

## Peroxy Acids

INTERVENTION SUMMARY	
<b>Status</b>	Currently Available
<b>Location</b>	Post slaughter
<b>Intervention type</b>	Surface treatment – usually spray application
<b>Treatment time</b>	10-30 seconds
<b>Regulations</b>	Approved in US, Australia, prohibited in the EU
<b>Effectiveness</b>	1-1.5 logs
<b>Likely Cost</b>	Upfront cost for a cabinet to apply solution, on-going costs are inexpensive, estimated cost for solution is 8¢ per beef carcass
<b>Value for money</b>	Literature does not support significant reductions
<b>Plant or process changes</b>	Spray cabinet is required
<b>Environmental impact</b>	Effluent must be treated
<b>OH&amp;S</b>	Peroxyacetic acid is an irritant Secure storage and safe handling of the undiluted chemical is required Risk of inhalation
<b>Advantages</b>	Inexpensive
<b>Disadvantages or Limitations</b>	Possible discolouration of the lean if used at high concentrations Possible residual compounds and fat oxidation depending on the concentration applied Requires refrigerated storage

## Peroxy Acids

Peroxyacetic acid functions as an oxidiser and is mainly used as a carcass wash in commercial beef processing plants. Inspexx™ is a 0.02% peroxy acid solution marketed by EcoLab for reducing microbial contamination on processed red meat surfaces. As with other chemicals, there are opportunities for application at the appropriate concentration during spray chilling of carcasses, assuming no unacceptable residues remain on the product (Stopforth 2004).

Under laboratory conditions, researchers have achieved 1.0-1.4 log reductions in *E. coli* O157:H7 inoculated onto beef carcass tissue (Ransom *et al.* 2003). In a commercial trial, the effect of a solution of 0.02% peroxyacetic acid on chilled beef quarters was investigated at two slaughtering plants (Gill and Badoni 2004). These researchers found little effect on total bacteria or *E. coli* on meat from one of the plants, and no effect in the other plant; a solution of 2 or 4% lactic acid was found to be more effective. A study by King *et al.* (2005) noted that peroxyacetic acid at concentrations up to three times the approved levels results in only minimal reductions on chilled beef carcasses (<0.2 log of *E. coli* O157:H7 and *Salmonella* Typhimurium); however, reductions on hot carcass surfaces were marginally better (0.7 log). It was recommended that processors conduct their own in-plant validations for their particular process to ensure its efficacy as an intervention treatment.

Peroxyacetic acid (an equilibrium mix of peroxyacetic acid, octanoic acid, acetic acid, hydrogen peroxide, peroxyoctanoic acid, and 1-hydroxyethylidene-1,1-diphosphonic acid) is approved by FSIS for use on beef carcasses (21 CFR 173.368; FDA 2003). Peroxyacetic acid is not permitted under EU regulations. Peroxyacetic acid requires proper handling such as storage in a cool, well-ventilated area. The approximate cost per beef or pig carcass is indicated in the table below

**Table 1: Approximate costs for organic acid spray in beef/pork processing plants (A\$, adapted from Reynolds, 2005)**

	List price (200 litres)	Cost per unit (ml)	Cost per litre of solution	Cost per carcass*
Peroxyacetic Acid 200 ppm = 2 ml + 1 litre H <sub>2</sub> O	\$1,336.10	0.7¢	1.4¢	1.2¢ (pig) 3¢ (beef)

\* 8 litres of peroxyacetic acid (180-200 ppm) will treat approximately 10 pigs or 5 beef carcasses.

## Proponent/Supplier Information

Peroxyacetic acid (non-patented formula) can be purchased from food-grade chemical suppliers such as Swift Australia.

### Swift Australia (Head Office)

1<sup>st</sup> Floor, 372 Wellington Rd

Mulgrave, VIC 3170.

Ph: 03 8544 3100

Fax. 03 8544 3299

Website: <http://www.swiftco.com.au>

The peroxyacetic-based process approved in the US (21 CFR 173.370) as mentioned earlier is approved for washing, rinsing, cooling, or otherwise processing fresh beef carcasses. The compound mixture must be no more than 0.022% peroxyacetic acid and 0.0075% hydrogen peroxide delivered at a maximum pressure of 1724 kPa and maximum temperature of 50°C (Inspexx 200, Ecolab, St. Paul, Minnesota). The supplier in Australia is:

### EcoLab Australia

6 Hudson Avenue

Castle Hill 2154 NSW

Ph: 61-2-9680-5444

Website: <http://www.ecolab.com>

Brand: Inspexx 100

## References

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

Gill, C. O., Badoni, M. (2004) Effects of peroxyacetic acid, acidified sodium chlorite or lactic acid solutions on the microflora of chilled beef carcasses. International Journal of Food Microbiology **91**: 43-50.

King, D. A., Lucia, L. M., Castillo, A., Acuff, G. R., Harris, K. B., Savell, J. W. (2005) Evaluation of peroxyacetic acid as a post-chilling intervention for control of *Escherichia coli* O157:H7 and *Salmonella* Typhimurium on beef carcass surfaces. Meat Science **69**: 401-407.



## Meat Industry Services

Supported by:



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.

Reynolds, A. E. (2005) Utilisation of spray wash with organic acids (peroxyacetic acid and lactic acid) and chlorinated wash in combination, utilizing direct application methods, for pathogen reduction on pork and beef carcasses in small and very small meat processing plants. Research Note: FSIS New Food Safety Technologies Applicable for Small and Very Small Plants.

[http://www.fsis.usda.gov/PDF/New\\_Technology\\_C29\\_Summary\\_FY2003.pdf](http://www.fsis.usda.gov/PDF/New_Technology_C29_Summary_FY2003.pdf)

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.