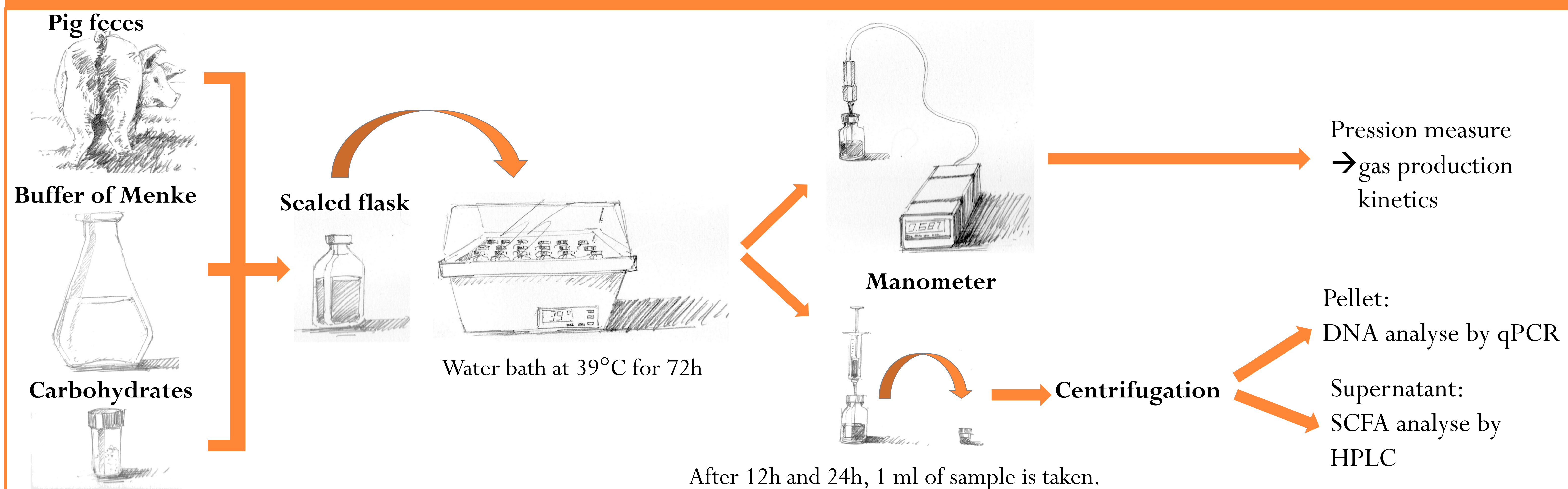


Introduction

- Prebiotics are non-digestible food ingredients that stimulate the growth and/or activity of bacteria in the digestive system in ways claimed to be beneficial to health.
- Promising prebiotic must have bifidogenic and butyrogenic effects and good gas production kinetics.
- An *in vitro* gas-test experiment was carried out in order to establish the prebiotic potential of 6 groups of carbohydrates: pectic oligosaccharides (POS), pectin, cellobiose, gluconic acid and isomaltooligosaccharides (IMO). Inulin was used as control.
- This *in vitro* test allows screening and then select the best prebiotic to *in vivo* test. The gas-test thereby decreases the number of animals used for the research.

Aim of the work: To classify new functional carbohydrates intended for human health

Material and methods



Results

To quantify the prebiotic potential (selective fermentation), a prebiotic index (PI) is calculated as follows:

$$PI = (Bif/Total) - (Bac/Total) + (Lac/Total) - (Clos/Total)$$

Tab 1: PI of carbohydrates (fermentation at 0.667% (w/v) at 7.6 pH)

	PI scores	
	12 hours	24 hours
IMO	0.92	1.52
Gluconic acid	1.00	0.65
Inulin	0.65	1.1
Pectin	-0.35	-0.84
POS	-0.38	-0.60
Cellobiose	-1.23	-0.31

Fig 1: Evolution of Bifidobacteria during the *in vitro* fermentation for different carbohydrates

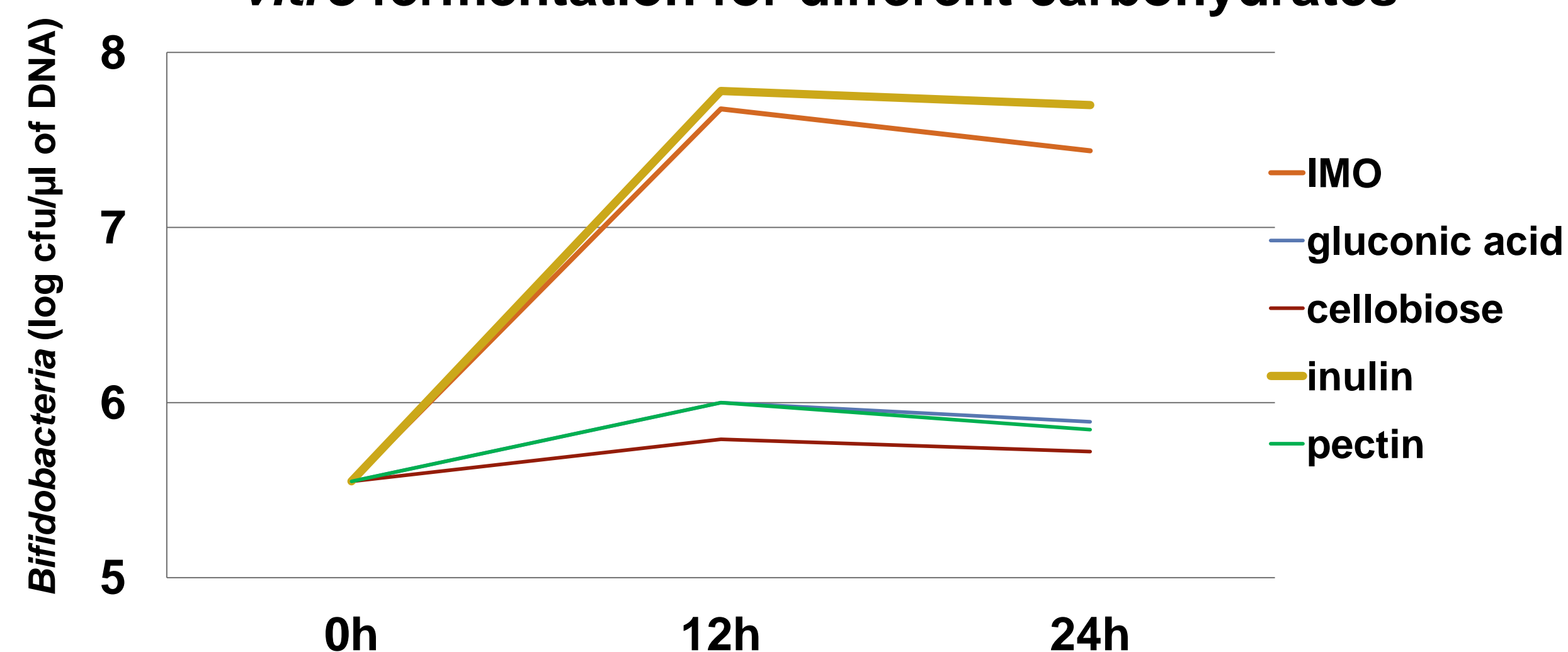
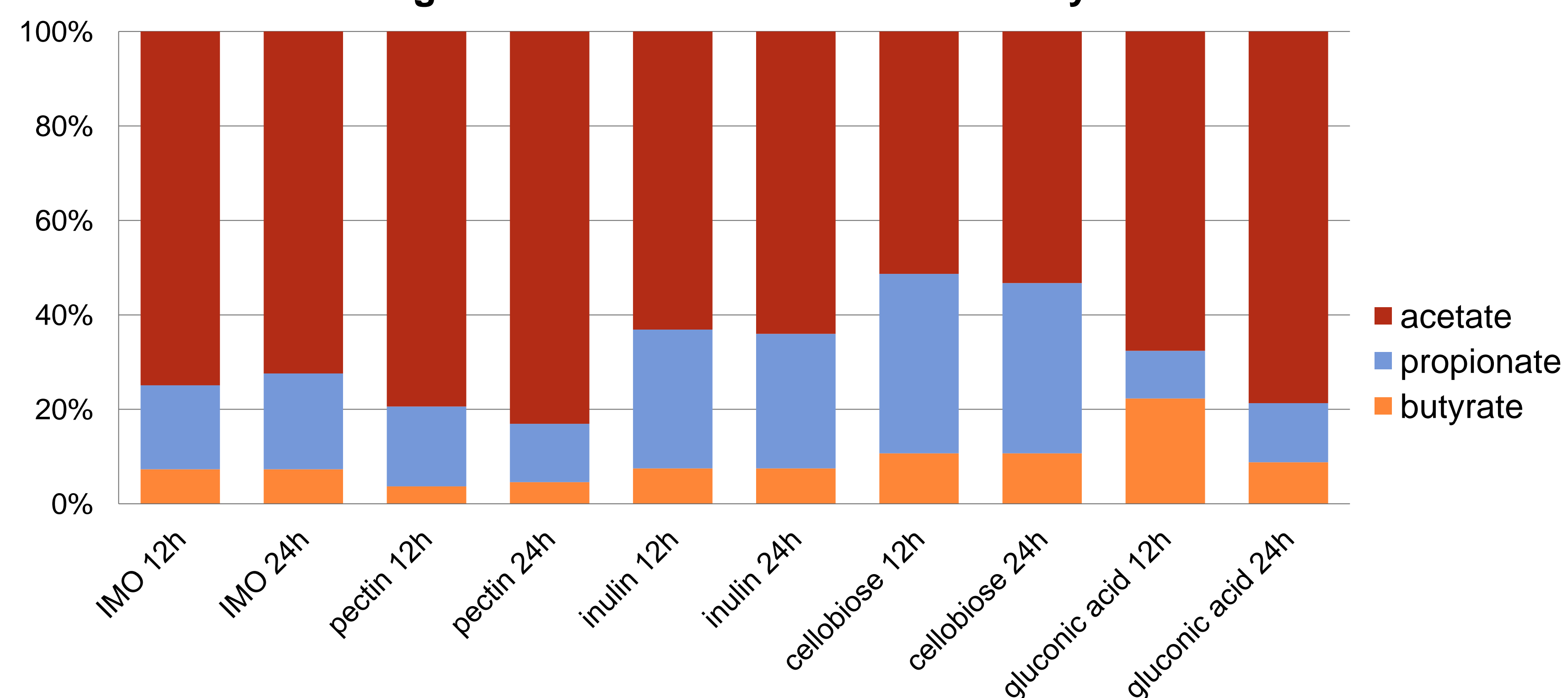


Fig 2: SCFA ratios of different carbohydrates



IMO are the best carbohydrates tested during the experiment; they show as high bifidogenic and butyrogenic effects as inulin (fig 1 & 2). The gas production kinetics are also similar to inulin but the IMO fermentation rate is lower.

Gluconic acid proves to be butyrogenic. It produces less *Bifidobacteria* than inulin (fig 1). Its prebiotic index is however higher after 12h of fermentation (tab 1). It produces more gas and ferments slightly later than inulin.

Cellobiose is butyrogenic (fig 2). However, it does not favour a healthy flora (Fig 1), which explains its low prebiotic index (tab 1). Cellobiose ferments later than inulin and its fermentation rate is the highest.

Most pectin studied ferment later than the other substrates. Their butyrate ratio is the lowest compared to the other carbohydrates tested. Their prebiotic index scores are close to the cellobiose ones (tab 1). They produce less *Bifidobacteria* than inulin (fig 1).

Conclusion

Without using animals, the gas-test enabled the classification of the tested carbohydrates according to their prebiotic potential and gives following classifications: IMO=inulin > gluconic acid > cellobiose > pectin=POS