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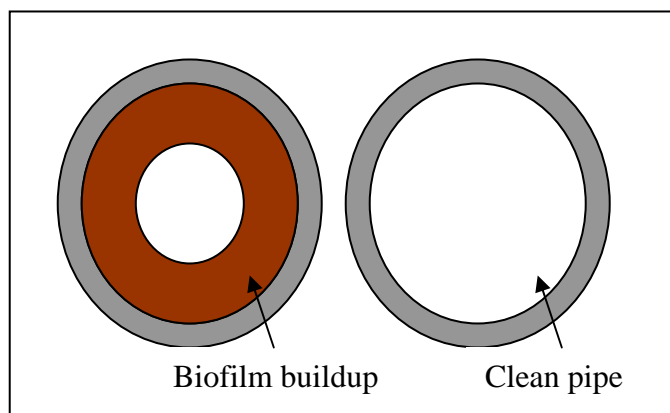
BROILER TIP . . .

BIOFILMS IN POULTRY DRINKING SYSTEMS

Water is an important but often overlooked nutrient. Most people concentrate on making sure they have adequate supplies of water for bird consumption and evaporative cooling systems. However, there are many instances where water quality may be impacting performance whether it is a mineral or other contaminants in the water. Substances such as iron oxide can contribute to leaky drinkers or even reduce water availability. In many cases, bacteria can flourish in water systems and produce a slimy film known as biofilm that can obstruct water lines and filters, restrict water flow and impact bird performance.

What are Biofilms?

According to the Merriam-Webster's Medical Dictionary a biofilm is "a thin usually resistant layer of microorganisms (as bacteria) that form on and coat various surfaces (as of catheters or water pipes)". The slime that these bacteria produce protects them from many sanitizers and disinfectants so that even farms that have water line maintenance programs can still have biofilm issues. Biofilms will acquire the chemical characteristics of the surrounding water environment and will accumulate microorganisms such as bacteria and viruses if they are present in the water and left untreated. These bacteria could be present from flock to flock unless the biofilm is completely removed. Biofilms can also reduce the effectiveness of medications, disinfectants, and make it difficult to conduct water analysis.



PUTTING KNOWLEDGE TO WORK

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What causes a biofilm to develop?

In poultry drinking systems, the presence of water, low flow rates, warm house temperatures, bacterial presence and poor water quality contribute to the formation of biofilm. The combination of any of these factors creates ideal environments for the bacterial growth and biofilm formation.

How do I identify a biofilm problem?

Biofilm appearance can differ from situation to situation and can have different colors including red, green, brown, cream, and clear. Many people that have experienced the problem and have seen the biofilm refer to it as “snot”. Places to examine for the presence of slime to determine if a biofilm problem exists includes regulators, filters, filter housing, medicator pumps, inside the water reservoir on evaporative cooling systems, and the water pipe itself. Water pressure drop may also be an indicator of a biofilm problem as the buildup restricts the flow of water through filters and water lines. Another method of detecting biofilm problems would be to test chlorine (Cl) concentrations at the beginning and end of the water line. Microorganisms in biofilms will absorb or bind some of the Cl reducing the Cl concentration at the end of the line. Oxidative reduction potential (ORP) will also decrease down the water line if biofilm and/bacteria are present. The ORP is a measure of water oxidation levels in millivolts (mV) and higher levels are normally associated with better bactericidal properties. If a problem is suspected, a bacterial analysis of the well water and water lines should be conducted to determine the presence of bacteria.

How do I correct a biofilm problem?

Once a biofilm problem is identified, the water system needs to be completely cleaned. Water lines should be flushed regularly (at least once per flock) to minimize bacteria and debris buildup. However, when a biofilm or bacterial problem exists, a sanitizer will be required to correct the problem. If the well has bacterial contamination, the well should be treated and shock chlorination is a common method used to do this. It is important to know the well dimensions so that the proper amount of Cl can be added. Use the extension bulletin entitled “[Disinfecting Your Well Water: Shock Chlorination](#)” to ensure that the procedure is done correctly to ensure maximum bacterial reduction. It is important to check with the drinker manufacturer to ensure that the chlorine concentration will not damage nipples located inside the house. The shock chlorination procedure suggests 3 pints to every 100 gallons of water in the well which will equal a Cl concentration of 3.75 ppm. Water pH of 7.0 or higher can reduce the sanitizing effectiveness of Cl and this should be considered if a well has a high pH.

There are a number of products available to thoroughly clean the water lines. Iodine has been used as a water line sanitizer as well as other solutions such as bromine, hydrogen peroxide, peroxyacetic acid and ozone. These products are strong oxidizers which kill bacteria and viruses leaving the water safe to drink. Acidifiers such as citric, acetic, and propionic acid and sodium bisulfate lower water pH and are effective sanitizers. While there are many products and solutions that are effective for sanitizing water lines, they may not remove a biofilm that is already present in the system. They will sanitize the water, but the bacteria, fungi, protozoan and other organisms in the biofilm will be protected from the product. In these cases, it is a waste of money and labor to run ineffective materials through the water line. Be sure that the solution used is effective at removing biofilm and that it is safe for the rubber, plastic and metal

components of the drinker system. Some recommended concentrations for various sanitizing products are listed in table 1, all other products should be utilized according to the product label and instructions in accordance with the drinker manufactures guidelines.

Table 1. Water line cleaning recommendations that can be utilized once a week while birds are present.

Ammonia	Citric Acid	35% Hydrogen Peroxide	Household Bleach (Chlorine)	Vinegar	Iodine ¹ (18.05%)
Stock solutions to be administered at a rate of 1 gram stock per 128 ml of drinking water					
170 grams Clear Household Ammonia per gallon of water	1 Pack Citric Acid per 3.79 liters water	14-21 ml per 3.79 liters water	140 to 170 ml Household Bleach per 3.79 liters water	1.8 liters White Household Vinegar per 1.8 liters water	55 ml of 18.05% Iodine Complex Disinfectant per 3.70 liters of stock solution

¹Use Iodine (18.05%) with rubber seated drinkers

Source: Water is the most important nutrient, I.D. Russell Co., Longmont, CO

Biofilm problems may be detrimental to bird performance as they can restrict water flow, clog filters and nipples and harbor microorganisms. A water line sanitizing program and routine water testing will minimize these problems so that a biofilm does not develop. Flushing the lines during growout is good, but sanitizing in between flocks is essential. For additional information and help with water sanitizing programs, contact your broiler flock supervisor and county extension agent.

The use of trade names and references to specific companies and equipment in the letter does not imply an endorsement. The University of Georgia Cooperative Extension Service does not promote the use of any brands, equipment or companies to the exclusion of others.



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Extension County Coordinator/Agent

Consult with your poultry company representative before making management changes.

“Your local County Extension Agent is a source of more information on this subject”