

Selection of Wakame Assimilative and Adhesive Lactobacilli and Their Genomic Characterization

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Synbiotics, the combination of prebiotics and probiotics, have been considered as potential candidates for antimicrobial substitutes in the livestock industry due to their positive effects on gastrointestinal disorders. Wakame, an edible seaweed, has prebiotic and immunomodulatory properties and therefore, wakame waste have been proposed to be used in feed formulation as a prebiotic in combination with immunomodulatory probiotics (immunobiotics). In order to select wakame assimilating immunobiotics for the development of symbiotic feeds, we isolated lactobacilli from the porcine intestine using a component adjusted wakame broth, and screened them in vitro for their immunomodulatory properties, adhesion capacities and wakame-assimilative abilities¹). The immunomodulatory effect of lactobacilli was evaluated in porcine intestinal epithelial (PIE) cells after the activation of Toll-like receptor (TLR)-3 or TLR4. The adhesion of lactobacilli to porcine mucin and PIE cells were evaluated by Biacore and fluorescence assays, respectively. The pH, turbidity, viable bacterial count and sugar consumption were measured following incubation of Lactobacillus strains in the enzyme-treated wakame medium. A total of 116 lactobacilli strains were isolated, 8 of which were selected for further research because of their differential immunomodulatory abilities. The 8 strains showed different adhesion abilities to porcine mucin and PIE cells. No correlation between the immunomodulatory and adhesion capabilities were found. The sequencing of the complete genome of the 8 strains and the genomic analysis revealed that immunomodulation and adhesion depend on the combination of several cell-surface bacterial factors acting simultaneously on the intestinal cells of the porcine host^{2,3}). All lactobacilli were able to utilize saccharides in enzyme-treated wakame. Wakame improved the survival of lactobacilli in simulated gastric conditions. The synergistic combination of the immunomodulatory effects of wakame and lactobacilli selected in this work could be used as a highly efficient functional feed to improve immune health status in pigs.

1) Masumizu, Zhou et al., *Microorganisms* (2019).

2) Zhou, Albarracin et al., *Microbiol. Res. Announc.* (2020).

3) Zhou, Albarracin et al., *Microorganisms* (2020).