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Problem Solving Drinking Water Challenges

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The single most important nutrient provided to birds is water. Optimizing quantity and quality is essential for achieving desired performance from food animals whether they are raised organic, antibiotic free or under traditional production practices. Identifying weak points in either quality or quantity is the starting point for a good water program.

1. What is the Water Supply?

a. **Identify and inspect the source.** Have there been any changes such as maintenance on a well pump, flooding near a well-head or loss of pressure that could cause back siphoning. If a system is from a municipal supply, inquire if changes have been made in the water treatment program. Giving the water source a critical evaluation can be the crucial starting point to finding an issue.

Field Experience: A top performing breeder farm began to consistently struggle with bird health issues for three consecutive flocks which resulted in reduced egg numbers. Turns out maintenance had been done on the well pump and in the process the well became contaminated with *E coli.* Shock chlorination of the well and a good daily water sanitation program made a significant difference. Check wells after flooding events such as after hurricanes or record rainfalls. It can be weeks or even months after an event when problems surface and is usually linked to health issues in flocks.

2. Test the Water

a. **Minerals**: Test the water at the source for pH, iron, manganese, calcium, magnesium, nitrates, sulfates, sodium and chloride. When possible include heavy metals such as arsenic, copper, cadmium and lead. While getting total dissolved solids or hardness is a starting point, it doesn't give adequate information so that an action plan can be developed if necessary. To fix high levels of sodium will require a different solution than eliminating iron or calcium from a supply and by knowing specific amounts of each, problems are more easily identified. The only time it is necessary to check mineral content beyond the source is if there is a concern that water treatment is not working properly. Rarely does the quality change dramatically without some type of treatment failure such as acid injectors or water softeners.

Field Experience: Acid water is becoming a more common diagnosis where water has a very low pH, in the range of 3.2 to 4.5 and almost no mineral content. The exception is iron which is most likely leached from the soil as the acid water passes through to the aquifer. Flocks tend to experience poor weight gain, high feed conversions but tend to have good livability. This water needs buffering with a basic product like sodium bicarbonate but this is only a good idea if the sodium level in

Modern broiler chickens and turkeys are genetically selected for efficient yield and should not be forced to divert resources to fight the stress caused by contaminated water.

the water supply is less than 50 ppm. Start with mixing ¼ to ½ cup of baking soda to a gallon of water then administer one ounce to each gallon of water. If flocks respond with improved performance, then a permanent solution is a soda ash feeder. On several occasions farms plagued with health issues have iron or manganese in the water supply and even tiny amounts of these minerals can be enough to support pathogenic bacteria like pseudomonas or *E coli*. The solution is oxidation with chlorine or chlorine dioxide and a good filtration system. Another problem is sodium and chloride levels. Farms with over 200 ppm of either or both should consider reformulating the diets to reduce salt content or install reverse osmosis (RO). I spoke at a broiler breeder meeting and one of the producers came up afterwards and let me know that I had helped diagnose this problem on his farm 4 years earlier. He followed my advice of installing an RO system and it paid for itself within 10 months.

b. **Bacteria:** Test the source and water in the production barn for total bacteria as well as *E coli* and coliform. If antibiotics or organic acids have been used in the water system, then include a yeast and mold analysis. Microbial levels can change dramatically from source to the actual drinkers. Testing the water throughout the process helps identify where loss of quality is occurring. This is beneficial for focusing a cleaning and sanitation program where it is needed most. When working with operations plagued by health challenges, consider opening a water regulator and swabbing the diaphragm or even a filter in a filter housing. If the water system is a source of disease challenges, these are the most likely places to find the issue.

Field Experience: Working with a couple of operations where we swabbed water line regulators and ends of water lines, we found systems loaded with disease organisms that had been consistently plaguing performance. Proving it was present even after line cleaning helped the operations understand they needed to improve their line cleaning program and then to check after cleaning to confirm it was effective.

3. Inspect the Water System on the Farm

a. **Drinkers and regulators – How old is the equipment?** Have they been subjected to treatments such as acids and chlorine that might impair their function over time? Measure milliliters per minute flow from the drinkers to assure they are putting out the right quantity recommended by the manufacturer for each specific bird age. Precision management of drinkers both for optimal flow (neither too little or too much) and height of drinkers (neither too low or too high) is HUGE for disease prevention and optimizing performance. Any time flocks do not gain as expected, have higher feed conversions but good livability, the number one culprit is water restriction.

Field Experience: A broiler farm was experiencing poor weight gains and higher feed conversions. Testing the drinkers for static water flow showed the drinkers were not putting out adequate water and upon examination of the regulators, the diaphragms were hardened and no longer functioning properly. Continuous use of chlorine and acids for multiple years had caused the damage. Replacements of the diaphragms fixed the drinker flow issues and next flock weights and feed conversions were back in the target range. A second farm insisted on keeping their drinkers at a level that made the birds raise up on their toes to drink. This farm consistently struggled with weight gain and feed conversions. Seeing how much the modern front heavy broiler was struggling to drinker, the suggestion was made to relax the drinker height so birds turned their heads up but without raising their backs. Immediately water consumption improved which resulted in better weights and feed conversions.

Correct drinker height and water flow are essential for optimizing performance.

Test drinkers for static flow to assure they are delivering adequate levels of water. Follow manufacturers guidelines for different aged birds.

b. **Supply plumbing — Determine gallons per minute flow rate at each barn to assure birds have an adequate quantity of water coming into the barn.** How old is the plumbing and could there be mineral and/or biofilm buildup? Are there dead end pipes that could be a factor? What is the age and material of the distribution system?

Field Experience: We performed a water survey across top and bottom performing broiler breeder farms and one of the measurements was gallons per minute flow. One brand

Make sure hoses don't restrict flow.

new farm was identified as poor performing with the first flock falling short on egg numbers. A check of the gallons per minute water flow at a faucet in the entry room found only 2 gallons per minute flow while the majority of good performing farms had at least 8-10 gallons per minute flow. On another occasion, a beautiful new broiler farm was struggling with weight gains and high feed conversions. Inspection of the water hoses feeding into the regulators revealed the hoses were restricting water flow. Hoses were replaced with a larger diameter hose and the issue was resolved.

4. Sanitation Between Flocks

a. **Has the system been cleaned between flocks?** How? With what products? Was the entire system, barn lines as well as underground distribution lines, cleaned? Proper cleaning procedures are critical for success with eliminating disease challenges in the water. Sometimes what we think is occurring may not be reality.

Field Experience: Several operations have cleaned the underground distribution lines going to barns and what came out looked like something from a sewer. Almost all reported that farm performance improved after the thorough water system cleaning.

b. **Ask questions and make sure products designed for water system cleaning are being used at the correct concentration and left adequate time to complete the job.** Utilize swabs to inspect/verify that the cleaning procedure is working. Again, opening a regulator and swabbing it for microbial growth post line cleaning will provide all the evidence needed.

Field Experience: Our lab has evaluated cleaners and definitely found that running the concentrated hydrogen peroxides with a medicator is not a strong enough dosage and leaving the cleaner for only a couple of hours is not enough time for a thorough cleaning. For most of the stabilized hydrogen peroxides used for line cleaning, the concentrations need to be 2-4% and should be left in the lines for 6-12 hours for the products containing peracetic acid and for 2-4 days for the stabilized products with no acid.

If the water holding tank looks like this, it's time for a thorough cleaning.

5. Product Use During Flocks

a. **Sanitizers — is there a routine use of daily water sanitizers?** It may be necessary to pull a sample from the drinker and test for bacteria and use this to correlate to an adequate dosage of chlorine (2-4 ppm free chlorine) or hydrogen peroxide (25-75 ppm) or chlorine dioxide (0.5-1.5 ppm free chlorine dioxide) because the water on farms will respond differently to each sanitizer. What works beautifully on one operation may be too much or too little for another.

Field Experience: A company that was struggling with *E coli* challenges in young poults found their water storage setup was resulting in a loss of chlorine residual by the time the slow-moving water reached the poults. A switch to a stabilized hydrogen peroxide during the brooding period made a difference in bird health. Stabilized products tend to hold their sanitizing residual for much longer than chlorine or even chlorine dioxide so these can be a useful tool during vulnerable points like early brooding, onset of lay or at move for turkeys. A broiler complex was struggling with high 7-day mortality with chicks often showing signs of *E*

Use the right injector to deliver the correct level of cleaner. Medicators only inject a 0.78% solution while most cleaners need to be injected as 2-3% solutions.

coli infections. The complex moved to stabilized hydrogen peroxide during the first week of production and the problem was significantly reduced.

b. **Additional products — How frequently are products such as vaccines, vaccine stabilizers, vitamins, organic acids, and water additive probiotics used in the system is important to know.** While these may have benefits for the birds, they can be food sources for biofilm in water systems. The more operations steer away from good, clean, sanitized water, the greater the risks of microbial blooms in the water system. If vaccinations, vitamins or other products must be used, then consider bumping up the daily sanitizer level for an extra day or two after running the product. If free chlorine residual target is usually 2 ppm, then increase to 4 ppm. This could help reduce any risks from biofilm that took advantage of no sanitizing residual and food in the water.

Field Experience: We got a frantic SOS call from a producer with week old chicks and water systems clogged with a thick slimy gel. Turns out he had used an organic acid at the end of the last flock, did not clean water lines and then started the new flock on a water additive probiotic. It turned into the perfect recipe for a water system disaster that even raising the lines at night and filling with concentrated cleaner did not fix. He finally had to buy extra nipples and slowly replace and clean all the nipples in his 6 barns. Ouch!

6. Sanitizer Monitoring and Verification

a. **Is any monitoring being done to assure the sanitizer residual is effective?** The sanitizer level needed when birds are young may be different than what is needed as they age. By establishing a continuous monitoring program, it is much easier to have an idea of what needs to be done throughout the flock to assure the water is clean and sanitized at a level that is the most beneficial for the birds.

Field experience: The opportunity to work and learn from many operations has led me to this piece of wisdom. Rarely can you set an injector and trust it to perform perfectly every day. Getting in the habit of monitoring can help assure that levels are always perfect.

Shock chlorinating a well may be necessary after flooding or if the well is contaminated with more than 10,000 cfu/ml of aerobic bacteria or ANY *E coli* or coliforms

b. Is there consistent documentation of sanitizer residual? It is hard to convince people that water sanitation is a major part of an operation if there is no proof of testing.

Field Experience: Operations that monitor and document their water sanitizer levels rarely need my help.

Water is a fascinating nutrient input that can be plagued with a multitude of issues affecting everything from quality to quantity. Water supplies are dynamic and the nature of the business itself can create challenges. This guide is a summary of experiences working with operations that traced issues to their water supplies and systems. Hopefully, the wisdom shared here can help others prevent or correct production issues that impact the bottom line.

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