### Chlorine Dioxide

<table>
<thead>
<tr>
<th>INTERVENTION SUMMARY</th>
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<tr>
<td><strong>Status</strong></td>
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<td><strong>Location</strong></td>
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<td><strong>Intervention type</strong></td>
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<td><strong>Treatment time</strong></td>
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| **Regulations** | Approved in the EU, US and Australia  
In Australia, chlorine dioxide may be used as a processing aid in meat production, providing that residual chlorine compounds cannot exceed 1 ppm in the final product |
| **Effectiveness** | Reported to be effective at levels above 50 ppm  
Levels above 200 ppm are needed to reduce pathogenic strains of *E. coli* |
| ** Likely cost** | Capital cost for spray cabinet and on-going cost for purchase of chemicals |
| **Value for money** | Reasonable to good |
| **Plant or process changes** | Space is required for installation of spray cabinet, though can modify and existing spray cabinet |
| **Environmental impact** | Rapidly neutralised, low environmental impact |
| **OH&S** | Appropriate ventilation around spray cabinet, safe handling of chemicals at point of generation |
| **Advantages** | Not corrosive at recommended concentrations  
Not affected by organic loading on product |
| **Disadvantages or limitations** | Full coverage of meat surface required |

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Chlorine Dioxide

Chlorine dioxide exists as an undissociated gas dissolved in water at near neutral pH range. It is an oxidising agent and could be used to inactivate bacteria and/or prevent further replication (bacteriostatic effect). Accordingly, chlorine dioxide has the potential application as an antimicrobial agent in ground meat and meat products, to reduce the risks associated with pathogenic bacteria and to extend the shelf life of the treated food. A major advantage of using chlorine dioxide over chlorine for disinfection is the decreased formation of organic disinfection by-products.

To date, several studies have investigated the efficacy of chlorine dioxide in reducing pathogens. Yoder et al. (2012) demonstrated that chlorine dioxide at 100 or 540 ppm achieved a significant reduction of S. Typhimurium (up to 3.25 log cfu/cm²), E. coli O157:H7 (up to 4.36 log cfu/cm²) and Campylobacter spp. (up to 4.57 log cfu/cm²) on inoculated beef plates. However, it has been reported that 200 ppm chlorine dioxide only reduced E. coli and S. Typhimurium by 0.71 and 0.61 log cfu/g, respectively, in ground beef (Stivarius et al., 2002). A similar reduction in E. coli populations on beef trimmings was observed when chlorine dioxide (at 200 ppm) was used in conjunction with 10% trisodium phosphate (0.61 log cfu/g) (Pohlman et al., 2002a) or 0.5% cetylpyridinium chloride (1.13 log cfu/g) (Pohlman et al., 2002b). It has also been reported previously that the use of chlorine dioxide as a spray wash (520 kPa, 16°C, 10 s) to decontaminate beef carcass surfaces at up to 20 ppm was as effective as water washing (Cutter and Dorsa, 1995). These reported reductions, although statistically significant in the studies performed, are likely in practice not to be significant under commercial conditions.

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References


