

Research Notes

Arm & Hammer Animal and Food Production



Efficacy of PorciBrom when used in a pork harvest intervention system.

STUDY OVERVIEW

This study¹ was conducted to evaluate the efficacy of PorciBrom™, also known as DBDMH (1,3-dibromo-5,5-dimethylhydantoin), in reducing inoculated populations of non-pathogenic *Escherichia coli* biotype I as well as natural microflora on pork carcasses.

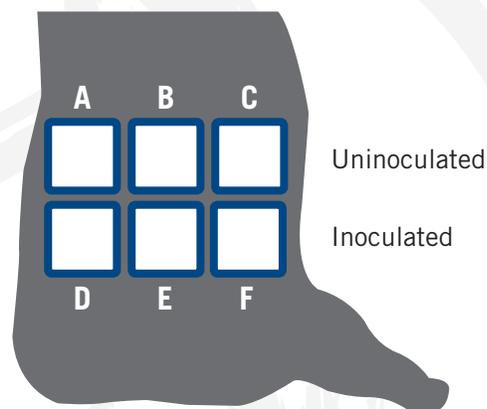
In a commercial facility, carcasses were inoculated on the rail with a mixture of five non-pathogenic *E. coli* biotype I strains, serving as surrogates for pathogenic *Escherichia coli* and *Salmonella enterica*. The external carcass surface was inoculated in three zones (D, E, F, Fig. 1), while the remaining three zones (A, B, C, Fig. 1) stayed uninoculated to test the efficacy of PorciBrom interventions against carcasses' natural microflora.

The efficacy of PorciBrom at a target concentration of 250 ppm was evaluated in carcass wash, as well as in a whole intervention system that included the carcass wash followed by a PorciBrom spray chill system, also at a target concentration of 250 ppm.

Pre-treatment samples were collected from Zones A and D prior to application of PorciBrom. Post-treatment samples were collected from Zones B and E after application of PorciBrom in the carcass wash cabinet. Post-whole system samples were collected from Zones C and F after PorciBrom was applied in the spray chill system.

Samples were collected and analyzed for bacterial counts (n=40 per sampling site, Zones A-F). Samples from inoculated zones were analyzed for *Enterobacteriaceae* (EB) counts (N=120), while samples from uninoculated zones were analyzed for EB counts (N=120) and aerobic plate counts (APC; N=120). Bacterial counts before treatment, after carcass wash, and after whole intervention system were statistically analyzed and compared.

FIGURE 1: Location of inoculated and uninoculated zones for each pork carcass side.



RESULTS

Of the surrogate-inoculated zones (Table 1), application of PorciBrom™ in the carcass wash cabinet reduced ($P<0.05$) inoculated EB populations to 4.8 log CFU/cm², compared to the 6.1 log CFU/cm² population initially obtained. Application of PorciBrom in the spray chill further reduced ($P<0.05$) inoculated EB populations to 3.7 log CFU/cm². The whole intervention system (carcass wash followed by spray chill) provided a 2.4 log CFU/cm² reduction of the inoculated surrogate populations compared to the control.

| Pre-Treatment Control | Post-Carcass Wash | Post-Carcass Wash and Spray Chill |
|------------------------|------------------------|-----------------------------------|
| 6.1 ± 0.3 ^a | 4.8 ± 0.4 ^b | 3.7 ± 0.3 ^c |

^{a,b,c} LSM means with different superscript letters within the row are different ($P<0.05$).

While initial EB counts for uninoculated samples were too low to clearly differentiate between pretreatment control and the whole system, samples from uninoculated zones all had detectable APC (Table 2). An initial APC of 3.0 log CFU/cm² was collected. After application of PorciBrom in the carcass wash, the APC was reduced ($P<0.05$) to 2.4 log CFU/cm². The APC was reduced further ($P<0.05$) to 1.5 log CFU/cm² after application of PorciBrom in the spray chill. The whole intervention system reduced ($P<0.05$) APC on uninoculated zones by 1.5 log CFU/cm².

| Bacterial Count Type | Pre-Treatment Control | | Post-Carcass Wash | | Post-Carcass Wash and Spray Chill | |
|----------------------|-------------------------|-------|-------------------------|-------|-----------------------------------|-------|
| | Mean ± SD | % BDL | Mean ± SD | % BDL | Mean ± SD | % BDL |
| APC | 3.0 ± 0.6 ^a | 0 | 2.4 ± 0.7 ^b | 0 | 1.5 ± 0.7 ^c | 0 |
| EB | <0.4 ± 0.7 ^b | 30.0 | <1.4 ± 1.0 ^a | 12.5 | <0.0 ± 0.4 ^b | 32.5 |

^{a,b,c} LSM means with different superscript letters within the row are different ($P<0.05$).

Means with a less than symbol (<) indicate at least one sample had counts that were below the microbial analysis detection limit (< -0.3 log CFU/cm²).

% BDL: indicates the percent of samples with counts that were below the analysis detection limit (< -0.3 log CFU/cm²).

CONCLUSIONS

- In this investigation, PorciBrom significantly reduced surrogate *E. coli* organisms in commercial processing conditions.
- Application of PorciBrom was effective in reducing aerobic microbial populations on pork carcasses in this study.
- PorciBrom may be considered a viable food safety intervention to support the reduction of foodborne pathogens in pork.



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1 Davis HE, González SV, Geornaras I, Delmore RJ. Validation of the Use of 1,3-Dibromo-5,5-Dimethylhydantoin (PorciBrom) in a Pork Harvest Intervention System. Center for Meat Safety & Quality, Department of Animal Sciences, Colorado State Univ. 2019. Data on file.

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