Carbohydrates blended with polydextrose lower gas production and short-chain fatty acid production in an in vitro system.

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Brittany M. Vester Boler, David C. Hernot, Thomas W. Boileau, Laura L. Bauer et al.

ABSTRACT
Maximizing health benefits of prebiotics, while limiting negative side effects, is of importance to the food industry. This study examined several oligosaccharides and their blends in an in vitro fermentation model. Substrates included medium- and long-chain fructooligosaccharides (FOS), oligofructose-enriched inulin, galactooligosaccharide, polydextrose (POL), and 50:50 substrate blends. Substrates and blends were fermented in vitro using human fecal inoculum, and fermentation characteristics were quantified at 0, 4, 8, and 12 hours. We hypothesized that mixtures of short- and long-chain oligosaccharides would generate less gas than do short-chain oligosaccharides and modulate gut microflora to a greater extent than do long-chain oligosaccharides. Carbohydrates blended with POL had decreased (P < .01) total gas volume and H2 produced after 4, 8, and 12 hours of fermentation compared with individual carbohydrates. Mixing of 2 oligofructose-enriched inulin products led to less (P < .05) gas produced and a slower (P < .05) rate of production. When mixed with POL, all carbohydrates tested in the present study produced less total short-chain fatty acids (P < .04) and butyrate (P < .0001) after 12 hours of in vitro fermentation, compared with individual carbohydrates. The bifidogenic effect of medium-chain FOS and oligofructose-enriched inulin after 12 hours of in vitro fermentation was lower (P < .05) when mixed with POL. Mixing the pure carbohydrates with galactooligosaccharide increased (P < .05) bifidobacteria counts measured after 12 hours of in vitro fermentation, except when mixed with medium-chain FOS. In general, when mixed with POL, all carbohydrates had lower gas production, gas production rates, butyrate and total short-chain fatty acid production, and bifidobacteria counts than when fermented alone for 12 hours.