

New Synbiotic Potential Score (SPS) for rationale Synbiotic Selection



The Purpose:

To develop a rapid and quantitative screening platform to identify strain-specific prebiotic–probiotic combinations with the highest synbiotic potential.

ISAPP definition of SYNBIOTICS

A mixture, comprising live microorganisms and substrate(s) selectively utilized by host microorganisms, that confers a health benefit on the host¹.

Synbiotics are increasingly explored as targeted nutritional tools to modulate the gut microbiota and support host health.

Synergistic synbiotics in particular, are designed to combine specific probiotic strains with prebiotic substrates that are selectively utilised by those strains, thereby enhancing functional efficacy.

However, not all probiotic strains utilise prebiotic fibres equally, and commonly used in vitro screening methods often fail to capture strain-specific growth behaviours.

Synbiotic Potential Score (SPS)

$$\text{SPS} = \frac{(\text{growth on fibre}) - (\text{background growth})}{(\text{growth on glucose}) - (\text{background growth})}$$

Quantitative strain-fibre screening



Reduction of background-driven effects



Objective ranking of strain–fibre combinations

Revealing true fibre-driven microbial growth:

The SPS enables a clearer assessment of true synbiotic activity.

By integrating nutrient-limited conditions with full growth-curve analysis, SPS captures fibre-specific microbial responses over time, avoiding bias from single time-point measurements and enables a more nuanced evaluation of both rapidly fermented and complex fibres.



Displays selective prebiotic activity under nutrient-limited conditions, revealing fibre-driven microbial growth that may be masked in rich media.



Consistently supports strong bifidogenic growth across strains, even under minimal nutrient conditions, reflecting its rapid and readily fermentable nature.

Combinations of the two fibres

Combining EUOLIGO® FOS and PROMITOR® Soluble Fibre revealed complementary, strain-specific growth patterns, highlighting how fibre blends can support differentiated synbiotic strategies.

Conclusions:

- The Synbiotic Potential Score (SPS) is a simple way to compare how well different fibres support the growth of beneficial bacteria, *in vitro*.
- SPS allows many fibre–strain combinations to be tested and ranked quickly.
- With this methodological framework, SPS helps reveal the real effect of each ingredient: EUOLIGO® FOS shows broader and faster support of bacterial growth, while PROMITOR® Soluble Fibre shows more selective, condition-dependent utilisation, highlighting different synbiotic roles rather than a one-size-fits-all approach.
- Combining fibres reveals complementary utilisation by bacteria, highlighting opportunities to better match fibres with specific strains in synbiotic development.

References

1. Swanson, K.S., Gibson, G.R., Hutkins, R., Reimer, R.A., Reid, G., Verbeke, K., Scott, K.P., Holscher, H.D., Azad, M.B., Delzenne, N.M.: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of synbiotics. Nat. Rev. Gastroenterol. Hepatol. 17, 687–701 (2020).



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