

## Abstract

# In-Depth Analysis of Edible Yeast-Based Protein Digestion in Humans Using the Dynamic In Vitro TIM-1 Model <sup>†</sup>

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**Abstract:** The global protein demand is constantly on the increase, requiring sustainable and healthier protein alternatives for animal and human nutrition. Yeast-based proteins (YBPs) represent a non-negligible environmentally friendly fermentation-based solution with high nutritional quality and bioavailability. Although in vitro studies cannot reflect the full complexity of in vivo digestion, they are considered a useful alternative to animal models in assessing protein digestibility. Herein, TIM-1 (TNO gastro-intestinal model) was used to assess the digestibility profile of a proprietary edible YBP according to INFOGEST guidelines. We characterized the YBP's digestibility and amino acid bio-accessibility and compared the YBP with milk-based references (casein and whey proteins). Each treatment was evaluated in triplicate during 5 h of digestion with hourly collection from jejunum and ileum compartments and final residual stomachal samples. Total nitrogen and free amino acid (FAA) were quantified. Size-exclusion chromatography and SDS-PAGE were also applied to assess the fate of protein hydrolysis over time. This study showed that all proteins were fully hydrolyzed upon one hour of digestion. YBPs were as good as milk-based references in terms of digestibility and small intestine absorption, reaching up to 60% of total bio-accessible protein after 5 h. Noteworthy, total YBP absorption followed a kinetics closer to that of whey protein in jejunum and ileum compartments. Our results are in line with a previous in vivo evaluation of YBPs where fecal N digestibility, PDCAAS, and DIAAS were evaluated. Altogether, our results suggest that YBPs could be a nutritionally relevant animal protein alternative.

**Keywords:** yeast-based proteins; in vitro digestibility; amino-acids



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