

Effects of fermented soybean meal on carbon and nitrogen metabolisms in large intestine of piglets

ABSTRACT

Fermented soybean meal (FSM), which has lower anti-nutritional factors and higher active enzyme, probiotic and oligosaccharide contents than its unfermented form, has been reported to improve the feeding value of soybean meal, and hence, the growth performance of piglets. However, whether FSM can affect the bacterial and metabolites in the large intestine of piglets remains unknown. This study supplemented wet-FSM (WFSM) or dry-FSM (DFSM) (5% dry matter basis) in the diet of piglets and investigated its effects on carbon and nitrogen metabolism in the piglets' large intestines. A total of 75 41-day-old Duroc×Landrace×Yorkshire piglets with an initial BW of 13.14±0.22 kg were used in a 4-week feeding trial. Our results showed that the average daily gain of piglets in the WFSM and DFSM groups increased by 27.08% and 14.58% and that the feed conversion ratio improved by 18.18% and 7.27%, respectively, compared with the control group. Data from the prediction gene function of Phylogenetic Investigation of Communities by Reconstruction of Unobserved States (PICRUSt) based on 16S ribosomal RNA (rRNA) sequencing showed that carbohydrate metabolism function families in the WFSM and DFSM groups increased by 3.46% and 2.68% and that the amino acid metabolism function families decreased by 1.74% and 0.82%, respectively, compared with the control group. These results were consistent with those of other metabolism studies, which showed that dietary supplementation with WFSM and DFSM increased the level of carbohydrate-related metabolites (e.g. 4-aminobutanoate, 5-aminopentanoate, lactic acid, mannitol, threitol and β -alanine) and decreased the levels of those related to protein catabolism (e.g. 1,3-diaminopropane, creatine, glycine and inosine). In conclusion, supplementation with the two forms of FSM improved growth performance, increased metabolites of carbohydrate and reduced metabolites of protein in the large intestine of piglets, and WFSM exhibited a stronger effect than DFSM.