



In vitro fermentation of in vivo undigested human dietary protein sources by human and porcine faecal inoculum

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Background

- Protein fermentation is often regarded as an undesired process
- Limited information on the fermentability of proteins
- Pig gastrointestinal tract is very similar to human's

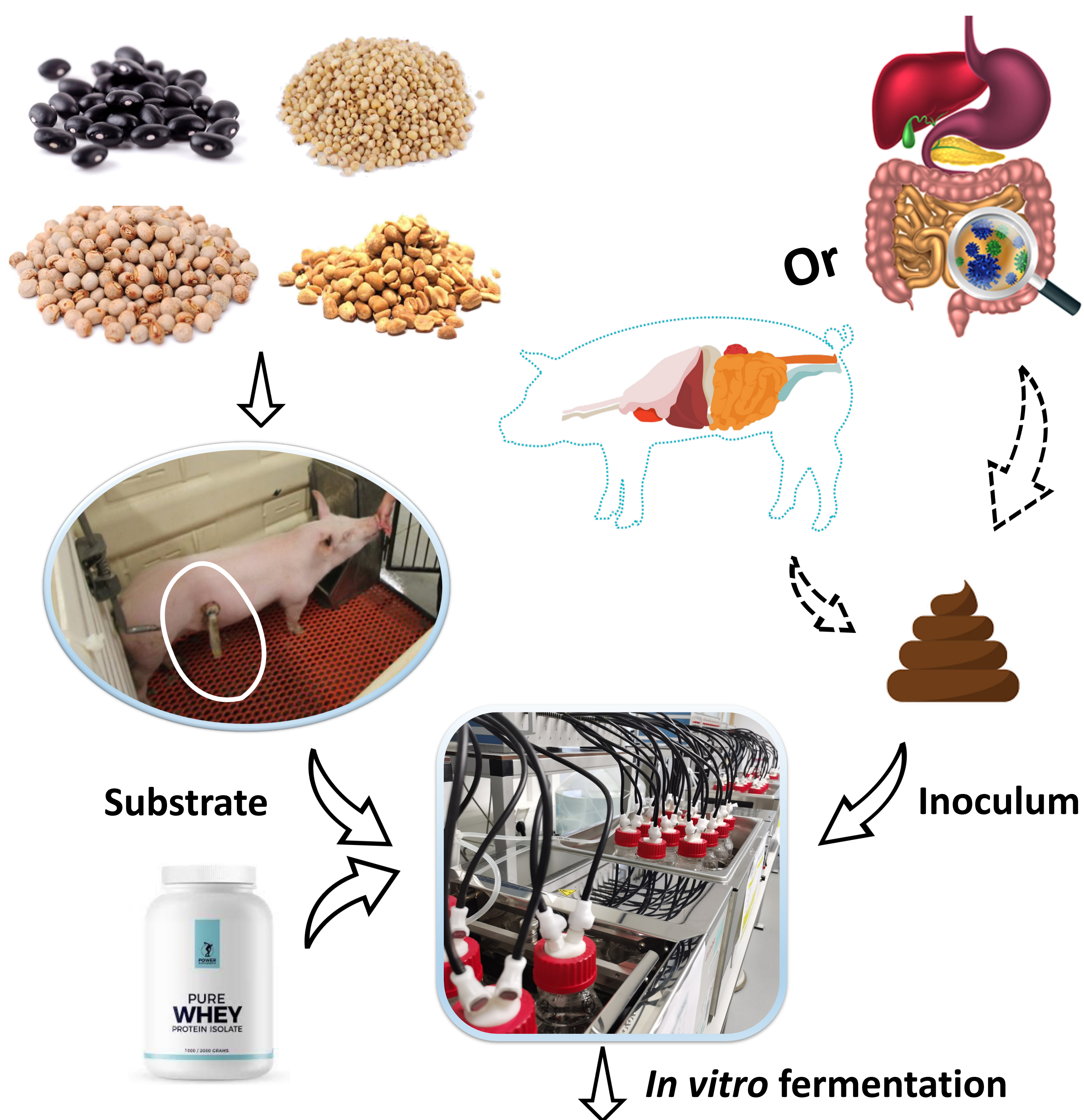
Aim

- Investigate the effects of **donor species** on **protein fermentation**
- Evaluate the **fermentation of different human dietary proteins**

Material & Methods

- ✓ *In vitro* gas production technique
- ✓ **Human** (n=5) or **porcine** (n=20) **faecal inoculum**
- ✓ N limiting environment: N-free buffer + fermentable carbohydrates

- Whey protein isolate (WPI) as positive control
- **Ileal digesta** from pigs fed with black beans/sorghum/pigeon peas/roasted peanuts



- ☐ Gas production (GP) curves for 48 h
- ☐ Maximum gas production rate (R_{max})
- ☐ Cumulative GP before the start of the microbial turnover phase (GP_s)
- ☐ Time of GP_s (T_{GP_s})
- ☐ The slope of the linear microbial turnover

Results

- GP reached plateau around 20h and the cumulative GP of all the substrates were around 200ml (Fig.2)
- Samples showed **higher variance** with **pig inoculum**

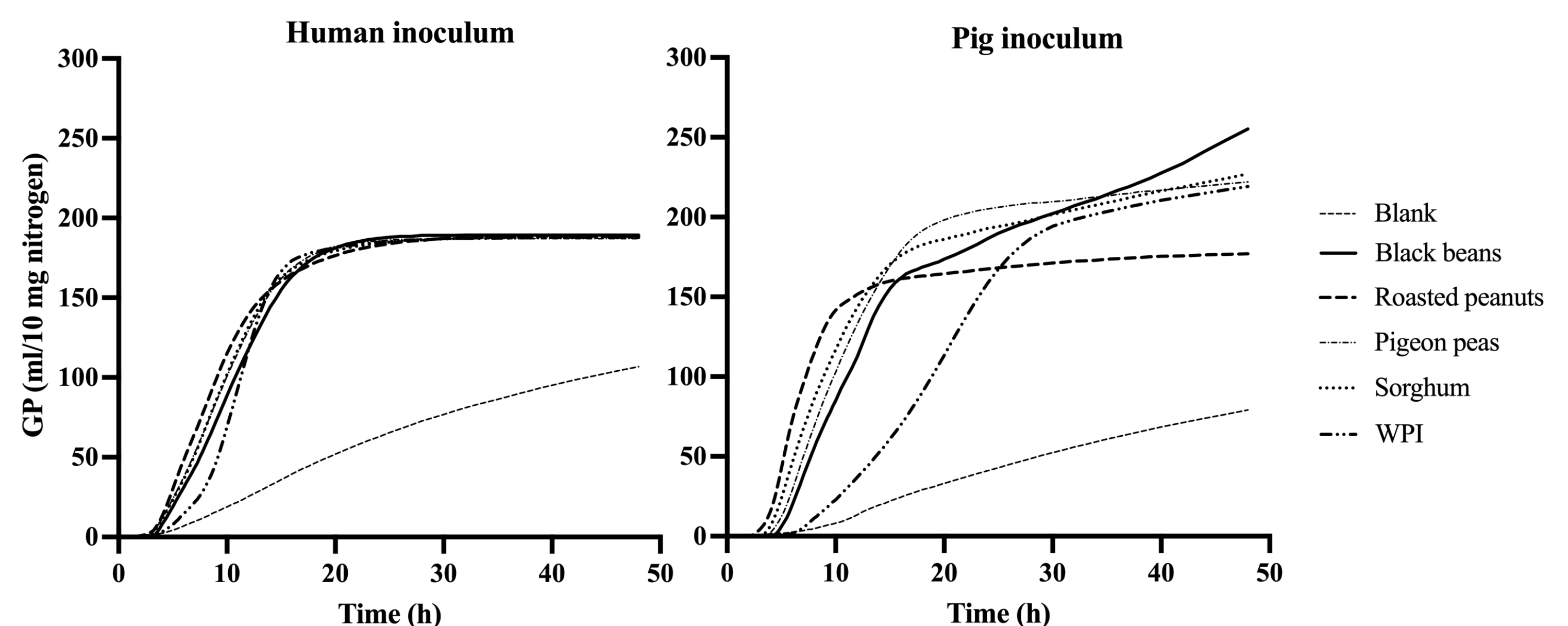


Figure 2. Measured 48 h *in vitro* cumulative gas production (GP) of human or porcine faecal inoculum (Blank), whey protein isolate (WPI) and porcine ileal digesta samples fed with different human dietary protein sources. N=3

- GP_s, T_{GP_s} for peanuts and sorghum: higher with **human** inoculum
- R_{max} for black beans and peanuts: higher with **pig** inoculum
- **Slope (microbial turnover):** 32-64 times higher with **pig** inoculum

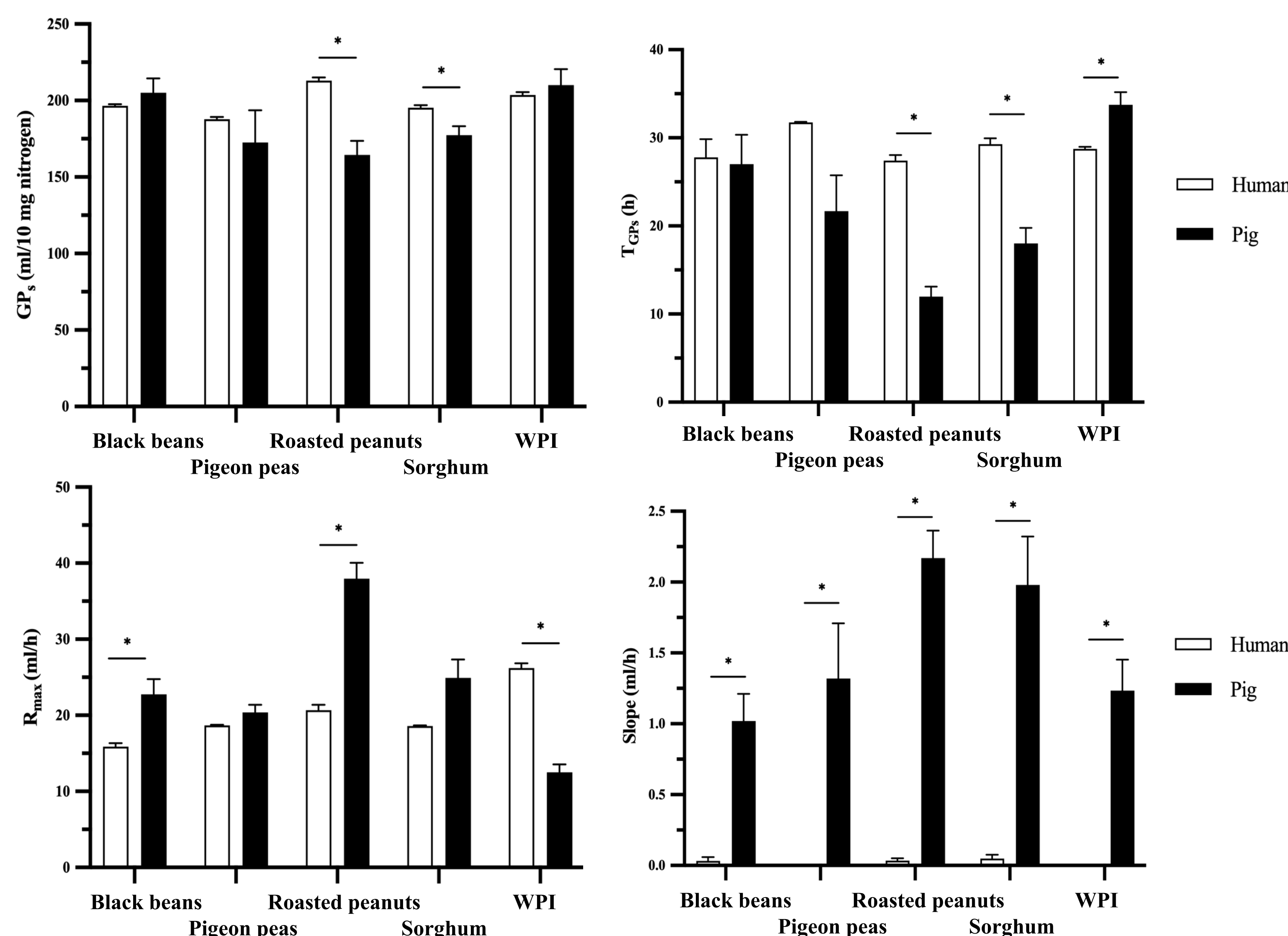


Figure 3. Mean \pm SD cumulative GP before the start of the microbial turnover phase (GP_s), time of GP_s (T_{GP_s}), maximum gas production rate (R_{max}) and the slope of the linear microbial turnover during the *in vitro* incubation of human or porcine faecal inoculum (Blank), whey protein isolate (WPI) and porcine ileal digesta samples fed with different human dietary protein sources. N=3

Conclusions

- 1) Human and porcine faecal microbiota ferment ileal-undigested proteins, peptides, and amino acids **differently**
- 2) For *in vitro* assessment of protein fermentation, the **donor-species** of the faecal inoculum should be selected carefully as different rank of fermentability was found based on GP_s and R_{max}

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