



WELFARE & NUTRITION

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TARGETED METABOLOMICS: EXPLORATIVE STUDY ON THE METABOLOMIC RESPONSE OF SEVERAL ALGAE IN WEANED PIGLETS CHALLENGED WITH *ESCHERICHIA COLI* K88

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Introduction

The beneficial effects of algae on nutrition, physiology, health promotion and welfare for animals and humans are well documented. A novel approach is necessary to explain positive effect of algae on growth promotion, antioxidant and antimicrobial effect, immune system modulation and gastrointestinal tract protection through measuring the metabolic profile changes in weaned piglets fed with algae. The aim of this study is to profile the biological samples of weaned piglets challenged with *Escherichia coli* K88 using metabolomic analysis to elucidate mechanism of action of algae supplementation on weaned piglets.

Material & Methods

The study lasted 14 days, had a randomized complete block design, using 56 weaned piglets in 4 treatments (Basal Diet -BD-, BD plus algae APSA108005 or APSA103017 or APSA102026 at 0.2%). Oral challenge with 5x10⁸ CFU *E. coli* K88 was performed on day 4. On day 14, plasma, serum, muscle and liver were collected from one piglet per pen to determine the profile variation of biochemical parameters by detection kits, malondialdehyde by spectrophotometry, fatty acids and amino acids by GC-MS and HPLC-DAD respectively.

Results

26 metabolites were up-regulated and 23 down-regulated significantly ($p < 0.05$) in weaned piglets supplemented with algae compared with control ones. These metabolites demonstrate the antioxidant effect of algae (Malondialdehyde, HDL, C16:1n7, methionine), on growth promotion-source of energy (leucine, lipids, glucose, cholesterol, phospholipids, triglycerids, NEFAS-liver, total protein, C18:2n6, aspartic acid, serine, histidine, leucine), antimicrobial effect (valine) and immune system modulation (alanine, methionine, lysine).

Discussion & Conclusion

The metabolome of algae supplemented weaned piglets was different from the control ones. Significant differences were observed in metabolites related with antioxidant effect, protein and energy metabolism, the response of the animal against infections and immune system modulation. 14 first days algae supplementation in weaned piglets diets have potential to improve animal performance and welfare.