Quality Water for Dairy

www.dutrion.com

Importance of Water Quality for Dairy:

Profitable livestock production requires many quality management skills that all impact the technical results. Factors such as health status, barn temperature, ventilation, water quality, and nutrition all play a big role in animals reaching their genetic potential and improving the producer's bottom line.

Often water lines that are poorly maintained contain biofilm build-up caused by contaminated water sources or sources high in minerals, like iron and manganese. This can offset the water-feed ratio and decrease feed efficiency and therefore milk production. When we consider the fact that it takes four litres of water to produce one litre of milk, the role of quality water is crucial.

As not all animals are healthy, respiratory diseases (and others) will sit and grow in water bowls and troughs, in combination with feed deposits left in water sources there are many challenges to keeping water clean and fresh. With evolving concerns like the rise of the highly pathogenic avian influenza (HPAI) there is a chance that animals cross-contaminate each other by drinking out of the same water source. Furthermore, most dairy animal housing systems have birds flying in and out which increases the risk of spreading diseases.

A common practice of tipping water troughs and cleaning them thoroughly twice a week help keep contamination to a minimum. Chlorine dioxide is an excellent choice to effectively disinfect and secure proper water line sanitation (see figure below), keeping the communal water sources clean and safe.

Chlorine dioxide oxidizes hydrogen sulphides, which produce bacteria that can cause leaky gut and inflammatory bowel disease. These bacteria and diseases can lead to reduced feed efficiencies, lesions, and possible ulcers. There is a range of hydrogen sulphide-producing bacteria commonly found in the gastrointestinal microbiome. Major players of hydrogen sulphide production in the gut are: Klebsiella, Salmonella, Enterococcus, Streptococcus, Campylobacter, Staphylococcus, E. coli.

Role of Chlorine Dioxide (ClO_2)

Chlorine dioxide is effective within a wide pH range (4 – 10), unlike chlorine which becomes less effective once the pH is greater than 7. Chlorine dioxide is a known disinfectant for bacteria and viruses. Using chlorine dioxide instead of chlorine can assist in reducing the formation of harmful disinfection byproducts, for example trihalomethanes and halogenated acetic acids. At the right concentrations, chlorine dioxide mixed with water forms a safe stock solution that can be added to the dairy's drinking water distribution.

HEAD OFFICE
223077 Hwy 611
Ferintosh, Alberta
Canada T0B 1M0

Contact Us
info@dutrion.net
Office: (780) 361-2114

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What is Dutrion Tablet?

Dutrion Tablet® formulation is an optimized mixture of ingredients that are added to a specific volume of water, it reacts quickly and safely to form a long-lasting chlorine dioxide solution. This concentrate is then simply dosed into the main water distribution system to disinfect the target water. Once the Dutrion® stock solution is dosed into your water lines, it remains effective with a good residual, depending on the incoming raw water and the degree of contamination that has been built up in the water system. The product is easy to use, store, and transport. ClO_2 with appropriate dosing rates, has no harmful effects on humans, livestock, crops, equipment, or the environment.

Unique ClO_2 Chemistry:

The chlorine dioxide molecule in water will oxidize the cell walls of pathogens (by pulling layers off). It can adopt five electrons (5e), which gives chlorine dioxide 2.5 times more capacity to deactivate pathogens at lower dosing rates compared to most other disinfectants, like ozone and hydrogen peroxide which can only adopt two electrons (2e).

- Chlorine Dioxide (5e)
- Hydrogen Peroxide (2e)
- Hypochlorous Acid (2e)
- Ozone (2e)
- Sodium Hypochlorite (2e)
- Sodium Chlorite (2e)

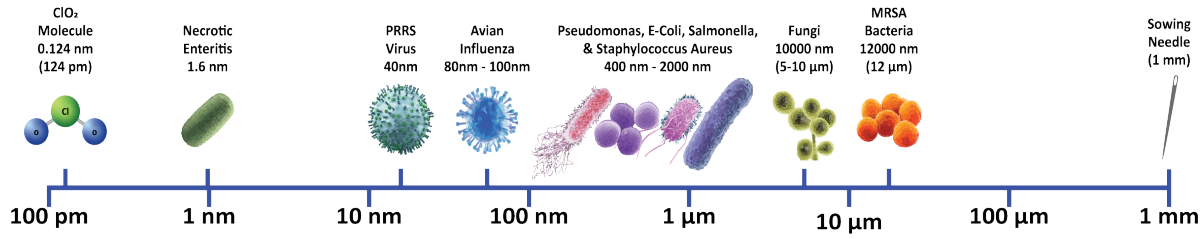
Hydrogen peroxide and ozone are short-actives and usually require higher dosing rates to maintain a residual at the end of the line. The high dosing levels can make them extremely powerful and non-selective oxidizers, therefore capable of killing pathogens and harming healthy (aerobic) cells.

The impact of oxidation on the rumen:

Like most mammals, ruminants' bodies are designed around oxygen, and they require the best oxidation potential to maintain a healthy life. When used in appropriate quantities, chlorine dioxide has a similar oxidation potential to regular oxygen in the body. It is not only important what will be oxidized, but also what will not be oxidized (such as beneficial bacteria in the stomach).

The rumen is anaerobic (meaning there is little to no oxygen present). Microbes present in the rumen cannot grow in the outside air, and can only tolerate small amounts of oxygen. The rumen allows for the growth of rumen microbes and the process of fermentation to digest feed and forages for the cow. Any disruption to the delicate balance of the rumen environment will result in poor growth of the microbes, poor health and digestion, and ultimately lower milk production.

Molecular Size Matters:



As can be seen in the chart above, the size of a chlorine dioxide gas molecule is 0.124 nm, much smaller than microorganisms and viruses, allowing the gas to easily penetrate any areas where these microorganisms might be concealed.

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