Cetylpyridinium Chloride (CPC)

INTERVENTION SUMMARY	
Status	An Emerging Technology
Location	Post slaughter – hide-on
Intervention type	Surface treatment of hide
Treatment time	10-30 seconds
Regulations	Not yet approved
Effectiveness	1.5-5 log
Likely Cost	To set up water supply, pumps, chemical storage and effluent treatment for a plant of 500 head per day would be hundreds of thousands of dollars
Value for money	Other technologies likely to be more effective if applied after hide removal.
Plant or process changes	Significant space would be needed for installation of baths or cleaning units
Environmental impact	Production of water effluent and chemicals. Large amounts of water and energy would be required
OH&S issues	Concentrate would need to be properly stored and handled Concentrate may be irritant
Advantages	Reduces visible soil entering the process Cleaner skins allows slaughter personnel to keep their hands and tools cleaner A freshly washed hide may have less loose hairs
Disadvantages or Limitations	Residues may remain if applied directly to meat surface Could stress animals if applied to the live animal, which would result in tougher meat (DFD).

Cetylpyridinium Chloride (CPC)

Cetylpyridinium chloride is a quaternary ammonium compound and is the active chemical in some human mouthwashes on the market. The antimicrobial activity is due to an interaction of basic cetylpyridinium ions with acidic molecules on bacteria, which subsequently inhibits bacterial metabolism by forming weak ionic compounds that interfere with bacterial respiration.

CPC has been shown to be effective for poultry washes at concentrations of 0.5%, giving reductions of up to 2.5 log in *Salmonella* Typhimurium levels, and also reducing cross-contamination (Kim and Slavik 1996). Research by Ransom *et al*. (2003) and Cutter *et al*. (2000) showed that spray-washing of beef fat with a solution of 1% CPC immediately reduced inoculum levels of *E. coli* O157:H7 and *Salmonella* Typhimurium to virtually undetectable levels, from 5-6 log cfu/cm² initial counts. Unfortunately, residual CPC levels after treatment were considered excessive for human consumption. A 0.5% CPC solution has also been trialled for use as an antimicrobial treatment applied to beef trimmings before grinding. Microbial reductions were less than 1 log and there was improved colour during simulated retail display without negatively impacting sensory odour characteristics (Pohlman *et al*. 2002). CPC has also been found to be very effective (almost 5 log microbial reduction after 24 hours) under conditions that simulated the spray-chilling process of beef carcasses (Stopforth *et al.* 2004).

CPC has also been proposed as a hide intervention to be used after stunning and before hide removal. Bosilevac *et al*. (2004a) tested the potential of a combined water wash and 1% CPC treatment under conditions simulating a hide-wash cabinet. Total aerobic bacteria were reduced by 1.5 log on pre-evisceration carcasses. There was no detectable CPC transfer to the chilled carcasses.

CPC is approved for use in the US to treat the surface of raw poultry carcasses prior to immersion in a chiller (21 CFR 173.375: FDA 2003). CPC has yet to receive approval for use in the US and the EU on beef carcasses. It may first get approval as a hide intervention treatment prior to slaughter.

CPC is marketed to the US poultry industry as Cecure™ by Safe Food Corporation.

Proponent/Supplier Information

Safe Food Corporation

4801 North Shore Drive

North Little Rock AR 72118

Phone: 501.758.8500

E-Mail: SafeFoods@SafeFoods.net
Website: http://www.cecure.com/home/home.htm

References

Bosilevac, J. M., Arthur, T. M., Wheeler, T. L., Shackelford, S. D., Rossman, M., Reagan, J. O., Koohmaraie, M. (2004a) Prevalence of *Escherichia coli* O157 and levels of aerobic bacteria and *Enterobacteriaceae* are reduced when hides are washed and treated with cetylpyridinium chloride at a commercial beef processing plant. Journal of Food Protection **67**: 646-650.

Cutter, C. N., Dorsa, W. J., Handie, A., Rodriguez-Morales, S., Zhou, X., Breen, P. J., Compadre, C. M. (2000) Antimicrobial activity of cetylpyridinium chloride washes against pathogenic bacteria on beef surfaces. Journal of Food Protection **63**: 593-600.

FDA (2003) Code of Federal Regulations Title 21, Government Printing Office, USA

Kim, J. W., Slavic, M. F. (1996) Cetylpyridinium Chloride (CPC) treatment on poultry skin to reduce attached *Salmonella*. Journal of Food Protection **59**: 322-326.

Pohlman, F. W., Stivarius, M. R., McElyea, K. S., Waldroup, A. L. (2002) Reduction of *E. coli*, *Salmonella typhimurium*, coliforms, aerobic bacteria, and improvement of ground beef color using trisodium phosphate or cetylpyridinium chloride before grinding. Meat Science **60**: 349-356.

Ransom, J. R., Belk, K. E., Sofos, J. N., Stopforth, J. D. Scanga, J. A., Smith, G. C. (2003) Comparison of intervention technologies for reducing *Escherichia coli* O157:H7 on beef cuts and trimmings. Food Protection Trends **23**: 24-34.

Stopforth, J. D., Yoon, Y., Belk, K. E., Scanga, J. A., Kendall, P. A., Smith, G. C., Sofos, J. N. (2004) Effect of simulated spray chilling with chemical solutions on acid-habituated and non-acid-habituated *Escherichia coli* O157:H7 cells attached to beef carcass tissue. Journal of Food Protection **67**: 2099-2106.