

The Campaign for Quality Drinking Water Continues

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Introduction

Public concern over the use of antibiotics in feed animals has forced the poultry industry to limit the use of antibiotics in poultry production. Some companies have even reduced usage of other feed additives such as copper sulfate in an effort to reduce proventriculitis (gizzard erosion) and feed costs. As the use of antibiotics decreases in daily production, the emphasis on a healthy rearing environment for optimum bird performance will increase. One critical aspect of a healthy environment is high quality drinking water. Water comprises 70 % of the bird's body and it is essential for virtually every bodily function.

Nature designed the chicken and turkey to swallow whole seeds and bugs. Swallowed materials collect in the crop where they become softened by water before moving into the proventriculus or true stomach and on to the gizzard to begin the grinding process. When seeds are whole the outside protective coating prevents it from being attacked by bacteria so that a limited number of bacteria would develop within the crop. However, most feed today is ground and easily digested by both bird and microbes. Thus, feed can encourage bacterial, mold or yeast growth in the crop, particularly if the water supply is contaminated. This extra microbial growth may reduce performance and could increase contamination rates. This is just one of many reasons why a producer should continuously strive for good water quality.

Water Quality Problems – More Common than You Think.

As the modern broiler has been bred for more and more efficiency in growth and feed conversion, birds have become less and less tolerant of stressors. What might have had no impact on birds fifteen years ago could be devastating for the bird of today. The industry's evolution towards enclosed water systems might result in a false sense of security about the quality of drinking water over the life of production facilities. The reality is that when birds activate nipples there can be some backflow of water in the compartment above the nipple. Water in the backflow may contain whatever infection or contaminant the birds drinking have, including bacteria and viruses. To make matters worse, any loss in pressure in the water system can result in water re-circulating back as far as the well or municipal water line. If this happens, contamination can exist not only in the drinkers, but also throughout the entire system. If no action is taken to maintain adequate levels of sanitizer in the water supply then over time, given the warm stable environment of the water system, a film of bacteria can build up where harmful pathogens can survive for days if not months. *Bordetella* has been isolated (which causes

turkey coryza) from the inside of nipple drinkers and from the rubber seal in the water line regulator in houses from *Bordetella* positive turkey flocks.

Recent Field Findings

- **Bacterial contamination in closed water lines**

Years of testing and numerous water quality evaluations for poultry producers have produced surprising results. Regularly we have found high levels of aerobic (meaning oxygen requiring) bacteria in closed water lines. Up to a million bacteria per milliliter (ml) have been found in contaminated water, when acceptable levels are 100 bacteria/ml. While performance may or may not be poor on farms with this level of bacteria, the situation makes the water system a potential disaster because if a harmful organism does get in, there are now so many hiding places in the water system that drastic sanitation measures will be required to get rid of the problem. Remember organisms such as *E. coli* can multiply into trillions in only a few hours given the right conditions.

- **Contamination in Well or Municipal Water**

Extensive testing has shown that many water sources such as wells or municipal supplies at the farm are contaminated with bacteria. This finding further stresses the need to have back flow protectors to prevent pulling water from poultry houses back into clean systems. Should a well turn out to be contaminated, the best solution is shock chlorination between flocks. Instructions on how to accomplish this are listed at the end of this article. It is important to note that drinker manufacturers do not recommend running high levels of bleach through drinker lines because it can be damaging to the equipment. Therefore, a shock chlorinated well should not be flushed through the poultry house. Instead, after the well has been cleaned, follow up with line sanitation using an approved cleaner and disinfectant. Bacteria tests conducted on contaminated wells that have been properly shock chlorinated have shown a dramatic reduction in bacterial count.

- **Mineral Build-Up**

Minerals such as iron tend to build up in water lines. This is particularly true in drinker lines that have never been flushed properly. This has been documented by measuring mineral levels at the source (the well or medication room) and then at the end of the drinker line. Since mineral build up (sediment) provides harmful organisms with food and a place to hide, prevention of mineral sediment alone is an adequate reason for high pressure flushing. However, many producers may not have the proper regulator bypass flush systems or water pressure to get a good flush. Producers who have drain lines that run up into the ceiling before exiting the house may not have adequate pressure to achieve a strong flushing action in the line. It might on occasion help with flushing to drop these drain lines onto the floor and let the water run out a door. Certainly it is worthwhile to check with the manufacturer of your water system to determine if it is designed properly for high pressure flushing.

- **Coping with High Sodium and Chloride content**

Producers who have high sodium and chloride (salt) levels in the water seem to minimize flushing in their birds when water sanitation is excellent. Producers with high salt levels and poor sanitation almost always suffer from poor flock performance. Since there are no economical solutions for high salt content in the water, everything a producer can do to minimize its impact can only benefit bird performance.

- **Too Much Sanitizer**

Not only is a water sanitation program important, but also the proper use of sanitizers is essential. Recently we tested the water on a poultry farm that had suffered poor performance flock after flock. The birds not only did not grow and convert well, but also had pasty coloring. A test on water taken at the end of the line revealed a chloride level of over 600 parts per million (ppm). It turns out that the producer had improvised chlorination utilizing a system that had not been designed for delivering this sanitizer. After the equipment was disconnected the total water chloride levels dropped to less than 7 ppm and flock performance improved.

- **Testing for Water Problems**

If a producer suspects that a water supply might be the cause of chronic flock problems such as feed passage, poor weight gains or poor feed conversion, then it is important to have the water tested for both minerals and bacteria. The Center of Excellence for Poultry Science is currently equipped to conduct pH and mineral testing (with the exception of nitrates and sulfate), as well as aerobic bacteria counts for a small fee. The contact number is 479-575-3250 for more information about water testing.

A Procedure for Shock Chlorinating Wells¹

For shock chlorination, the goal is to achieve 200 parts per million (ppm) chlorine in the system. Remove any activated carbon filters that might be in the system to prevent filter damage. Household bleach can be used for shock chlorination. Approximately 3 pints per 100 gallons will give a 200 ppm solution. Caution should be used when handling chlorine compounds and minimize human exposure to chlorine fumes in confined areas such as well houses.

Step 1. Determine the depth of water in the well. It might be necessary to contact the company that drilled the well to get an exact well depth and water level.

Step 2. Determine the volume of water in the well. Measure the inside diameter of the well and then refer to Table 1 to determine gallons per foot of water depth.

¹ Adapted from Anon. 2002

Table 1: Volume of water contained per foot of well depth¹

Well casing diameter (inches)	Water volume (Gallons/foot of water depth)
4	0.65
6	1.47
8	2.61
10	4.08
12	5.88
18	13.22
24	23.50
30	36.72
36	52.87

¹ From Anon., 2002.

Step 3. Estimate the volume of water in the distribution system and then calculate the total amount of water in the system. Plan for at least 50 gallons in the pipelines and also calculate how much is in hot water heaters, holding tanks etc.

Step 4. Determine the amount of chlorine product required for a 200 ppm solution for all of the water in the system.

Step 6. Pour the chlorine mixture into the well and distribution system. Dissolve the amount of chlorine solution needed into a clean 5 gallon plastic bucket and then slowly pour this into the well but splash it onto the well casing when possible. It is recommended that a hose be attached to a nearby water hydrant and this be allowed to drain back into the well. This will help mix the bleach with the well water. Once the solution has been placed in the well, then turn on hydrants and let run until a strong bleach smell is observed. Turn off hydrants and let bleach stand in system for 2-3 hours or overnight if possible.

Step 7. Flush the system to remove the chlorine. The entire system must be emptied of chlorine and thoroughly flushed. Do not put the chlorinated water into a septic system. Drain the water where it will have a minimal impact on vegetation and animals.

References

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