

Preclinical study shows combination of chicory-derived prebiotics and HMO for toddler gut health

26 June 2025 | News

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A new preclinical study, conducted by Pudenz et al., demonstrates that combining chicory-derived inulin-type fructans with the human milk oligosaccharide (HMO) 2'-fucosyllactose (2'-FL) leads to additive, and even synergistic, effects on toddler gut microbiota. As one of the first studies to test combinations of prebiotics from chicory root with 2'-FL, it strengthens the argument for prebiotic blends to be used in milk formulas to support early-life gut health, with potential long-term benefits for digestive and immune function.

The science-driven, ingredient-specific research, conducted in collaboration with leading academic partner ETH Zurich, focused on microbial composition and metabolic effects in early nutrition. As part of the in vitro fermentation study, stool samples from toddlers were tested using the PolyFermS long-term continuous fermentation model, a sophisticated technology that preserves the individual microbial community and biodiversity of each donor. It also mimics the dynamics of the large intestine, allowing donor-specific and reproducible insights into gut fermentation.

The study abstract was first published as an e-poster during the 57th Annual Meeting of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition in Finland, a major event in the paediatric nutrition field in Europe.

The findings showed that inulin-type fructans induced metabolic and compositional changes in the gut microbiota, while 2'-FL alone had less prominent effects. However, the combination of fructans and 2'-FL led to additive or synergistic effects and enhanced the production of the beneficial metabolite butyrate, an important fuel for gut cells. This correlated with an increase in beneficial bacteria, including *Faecalibacterium* and other members of the *Lachnospiraceae* family. In addition, the novel prebiotic combination of 2'-FL and inulin-type fructans promoted the bifidogenic effect, i.e., the growth of bifidobacteria, depending on the initial microbiota. While this growth was observed in all samples, the type

of Bifidobacterium species that increased varied by donor.

The results demonstrate that the combination of prebiotics from chicory root and 2'-FL can more effectively support the development of a healthy gut microbiota in toddlers than the two ingredients individually. This finding further supports the role of scientifically backed prebiotic blends in complementing early-life nutrition, especially for toddlers transitioning from breastfeeding. The varying findings across the samples highlight individual differences and the potential for personalised nutrition approaches.

Stephan Theis, Head of Nutrition Science and Communication at BENEÖ, commented: "These new insights underline the power of combining prebiotics from chicory root with the human milk oligosaccharide, 2'-FL, to more closely replicate the natural gut-supporting effects of breastmilk – a promising direction for smart solutions in toddler nutrition."

While 2'-FL is the most abundant and extensively studied HMO, prebiotics from chicory root belong to the very few proven prebiotics according to ISAPPⁱⁱ, and are the only plant-based ones available. The new study reinforces BENEÖ's leading role in researching prebiotics from chicory root, leveraging extensive expertise to enhance baby food with functional ingredients. Thanks to its strategic global partnership with WACKER, BENEÖ is offering the HMO 2'-FL, reaffirming its commitment to bridging the gap between formula and the natural composition of breast milk.