Electrolysed Water

FOOD SAFETY TECHNOLOGY SUMMARY	
Status	An Emerging Technology
Location	Pre or post slaughter
Intervention type	Surface treatment of hide or warm carcass
Treatment time	15-30 seconds
Regulations	Considered safe in US, Japan & Australia, but awaiting full approval. Not approved for the EU for carcass washing, but approved for treatment of drinking water. Approved for water treatment and equipments sanitising in New Zealand
Effectiveness	1.5-3 log reduction
Likely Cost	Envirolyte units range from AU$20,000 to AU$75,000
Value for money	Substantially cheaper than other treatments (eg. organic acid chemicals are more expensive than salt). However, even though the salt would be cheaper the equipment costs would be similar to any surface treatment equipment
Plant or process changes	Minimal change, can use existing plumbing. Space may be required for a spray cabinet treatment area if none existing.
Environmental impact	Environmentally friendly solution, may in fact improve quality of effluent Energy would be required to produce the current
OH&S	Solution is harmless, unit is fully enclosed so little safety issue from electric current generated as part of process
Advantages	Salt is the only chemical used Little corrosion of stainless steel and carbon steel when using EO water
Disadvantages or Limitations	Need a spray cabinet to apply treatment Depending on the pressure of application, there may be issues with water penetration into the fat surfaces

Electrolysed water

Electrolysed water (EO) is produced by passing a current of electricity through a dilute saltwater solution. One product of the reaction is sodium hydroxide (NaOH) and the other is hypochlorous acid, which has a low pH, contains active chlorine, and has a strong oxidation-reduction potential similar to that of ozone. The properties of EO water can be optimised by increasing the voltage and increasing the salt concentration which results in a more acidic solution and higher residual chlorine level. Three forms of the solution can be produced, an acidic form, a neutral pH form and an alkaline form. The electrolysis unit produces the solutions in a concentrated form which is then diluted through an automatic dosing system to the required concentration.

EO has been shown to give good reductions in *Listeria monocytogenes* (4.3-5.2 log) and *Staphylococcus aureus* (1.7-1.9 log) on rubber gloves and stainless steel, and in *Campylobacter jejuni* on poultry carcasses (4.9 log) (Ayebah *et al.* 2005a, 2006; Kim *et al.* 2005; Liu and Su 2006; Park *et al.* 2002). Similarly, a Spanish study found that the neutral EO water could reduce populations of *Escherichia coli*, *Pseudomonas aeruginosa*, *Listeria monocytogenes* and *Staph. aureus* on stainless steel and glass by 7 log cycles (Deza *et al* 2005). Research by Ayebah *et al.* (2005b) showed that EO water was relatively non-corrosive when applied to common materials used in the food industry (carbon steel, stainless steel, aluminium and PVC), and the acidic EO water has been shown to be a good sanitiser for use when cleaning abattoirs (Bach *et al* 2006). These authors found that using EO water gave surface microbial counts 1 log lower than when an iodophor sanitiser was used. There have also been reports that using acidic EO water in water troughs can reduce the level of endemic illness and shedding of *E. coli* O157 in cattle.

In Australia, EO units, branded Envirolyte®, are supplied by the company Waterculture. The EO waters produced are referred to as Anolyte and Catholyte, and can be used separately or combined to give a greater effect.

A USA company markets disinfection fluids, called Primacide A, Primacide B and Primacide C, which are manufactured using an electrolysed water system called Empowered Water™. Safety approvals for Primacide A and B have been granted by FDA and USDA for use in food processing. Primacide A is designed for use on beef hides as well as the on the carcass immediately following hide removal. The manufacturer has conducted tests in conjunction with USA researchers evaluating the effect of electrolysed water. This research was conducted on hide pieces in a model hide washing system (Bosilevac *et al*. 2005). EO water reduced hide APC by 3.5 log, and Enterobacteriaceae counts by 0.9 log., and reduced *E. coli* O157:H7 prevalence from 82% to 35%. Plain water, by comparison, had no effect on *E. coli* O157:H7 prevalence.

Proponent/Supplier Information

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