

76. Comparing the effect of disinfectants on pork abattoir surface hygiene after sanitation

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Introduction: Pork abattoirs and boning rooms in Australia may operate on either a single or two shift basis. Jolley et al., (2019) have shown that microbiological build up in boning room equipment over a shift can have a negative impact on product shelf-life and quality. In operations with multiple shifts per day, it is impossible to do a full facility clean between shifts, therefore the role of surface disinfectants, post cleaning and sanitation, during shifts are extremely important in minimising microbiological build up. Most commercially available surface disinfectants are quaternary ammonium cation based like alkyl dimethyl benzyl ammonium chloride. Whilst use of these disinfectants is widespread, it does pose some issues including equipment corrosion, skin irritation and the need to be rinsed off post sanitation. The increasing availability of non-quaternary ammonium-based disinfectants suitable for large scale commercial use has seen their increased adoption. The aim of this study was to compare the effect of a quaternary ammonium disinfectant with that of a disinfectant based on naturally occurring active ingredients, commonly found in food, on the microbiological build up on pork boning equipment during normal daily operation.

Material and methods: Two surface disinfectants were compared in this study (i) Control disinfectant (quaternary ammonium, Supreme, Integra Water Treatment Solutions, Miranda, NSW) and (ii) Test disinfectant (non-quaternary, DoxallTM, Wintermute Biomedical Australia, Scoresby, VIC). The surface disinfectants were applied to a static table (Replicate 1) and leg, shoulder and middle boning room conveyor belt equipment (Replicate 2,3 and 4) in a commercial facility. Application of the surface disinfectants occurred as per the manufacturers' application rates prior to the commencement of the first boning shift and in

between the first and second boning shifts. The application area for the two disinfectants were clearly demarcated and the conveyors were marked to identify the two test areas. Surface swabs (10cm², Q-SwabTM, Hygiene, Camarillo, CA, USA) for total viable count (TVC, reported as CFU/cm²) were conducted prior to the application of the surface disinfectant, pre-first shift and then after the second shift (Replicate 1 - 5 pre-shift and 5 post-second shift swabs; Replicate 2, 3 and 4 - 6 pre-shift and 6 post-second shift swabs per replicate). Each replicate was conducted on separate days. The surface swabs for TVC were plated on Petrifilm Plates (3MTM, St. Paul, MN, USA). Incubation temperature and period for the TVC film was 30 °C for 48 h. TVC data from the post-second shift swabs were compared using the non-parametric Mann-Whitney *U* test, due to non-normal distribution as determined by D'Agostino-Pearson normality test (Prism, GraphPad Software, San Diego, CA, USA).

Results: TVC values from Replicate 1 showed a non-significant trend with control mean at 14.25 CFU/cm² and test disinfectant with 4.83 CFU/cm² (2.95 fold decrease from control). There were no significant differences for Replicates 2 and 3, whilst the TVC values from Replicate 4 showed a non-significant trend with the control mean 28.7 CFU/cm² and test mean 13.6 CFU/cm² (2.1 fold decrease from control). When the data was combined, the test disinfectant significantly reduced TVC compared to control disinfectant ($P = 0.039$). (Figure 1).

Conclusion and implications: Results from this study indicate that the non-quaternary ammonium based disinfectant outperformed the quaternary ammonium based disinfectant and had a lower microbiological build up on pork boning equipment. The lower microbiological build up on pork boning equipment and some of the issues when using quaternary ammonium-based disinfectants supports the shift to non-quaternary ammonium based disinfectants in pork processing facilities.

References

Jolley, J., Kiermeier, A., & Sumner, J. (2019). *Process monitoring for the Australian meat industry – A Comparative Industry Trial, Project No 2018–1070*.

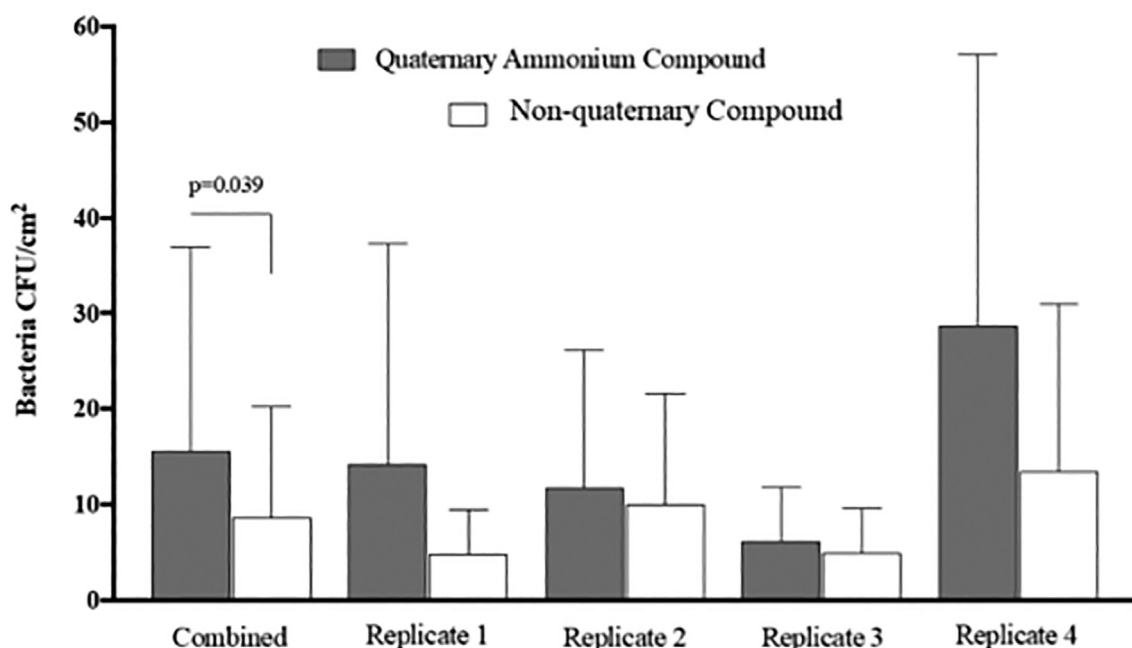


Figure 1. Total viable count (TVC) of pork boning room surfaces disinfected with control, quaternary ammonium based, or test, non-quaternary ammonium disinfectant. Combined and Replicate 1 to 4 (left to right).