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Administration of Experimental Chlorate Preparations in Feed or Water to Reduce the Incidence of *Salmonella* Typhimurium in Pigs Immediately Preharvest

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Introduction

Chlorate has long been known to exhibit a selective toxicity against nitrate respiring bacteria such as *Escherichia coli* and *Salmonella* while remaining innocuous to most beneficial gut anaerobes lacking this activity[1]. Only recently, however, have chlorate salt preparations been investigated as potential preharvest food safety supplements[2]. Presently, we report results from a pig model investigating the effects of administering experimental chlorate preparations (ECP) to pigs via drinking water or via feed supplementation on the recovery of *Salmonella* from pigs.

Materials and Methods

In two separate experiments, weaned pigs were experimentally challenged per os with approximately 10^9 CFU of a novobiocin and naladixic acid resistant *Salmonella* Typhimurium. Twenty four hours later, the pigs were allowed ad libitum access to drinking water or feed supplemented with ECP as indicated. The pigs were humanely euthanized approximately 24 h after being allowed access to the respective treatments and gut and ileocolic lymph specimens (1 to 2 g) collected at necropsy were cultured qualitatively for the challenge *Salmonella* strain.

Results and Discussion

Significant reductions in gut prevalence of the challenge *Salmonella* strain were observed following drinking water administration of ECP (Figure 1). While proportions of pigs yielding *Salmonella*-positive ileocolic lymph tissues were significantly reduced following feed administration of ECP, recovery of *Salmonella* from cecal and rectal contents from these pigs was too low to measure differences (Figure 2). No adverse effects of ECP on water or feed consumption were observed (data not shown). These results demonstrate that drinking water or feed administration of ECP reduced the prevalence of *Salmonella* positive pigs presented at slaughter and support the concept that ECP may be a useful tool to reduce the risk of carcass contamination during processing. Further research is needed to optimize delivery protocols and treatment durations.

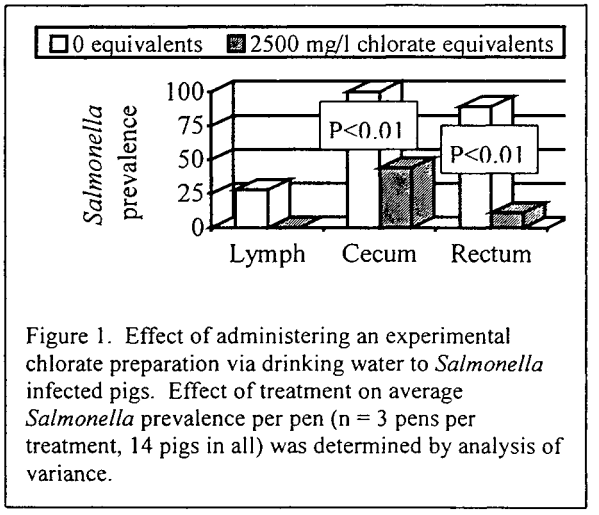

Figure 1. Effect of administering an experimental chlorate preparation via drinking water to *Salmonella* infected pigs. Effect of treatment on average *Salmonella* prevalence per pen (n = 3 pens per treatment, 14 pigs in all) was determined by analysis of variance.

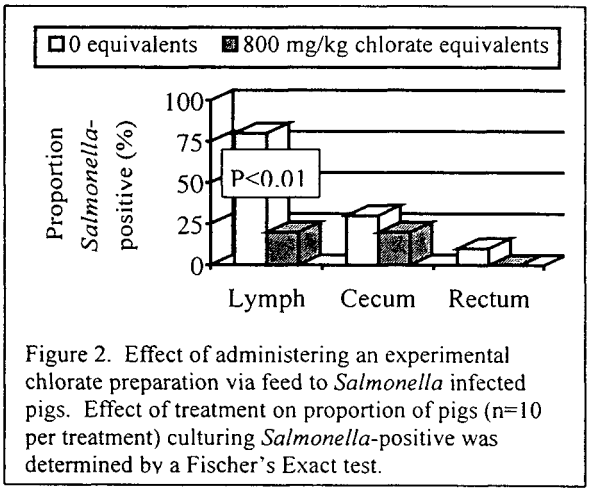

Figure 2. Effect of administering an experimental chlorate preparation via feed to *Salmonella* infected pigs. Effect of treatment on proportion of pigs (n=10 per treatment) culturing *Salmonella*-positive was determined by a Fischer's Exact test.

References

1. Stewart V. Nitrate respiration in relation to facultative metabolism in enterobacteria. *Microbiol. Rev.* 1988;52:190-232.

2. Anderson RC, Buckley SA, Callaway TR, Genovese KJ, Kubena LF, Harvey RB, Nisbet DJ. Effect of sodium chlorate on *Salmonella* Typhimurium concentrations in the weaned pig gut. *J. Food Prot.* 2001;64:255-258.