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Effect of Sodium Chlorate on Porcine Gut Concentrations of *Escherichia coli* O157:H7 in vivo

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Salmonella and *Escherichia coli* are of importance to the swine industry, causing economic losses due to disease and compromised food safety. Berends et al. (1996) reported that up to 30% of finished pigs may shed *Salmonella*. Borie et al. (1997) reported that more than 68% of slaughter pigs in Santiago, Chile were colonized by enterohemorrhagic *E. coli* strains thus implicating pigs as a carrier of these pathogens. Because the gut is a major reservoir for *Salmonella* and *E. coli*, strategies are sought to reduce their concentration in the pig gut immediately preharvest.

Salmonella and *E. coli* possess respiratory nitrate reductase activity that also catalyzes the intracellular reduction of chlorate, an analog of nitrate, to cytotoxic chlorite. We previously reported that oral chlorate administration selectively killed *Salmonella*, but not potentially beneficial anaerobes, in experimentally infected pigs (Anderson et al., 2000), and now report the bactericidal effect of chlorate on *E. coli* within the pig gut.

Weaned pigs orally infected with 2.4×10^9 colony forming units (CFU) of a novobiocin and naladixic acid resistant strain of *E. coli* O157:H7 were treated via oral gavage (10 ml) at 8, 16 and again at 24 h post challenge with 0 or 100 mM sodium chlorate solutions. Treatments also contained 2.5 mM sodium nitrate and 20 mM sodium lactate. Pigs were euthanized 8 h after receiving the last treatment and samples collected by necropsy were cultured qualitatively and quantitatively for *E. coli* O157:H7. Concentrations of total culturable anaerobes were estimated via a three-tube most probable number method. Data were tested for treatment differences by analysis of variance.

Mean \pm SD concentrations (\log_{10} CFU/g) of *E. coli* O157:H7 in ileal, cecal, colonic and

rectal contents of placebo treated pigs were 4.03 ± 2.10 , 3.82 ± 0.75 , 4.42 ± 0.79 and 4.03 ± 0.48 , respectively. In contrast, *E. coli* O157:H7 concentrations from ileal (1.56 ± 0.69), cecal (2.65 ± 1.20), colonic (3.05 ± 1.19) and rectal (3.00 ± 0.91) contents of chlorate treated pigs were significantly reduced ($P < 0.05$). No effect of chlorate treatment was observed on most probable numbers of total culturable anaerobes from cecal contents, with values ranging from 11.03 to 11.92 \log_{10} cells/g.

References

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