



Università di Foggia
Scienze Agrarie, Alimenti,
Risorse Naturali e Ingegneria



ISPRA
Istituto Superiore per la Protezione
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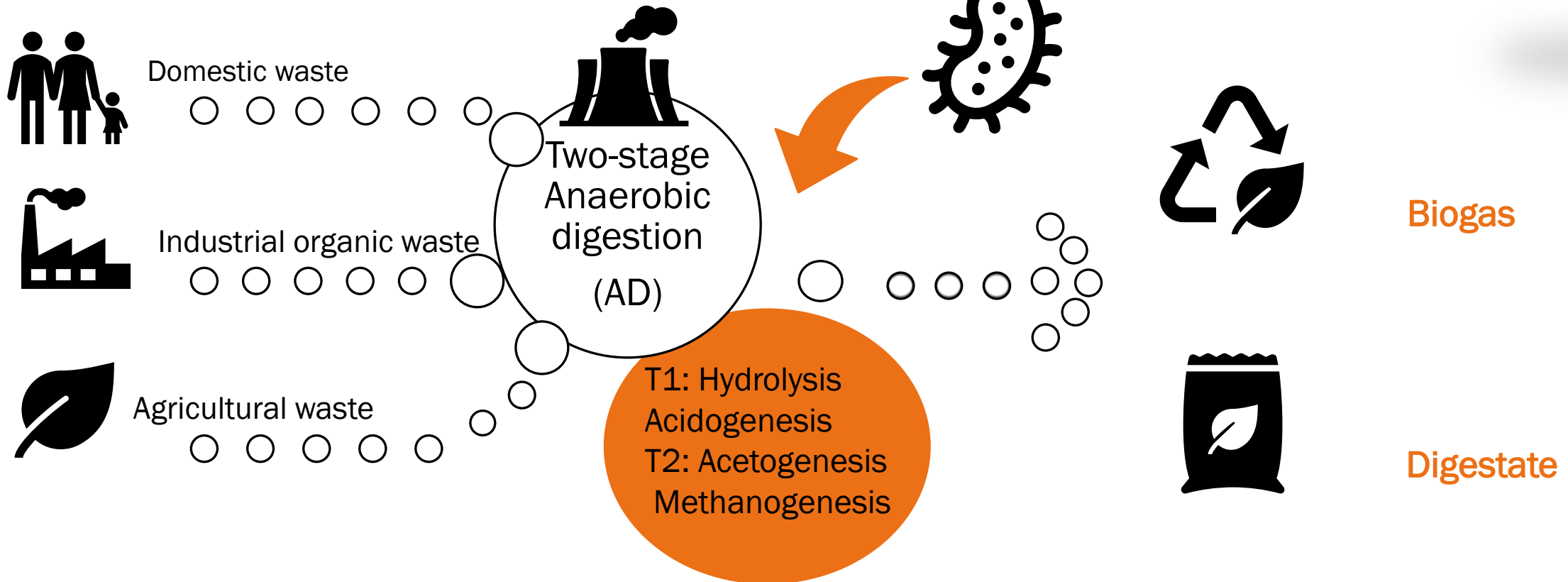
Effect of a partial substitution of energy crop with agricultural waste on the dynamics of bacterial communities in a two-stage anaerobic digester

FEDERICA PIERGiacomo, MICOL BELLUCCI, LUIGI BORRUSO,
LORENZO BRUSETTI AND LUCIANO BENEduCE*

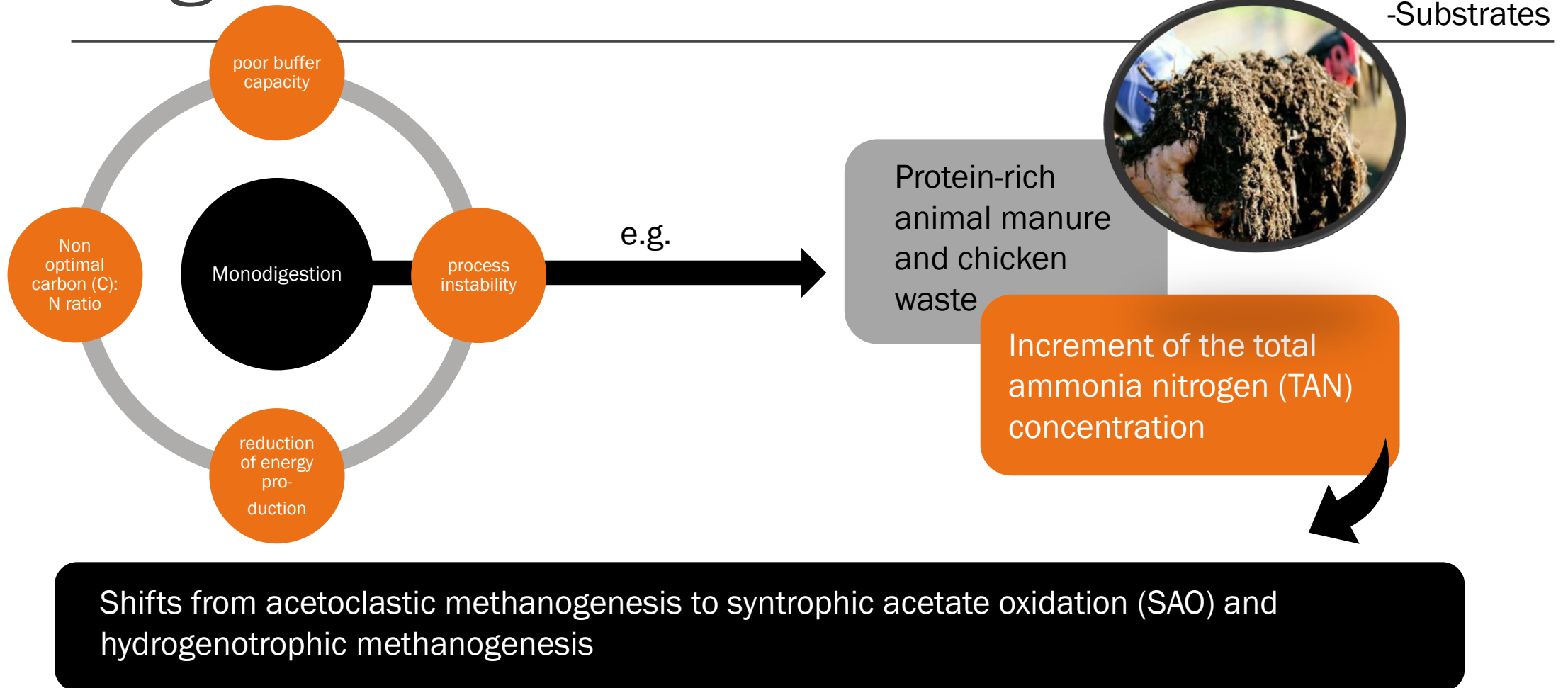
Background



-AD process



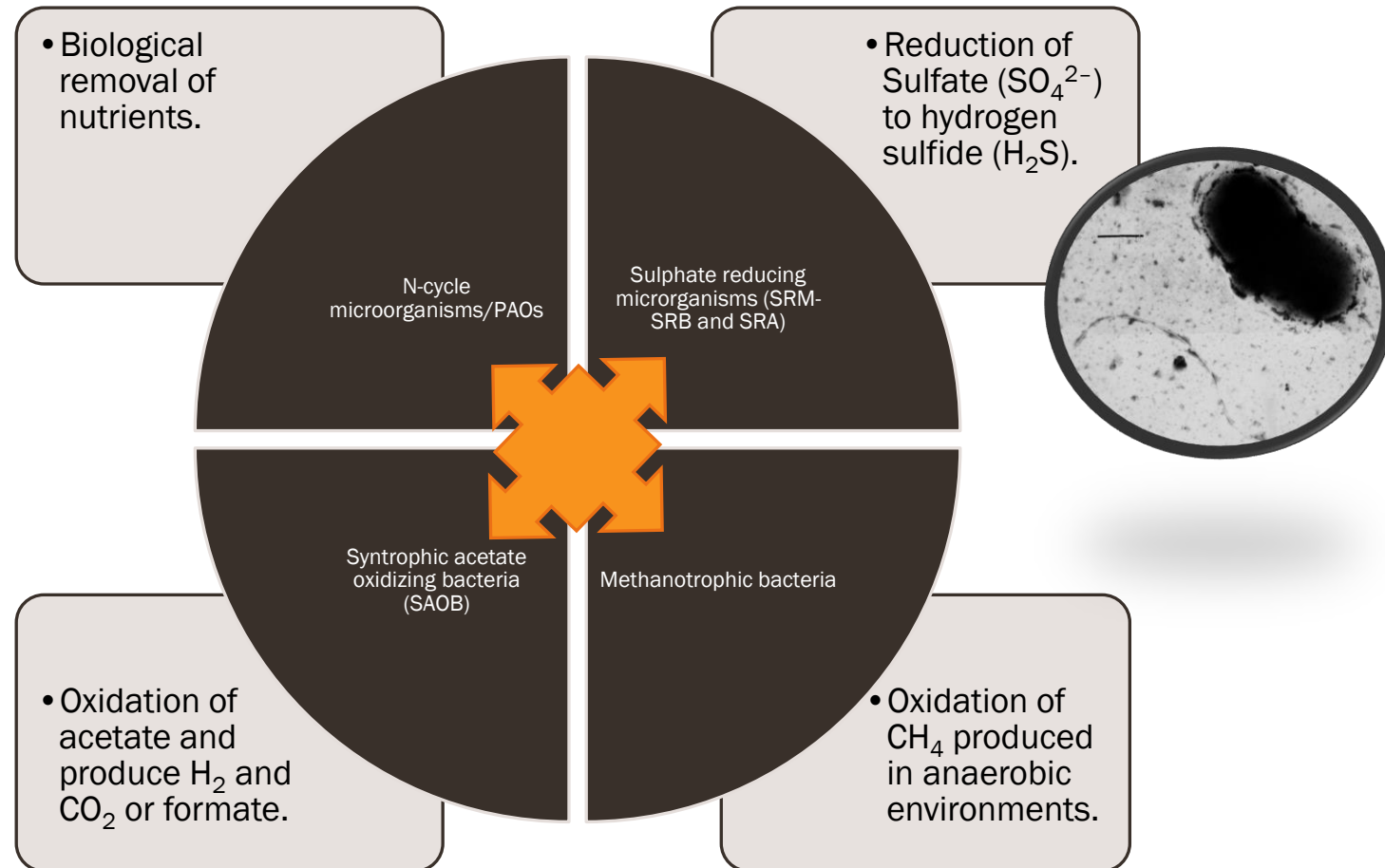
Background



Background



-Microbial Communities



Aim



The change in the digester feeding and in the carbon:nitrogen (C:N) ratio had been key factors in determining the bacterial and archaeal communities (Bellucci et al. 2019)



Extended analysis of the **bacterial populations** which could have competed or shifted also at relatively low level by means of 454-pyrosequencing and LEfSe method

Research Article



Received: 7 July 2019

Revised: 25 October 2019

Accepted article published: 20 November 2019

Published online in Wiley Online Library:

(wileyonlinelibrary.com) DOI 10.1002/jctb.6286

Microbial community dynamics and process performance of a full-scale two-stage anaerobic digester under the replacement from energy crop to poultry manure

Micol Bellucci,^{a,b}  Luigimaria Borruso,^c Lorenzo Brusetti,^c Pasquale Russo^a and Luciano Beneduce^{a*}

Materials and methods



5 months
monitoring



Cow manure and mixture of water, olive cake, kitchen poultry/manure and energy crop (ensiled maize, goat and triticale (poultry manure/litter (PML)) feeding



Slow replacement of energy crops with chicken manure, consequently reducing the C/N ratio



PCR amplification and 454-pyrosequencing



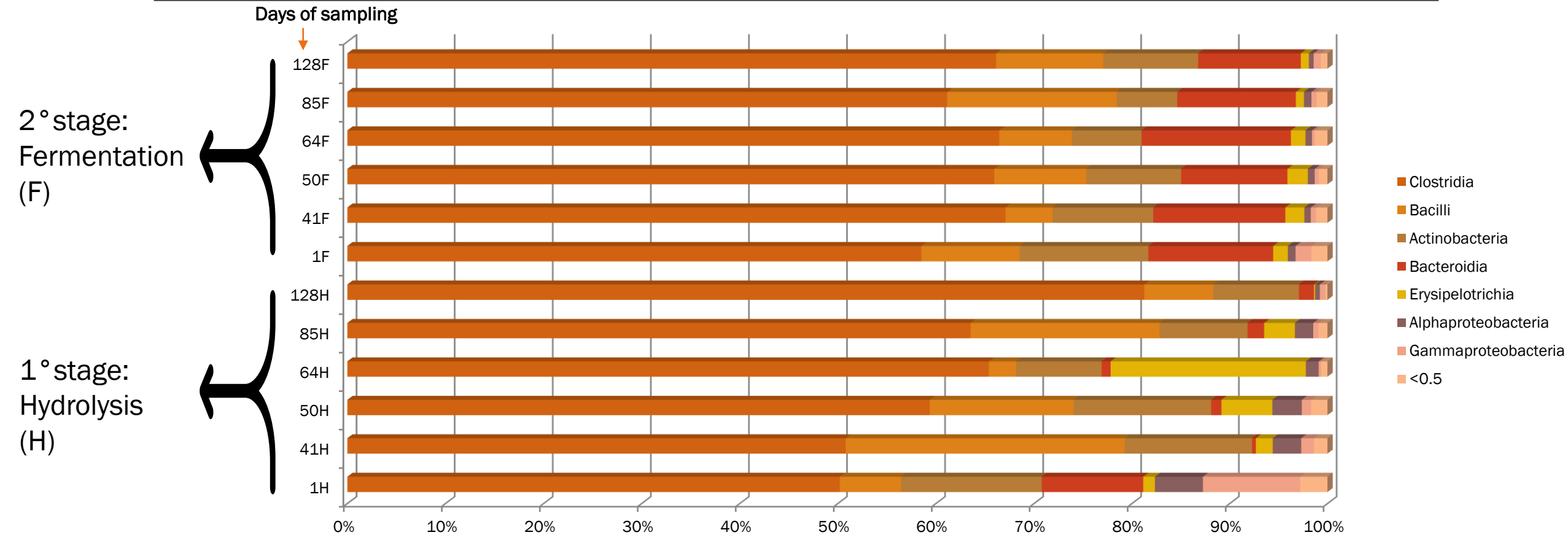
Statistical Analysis (Qime 2 and Lefse)



Results



-Sequencing analysis

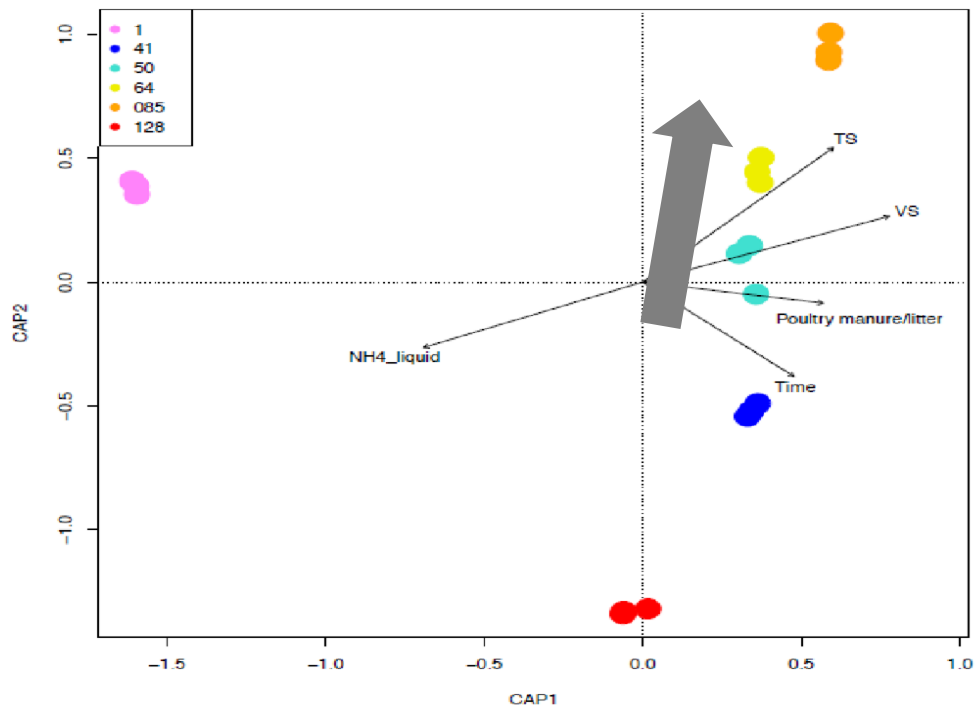


Results

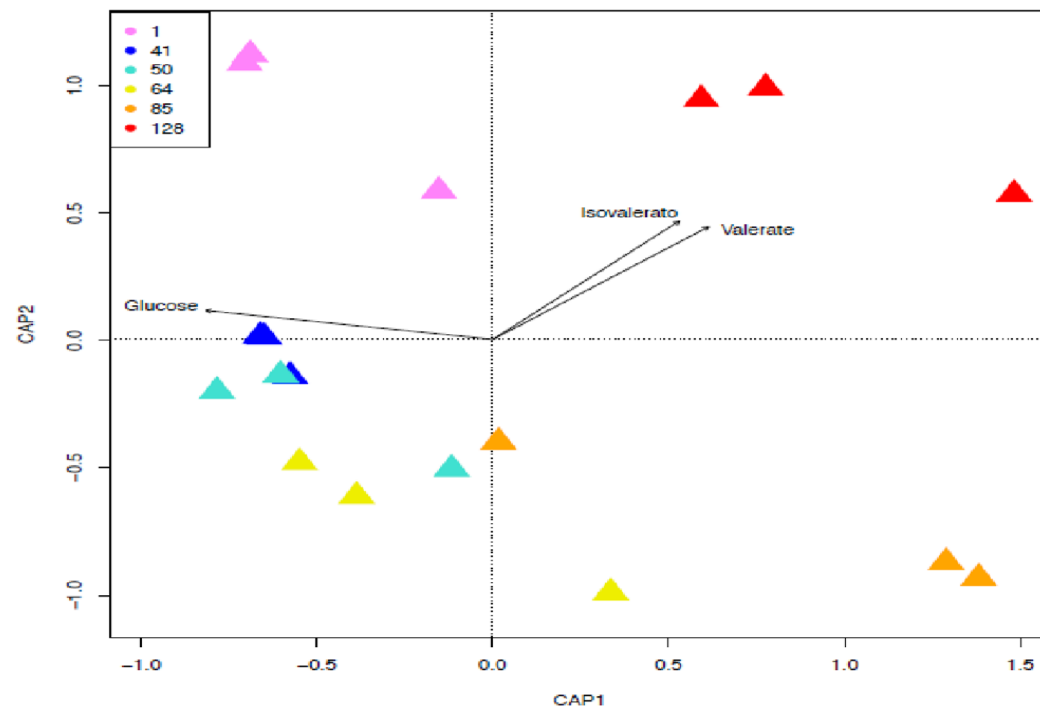


-PCA

1° stage: Hydrolysis (H)



2° stage: Fermentation (F)

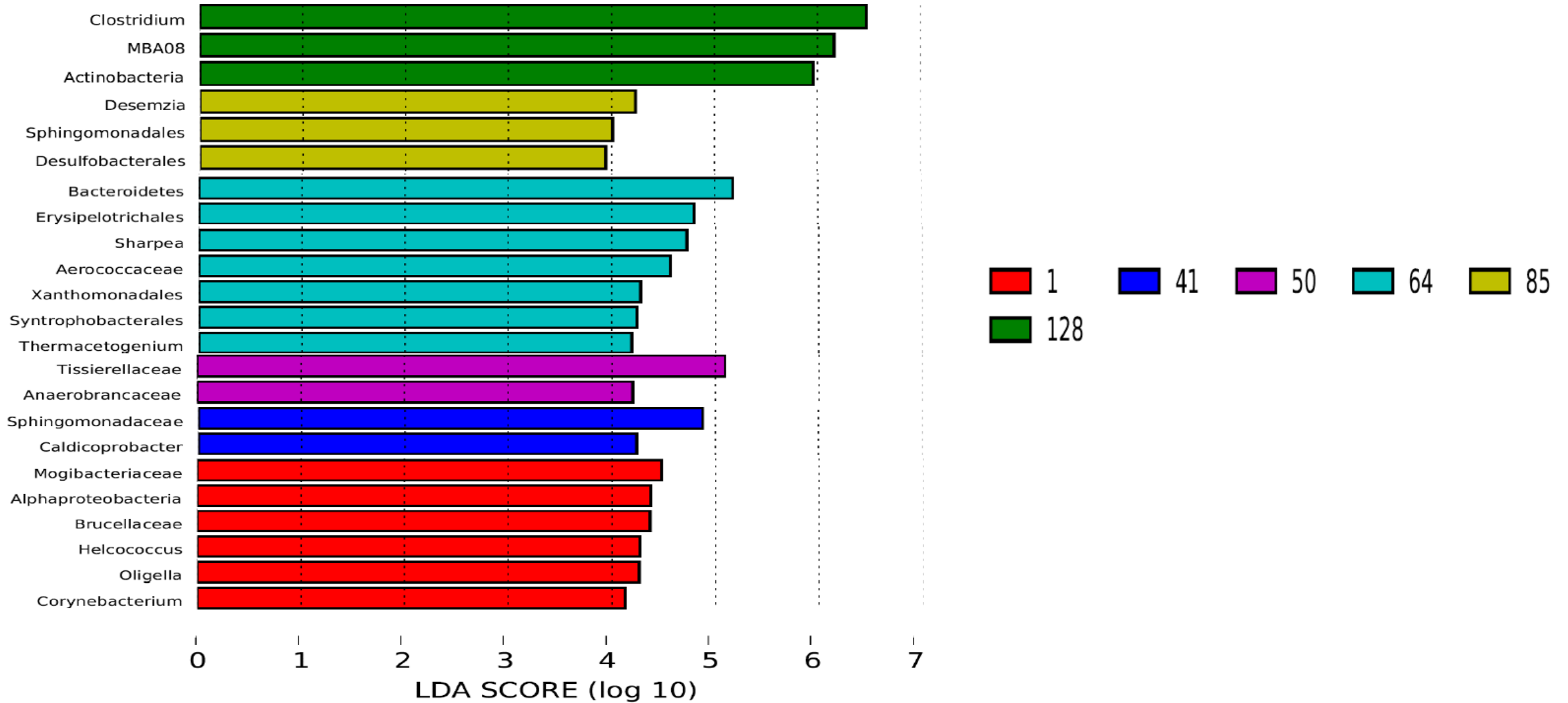


Results



1° stage: Hydrolysis (H)

- LEfSe

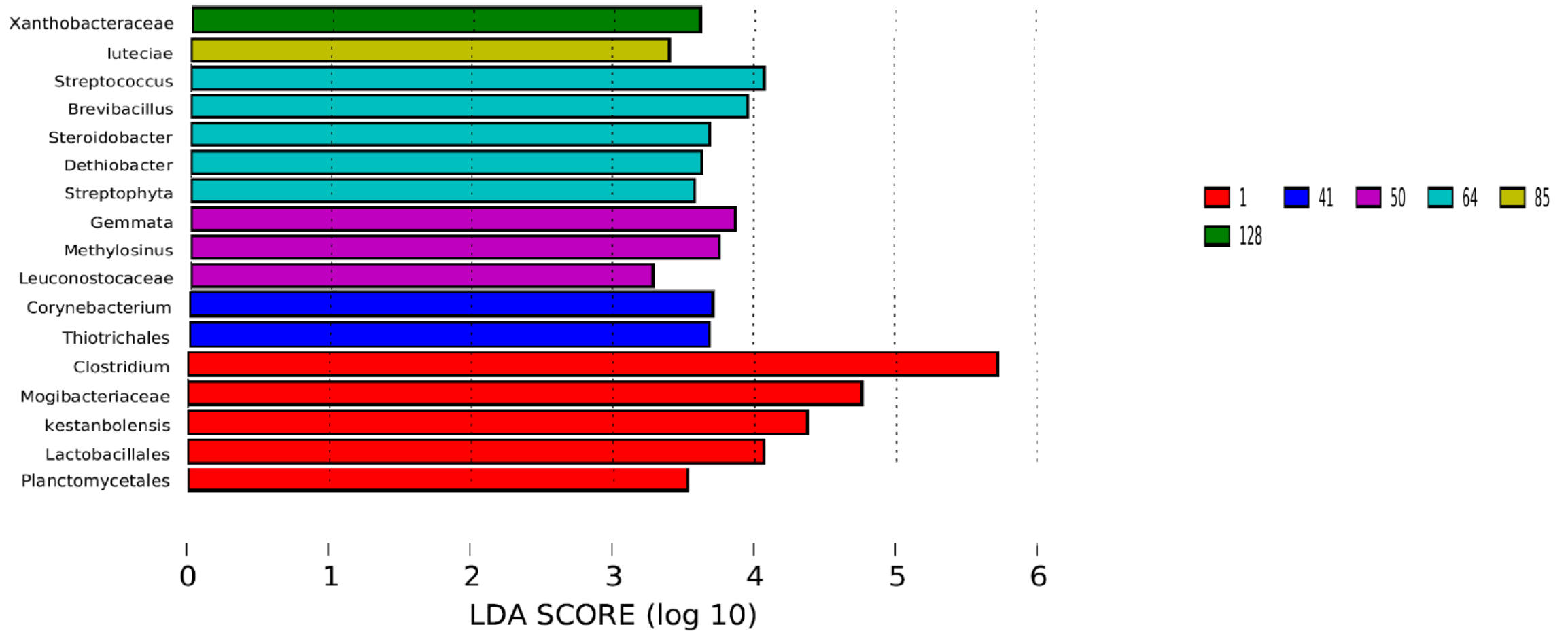


Results

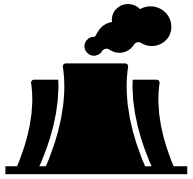


2° stage: Fermentation (F)

- LEfSe



Conclusions



- The change in the diet affected the bacterial community dynamics in both reactors, with interesting specific features;



- Hydrolysis reactor showed major bacterial community dynamics related to sulphate reducing and syntrophic acetate oxidizing taxa,
- Methanogenic bioreactor showed more dynamical OTUs were the ones related to cellulose degradation and potential anaerobic ammonia oxidation;



- Further studies will confirm the influence of different food waste feeding on specific bacterial populations;
- More investigation is needed about SAO and Anammox.

A hand is shown placing a white domino with a grey scribble on top onto a line of dominoes that are falling in a chain reaction. The dominoes are white with various colored dots (red, green, blue, yellow) and icons (people, a mouse). The background is a solid blue color.

Thank you!



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