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Ramp up poultry drinking water sanitation measures in the wake of Avian Influenza virus outbreak

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Audience: Commercial and backyard poultry growers, poultry producers, and service technicians

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Follow strict biosecurity measures during daily farm operation

The US has witnessed occasional outbreaks of high-path avian influenza virus (**HPAI**) in commercial poultry farms and backyard flocks. There have been recent outbreaks of HPAI observed in multiple states including to our neighboring states, Kentucky (broilers) and Virginia (backyard mixed species) (USDA-APHIS, 2022; CDC 2022). Wild birds particularly migrating waterfowls are the carriers of the avian influenza viruses that are found to be freely circulating in these populations.
Domesticated birds acquire HPAI through direct contact with waterfowl infected with viruses or through other common transmission routes such as infected poultry or inanimate surfaces that are contaminated with the viruses. The outbreak of HPAI could pose a substantial economic loss for the US poultry industry due to massive culling practices that are required of infected flocks, and the potential trade restrictions. For farms located near areas with virus outbreaks, strict biosecurity protocols are essential. Biosecurity practices should include using designated farm clothes that are only used while working on the farm, disinfecting footwear and vehicles while entering and working in poultry premises and disinfecting shared equipment. Strict diligence in following all possible biosecurity measure during daily farm operation is imperative when working amidst disease outbreaks such as HPAI.

Drinking water sources can be a vector for high-path Avian Influenza virus

One operational biosecurity practice that is often overlooked is treating drinking water supplies for birds. The cost of not treating water supplies can be higher especially during the time of disease outbreak such as HPAI. The enclosed water supplies in the poultry operation are often "out of sight out of mind" for most poultry growers and could remain as a disease threat when water sanitation measures are not practiced. The avian influenza viruses easily grow and thrive in water sources and supplies (Domanska-Blicharz *et al.,* 2010; Lebarbenchon *et al.,* 2010). Backyard poultry are vulnerable to HPAI infection because they often share surface water with wild waterfowls who carry avian influenza viruses. Poultry farms that intersect the North American flyways of waterfowl migration pathways need to be especially cognizant about treating water supplies and should enforce strict water treatment strategies. The droppings from HPAI infected wild fowls on land surfaces can easily seep into the ground during rain events and contaminate underground water sources. This phenomenon of ground water contamination can be even more prevalent in Tennessee as the state has karst type topography. Droppings from infected birds could directly contaminate surface water bodies. Surface water bodies often interact with the underground water leading to cross contamination between water bodies. So, farms that get their water from underground sources need to be diligent about treating water.

Effectively treat water supplies during the event of disease outbreak

The goal of poultry water sanitation procedures and sanitizer/disinfectant products is to target and eliminate the microbial challenges that exist and thrive in water supplies whether they are bacterial, fungal, viral or protozoal (Figure 1.) Ideal disinfectants used as a drinking water sanitizer should create disinfectant residuals throughout the distribution system and should inactivate microbes, control biofilms or neutralize undesired contaminants. Products such as chlorine, chlorine dioxide, and hydrogen peroxide are commonly used as poultry drinking water sanitizers and are known to be effective against microbes including the HPAI viruses (USDA-APHIS, 2018; Zou *et al.,* 2013; Lenes *et al.,* 2010). Some considerations while treating poultry drinking water supplies:

Figure 1. Treat water to ensure microbially safe drinking water to poultry.

- Proper application of sanitizer dose is critical for good sanitizing efficacy. Start with recommended levels of sanitizer then adjust sanitizer concentrations as needed based on microbial testing results.
- Starting points for sanitizing residuals are free chlorine- 2-4 ppm, free chlorine dioxide-0.5-0.8 ppm and hydrogen peroxide-25-75 ppm.
- There are farms that can manage perfectly on microbes with 1 ppm free chlorine and then there are those that require as much as 6-8 ppm. These differences depend on what minerals are present in water and the overall hygiene of the water system. Make sure to measure the sanitizer residual concentration

Figure 2. Taking swab and drip samples to monitor the residual and microbial efficacy of water treatment.

and microbial efficacy of sanitizer by taking drip and swab samples at the end of the water lines (Figure 2). When water sanitizers are in place and at appropriate concentrations, then aerobic plate count results should be 0 cfu/ml.
- Ideally, water samples collected for evaluating sanitizer effectiveness should be collected sterilely and in containers that have sodium thiosulfate to neutralize the sanitizer. Samples should be shipped overnight using ice packs in a Styrofoam box to service labs for microbial enumeration. You can also contact the author at pmaharja@tnstate.edu for information on sample shipping and lab analysis.
- Once a residual level is correlated with no microbial growth in the water supply at the drinker, then establish a residual monitoring program and document the test results.

The best indicator of the effectiveness of water sanitation programs will be an evaluation of what microbial populations are living in the water supplies. Consistent water sanitation practices on farm can keep the microbial levels in water under control in the event of occasional microbial surge due to day-to-day water quality fluctuations (Maharjan *et al.,* 2016). Daily water sanitation programs are an excellent tool to help prevent health challenges including the HPAI threat being introduced to flocks via the water system. Have water sanitation practice as a mandate in your operation when disease outbreak in the surrounding farm is noticed especially if the disease agent can survive in water sources or water systems.

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