

Steam Vacuum

TECHNOLOGY SUMMARY	
Status	Currently available
Location	Post slaughter
Intervention type	Spot treatment
Treatment time	5 seconds
Effectiveness	Good results if used correctly
Regulations	Approved in the US and Australia, achieving acceptance in the EU
Likely cost	A\$100,000+
Value for money	Fair to good
Plant or process changes	Requires personnel to operate Can be included in most existing configurations
Environmental impact	Energy is required, and water to produce steam Small amounts of liquid effluent are produced
OH&S	Although steam is produced, the risk of scalding is low. Manual handling training may be required to prevent repetitive strain injuries
Advantages	Less expensive than most interventions Can be directed at visibly contaminated areas Possible robotic installations in the future
Disadvantages or limitations	Condensation may be an issue if area not well ventilated. Some bleaching of meat surface but not permanent discolouration

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Steam Vacuum

Steam vacuum uses steam and/or hot water to loosen soil and kill bacteria, followed by application of a vacuum to remove contaminants. The effectiveness of steam vacuum depends on employee diligence of application and the operational status of the equipment. It is only useful when applied to specific areas of the carcass that are visibly contaminated, i.e. it is not conceivable to 'vacuum' the whole carcass.

Steam vacuum systems are used in Australia for removal of wool fibres and wool dust from sheep carcasses however they are used infrequently as interventions for beef sides. AQIS Meat Notice 98/1 states that the unit must be used for localised 'spot' treatment only and should be applied to a particular area of the carcass surface for a five-second contact time.

The equipment is a hand-held device consisting of a vacuum wand with a hot spray nozzle, delivering water at 88-94°C to the carcass surface under pressure, while simultaneously vacuuming the area. The technique has previously shown reduce the aerobic plate count by 3 log (6.2 log cfu/cm² to 3.2 log cfu/cm²), total coliform count by 4.0 log (5.0 log cfu/cm² to 1.0 log cfu/cm²) and *E. coli* count by 4.0 log (4.8 log cfu/cm² to 0.8 log cfu/cm²) on artificially inoculated beef short plates (Dorsa *et al.*, 1996a; 1996b). Similarly, other researchers have found aerobic plate counts and total coliform counts to be reduced by 1.1-2.3 log and 1.2-2.2 log respectively using two different hot water/steam vacuum systems, (Kochevar *et al.* 1997). Some bleaching of the carcass surface was noticed using the system, but this was not a permanent discolouration. Further trials have also shown steam vacuum to be very effective at reducing the number of *E. coli* O157:H7 on beef (Dorsa *et al.*, 1996a).

Steam vacuum has gained wide acceptance by the US industry as an effective tool for spot treatment on the slaughter floor prior to final inspection and chilling (Huffman, 2002), and is approved by USDA-FSIS as a substitute for knife trimming for removal of faecal and ingesta contamination where spots are <2.54 cm diameter (Huffman, 2002). It is applied prior to chilling; trials on use after chilling failed to remove artificially inoculated *Salmonella* organisms, possibly because the organisms had been allowed time, during chilling, to become firmly attached to the surface and form biofilms (Bacon *et al.*, 2002). The Danish Meat Research Institute has modified the hand-held suction head to improve the functionality and reduce the weight to 300 g (Tarp, 2006). In order to reduce the cost of equipment for small and very small plants, Trivedi, *et al.* (2007) demonstrated that a household steam cleaning system could be effective in reducing bacterial numbers on beef and pig carcasses. Gill (2009) has suggested that steam vacuum will only lead a reduction in bacterial load where it is associated with visible contamination. However, as there is not necessarily a relationship between visible and microbiological contamination, sites which are contaminated microbiologically, but not visibly, are unlikely to be treated by the machine operator.

Proponent/Supplier Information

Jarvis ANZ Pty Ltd

6 Rosa Place

Richlands

QLD 4077, Australia

Ph: 07 3375 3444

Fax: 07 3375 3533

Email: sales@jarvisanz.com.au

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

Kentmaster Equipment (Aust) Pty Ltd

Unit 2, 24 Central Court

P.O. Box 420, Browns Plains

QLD 4118, Australia

Ph: 07 3806 8400

Fax: 07 3806 7933

Email: Australia@Kentmaster.com;

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

References

Bacon, R. T., Sofos, J. N., Belk, K. E., Smith, G. C. (2002) Application of a commercial steam vacuum unit to reduce inoculated Salmonella on chilled fresh beef adipose tissue. Dairy, Food and Environmental Sanitation **22**: 184-190.

Dorsa, W. J., Cutter, C. N., Siragusa, G. R. (1996a) Effectiveness of a steam-vacuum sanitiser for reducing *Escherichia coli* O157:H7 inoculated to beef carcass surface tissue. Letters in Applied Microbiology **23**: 61-63.

Dorsa, W. J., Cutter, C. N., Siragusa, G. R., Koohmaraie, M. (1996b) Microbial decontamination of beef and sheep carcasses by steam, hot water spray washes, and a steam vacuum sanitizer. Journal of Food Protection **59**: 127-135.

Gill, C. O., (2009) Effects on the microbiological condition of product of decontaminating treatments routinely applied to carcasses at beef packing plants. Journal of Food Protection **72**: 1790–1801

Huffman, R. D. (2002) Current and future technologies for the decontamination of carcasses and fresh meat. Meat Science **62**: 285-294.

Kochevar, S. L., Sofos, J. N., Bolin, R. R., Reagan, J. O., Smith, G. C. (1997) Steam-vacuuming as a pre-evisceration intervention to decontaminate beef carcasses. Journal of Food Protection **60**: 107-113.

Tarp, C. (2006) Steam suction for food safety. Fleischwirtschaft International **2**: 24-25.

Trivedi, S., Reynolds, A.E., Chen, J. (2007) use of a commercial household steam cleaning system to decontaminate beef and hog carcasses processed by four small or very small meat processing plants in Georgia. Journal of Food Protection **70**: 635-640.