Preliminary study of xylo-oligosaccharides role as prebiotics in piglets using the in vitro cumulative gas production technique

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Final degree project | June 2020

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BACKGROUND

Weaning occurs early in life, especially when it comes to digestive maturity.

There is a need to study nutritional strategies to reduce the impact on the intestinal tract suffered by piglets at this stage.

Prebiotics can have a beneficial impact on the health and intestinal microbiota.

HYPOTHESIS AND OBJECTIVE

The microbiota of weaned piglets has more ability to successfully ferment xylo-oligosaccharides than those still in lactation phase

The inoculum obtained from the faeces will offer a response like the one shown by those of the cecum

The prebiotic role of xylo-oligosaccharides is preliminarily assessed from their in vitro fermentation by the inoculum of piglets belonging to the different production phases of lactating or post-weaning piglets.

MATERIALS AND METHODS

Sampling → Remove the cecum and a section of the rectum from

- 4 suckling piglets from different litters → 18 days of life
- 4 weaned piglets from different pens → 60 days of life

Suckling/weaned piglet; number x; cecum/faeces sample

1	2	3	4	5	6
CRT	CRT	LOW	LOW	HIGH	HIGH

Figure 1. Flasks representation for each sample of each of the piglets. There are two replicas for each control flask (CRT), flask with 0.1 g XOS (LOW) and flask with 0.5 g XOS (HIGH).

96 incubation mediums

- Buffer (45 mL) → distilled water, macro and microminerals, reducing and indicator agents
- Inoculum of the faeces or cecum of each piglet (5 mL)
- XOS dose → control (CRT), 0.1 g XOS (LOW) or 0.5 g XOS (HIGH)

Mixed under a constant infusion of N_2 to create an anaerobic environment

Fermentation and in vitro cumulative gas production technique described by Theodorou et al. (1994).

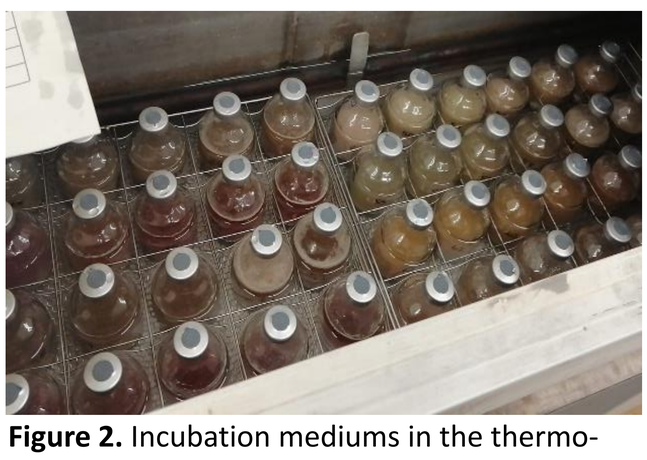

Figure 2. Incubation mediums in the thermo-adjustable water bath.

Locking with an encapsulator and deposited in a thermo-adjustable water bath at 39 ºC (figure 2)

The pressure of each medium was measured in each time set using an HD 8840 portable manometer.

RESULTS

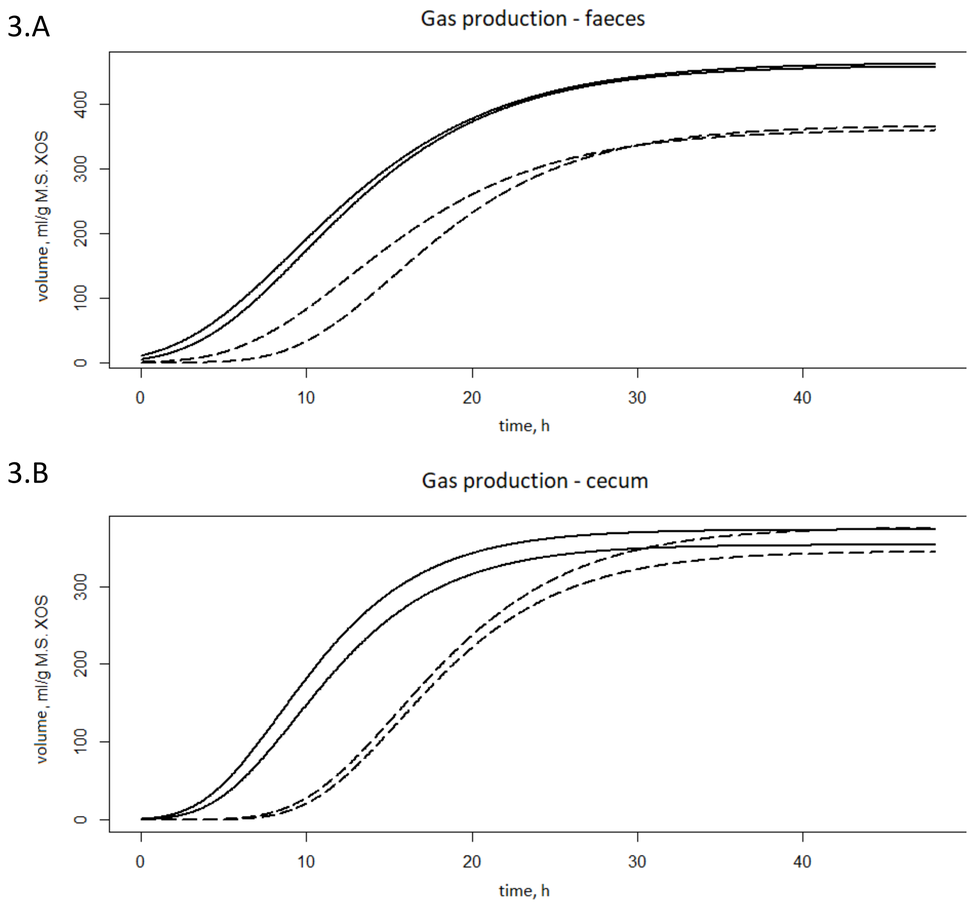

Figure 3. Regression of the accumulated gas production data (mL/g MS XOS) with the Gompertz model of the faeces samples (3.A) and cecal content (3.B) of weaned piglets (continuous lines) and suckling (broken lines).

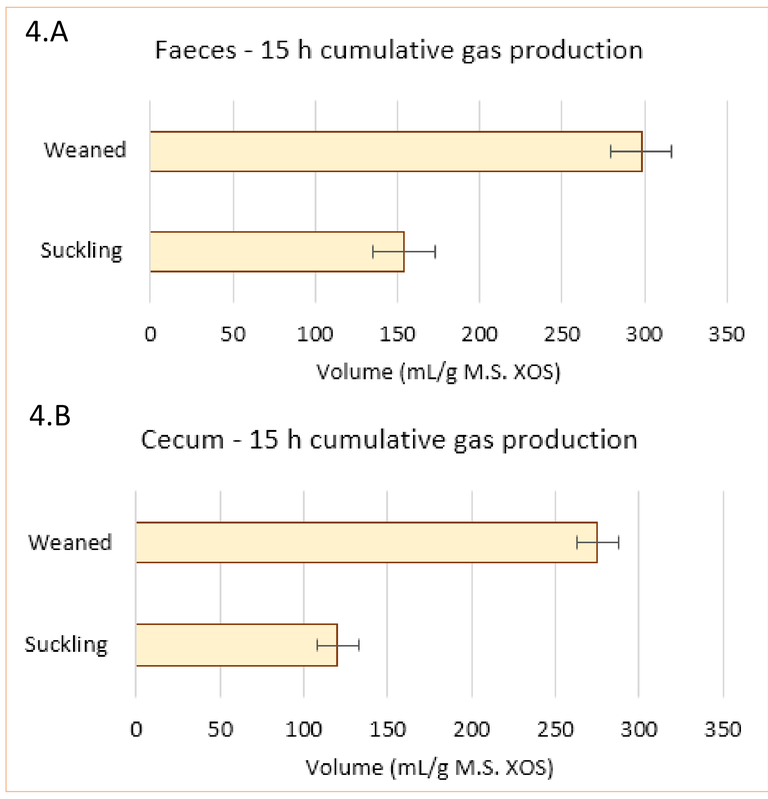

Figure 4. Bar charts of cumulative gas production (mL/g M.S. XOS) at 15 hours of incubation. Comparison between weaned and suckling piglets for both faeces (4.A) and cecum (4.B) samples.

CONCLUSIONS

Weaned piglets' microbiota was able to ferment XOS more efficiently than suckling

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Higher accumulated final gas volume than suckling piglets

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The microbiota of suckling piglets required longer adaptation time to begin the fermentation process

Faeces are good candidates for evaluating fermentation

Suckling piglets' microbiota has the potential to ferment XOS, so they could play an important role as a prebiotic in piglets of this condition

Second trial

- Faeces as unique samples
- Larger sample size
- Evaluate higher doses of XOS