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Logo Design
Ruth Cronje, and Jan Swanson;
based on the original design by Dr. Robert Dunlop

Solubilization and bactericidal activity of diphenyliodonium chloride from an experimental bypass product following exposure to different pH

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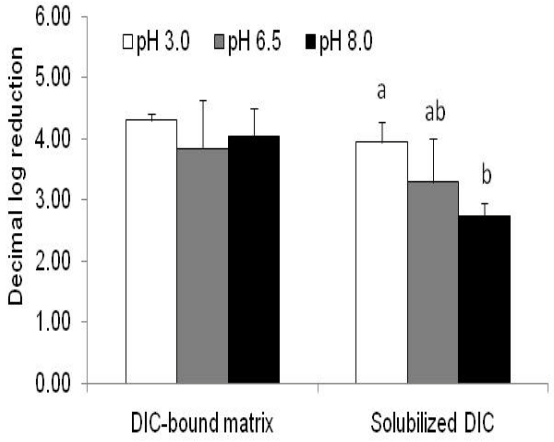
Introduction

Campylobacter are estimated to be a leading bacterial cause of human foodborne illness. Most human *Campylobacter* infections are caused by *C. jejuni*; however, 4% of clinically confirmed cases in one study were attributed to *C. coli* (Friedman et al., 2004). Whereas most pigs are colonized with *C. coli,* considerable numbers can be colonized with *C. jejuni*. *Campylobacter* differ physiologically from most other commensal gut bacteria in that they are unable to ferment carbohydrates. Studies show that the deaminase inhibitor, diphenyliodonium chloride (DIC), markedly reduces survivability of *Campylobacter* in vitro, but results from an in vivo study indicated that absorption of DIC in the proximal gastrointestinal tract may have precluded delivery of efficacious amounts of DIC to the cecum and large intestine. The aim of this study was to evaluate the characteristics of an experimental bypass DIC preparation.

Material and Methods

An experimental bypass product containing DIC-adsorbed to a ionic exchange matrix was pre-incubated (2 h) in each of 3 different pH solutions (pH 3, 6.5 and 8). Residual fluids and solids were separated via centrifugation (5 min 10,000 x g) and filtration and each were tested in triplicate for bactericidal activity against a 48 h *C. jejuni* culture. Decimal $\log_{10}$ reductions determined after 6 h incubation were analyzed for treatment effects by analysis of variance.

Results and Conclusion



Results revealed that DIC was readily solubilized from DIC-bound matrix treated at pH 3.0, with residual fluid from pH 3 treatments exhibiting >100% activity of that observed with solutions of free DIC (not shown) and nearly 100% activity of the bound material. Conversely, fluid fractions from DIC-bound matrix treated at pH 8 exhibited less ($P < 0.10$) anti-*Campylobacter* activity than the pH 3 treated fluid, with fluid fractions from pH 6.5 treated material being intermediate. These results suggest that the present DIC-adsorbed resin has not been optimized to prevent solubilization of DIC from the product within the proximal gastrointestinal tract.

References

Friedman,C.R., et al. 2004. Risk factors for sporadic *Campylobacter* infection in the United States: A case-control study in FoodNet Sites. Clin. Infect. Dis. 2004; 38(Suppl 3):S285–289.