Ozonated Water

INTERVENTION SUMMARY	
Status	Currently Available
Location	Post slaughter
Intervention type	Surface treatment
Treatment time	15-60 seconds
Effectiveness	1-2 logs
Regulations	Approved in US and Australia
Likely Cost	High capital outlay. The Ozone Safe Food website has a cost ($US) savings calculator to input data to compare with your current process but it does not include the capital cost of the equipment
Value for money	Worth consideration
Plant or process changes	A reasonable space needs to be available to install the application equipment, though the generation unit may be installed externally to the point of use
Environmental impact	No residual chemicals are generated and ozone readily decomposes to oxygen
OH&S	Ozone gas is toxic and measures need to be put in place when in use. For example, no personnel access to area being fumigated
Advantages	The ozone dissipates quickly No residual chemicals after treatment
Disadvantages or Limitations	Possible discolouration of lean at high concentrations Potential for oxidation of fat An appropriate method to keep the concentration of ozone in solution at an effective level is very important

Ozonated Water

Ozone is a water-soluble, naturally occurring gas which is a powerful oxidising agent. It destroys microorganisms by attacking and oxidising the cellular walls and membranes. Ozone is very unstable, and on exposure to air and water it rapidly decomposes to form oxygen. Hence, it must be generated at the point of use.

Gram positive organisms are more sensitive to ozone than Gram negative, and bacteria are more sensitive than yeasts and moulds. The efficacy of ozone treatment is affected by pH, temperature, relative humidity, concentration, and phase of microbial growth and by the presence of organic material (Sofos and Busta 1991).

Reductions of 2.5 log have been reported on beef tissue using 0.5% ozonated water (Gorman *et al.* 1995), but other researchers have reported reductions of 1.3 log or less (Reagan *et al.* 1996), and Castillo *et al.* (2003) found no difference between a water wash containing aqueous ozone applied to a hot carcass compared to that of water on its own. In a study where ozonated water was used in a simulated hide washing system (Bosilevac *et al*. 2005) there was a reduction of 2.1 log in the total aerobic count on the hides, compared with water alone, which only reduced the total microbial count by 0.5 log. A comprehensive review on the potential applications of ozone treatments for fresh and ready-to-eat red meat products was prepared by researchers at Food Science Australia (MLA 2004).

Recently, researchers at Kansas State University in the US have combined ozone and ionization in a system to reduce pathogens in food processing plants. Essentially, the oxidizing gases are used to fumigate a room, but at levels that are safe and breathable. This research is not yet published.

Ozone is an oxidised form of oxygen and converts readily to ordinary oxygen so there are no residual chemicals generated. However, use of this chemical may elicit oxidation (increased rancidity) of fat and muscle pigments.

In Australia, ozone treatment is regarded as a processing aid in the Food Standards Code (FSANZ 2006) Standard 1.3.1, Clause 11. There are currently no restrictions on its use, save that good manufacturing practice (GMP) is followed. Ozone is approved for use in the US on all meat and poultry products in accordance with current industry standards of good manufacturing practice (21 CFR 173.368; FDA 2003).

The Ozone Safe Food website has a cost savings calculator to input data for your process. It is in $US however.

Hi Tech Pacific is the Australian distributor of Delzone™ (marketed by US company Del Ozone). Delzone is an ozone sanitation system that uses ozone-enriched cold water as an antimicrobial for final rinse, no residue surface sanitation of food-contact and non-food contact surfaces. A similar product is produced by the Australian company, Ozone Industries.

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