

# Improving decomposition and reducing fill-up in traditional pit-latrines

Jeroen Ensink, Belen Torondel, Steven Sugden, Viet-Ahn Nuygen & Walter Gibson

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# Who are we?

- Project run by the London School of Hygiene and Tropical Medicine
- Funded by a five-year grant (2009-14) from the Bill & Melinda Gates Foundation
- Leading global partners from academia, development and business
- International Advisory Group of sanitation, scientific, development and new-business experts
- [www.sanitationventures.com](http://www.sanitationventures.com)



# Objectives

## workstream 2 & 3

- To analyse pit latrine contents for the identification of major targets for accelerated decomposition
- To identify the influence of pit design, pit usage, environmental conditions and location on decomposition rates and pit lifetime

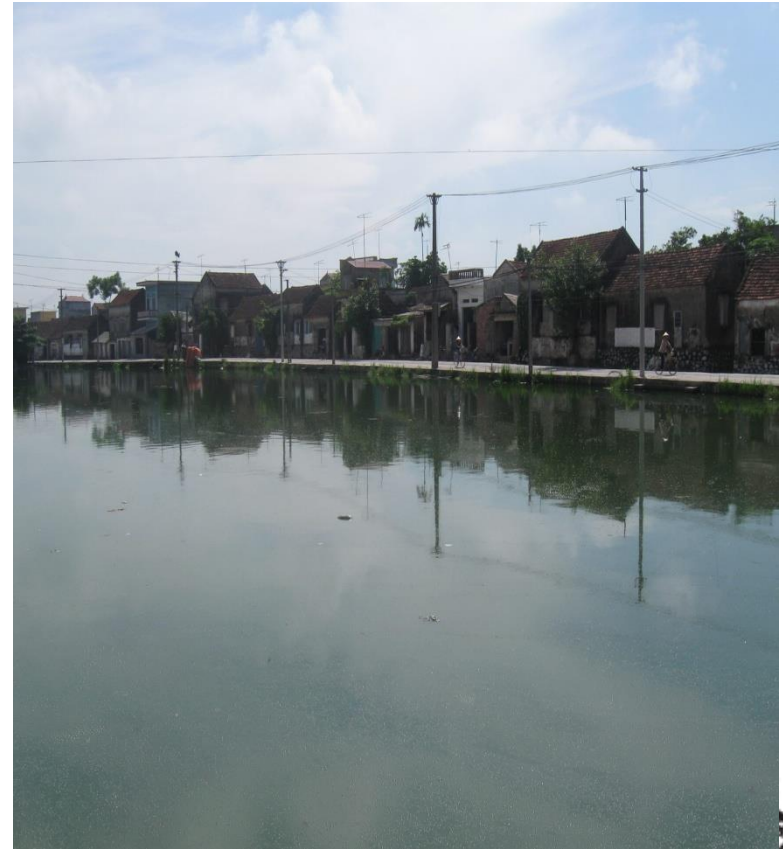


# Site selection (I)

- Ifakara, Tanzania



- Hanoi, Vietnam



# Site selection (II)

	Tanzania (Ifakara)	Vietnam (peri-urban Hanoi)
Pit latrine coverage	100%	10-20%
Latrine type	Simple, mostly unlined pit latrines	Raised double vault latrines and lined pit latrines
Users	Communal/compound latrines (10-15 users)	Family (4-6 users)
Soil type	Sandy/loam	Clay/loam
Climate		
Rainfall	Short rainy season	Long winter rains
Temperature	Relatively constant and high throughout the year	High during summer, cold during winter
Anal Cleansing	Water	Paper+Water
Diet	Predominantly vegetarian	Daily meat
Excreta management	Disposal	Used in agriculture
Urine	Disposed in pit	Separated



# Latrine fill-up (1)



# Fill-up (2)

$A - B = + =$  Accumulation  
 $A - B = - =$  Decomposition

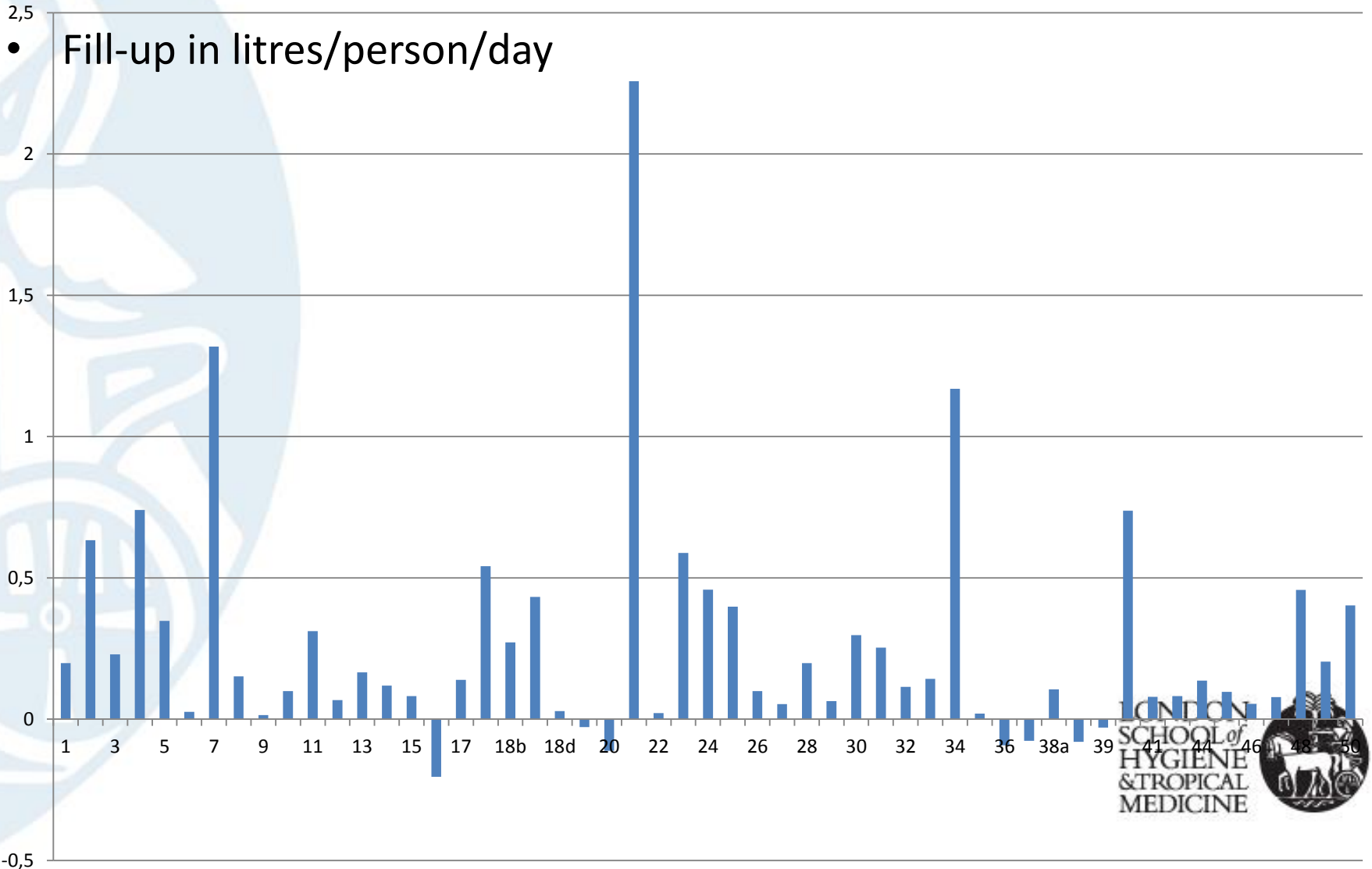
A



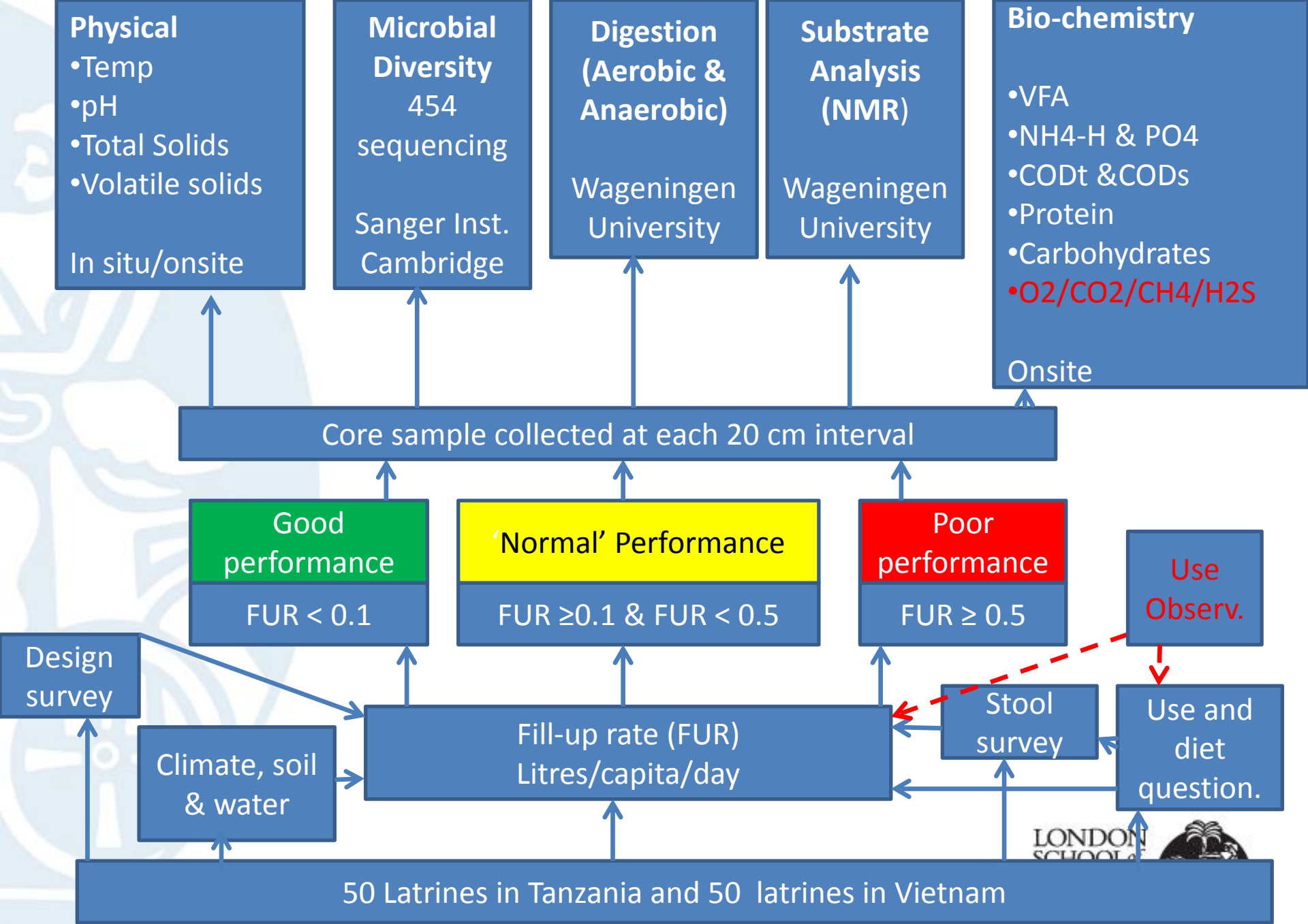
B



# Fill-up (3)

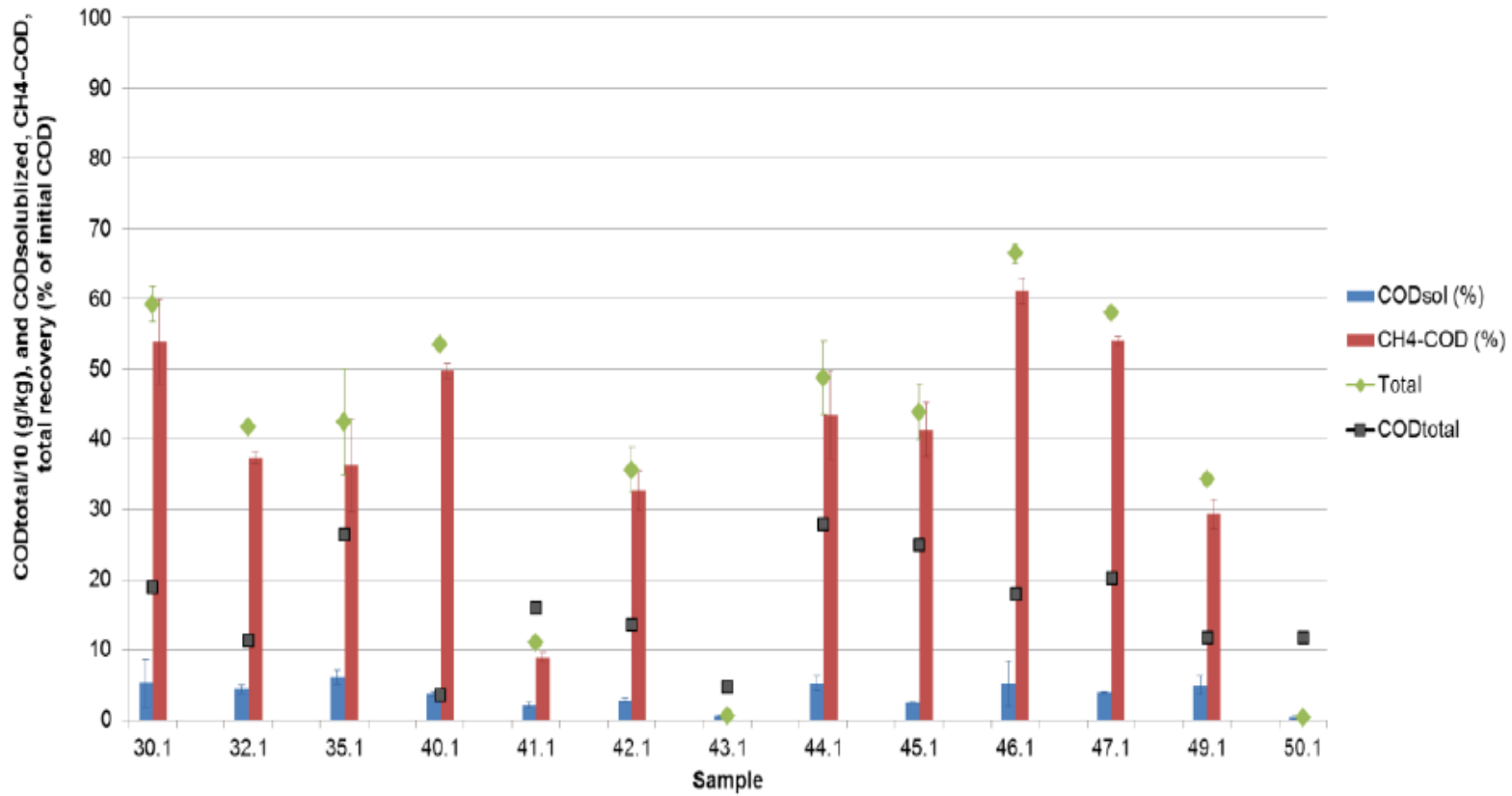






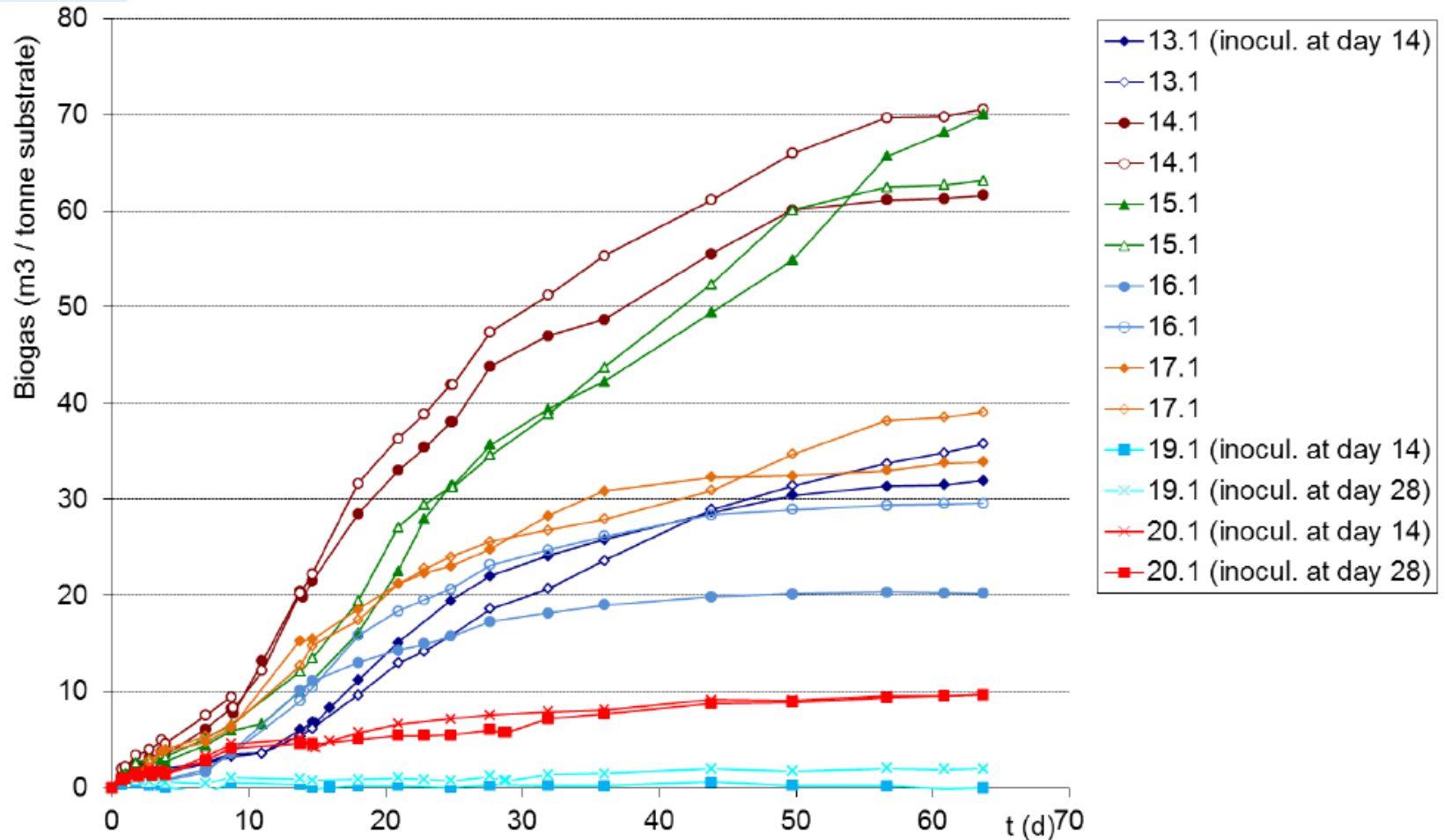
# Biodegradation (1)

## remaining fraction



# Biodegradation (2)

## Latrine types



# Assumptions of rate limiting steps

- **There is a fraction of faecal matter which is difficult to degrade**
  - Through characterising this material we will be able to identify whether specific organisms, or enzymes exist which could break it down and be added to the latrine
- **Environmental conditions are unsuitable to support the microbial communities needed for breakdown**
  - to alter them either through physical action (eg aeration, mixing, or adding water), or design (adding a roof, lining, improving drainage) or chemical addition (eg for pH control) or additives which provide a suitable “niche” for the right bacteria
- **There is a lack of a key microbial family needed for biodegradation**
  - (See first) + seeding of latrines with faecal material of successful pits?



# Acknowledgements

- Bernard Leseki & Faraji Abdelahi, Ifakara Health Institute
- Prof Viet-Anh Nuygen, Hanoi University of Civil Engineering
- Chris Quince & Umer Illiaz, Glasgow University
- Alan Walker, Sanger Institute
- Miriam van Eekert, LEAF, Wageningen University
- Chris Buckley, University of KwaZulu Natal

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