Chlorate concentration in the jejunum and cecum in growing pigs when supplemented in feed.

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Prior research has demonstrated that oral administration of chlorate and nitrate results in reduced risk and/or concentration of Salmonella enterica fecal shedding of infected pigs, poultry and ruminants. The effect of chlorate is concentration dependent in vitro, but the concentration of chlorate in the GI tract has not been measured in vivo, and consequently the optimal dose of chlorate is poorly defined. We administered three dosages of chlorate (0, 40 and 120 mg/kg/day) and nitrate (0, 2 and 8 mg/kg/day) to 18 growing pigs using a 3 x 3 factorial study design. After 1 or 5 days of treatment subjects were humanely sacrificed to allow collection of jejunal and cecal content samples. The dose of chlorate and nitrate was at or doses associated with suppressed Salmonella shedding in a prior study in our lab. Samples were assayed using LC-MS-MS and chromatographic methods.

Chlorate concentration was higher in jejunal content from pigs given 120 mg / kg /day dose of chlorate (54 ppm) than those given 40 mg / kg / day (17 ppm) or controls (<0.1 ppm). The 120 mg / kg / day dose of chlorate was associated with higher chlorate concentrations in the lower intestinal tract, although concentrations detected were much lower than for jejunal samples (cecal, 3.7, colonic, 0.3 ppm). Chlorate concentration was not dependent on duration of treatment or nitrate dose. Nitrate concentration varied from 1-11 ppm, but was not reliably predicted by any factors studied. The low concentration of chlorate found in the lower GI tract (cecum and colon) contrasts with much higher concentration required for Salmonella suppression in vitro. It is possible that lower chlorate concentration is effective in vivo, or that higher doses may be necessary to achieve optimum Salmonella suppression effect in vivo.