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USE OF SODIUM SALT OF NITROETHANE TO REDUCE *SALMONELLA* TYPHIMURIUM IN WEANED PIGS

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Introduction Numerous studies have shown that *Salmonella* spp. are one of the leading etiologic agents of foodborne diseases. Evidence implicates that pigs are one of the major natural reservoirs for these pathogens. Practical control of *Salmonella* spp. before processing may aid the industry's multi-hurdle interventions. Nitroethane (NE) has been reported as an alternative electron acceptor by *Denitrobacterium detoxificans*² and also effective in inhibiting ruminal methanogenesis *in vitro*¹. Our laboratory has recently determined the antimicrobial activity of this compound against *Salmonella* and *Campylobacter jejuni* (unpublished). The aim of this study was to determine the bactericidal activity of a sodium salt of nitroethane (SNE) against *Salmonella* Typhimurium (ST) in the cecum and rectum of weaned pigs.

Materials and Methods A trial was conducted using weaned pigs (21-28 d of age). Piglets were challenged with approximately 10^9 CFU of a novobiocin and nalidixic acid resistant ST. Pigs were divided into four groups (n = 10/group); control (0 g NE equivalents/pig), 1 X (0.2 g NE equivalents/pig), 5 X (1 g NE equivalents/pig), and 10 X (2 g NE equivalents/pig). Sodium salt of NE was administered via oral gavage 24 h before sacrifice. Cecal and rectal contents were collected and ST populations were determined quantitatively and qualitatively. *Escherichia coli* and total coliforms were enumerated on *E. coli*/coliform Petrifilm plates. Total culturable anaerobes were determined via direct plating on anoxic brucellar agar under CO₂ (5 %). The concentrations of volatile fatty acid (VFA; acetic, butyric, propionic, isobutyric, valeric, and isovaleric) were determined by gas chromatography. Data were analyzed using the general linear model of SAS.

Results and Discussion Significant ($P < 0.05$) reductions of ST populations (mean log₁₀ CFU/g ± SD) were observed following SNE treatment at 5 and 10X doses in the cecum compared to controls

(3.43 ± 1.55 , 3.22 ± 1.35 vs 5.10 ± 1.03 , respectively). There was a numerical decrease of *Salmonella* populations in the rectum of treated pigs but this was not different ($P < 0.05$). An interaction between treatment and location of the gut was not observed ($P < 0.05$). Pooled data show that there was a significant treatment effect of SNE on reductions of *Salmonella* at 10X dose level compared to control (3.16 ± 1.45 vs 4.61 ± 1.47). The analysis of recovered populations of total coliform, *E. coli* and total culturable anaerobes indicates that these bacteria were not affected ($P < 0.05$) by this compound. In addition, there was no alteration ($P < 0.05$) in concentrations of acetate, propionate, and butyrate in the cecum or rectum of pigs among all groups (data not shown). No adverse biological effect of SNE administration was observed. These results demonstrate that SNE may have the potential to be developed as an intervention to control *Salmonella* in pig.

References

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