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Enzymatically digested food waste altered the fecal microbiota of growing-finishing pig

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INTRODUCTION

- Food waste
  - Discarded food that is still considered safe and nutritious for consumption (FAO, 2019)
  - Nearly 50% of food waste is landfilled or incinerated in the U.S. (Buzby, 2014)
- Enzymatic digestion breaks down large nutrient components in food waste to make them easily digestible
- No difference observed in carcass characteristic and meat quality of growing-finishing pigs fed with enzymatically digested food waste (Jinno et al., 2018)

OBJECTIVE

To determine the fecal microbiota of growing-finishing pigs fed with enzymatically digested food waste.

MATERIALS AND METHODS

- 56 pigs: 32.99 kg, 7 replicate pens per treatment (2 barrows and 2 gilts per pen)
- 2 dietary treatments:
  - Corn-soybean meal diet (Control) or liquid enzymatically digested food waste (Food waste)
- 3-Phase feeding program:
  - Phase 1: d 0 to 28; pigs were fed with Control or FW
  - Phase 2: d 28 to 53; pigs were fed with Control or FW
  - Phase 3: d 53 to 79; pigs were fed with Control
- 16S rRNA sequencing at V4 region:
  - FastQC (v. 0.11.8) and Trimmomatic (v. 0.38): Quality evaluation and trimming
  - QIIME2 (2018.6): Compositional analysis
  - R program: Calculate and visualize data
- Measurements from fecal samples:
  - Relative abundance: phylum and family
  - *Firmicutes:Bacteroidetes* ratio
  - Alpha diversity: Observed & Shannon indices
  - Beta diversity: Bray Curtis PCoA
- Statistical analysis: Relative abundance and alpha diversity were analyzed by ANOVA using the PROC MIXED of SAS.

DIET COMPOSITIONS

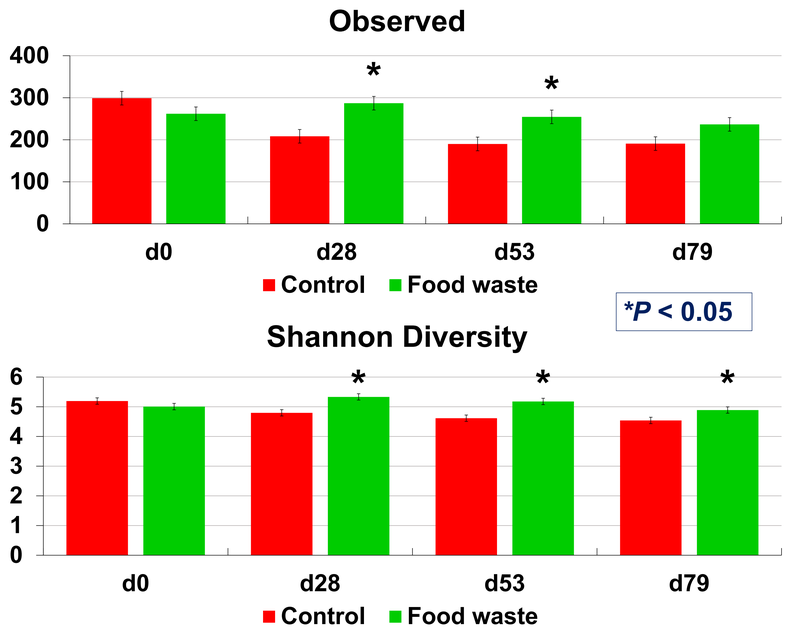
*Limestone, monocalcium phosphate, lysine HCL, DL-methionine, and threonine included	Control		
Item, %	Phase 1	Phase 2	Phase 3
Corn	68.2	74.4	77.7
Soybean meal	27.0	21.0	18.0
Soy oil	2.0	2.0	2.0
Salt	0.4	0.4	0.4
Vitamin-mineral	0.3	0.3	0.3
Other ingredients*	2.1	1.9	1.6

Analyzed nutrients, DM %	Control	Food waste
Dry matter	86.0	24.2
Crude protein	21.4	29.0
ADF	4.5	5.1
Crude fat	4.4	27.2
Ca	0.8	0.7
P	0.6	1.0

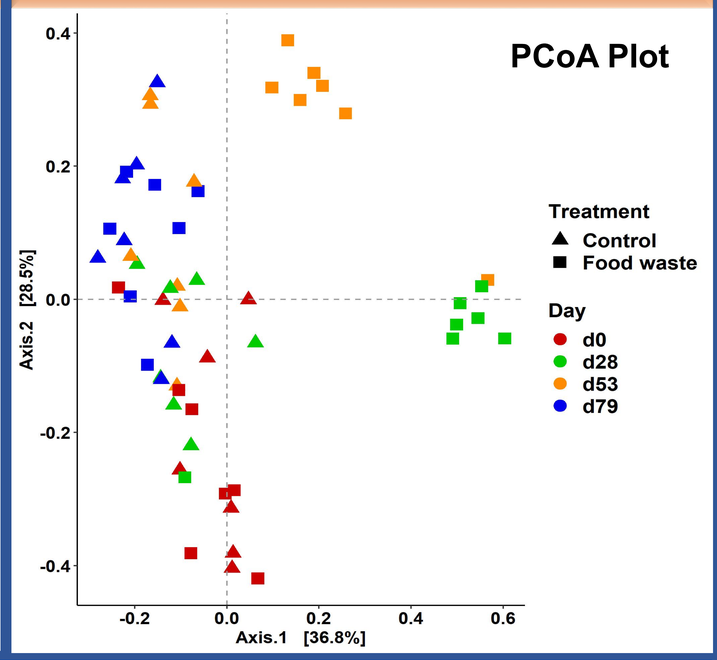
Item, %	Food waste
Enzymatically digested food waste	99.3
Salt	0.4
Vitamin-mineral	0.3

RESULTS

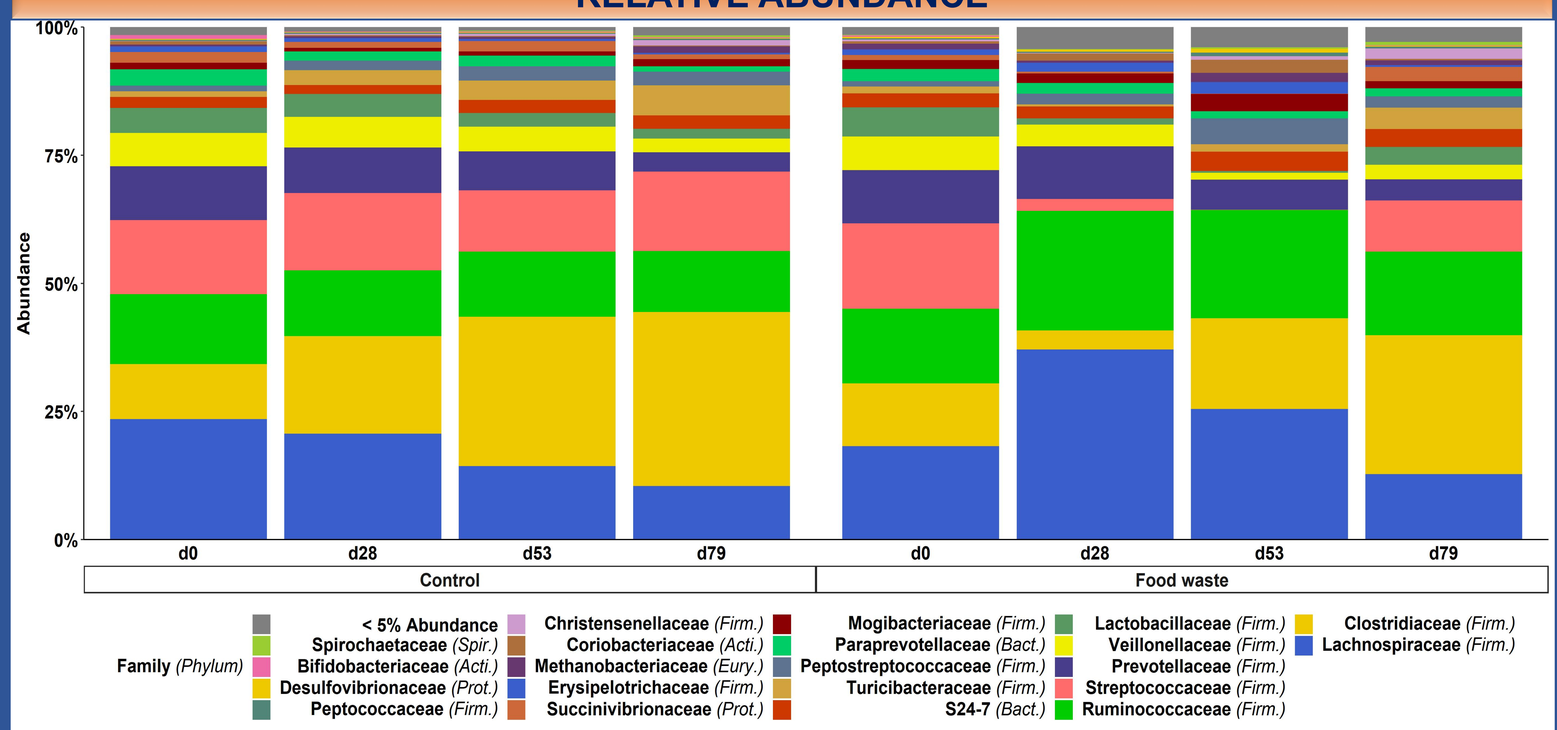
ALPHA DIVERSITY



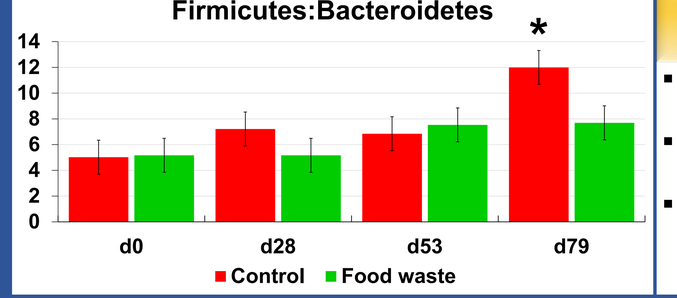
BETA DIVERSITY



RELATIVE ABUNDANCE



Firmicutes:Bacteroidetes



CONCLUSION

- Feeding enzymatically digested food waste alters microbial diversity within the gastrointestinal tract of growing-finishing pigs
- Different nutrient components in food waste diet most likely altered the microbial diversity
- Further analysis will evaluate the metagenomic of the microbiota of growing-finishing pigs fed with enzymatically digested food waste.

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