

Feeding glutamine to weaning piglets influences the gastrointestinal response to an *E. coli* challenge

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Glutamine (gln) is needed for immune and gut development and may be conditionally essential during physiological stress. The importance of gln during gastrointestinal infections in piglets has been suggested by studies demonstrating its ability to lower bacterial translocation rates, decrease the duration of diarrhea and improve survival. Although suggestive, these studies were performed in models of severe infection and can not be used to determine the potential preventative role of dietary gln. The objective of the present study was to determine the efficacy of supplementing the diet with additional gln (4.4 % w/w) on gut resistance to Enterotoxigenic *Escherichia coli* (ETEC) in the early post-weaning period. At 35 d of age, piglets underwent an *in situ* closed intestinal loop model of an ETEC challenge. This surgical procedure enabled exposure of intestinal loops, within the same piglet, for 4h to swine specific K88+ ETEC strains (K88AC & field isolate) and a placebo (control). Gut segments were then removed for Ussing chamber work and frozen for RT-PCR analyses. There was no effect of diet on feed intake (173 ± 11 g/d) or weight gain (1943 ± 157 g/d). In intestinal loops incubated with ETEC there was an increase ($P < 0.001$) in permeability (mannitol transport) and fluid content but this was not affected by diet. Gln-fed piglets had lower ($P < 0.05$) short-circuit current (Isc - K88AC & K88WT loops) and potential difference (PD - K88WT loop) compared to piglets fed the control diet. This suggests that the net ion movement (Isc) and changes in the electrochemical gradient (PD), which are expected to be higher with ETEC exposure, were prevented in the gln-fed piglets. There was a trend (although not statistically significant) towards a lower level of cytokines (IFN γ , IL-1, IL-6, IL-10, and TGF β) in the ETEC challenged intestinal loops of the gln-fed piglets. In conclusion, feeding additional gln to weaning piglets prevented the expected early physiological response by the intestine after an *in vivo* ETEC challenge. Therefore, gln supplementation to weanling piglets may be of potential benefit in reducing the risk of infection. (Support from the Canadian Institutes for Health Research)