Aqueous Ozone

INTERVENTION SUMMARY	
Status	Available
Location	Packaging, raw meats, RTE, production surfaces, drains
Intervention type	Surface
Treatment time	> 30 s to Minutes
Regulations	GRAS, FDA approval as a food additive in contact with meat and poultry, FSANZ permitted processing aid and ingredient, bleaching agent and washing and peeling agent, EU standard for water treatment
Effectiveness	Variable on red meat carcasses As a disinfectant on surfaces aqueous ozone is more effective than chlorine based disinfectants
Likely cost	Startup cost of equipment, ongoing running costs are considered low
Value for money	Difficult to ascertain
Plant or process changes	Medium, new equipment can operate in-line
Environmental impact	Minimal, ozone decomposes to oxygen
OH&S	Symptoms may occur at 0.1 ppm exposure
Advantages	Breaks down without a residue, is generated on-site
Disadvantages or limitations	Ozone off-gassing may occur if not monitored, ozone interacts with rubber seals, pipes and other components

Aqueous Ozone

Ozone (O3) is a naturally occurring blue gas which is a triatomic allotrope of oxygen. It is characterised by a high oxidation potential that has bactericidal properties. Residual ozone decomposes to nontoxic products. Ozone was declared an active substance under the EU Biocidal Products Regulation No 528/2012 (BPR) starting as of September 1st, 2013 (1). The FDA has approved the use of ozone in the treatment, storage and processing of foods including meat and poultry (2).

Ozone-containing water is used to cleanse equipment surfaces for pre-operational and in-process sanitation, in-process antimicrobial product washing (casing soak, product spray), for post-lethality treatment (of cooked foods), and wash-down of drains to control growth of *Listeria monocytogenes* (3).

Aqueous ozone has been used to treat meat at 0.2ppm ozone for up to 60 min with storage up to 24 days. This treatment reduced the pH, thiobarbituric acid reactive substances, and acid value suggesting a level of improvement in chemical properties (4). When sprayed onto raw beef pieces aqueous ozone did not significantly reduce the level of pathogens or the level of aerobic bacteria compared to a tap water rinse (5). The use of aqueous ozone to reduce *E. coli* O157 or *Salmonella* on beef carcases was ineffective at 28 °C with 95 mg ozone per litre (6). In comparison a simulated hide washing system using aqueous ozone provided a 2 log reduction in aerobic count compared to the use of water alone (7).

Ready to eat meat products have been successfully treated for pathogen reduction with aqueous ozone. A reduction of 1 to 2.4 log of *L. monocytogenes* on ham, salami, meatloaf, natural casing weiners and skinless weiners, was recorded after treatment with 0.6 ppm ozone for 30 s (8). Other protein sources such as salmon fillets have demonstrated a reduction in *Listeria* counts as well as total aerobic counts after treatment with 1.5 mg/L ozone without significant increases in lipid oxidation levels (9).

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