

In-plant Validation of the Efficacy of Lactic Acid as Antimicrobial Intervention on Beef Heads and Variety Meats

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Introduction

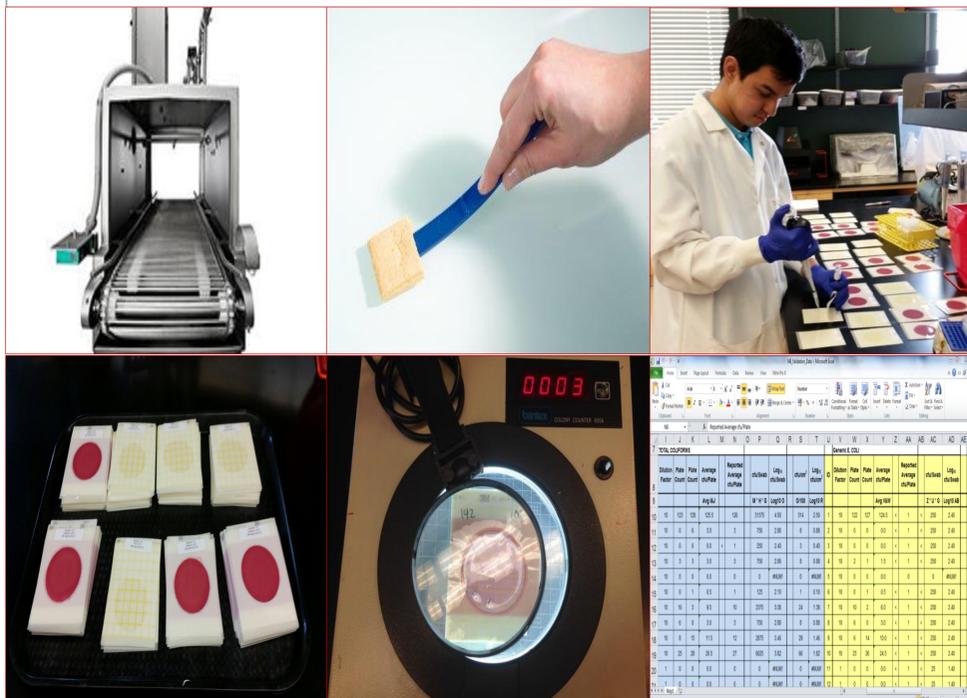
- The use of organic acids to decontaminate beef carcasses and cuts has been shown to be effective in reducing the presence of pathogenic bacteria, such as *Salmonella* and *E. coli* O157:H7 (2). Lactic acid has become the most commonly used organic acid for antimicrobial treatment of beef carcasses (1).
- Studies have demonstrated a substantial reduction of indicator microorganisms and *E. coli* O157:H7 when the tissues are sprayed or dipped in a lactic acid solution at concentrations between 2 to 5% (2, 4).
- The beef industry has many interventions in place to control pathogens on carcasses and cuts; however very few interventions to reduce the contamination in variety meats are currently available (3).

Objective

- To determine the efficacy of lactic acid as antimicrobial intervention on beef heads and variety meats, including livers and hearts.

Materials and Methods

Heads, livers, and hearts were randomly swabbed at the beginning of the shift, midday, and end of the shift at a beef processing facility. The samples underwent microbiological analysis consisting of Total Aerobic Plate Counts (APC), generic *E. coli*, and coliforms, with the aim of determining the reduction of these microorganisms after treatment with lactic acid spray.



Results

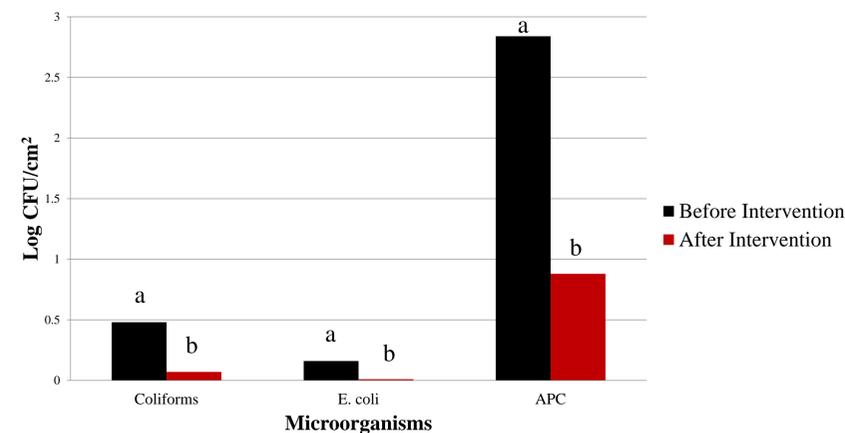


Figure 1. Microbial counts on beef heads before and after treatments

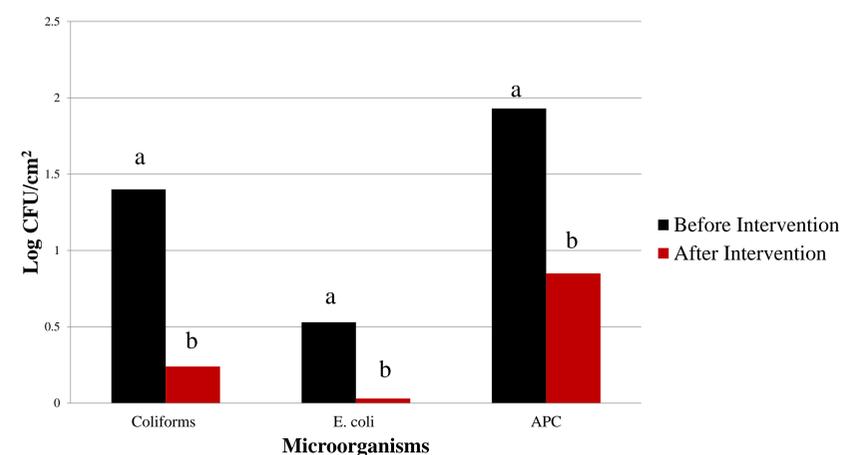


Figure 2. Microbial counts on beef livers before and after treatments

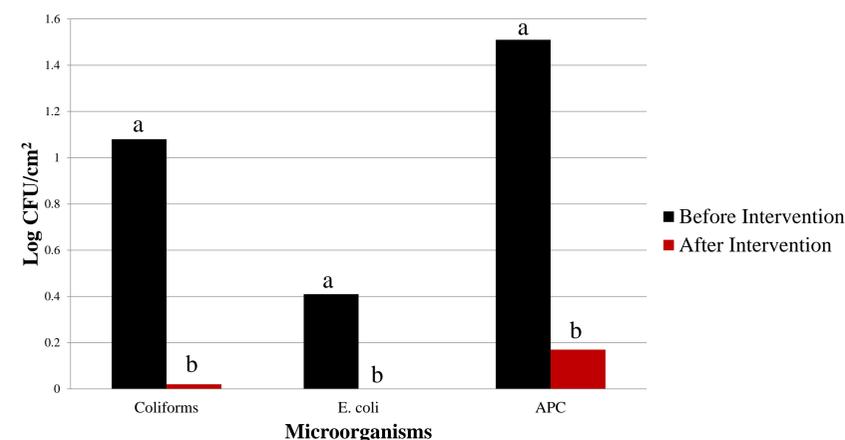


Figure 3. Microbial counts on beef hearts before and after treatments

For **beef heads**, treatment using 2 to 5% of lactic acid concentration significantly ($p < 0.05$) reduces *E. coli*, coliforms and total aerobic plate counts (Figure 1). The coliforms were reduced by 0.41 log cycles. Likewise, generic *E. coli* was reduced by more than 0.15 log cycles. The total aerobic counts were reduced even further by more than 1.96 log cycles.

For **beef livers**, as seen in Figure 2, the total coliforms count, *E. coli*, and total aerobic plate counts were significantly ($p < 0.05$) reduced after the intervention. The total coliforms were reduced by more than 1.16 log cycles whereas generic *E. coli* and total aerobic counts were reduced by 0.5 and 1.08 log cycles, respectively in the livers.

In **beef hearts**, the treatment showed a significant ($p < 0.05$) reduction in the total coliforms count, *E. coli*, and total aerobic plate counts after the intervention (Figure 3). The total coliforms were reduced by 1.06 log cycles, whereas generic *E. coli* counts were reduced by 0.41 log cycles. Likewise, total aerobic counts were reduced by more than 1.3 log cycles after treatment application.

Conclusion

The lactic acid intervention was effective in reducing total microorganisms and microbial indicators in beef heads, livers and hearts. The results show that the treatment can reduce up to 1.95 log cycles of the indicator microorganisms used by the industry to assess intervention control. Additionally, this treatment could improve the safety of the products tested as previous studies have shown a lactic acid wash to be effective against *E. coli* O157:H7 and *Salmonella*. These results are useful to support the use of a lactic acid intervention to reduce the presence of microorganisms on the products tested.

References

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