Let us not forgot that chlorine is much cheaper than antibiotics.

Bartier Disinfection Index



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Addendum : What the Terms Mean

Calcium hypochlorite: a dry chlorine donor available in the form of granules or tablets made by the absorption of chlorine in lime. It is unstabilised, making it suitable for regular sanitation or for shock treatment and produces 65% available chlorine. It tends to raise the pH.

Chlorine: It dissolves in water to form hypochlorous acid (HOCl, or free chlorine – the principal water sanitizer) and hypochlorite ion (OCl).

Chlorine Demand: Chlorine readily combines with chemicals in water, microorganisms and organic material. These components "use up" chlorine and comprise the chlorine demand of the treatment system. It is important to add sufficient chlorine to the water to meet the chlorine demand and provide residual disinfection.

Free Chlorine: Sometimes referred to as free residual chlorine, it is the amount of chlorine available for disinfection. When chlorine is added to the water supply part of it combines with other chemicals in water like iron, manganese, hydrogen sulfide.

Hypochlorite ion (OCl-): Results from the splitting up of hypochlorous acid (HOCl) into its constituent parts – H+ and OCl- (hypochlorite ion). This happens when the pH is too high. Hypochlorite ion is a poor disinfectant. Hypochlorous acid is 100 times faster than hypochlorite ion in killing a micro-organism.

Hypochlorous Acid (HOCl): It is formed when calcium hypochlorite is mixed with water. HOCl acts as a sanitizer killing bacteria. Useful amounts can only be obtained if the pH is within certain limits.

pH: The pH scale runs from 0 to 14 and is a measure of the acidity or alkalinity of a solution. It is not a quantitative measurement – like 2 ppm, it is a relative measurement – like "twice as long as" or "three times more than". The ratio of HOCl to OCl is dependent on the pH value of the water. The lower the pH the more HOCl is available.

Total Chlorine: is the sum of free chlorine plus combined chlorine (chloramines).

Shock Chlorination: uses chlorine concentrations ranging from 50 to 200 ppm. The primary purpose is to sanitize wells, piping and other equipment that the water passes through. It is not a continuous process and it cannot protect a defective well or plumbing system from continuous entry of contaminants. Only water systems that are protected against further contamination will benefit from shock chlorination

Superchlorination: adding high concentrations of chlorine into the water system within a barn for 12 to 24 hours as part of the water-line disinfection program between flocks.

Note: to increase effectiveness, water-lines should be cleaned first.