

Inclusion of sugary and salty food industry leftovers in post-weaning piglets: effects on gut microbiota and volatile fatty acids production

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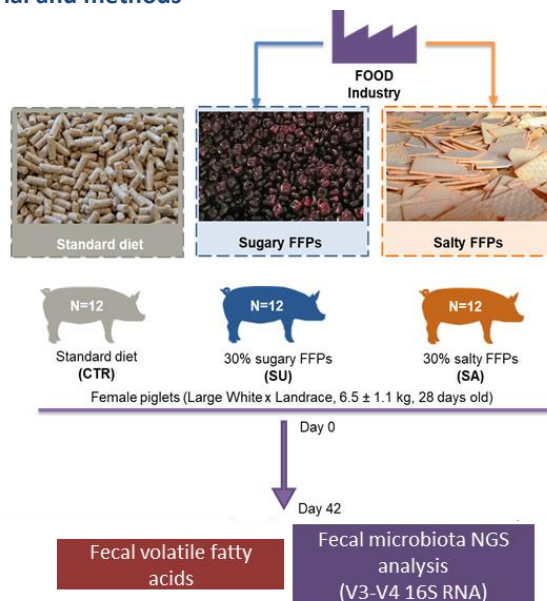
Introduction

Food can be lost or wasted during different steps of the manufacturing chain. Worldwide, there is over one billion tons/year of produced but uneaten food with over 102 million tons/year in the EU (EFFPA, www.effpa.eu). The recovery of food industry leftovers (FFPs) as animal feed could represent a strategy for both food waste reduction and food security challenges. The FFPs can be distinguished into two main categories: sugary confectionary FFPs (SU-FFPs), which include chocolate sweets, biscuits, cakes, and candies from confectionary industries, and salty FFPs from bakery production (SA-FFPs) such as bread and pasta. To our knowledge, the impact of partially replacing traditional ingredients with FFPs on the gut microbiota and intestinal volatile fatty acids production has not been extensively examined yet.

The present study aims to test the hypothesis that both sugary and salty FFPs as diet ingredients for post-weaning and growing pigs:

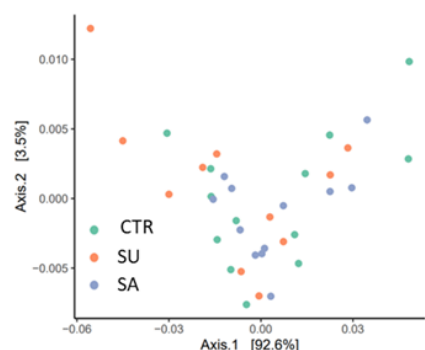
- do not impair the composition, evenness, and biodiversity of the gut microbiota;
- do not impact volatile fatty acids production.

Material and methods

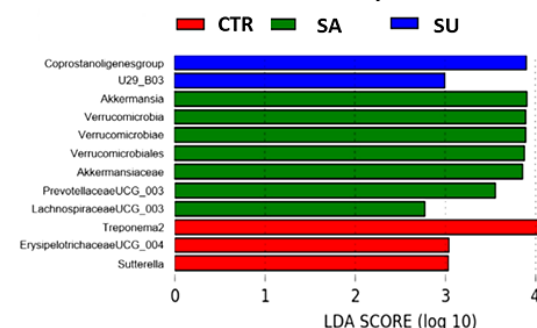


Results

Weighted Unifrac Beta diversity



Microbiota -Linear discriminant analysis of effect size



Statistics

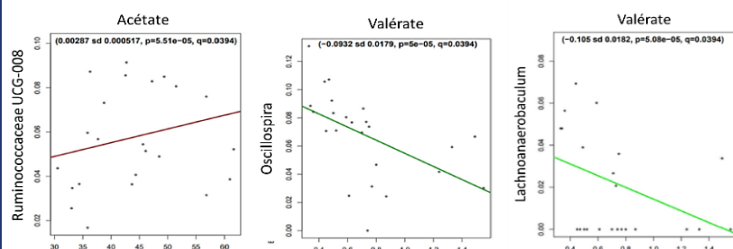
Microbiota:

in R v4.0.3.
R packages:
 phyloseq v1.26.1,
 vegan v2.5-5,
 microbiome v1.12.0,
 microbiomeutilities v1.00.15

Microbiota - volatile fatty acids correlations

MaAsLin
 (<https://huttenhower.sph.harvard.edu/maaslin/>)

Intestinal volatile fatty acids



Compared to the control, FFPs did not influenced the intestinal concentrations of acetate, propionate, butyrate and valerate. Ruminococcaceae UCG-008 positively correlated with intestinal acetate ($p < 0.001$), while Oscillospira and Lachnoanaerobaculum genera negatively correlated with intestinal valerate ($p < 0.001$).

Conclusion

The re-use of food industry leftovers to partially replace traditional ingredients in feed represents a promising strategy for a more sustainable food production. Because of the limited information on their effects on animal health and performance, leftovers have not been completely accepted as a source of feed yet. This study demonstrates that:

- sugary and salty food losses slightly influence the gut microbial population suggesting no detrimental effects on the gut health.
- no detrimental effects on intestinal volatile fatty acids production have been observed in pigs fed FFPs
- *Ruminococcaceae* positively correlated with acetate; *Oscillospira* and *Lachnoanaerobaculum* negatively correlated with valerate.

Long-term effects on pigs' gut health and behavior need to be further investigated.