



Water Line Cleaning and Disinfection on the Farm

Best Practices that Support Animal Health & Growth

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Decline of Antibiotics in Agriculture

Emerging research on antibiotics in livestock and poultry negatively impacting human health has led to a decline of antibiotic use in farms. Evidence suggests that the widespread use of antibiotics in animals can lead to antibiotic resistance in humans.¹ These antibiotic resistant bacteria, or “superbugs,” sicken 2.8 million people every year.²

According to a study published in *The Lancet Planetary Health*, restricting antibiotic use on the farm can reduce antibiotic-resistant bacteria in livestock up to 39%.³ As a result of these findings, the U.S. Food and Drug Administration (FDA) banned the use of medically important antibiotics solely for growth promotion and now requires veterinary prescriptions for all medically important antibiotics administered to livestock.⁴

Consumer awareness of the potential adverse effects on human health has increased demand for farms to restrict antibiotic use. From 2011 to 2015, sales of “antibiotic-free meat” grew 29% each year, compared to under 5% for conventional meat.⁵ Around the same time, Consumer Reports found that 86% of consumers wanted meat from livestock raised without routine antibiotics at their grocery stores.⁶

While limiting antibiotic use in animals is a necessary step in the right direction, it unfortunately creates issues for farmers. Traditionally, farmers used antibiotics, in part, to help fight off microorganisms that make animals sick. As of 2012, approximately 88% of swine in the United States were fed antibiotics for disease prevention and growth promotion, 16% of lactating dairy cows received antibiotics for clinical mastitis, 15% of beef cows were fed antibiotics for clinical respiratory disease and 42% of beef cows were given Tylosin, an antibiotic to prevent liver abscesses.⁷ Using fewer antibiotics means that animals have a harder time fighting off pathogens and may get sick more easily, grow more slowly or die.

Farmers also have to ensure the health and safety of animals to avoid recalls associated with outbreaks of bacteria such as *Escherichia coli* (E. coli). Food recalls threaten the safety of consumers and the financial stability of a farm. In the United States alone, food recalls have

¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4638249/>

² <https://www.cidrap.umn.edu/news-perspective/2019/12/fda-details-rising-sales-antibiotics-meat-production>

³ <https://www.who.int/news-room/detail/07-11-2017-stop-using-antibiotics-in-healthy-animals-to-prevent-the-spread-of-antibiotic-resistance>

⁴ <https://www.agriculture.com/livestock/cattle/the-new-rules-of-feed-antibiotics>

⁵ <https://www.washingtonpost.com/news/wonk/wp/2017/10/05/most-meat-producers-use-antibiotics-now-consumers-can-see-how-much/>

⁶ <https://www.washingtonpost.com/news/wonk/wp/2017/10/05/most-meat-producers-use-antibiotics-now-consumers-can-see-how-much/>

⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3234384/>

grown by 10% over the last several years.⁸ When a food company experiences a recall, they lose an average of \$10 million in direct costs, in addition to reputational damage and lost sales.⁹

Even though the times demand fewer antibiotics to limit antibiotic resistance, farms still need to raise animals quickly and healthily. As farmers move away from antibiotics, they are relying more heavily on proper cleaning and disinfecting to maintain animal health. As a result, keeping agricultural water clean is becoming more and more important. Removing or reducing antibiotic use means that farms need a plan B that prioritizes water line cleaning.

Water Safety Importance and Issues

Water quality varies around the globe, and each region faces unique challenges. However, one thing that never varies is the need for clean water and water lines. Clean water is an essential part of ensuring animal health and preventing contamination. Farmers need to be aware of what diseases can arise from particular water sources and unclean water lines.

Farms pull water from natural sources, including ponds and wells, or public water sources. Natural sources typically host more potentially harmful organisms and non-acceptable pH levels that can impact animal health. Surface water from streams, rivers, lakes and ponds can become contaminated with road salt, industrial run-off, algae and plant pathogens.¹⁰ Unsafe levels of salinity and toxic elements in water can cause health problems and morbidity in animals.¹¹

Diseases arise in water primarily due to biofilm build-up. A biofilm is a layer of slime containing microorganisms that forms on surfaces in contact with water.¹² These biofilms harbor diseases harmful to both humans and animals and can corrode metal pipes, releasing iron particles into the water.¹³ Probiotics, prebiotics, vaccines, vitamins and minerals in the water supply can all contribute to the growth of biofilms.

Poor water quality negatively impacts animal growth as well. As farmers move away from antibiotic use to promote growth, they must find other ways to raise large animals. Providing water without biofilms is a way of improving growth performance, but biofilms are very common. A study of water pipelines in the United States found 10 in 25 samples had

⁸ <https://time.com/5504355/food-recalls-more-common/>

⁹ <https://www.foodsafetymagazine.com/signature-series/recall-the-food-industrys-biggest-threat-to-profitability/>

¹⁰ <https://ag.umass.edu/greenhouse-floriculture/greenhouse-best-management-practices-bmp-manual/water-supply-sources>

¹¹ <http://veterinaryextension.colostate.edu/menu2/Cattle/04908LivestockDrinkingwaterquality.pdf>

¹² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4413065/>

¹³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4413065/>

unsatisfactory water quality, with harmful bacteria including E. coli and staphylococcus aureus.¹⁴

In addition to impacting animal health and growth, poor water quality damages equipment performance and durability. When high levels of contaminants or harmful particles travel through pumps, they reduce the lifespan of lines and pumps transferring and using water. Improving water quality increases the uptime of essential equipment and helps avoid equipment failure and unexpected downtime.

To make matters more difficult, water line maintenance is a particularly challenging task. It's impossible to spot buildup inside of pipes with the naked eye, and once present, biofilms are difficult to remove. They are several hundred times more resistant to various disinfectants and antibiotics than the same bacteria grown in suspension. This phenomenon occurs because the group of bacteria acts as one organism, capable of adapting to changing conditions.¹⁵ For example, E. coli in a biofilm is 3,000 times more resistant to chloride treatment than in water alone.¹⁶ Therefore, farms need to regularly clean and disinfect water lines to prevent biofilms from forming.

Best Practices for Water Line Cleaning on Farms

There are a number of best practices farms can implement to maintain safer and healthier water, including:

- **Maintaining a periodic schedule.** Farms should have a regular schedule in place for cleaning and disinfection. Most farms are instructed to clean and disinfect between flocks and herds, when the water lines are not in use, or when herds are moved to different barns. Conduct a thorough cleaning at least twice a year, even if sourcing from public water. While most public water sources contain some chlorine that reduces bacteria growth, poultry drinking water is handled with a slower flow and warmer temperature, meaning you cannot assume it has the same level of cleanliness as home tap water.¹⁷
- **Choosing the right chemicals.** Chemicals used to disinfect farm equipment include chlorine dioxide, bleach, peracetic acid, hydrogen peroxide and various acids and bases. Many are used in different combinations and concentrations. Farmers need to

¹⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4413065/>

¹⁵ <https://blueearthproducts.com/maintenance-cleaning/treating-biofilms-in-your-water-distribution-system/>

¹⁶ <https://projectblue.blob.core.windows.net/media/Default/Pork/Documents/Shock%20Water%20Treatment%20WEB.pdf>

¹⁷ <https://www.uaex.edu/farm-ranch/animals-forages/docs/Waterline%20Cleaning.pdf>

investigate which formulations are the best fit based on their livestock and poultry, equipment and water source.

- **Select the right equipment.** Dispensing systems greatly enhance the reliability and precision of chemical dilution. As there are different options available, it's important for farms to do their research and understand which type is best suited for their needs.
- **Following a thorough process.** Your cleaning process should follow a specific sequence. First, inject the chemical into the water line. Wait several days for the chemical to work. Then, flush the chemical out of the pipe. Lastly, test to make sure that the water's microorganism level is acceptable.

Technologies for Optimized Water Line Cleaning

When compared to manually mixing concentrated chemicals with water, using chemical dilution equipment is substantially safer. There are a variety of technologies that farms can use to administer chemicals. Each type – venturi systems, electronic pumps and water-driven pumps – offers numerous advantages.

Venturi systems function by pushing water through a nozzle and creating a pressure differential between the inlet and outlet. This vacuum pressure then pulls in the chemical and mixes it to the desired dilution. They offer benefits such as:

- **Accuracy** – Venturi equipment ensures accuracy when farms need to meet very specific dilutions. For example, many sanitizers used on the farm include quaternary ammonium compounds or peroxyacetic acid-based (PAA) sanitizers that need to be diluted with water before using. One or one-half ounce of these chemicals per gallon is common.
- **Easy installation** – These units are easy to install on a wall and come with everything needed to connect directly to water hoses. Changing dilution settings is also quick, requiring only a tip change.
- **Simple maintenance** – These systems are designed for quick and hassle-free maintenance. They have chemical pick-up lines with a filter that needs to be cleaned after each chemical container is used and should be changed out yearly.
- **Low cost** – Venturi dispensers are traditionally more affordable than other types of chemical dispensing equipment. Look for [a unit](#) that is compatible with highly aggressive chemicals (HACs) like chlorine, hydrogen peroxide and citric acid.

Electronic diaphragm metering pumps rely on electricity rather than air to operate and do not require the use of squeeze tubes. This equipment offers:

- **Reliability** – Electronics are the most reliable, accurate option for chemical dispensing. The [Hydro Xtreme](#) meets the needs of farms using HACs to improve water quality. It features remote management capabilities, safe operation and high-water pressure compatibility. [Proxy-Clean® Products](#) successfully implemented Hydro Xtreme on farms to achieve improved water quality and performance, along with other benefits.
- **Data collection** – Electronic dispensers come with data collection capabilities that allow users to easily track chemical usage and maintenance schedules. Greater insight into dispensing processes leads to long-term cost savings.
- **Reduced maintenance** – Uptime on electronic equipment is typically higher compared to other chemical dispensing systems. As a result, it requires less maintenance, further reducing long-term costs.

As the name suggests, Water-Driven Pumps (WDPs) are powered by water. This option uses volumetric proportioning to ensure precise dilutions despite changes in water pressure and flow. They provide farms with:

- **Convenience** – Many barns are already equipped with WDPs to administer vaccines and organic acids. Adding a line cleaning to an existing pump is straightforward provided that chemical compatibility is present. Consider an [option](#) that contains a patented internal mixing chamber that segregates harsh chemicals from critical internal components.
- **Cost savings** – With this mechanical option, farms save money on electricity. Additionally, chemical usage is proportional to water usage in WDPs. [Some WDPs](#) have a substantial lifespan due to long-lasting motors and are specifically engineered for poor water conditions.
- **Easy chemical changes** – WDPs make administering changes to chemical dilution easy, often with a simple twist of the pump. The [AquaBlend Xtreme](#) is one example that is also compatible with highly aggressive chemicals.

Whether you are searching for lower costs, convenience or data integration, chemical dispensing systems offer increased safety and accuracy overall for cleaning agricultural water lines.

Protecting Animals and Farms' Livelihoods

Farms need solutions that allow them to reduce dependence on antibiotics without sacrificing animal health and growth. Regular water line cleaning and sanitizing promotes animal well-being and reduces the risk of infection by preventing biofilm buildup. Chemical dispensing systems allow farms to safely and accurately clean water lines at a low cost. Good quality water

also supports equipment performance and durability. Given the numerous options available on the market, farms should understand the various benefits each offers and select a unit that will work best for their unique situation.