

Do all prebiotics have the same impact on my gut microbiota? A case study using an

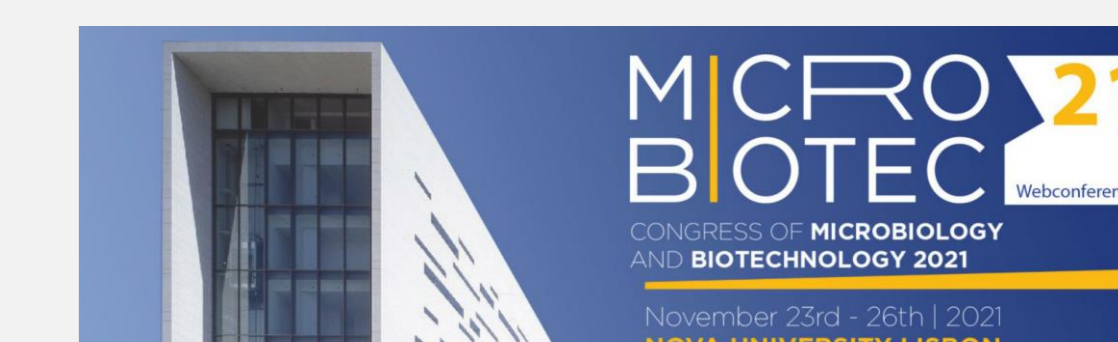
in vitro gastrointestinal model to assess functional oligosaccharides added to milk

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Introduction

Diet is one of the major key factors that influences gut microbiota community. The gut microbiota can provide physical and mental benefits to the host throughout life. The aim of this work is to assess the impact of the prebiotics fructooligosaccharides (FOS), galactooligosaccharides (GOS) and manooligosaccharides (MOS) on gut microbiota when added to skim milk (SKM) at different concentrations.

Methodology

Each prebiotic was added at 0.1% and 1% (w/v) to SKM and subjected to an *in vitro* gastrointestinal (GIT) model and fermented for 48h. Samples were collected at 0, 6, 24, 30 and 48 h and SCFA quantified by HPLC, and microbiota modulation assessed by qPCR.

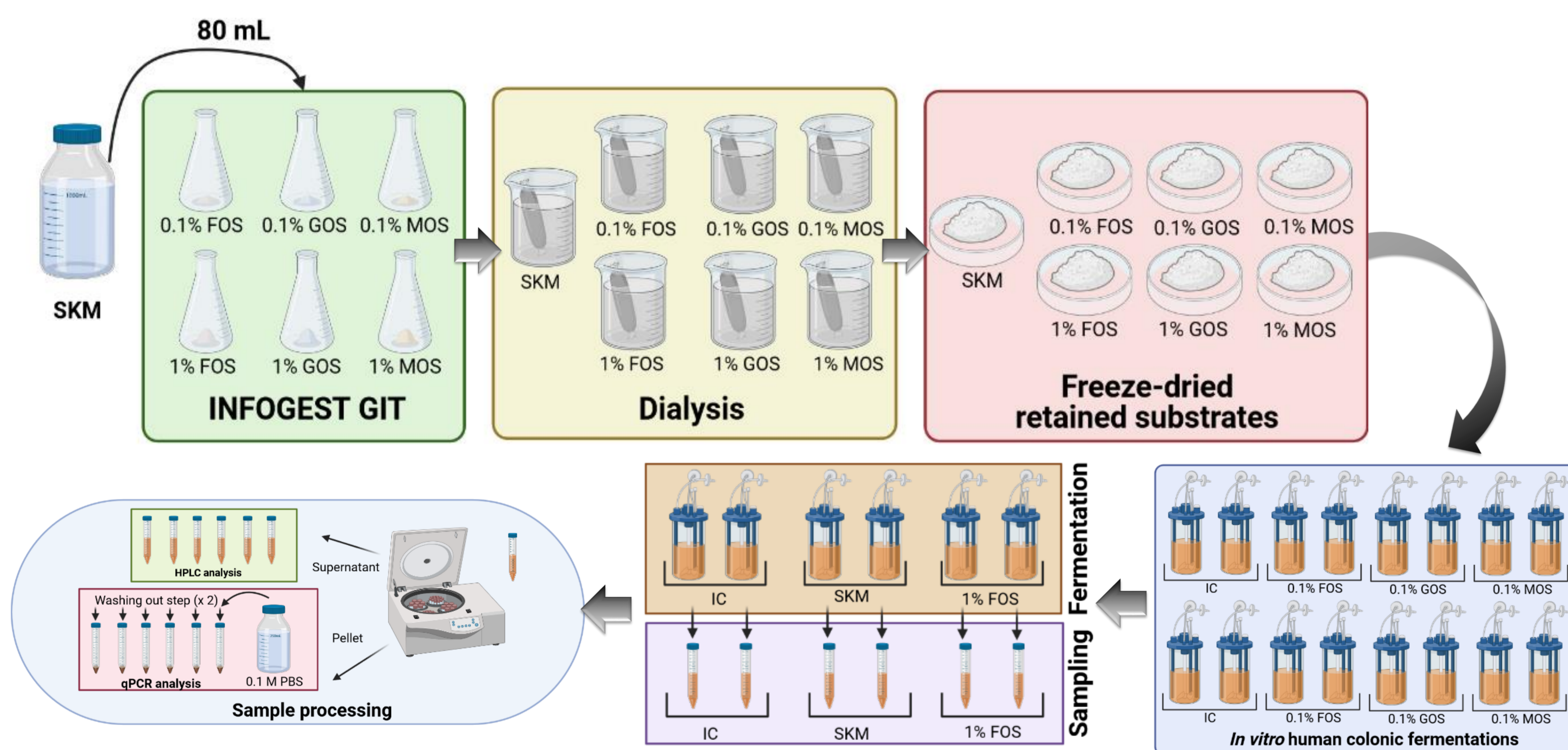


Figure 1- Experimental design of the study.

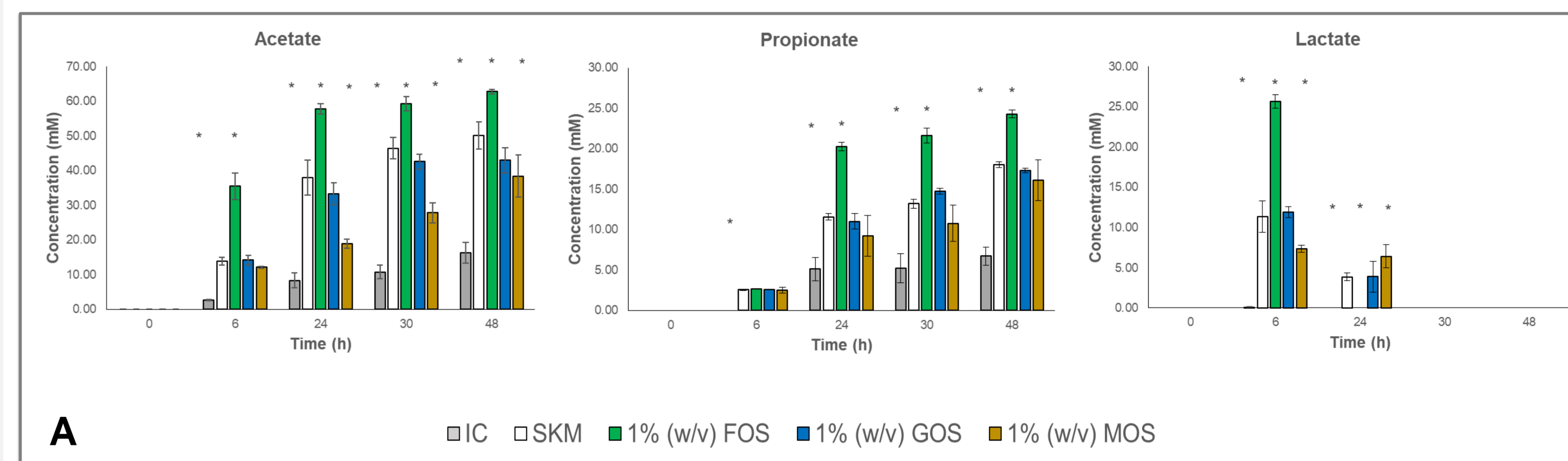
Acknowledgements

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Results and Discussion

Acetate, propionate and lactate



Lactobacillus, Bifidobacterium and Clostridium cluster IV

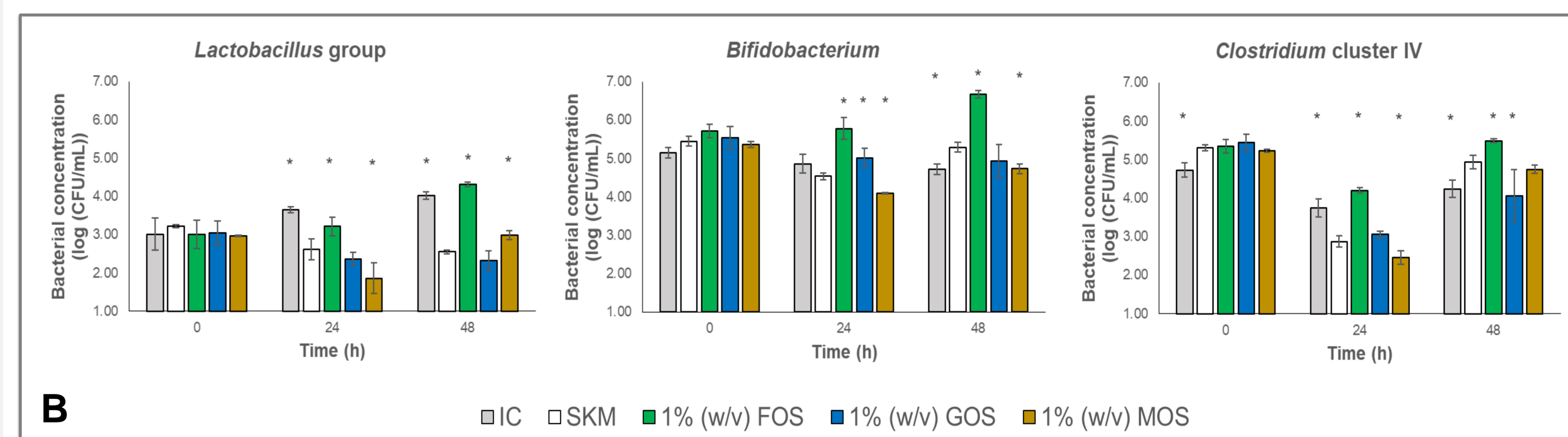


Figure 2- A-Concentration (mM, means \pm SD) of the different organic acids produced during fecal fermentations and B- Bacterial quantification (log (CFU/mL), mean \pm SD) of the different bacterial populations present in the fecal fermentations.

Benefits to the host's immune system

Conclusions

FOS, at 1%, was the only ingredient which was significantly ($p < 0.05$) different from the baseline condition (SKM), thus offering extra benefits. These findings can provide valuable data to the food industry, enabling the incorporation of functional ingredients in food products with a previous proof of concept of their potential benefits to the consumer's health.

References

- Brodtkorb A, Egger L, Alminger M, Alvito P, Assunção R, Ballance S, Bohn T, Bourlieu-Lacanal C, Boutrou R, Carrière F (2019) INFOGEST static *in vitro* simulation of gastrointestinal food digestion. *Nat Protoc* 14:991–1014.
- Carvalho NM de, Oliveira DL, Saleh MAD, Pintado M, Madureira AR (2021) Preservation of human gut microbiota inoculums for *in vitro* fermentations studies. *Fermentation* 7:14.