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The effects of laminarin derived from *Laminaria digitata* on measurements of gut health: selected bacterial populations, intestinal fermentation, mucin gene expression and cytokine gene expression in the pig.

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Abstract

The aim of the present study was to establish the optimum inclusion level of laminarin derived from *Laminaria digitata* on selected microbial populations, intestinal fermentation, cytokine and mucin gene expression in the porcine ileum and colon. A total of twenty-one pigs (mean body weight 17.9 kg) were randomly assigned to one of three dietary treatments: T1 – basal (control) diet, T2 and T3 – basal diets supplemented with laminarin included at 300 and 600 parts per million (ppm), respectively. Selected intestinal bacterial populations and volatile fatty acid (VFA) concentrations were measured in the ileum and colon. Relative gene expression levels for specific cytokine and mucin genes were investigated in ileal and colonic tissue in the absence and presence of a lipopolysaccharide (LPS) challenge. There was an up-regulation of MUC2 gene expression at the 300 ppm inclusion level in the ileum. In the colon, there was a significant reduction in the enterobacteriaceae population at the 300 ppm inclusion level ($P = 0.0421$). Dietary supplementation of 600 ppm laminarin led to a significant increase in MUC2 ($P = 0.0365$) and MUC4 ($P = 0.0401$) expression in the colon, and in the total VFA concentration in the caecum ($P = 0.0489$). A significant increase was also recorded in IL-6 ($P = 0.0289$) and IL-8 gene expression ($P = 0.0245$) in LPS-challenged colonic tissue at both laminarin inclusion levels. In conclusion, dietary inclusion of 300 ppm laminarin appears to be the optimum dose in the present study due to the reduction in the enterobacteriaceae populations and enhanced IL-6 and IL-8 cytokine expression in response to an ex vivo LPS challenge. Copyright © The Authors 2011.

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