

Enzymatically synthesised fructooligosaccharides from sugarcane syrup modulate the composition and short-chain fatty acid production of the human intestinal microbiota

ABSTRACT

Fructooligosaccharides can be produced by direct enzymatic conversion from sucrose-rich sugarcane syrup (SS) consisting of 58.93% sucrose yielding 21.28 g FOS/100 g sucrose. This study evaluated the prebiotic effect of unpurified/purified SS containing FOS for the modulation of the human intestinal microbial composition and short-chain fatty acid production. The unpurified and purified FOS substrates, which were a mixture of 1-kestose, nystose and 1F-fructosylnystose, were supplemented into human faecal culture using a pH-controlled batch fermentation system and significantly increased the Bifidobacterium counts after 5 h fermentation, while Bacteroides/Prevotella counts were highest throughout 24 h fermentation. Meanwhile, Lactobacillus/Enterococcus exhibited a slight increase after 5 h fermentation before reaching a plateau afterwards. The steady Bacteroides/Prevotella growth and increased Bifidobacterium population promoted an increase in the production of short-chain fatty acids acetate (58 ± 2.70 mM), propionate (9.19 ± 5.94 mM) and butyrate (7.15 ± 2.28 mM). These results provide evidence that representative gut microbiota could utilise the enzymatically synthesised FOS to generate short-chain fatty acids as metabolites in pH-controlled conditions, thus FOS from SS are a potential prebiotic ingredient for foods and health drinks.

Keyword: Prebiotic; Fructooligosaccharides; Enzymatic synthesis; Sugarcane; SCFA