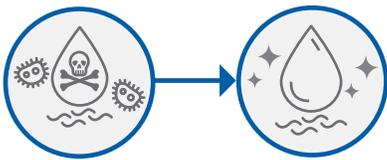




# The ORP Meter

## THE PERFECT TOOL TO EVALUATE THE EFFECTIVENESS OF A WATER TREATMENT PROGRAM

Tools, Standard Operating Procedures and Guidelines to effect a more complete biosecurity level



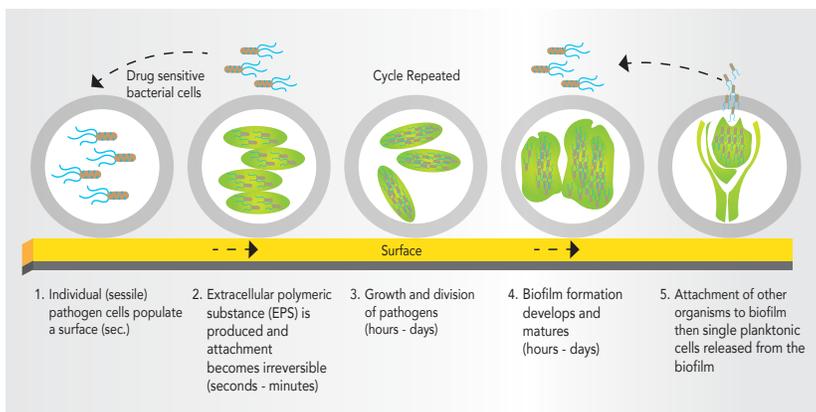
### THE PROBLEM: WHY IS THERE STILL BIOFILM IN MY WATER?

Across the world, farms constantly deal with problems of sanitation and disinfection. Hygienic treatments and measures are put in place to control deterioration, and to create conditions to secure healthy animals, facilities, and water. Stagnant water that is contaminated with manure and other contaminants can develop blue-green algae, which may be toxic to livestock. High bacteria concentrations can cause infertility, foot rot, low production, and other reproductive problems. These losses often can be prevented if essential features of adequate sanitation are recognized and adopted.

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Estimates show that more than 90% of the bacterial and disease-causing organisms are protected within a slimy, greasy habitat known as **biofilm**, and that the majority of water feeding systems are contaminated with this rich mixture of bacterial species, as well as fungi, algae, yeasts, protozoa.



It is critical that to maintain a clean, fresh water supply, to maintain health and performance of livestock, both the bacterial and biofilm presence must be eliminated from a water system through water hygiene processes. The majority of causes for the spread of diseases can be ascribed to **improper sanitation**, which enables germs to be carried. Quite often, livestock is managed by persons who either ignore the basic principles of hygiene and sanitation, and / or are unaware **not all chemical treatments are effective**.

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Education on the use of the ORP Meter, which will **accurately measure the disinfection strength of a solution**, should determine a baseline level, and this will point the direction toward a more complete program of contaminant eradication. Based on this level, the Acepsis<sup>™</sup> Dealer can utilize the knowledge acquired from numerous past system successes, to determine the **strength of the solution** being used, the **frequency of automatic dosing**, and a **projected timeline** before complete success is achieved.



**The ORP value is beneficial because it helps to determine the water's quality and decide the water treatment processes best to use to correct any issues. ORP can reflect the antimicrobial potential of the water. It determines the tendency of a chemical substance to oxidize or reduce another chemical substance.**

## USING ORP VALUES TO DETERMINE PATHOGEN INFECTION

**Oxidation reduction potential (ORP)** is a qualitative way to measure water's ability to either release or accept electrons during a chemical reaction. How easily a substance is **oxidized** or **reduced** is given by the **standard potential**. The standard potential refers to a half reaction written as a reduction. An ORP sensor consists of an ORP electrode and a reference electrode, in much the same fashion as a pH measurement.

The typical purpose of using ORP meter is to **ensure that an ORP reaction has gone to completion**, i.e., the substance of interest has been completely reduced or completely oxidized. The more positive the reduction potential, the greater the compound's affinity for electrons and tendency to be reduced. Finally, ORP is measured for the control of biological growth. Studies find the eradication of most bacteria, viruses, mold and fungi requires an ORP reading of **greater than 600 mV**. Many chemical compounds (i.e., hydrogen peroxide) do not reach above 300 mV, even in their most concentrated form. **Chlorine dioxide** maintains a >600 mV reading, even at lower concentrations. Additionally, its kill rate is instantaneous (< 1 second!). **The overall goal is to treat the water at an ORP of 650 – 700 mV with the lowest ppm product.**

The presence of biofilm is a true indicator of ineffective treatments, and the ORP meter can actually measure the level of bactericides in the water, at the water sources. Additionally, the ORP meter measures mV counts that might be too low to register on test strips. In day-to-day farm use, the ORP meter is used to determine whether to dump the troughs or not. This results in a savings of time and labor, especially once the water is properly treated.

## Measurement of Oxidizing Agent ORP Values In Pathogen Disinfection\*\*

OXIDIZING AGENT | OXIDIZING AGENT ORP VALUE RANGE (mV)

CHLORINE DIOXIDE (ClO <sub>2</sub> )		600 → 1000 MV
OZONE* (O <sub>3</sub> )		700 → 1000 MV
IODOPHORS (I <sub>2</sub> )		400 → 600 MV
HYDROGEN PEROXIDE		300 → 500 MV
SODIUM HYPOCHLORITE		250 → 500 MV



Table 1. provides the oxidizing (disinfecting) range of the most popular sanitizing agents in the industry. The higher the Oxidation Reduction Potential (ORP), the higher the disinfecting ability. This is measured in millivolts (mV).

## ORP Values In Pathogen Disinfection\*\*\*

PATHOGEN SURVIVAL IN SECONDS (S) OR HOURS (H) AT ORP LEVELS (MV)

Pathogens	<500 ORP (mV)	500 - 600	600 - 700	700+
E. COLI (0157:H7)	> 300 S	< 60 S	< 10 S	< 1 S
SALMONELLA SPP.	> 300 S	> 300 S	< 20 S	< 1 S
LISTERIA MONOCYTOGENES	> 300 S	> 300 S	< 30 S	< 1 S
THERMO-TOLERANT COLIFORM	> 48 H	> 48 H	< 30 S	< 1 S

Table 2. shows the relative survival rate of different pathogens and the role that oxidation power has in the disinfection process, using the ORP (mV) value to measure the rates. Based on the numbers from Table 1, chlorine dioxide is a clear winner over hydrogen peroxide.

\*Ozone is greatly influenced by the water quality and ozonation system.

\*\*Oxidation Reduction Potential (ORP) for Disinfection Monitoring, Control and Documentation; University of California, Trevor Suslow, Department of Vegetable Crops, University of California - Davis



**ACEPSIS™ PRODUCTS AND TECHNOLOGY:  
CREATING THE SUPERIOR DIFFERENCE**

Acepsis™ AquaSoar™ coupled with the AquaSoar™ Activation System Chamber gives the one-two delivery assurance necessary for successful results: superior hygiene technology combined with a superior and efficient delivery system. These results are readily apparent in the ORP readings.

Acepsis™ recommends getting an ORP meter that also displays the pH. The Hanna meter, for example, is accurate, and comes with the calibration liquids, so you can accurately adjust the calibration before each use.

Working in partnership with the farm producer and Acepsis™ renders the most successful outcome, when the proper steps are put in place. Your Acepsis™ Dealer offers a dedicated program that concentrates on getting the required results.

**The Acepsis challenge: Drink my water, it's clean!**



**For more information, call Acepsis™ or your local representative.**



ACEPSIS™, LLC is an animal health based company that is focused on the development of state-of-the-art animal hygiene technologies. Our Company's mission is to apply innovative animal hygiene technologies into the agricultural and veterinary market sectors.