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Iron is everywhere!

Harmless to ingest, but key
ingredient for biofilm

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Introduction or sidebar:

Did You Know?

- Iron is found in almost all well water across the globe.
- It can clog up nipple-type drinkers and cause them to malfunction.
- In dissolved form, it is a leading ingredient in the formation of biofilm.
- Iron-based biofilm can impart an odor and taste that can inhibit a flock's drinking.
- A good filtering system can eliminate much of it, aided by the right kind of sanitizer/cleaner and frequent flushing of drinker lines.

Iron is a mineral found everywhere. It makes up five percent of the earth's crust and is a familiar substance found in wells across the globe. By itself, it is not harmful to humans or animals to consume as part of the water they drink. Iron's main effect is to discolor items it comes in contact with, creating the reddish-brown or yellow stains on sinks, tubs, washing machines and clothes, and adding a distinctive taste and odor to water that people and animals may not like.

For poultry growers, however, water heavily charged with iron presents some challenges. First, in particulate form, iron can help clog up nipple-type drinkers or cause them to leak. Second, iron is a key ingredient in the production of biofilm, a slimy substance that sticks to the inside of water lines and grows by collecting sediment and particulates, and embedding and feeding microorganisms, including disease-causing pathogens. Such biofilm can harm watering equipment, impart odors and unpleasant tastes to the water, restrict water flow, and spread diseases throughout a flock.

Iron becomes a biofilm ingredient when its dissolved form meets up with iron bacteria in the water. Iron bacteria are microbes that don't cause disease but grow and multiply in the water and

use iron as part of their metabolism. The microbes act as oxidizing agents for dissolved iron, resulting in a thick, slimy biofilm that, among other things, protects their cells as well as other microorganisms. Drinker lines in poultry houses are particularly vulnerable to the formation of such biofilm because there is little water turbulence to break it up due to the extremely low water pressure used by nipple-type drinkers.

With little to disturb it, biofilm can rapidly grow inside the drinker lines, collecting sediment and particulate matter along with various kinds of bacteria and pathogens harmful to birds. The gooey, sticky substance protects these microorganisms. It can clog drinkers or coat drinker parts, reducing water discharge and causing them to malfunction and leak. This leakage results in wet litter, fostering excessive ammonia release and creating fertile conditions for disease and other threats to bird health and performance. The medication and supplement interventions through the drinker lines can also add to the biofilm, while the active agents in these substances can help the biofilm's collected microorganisms grow as well. The unpleasant odor and taste it adds to the water can inhibit the birds' drinking, and accordingly their performance.

Sanitize the well

Prevention of such challenges to the flock and its watering system begins at the wellhead. The composition of well water, including iron and iron bacteria, can vary from region to region depending on the geological makeup of the area, so some producers will face more of a challenge than others. However, because iron bacteria doesn't need much oxygenized water to survive, it can be found even in the most controlled well system. Accordingly, producers need to know their well and what's in it. Water samples should be periodically submitted to a qualified laboratory to test for iron, iron bacteria, and various contaminants.

If such contaminants are found, a chlorine shock treatment can be used to sanitize the well water before it goes into the grower's water system. However, this treatment may not kill all the iron bacteria, and some bacteria will most likely return before the well is treated again and will make its way into the grower's water lines along with iron and particulate matter.

A good filtration system

This is where a good filtration system can help. A wide variety of filters exist that can address a variety of contaminants. However, most producers find many of these filters too expensive. Most producers use inexpensive 10-inch, 20 to 30 micron rated pleated paper or cord-wound filters at each chicken house that will eliminate some of the particulate matter, including iron. In most cases, these filters are actually only 60 percent efficient when they are new, becoming more efficient as they trap particulate matter.

In examining such systems, Ziggity has recognized the need for a more effective but still relatively inexpensive system to filter out particulates like sediment and iron. This system begins right at the wellhead, by installing a large capacity, 20 or 30 micron rated filter to capture the bulk of the larger particulate, while individual chicken houses would still have a 5 to 10 micron rated 10-inch style filters for smaller particulates that escape the wellhead filter. The wellhead filter should be sized to handle a large volume of water. These large filters should also be washable for economical reuse. Ziggity believes this is an efficient way to improve the function of the watering system and make best use of the filtration system most producers already have.

Cleaning and flushing

At the same time, whatever microbes like iron bacteria that may still exist in the water will start to multiply once in the warm conditions of the chicken house. And drinker lines, as we've noted, provide an almost perfect breeding ground for biofilm formation. To address this challenge, producers will find a wide variety of sanitizing and cleaning agents at their disposal. But here care needs to be taken, because what may be good at solving one part of the problem may not be good at solving another part, or may even create other problems. For example, acidic sanitizers may kill most of the microorganisms in the drinker lines, but they may also corrode and damage drinkers over time — producers should check with their local distributor or the drinker manufacturer if they suspect the product they're using may cause a problem. A sanitizer like chlorine will kill bacteria and pathogens that are in the water, but will not likely affect the biofilm and whatever microbes are embedded in it. Chlorine also has a residual taste and smell that can discourage birds from drinking if levels are too high.

So the sanitizing and cleaning agents you use must accomplish three things:

- Kill all the microbes and pathogens that exist in the water.
- Oxidize or remove biofilm from the inside of the supply lines and drinker lines.
- Not harm any of the watering equipment.

Ziggity has found that varying solutions (check manufacturer recommendations) of hydrogen peroxide work best in meeting these three criteria. Such a treatment, accompanied by high pressure flushing, should usually be done between flocks. Furthermore, high pressure flushing of the watering lines should be done daily, or at least once a week, to prevent biofilm buildup. In warm weather, which can exponentially multiply the growth of microorganisms, Ziggity recommends flushing more than once a day. In this case, the flushing not only prevents biofilm from forming, but also flushes out the tepid, slow flowing water and replaces it with cooler water that is less hospitable to microorganism growth. Nowadays, automated flushing systems that are activated on a timed schedule take much of the labor out of these procedures.

The great prevalence of iron in our water supply makes it and iron bacteria hard to eliminate completely. However, with the right filtration and treatment options in place, the hazards that can result from iron and iron bacteria are quite manageable, enabling good health and performance in your flock.

Ziggity Systems, Inc. is the only manufacturer 100 percent focused on poultry watering for improved performance. For more information, write Ziggity Systems, Inc. at 101 Industrial Parkway, P.O. Box 1169, Middlebury, Indiana 46540-1169 USA, call +1 574.825.5849, fax +1 574.825.7674, or visit its Web site at www.ziggity.com.

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