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The effect of seaweed extract inclusion on gut health and immune status of the weaned pig.

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Abstract

An experiment (complete randomised design) was conducted to investigate the effects of *Laminaria hyperborea* and *Laminaria digitata* seaweed extract inclusion on gut morphology, selected intestinal microbiota populations, volatile fatty acid concentrations and the immune status of the weaned pig. Twenty-eight piglets (24 days of age, 6.5 ± 1.4 kg live weight) were assigned to one of four dietary treatments for 7 days and then sacrificed: (T1) basal diet (control); (T2) basal diet and 1.5 g/kg *L. hyperborea* seaweed extract; (T3) basal diet and 1.5 g/kg *L. digitata* seaweed extract; and (T4) basal diet and 1.5 g/kg of a combination of *L. hyperborea* and *L. digitata* seaweed extract. The seaweed extract contained both laminarin and fucoidan. Digesta samples were taken from the caecum and colon to measure the enterobacteria, bifidobacteria and lactobacilli populations and for volatile fatty acid analysis. Tissue samples were taken from the duodenum, jejunum and ileum for morphological examination. Blood samples were taken to determine the cytokine gene expression profile and to measure the phagocytotic capacity of the blood. Pigs offered diets containing *L. hyperborea* seaweed extract had less bifidobacteria in the colon ($P < 0.05$) and lactobacilli in the caecum ($P < 0.05$) and colon ($P < 0.001$). The inclusion of *L. digitata* seaweed extract resulted in lower populations of enterobacteria in the caecum and colon ($P < 0.01$), bifidobacteria in the caecum ($P < 0.05$), and lactobacilli in the caecum ($P < 0.05$) and colon ($P < 0.001$). Pigs offered the combination of *L. hyperborea* and *L. digitata* seaweed extracts had less enterobacteria ($P < 0.05$) and lactobacilli ($P < 0.01$) in the caecum and colon. Pigs offered the *L. digitata*-supplemented diet had a reduced villous height in the duodenum and jejunum ($P < 0.05$). The inclusion of the *L. digitata* seaweed extract increased the molar proportion of butyric acid in the colon ($P < 0.05$). There was a significant reduction in the ammonia concentration in the colon with the inclusion of *L. hyperborea* ($P < 0.01$) and *L. digitata* ($P < 0.05$) seaweed extracts. An increase in the expression of the Interleukin-8 mRNA was observed on day 6 with the supplementation of the combination of *L. hyperborea* and *L. digitata* seaweed extract ($P < 0.05$). The inclusion of *L. hyperborea* seaweed extract resulted in an increase in total monocyte number ($P < 0.05$). In conclusion, the supplementation of *L. hyperborea* and *L. digitata* seaweed extract alone and in combination reduced the enterobacteria, bifidobacteria and lactobacilli populations in the caecum and colon, while only marginal effects on the immune response was observed. Copyright © The Animal Consortium 2008.

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