

An *in vitro* evaluation of different carbohydrates on the selective fermentation of *Lactobacillus rhamnosus* ATCC 53103

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Objectives

Identify a prebiotic for *Lactobacillus rhamnosus* ATCC 53103 (LR) aiming to selectively enhance its growth and activity in the gut

Methods

- Growth of LR on 53 commercially available and experimental oligo- and polysaccharides was screened in pure culture
- Rate of gas production was determined in non pH-controlled faecal cultures
- Carbohydrates supporting growth were investigated further in pH-controlled, anaerobic batch cultures using faeces from six healthy adults
- Primary outcome was stimulation of growth and activity of LR, evaluated by strain specific qPCR
- Oligofructose (P95) and inulin HP (Orafti[®] HP) were used as positive prebiotic controls



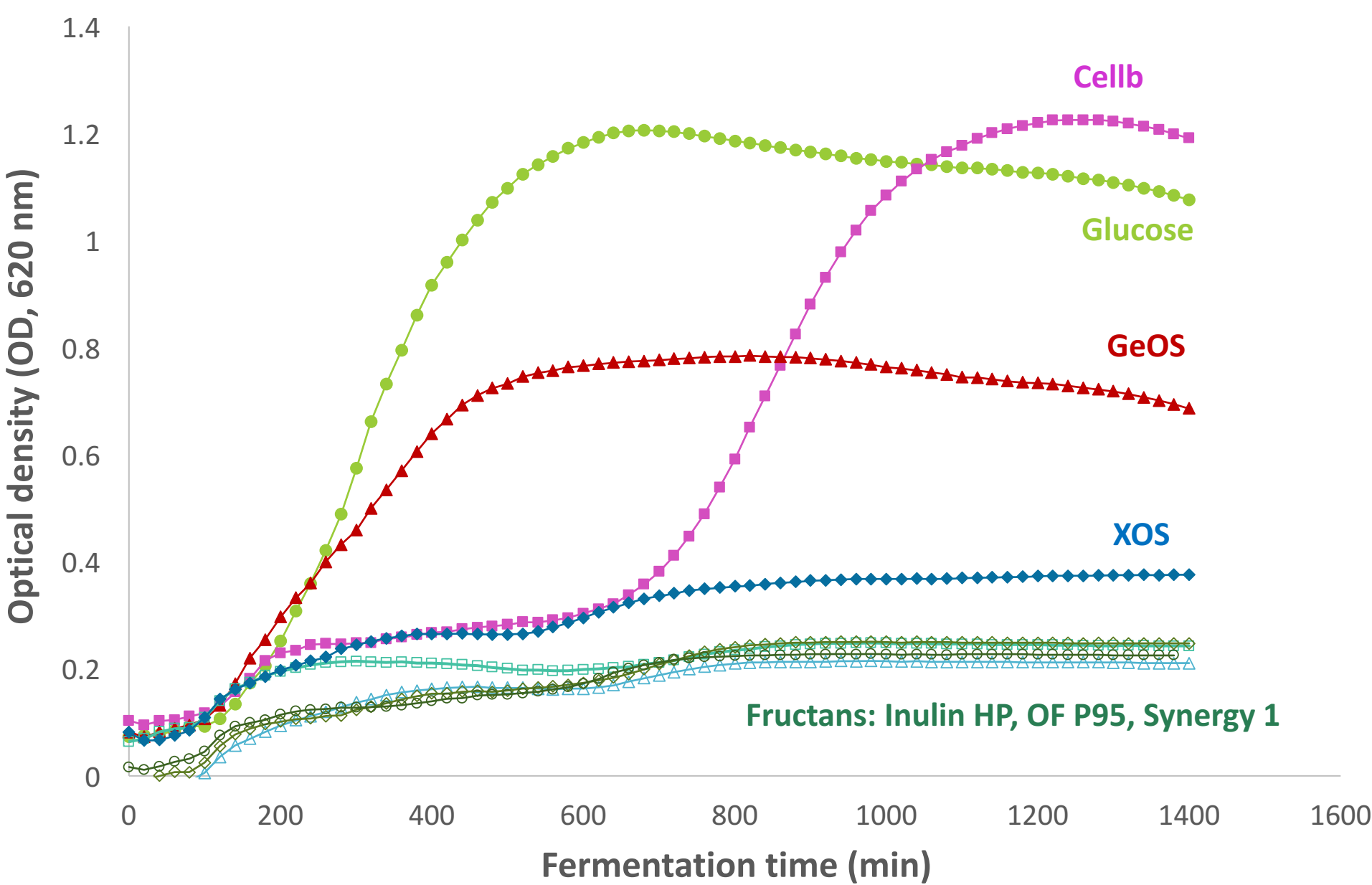
Combinations tested in batch culture:

Faeces	Cellb
Faeces + LR	Cellb + LR
Inulin	XOS
Inulin + LR	XOS + LR
GeOS	FOS
GeOS + LR	FOS + LR

GeOS: Gentiooligosaccharides
XOS: Xylooligosaccharides
Cellb: Cellobiose

Results

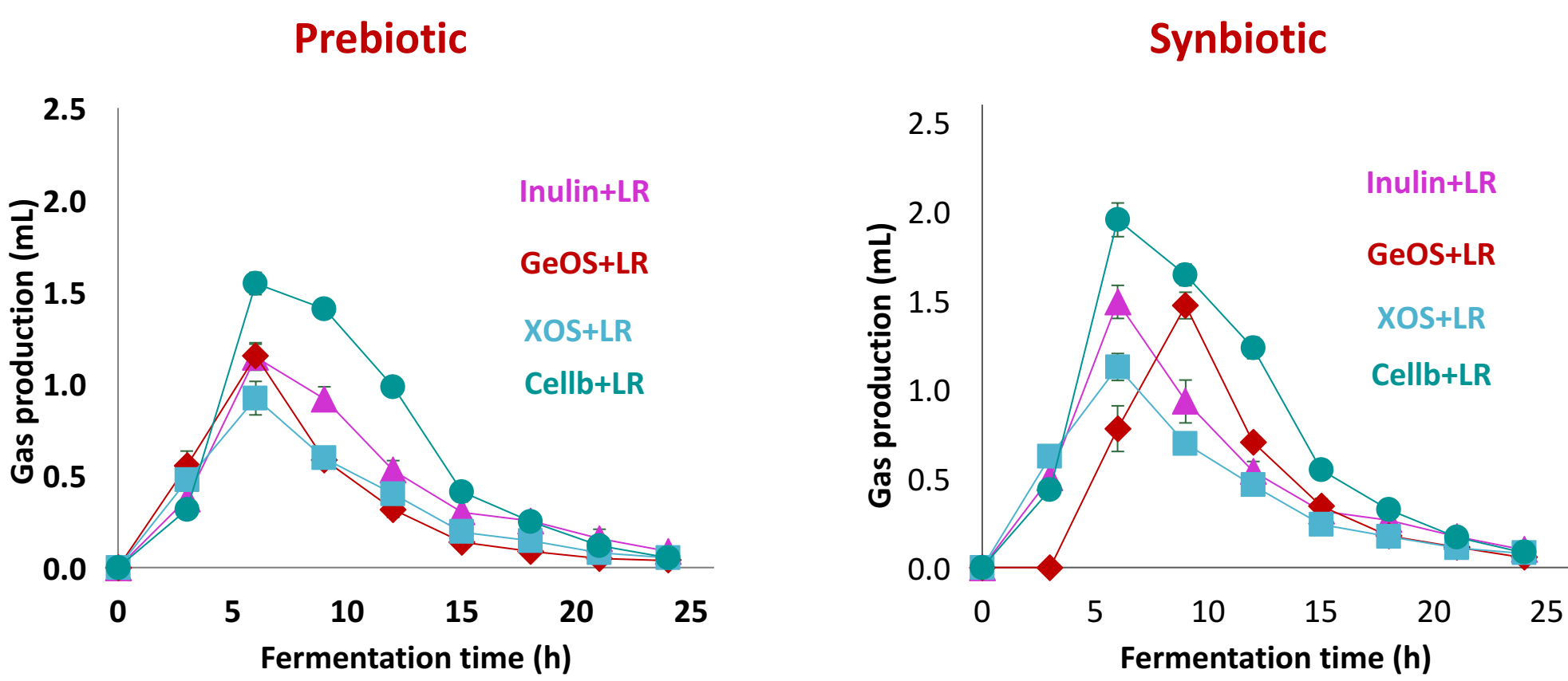
- Highest growth rates observed on cellobiose and gentiooligosaccharides followed by xylooligosaccharides and fructans



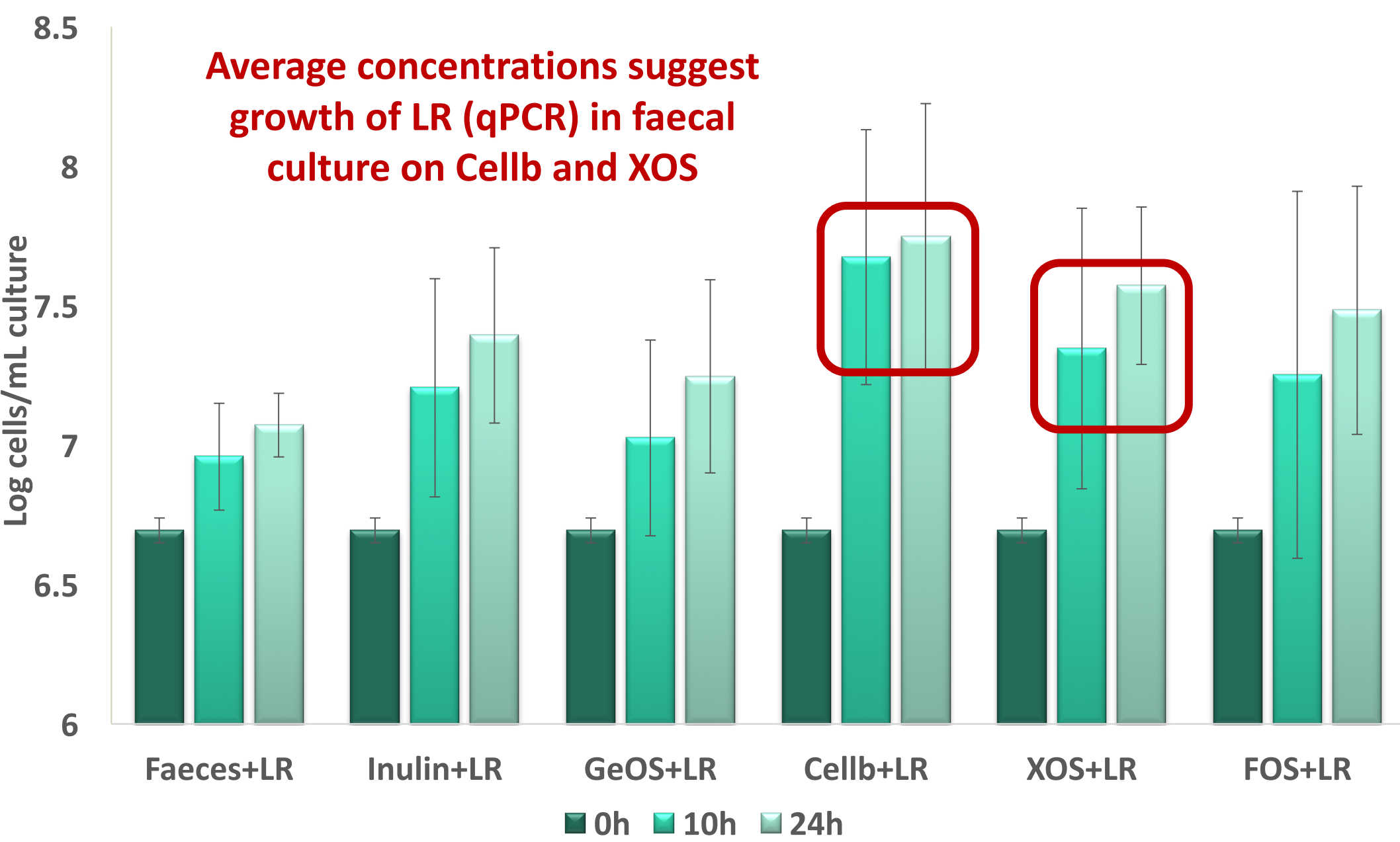
Pure culture growth of LR on substrates tested in faecal culture

Results

- Inulin and Cellb presented the highest rate of gas production within 10 h of fermentation. No significant differences between prebiotics and synbiotics noted



- XOS and Cellb supported significant increases in LR concentrations in pH controlled culture by qPCR
- Significant increases in *Bifidobacterium* populations (FISH) were also seen, together with increases in acetate levels by GC-FID



Future Research

XOS and Cellb extracted from sustainable resources will be evaluated further as specific prebiotics for LR

Enzymatic synthesis of novel oligosaccharides employing the enzymes secreted by LR will be carried out

Study Highlights

XOS and Cellb can be used to support the growth and activity of LR within the GIT

These mixtures will be developed into an optibiotic, an optimised synbiotic to modulate the microbiome