Chlorine

INTERVENTION SUMMARY	
Status	Currently Available
Location	Post slaughter
Intervention type	Surface treatment
Treatment time	10-15 seconds
Regulations	Approved at levels complying to that of potable water – maximum permitted level is 10ppm (mg/kg) in Australia and the EU; in the USA it is permitted at 20-50ppm
Effectiveness	Not effective at 10ppm
Likely Cost	No cost if used water already treated by municipality
Value for money	Not recommended as a specific food safety intervention
Plant or process changes	Spray cabinet required
Environmental impact	Rapidly neutralised, few environmental issues
OH&S	Potential to produce toxic byproducts Chlorine gas is toxic Secure storage of concentrate is required
Advantages	All plants have ready access to chlorinated water and most have chlorination equipment to vary chlorine strength
Disadvantages or Limitations	Neutralised by high organic loads

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Chlorine was one of the first chemical treatments to be used for carcass decontamination in the beef industry, and good reductions in microbial count have been achieved using water chlorinated at 200-500ppm. Unfortunately, such high levels of chlorine are not permitted in the food industry, and lower concentrations are not effective.

Water chlorinated to 200 ppm gave 1.5-2.3 log reductions in total aerobic bacteria on beef carcasses (Kotula *et al*. 1974), but the effects of carcass treatment with solutions of up to 250 ppm chlorine have been variable, with some very poor reductions being reported. For example, Cutter and Siragusa (1995a) reported that sprays of 50, 100, 250, 500, and 900 ppm chlorine were only slightly effective (<1 log reduction in most cases) in reducing two strains of *E. coli* that had attached to the surface of beef carcasses and lean fat tissue. Chlorine at 20-50 ppm was included in a list of approved antimicrobial treatments by FSIS in 1995, but levels above 10ppm are prohibited in Australia and the EU. Approval would be required if levels above 10ppm were to be used.

One of the main disadvantages of chlorine is that it is rapidly neutralised by large amounts of organic matter. Therefore, it cannot be effective as a hide intervention because of the large amounts of organic material often attached to hides.

Free chlorine gas, which is used to chlorinate water, is toxic, and chlorine can react with organic compounds to form trihalomethanes (THM) which are carcinogenic compounds (Boorman *et al.* 1999; Richardson 2003). THMs are a group of four chemicals that are formed along with other disinfection by-products when chlorine or other disinfectants react with naturally occurring organic and inorganic matter in water. The trihalomethanes are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The use of high chlorine levels is not acceptable to EU markets

References

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