ABSTRACT

The presence of Campylobacter on poultry products remains one of the leading causes for foodborne illness. The reduction in the use of antibiotics in animal agriculture has increased the need for alternative forms of improving food safety. The use of lactic acid bacteria (LAB) as a bio-preservative/protective culture in food commodities is an ancient technology that is safe and natural. In this study, 13 Lactobacillus spp. isolates were screened by a chicken skin dipping model to evaluate the potential to reduce Campylobacter counts. From this screening assay, 4 isolates (isolates 1-4) which produced >1 log reduction in Campylobacter counts were chosen for further evaluation in a chicken wingette model. In replicate trials, chicken wingettes were inoculated with C. jejuni (~7 Log CFU/mL) and treated with either a Lactobacillus broth culture or a BPD control (n=5 samples/treatment). Campylobacter counts were determined at 0, 1, 3, 5 or 7 days post treatment. Campylobacter counts were log_{10} transformed and data were analyzed using ANOVA with the PROC MIXED procedure of SAS. Isolates 2 or 4 were the most effective and consistently reduced Campylobacter counts from day 1 through day 7 (P<0.05). In follow-up studies, isolates 2 and 4 were subjected to additional testing aimed at assessing potential synergistic activity between the Lactobacillus isolates and their combination with a 2% chitosan (CH) solution. Each isolate by themselves, CH or their combination significantly reduced Campylobacter counts (~1-2.5 log reduction) from day 1 through 7. The combination of isolates+CH reduced Campylobacter counts on wingettes, but this treatment did not demonstrate any additional reduction compared to each individual treatment alone. Our studies demonstrate the potential use of CH or Lactobacillus isolates as a protective culture to reduce Campylobacter counts on raw poultry.

RESULTS

The ability of selected Lactobacillus spp. isolates to reduce Campylobacter counts on chicken wingettes (Trials 1 and 2) *

### DISCUSSION

Despite a plethora of postharvest interventions, Campylobacter remains a persistent contaminant on raw poultry products. A potential strategy for reducing this pathogen is by the treatment of raw poultry products with protective cultures. In the first two trials a chicken skin dipping model was utilized to screen 13 Lactobacillus isolates with previously demonstrated anti-Campylobacter activity. From this screening 4 isolates which produced greater than a 1 log reduction in Campylobacter counts were chosen for further evaluation in a chicken wingette model. The chicken wingette model was used to more closely resemble the heterogeneous nature of the skin on a chicken carcass and in addition, the treatment exposure time of 30 seconds more closely approximates a realistic exposure time in terms of integrating the coating treatment with intervention strategies already in place within the processing plant. The testing of 4 select Lactobacillus isolates has demonstrated the effectiveness of using specific lactic acid bacterial cultures as a protective culture to reduce C. jejuni. In an attempt to improve upon the efficacy of the cultures, selected Lactobacillus isolates were combined with a 2% chitosan solution and applied as a coating on the wingettes. From these trials we observed that both the isolates or chitosan treatments significantly reduced Campylobacter levels continuously through day 7 (1-2 log reduction). However, combination of isolates with chitosan did not demonstrate any additive or synergistic effect.

CONCLUSIONS

We have identified 2 LAB isolates, which consistently reduced the number of Campylobacter on wingettes and show potential to be used as a protective culture on raw poultry meat. Either Lactobacillus isolates or chitosan treatment can significantly reduce Campylobacter on chicken parts (1 to 2 log reduction). Use of these natural products could be part of a multifaceted approach to reduce Campylobacter counts in poultry and the incidence of this disease in humans.

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