Ozonated Water

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| **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 is very unstable, and when exposed to air and water it rapidly decomposes to form ordinary oxygen. This means that ozone must be generated at the point of use. Ozone typically destroys microorganisms by attacking and oxidising the cellular walls and membranes. 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 Standard 1.3.1, Clause 11 (FSANZ, 2013). There are currently no restrictions on its use, through good manufacturing practice (GMP) must be followed. Ozone is also 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, 2013).

Gram-positive organisms are more sensitive to ozone than Gram-negative organisms, and bacteria are generally 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).

Ozone has been evaluated for its efficacy in reducing microbial numbers on meat carcasses and cuts. Only little effects were observed on microorganisms including E. coli. It was found that E. coli reduced by 1 log unit on beef samples when exposing to 72 ppm ozone (Cardenas et al., 2011). Similarly, ozone at 5 ppm also caused a 1-log reduction of E. coli O157:H7 on pork carcass (Rahman et al. 2013). Furthermore, researchers at Kansas State University in the US combined ozone and peroxide in a system and determined its effects on pathogen levels in food processing plants (Ortega et al., 2007). It was found that these oxidative gases reduced all target organisms by at least 90% after a 24 hour exposure on stainless steel surfaces.

In a study where ozonated water was used in a simulated hide washing system (Bosilevac et al., 2005), a 2.1-log reduction in the total aerobic count was observed on the hides, while washing hide with water alone only reduced the total microbial count by 0.5 log. This is in contrast to the study of Castillo et al. (2003). The results of that study indicated no difference in numbers of E. coli O157:H7 and S. Typhimurium on the surfaces of a hot carcass after exposure to water wash containing 95 ppm ozone compared to that of water on its own.
A comprehensive review on the potential applications of ozone treatments for fresh and ready-to-eat red meat products was prepared by researchers at CSIRO (MLA, 2004).

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References


