

Management of pit latrine sludges – research of digestion processes, microbiological safety and the efficacy of pit additives



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Overview

- objectives of sanitation
- nature of material
 - loads
 - pathogen infections
- pit mechanisms
- additives
 - results
 - conclusions
- emptying
 - how
 - where to dump

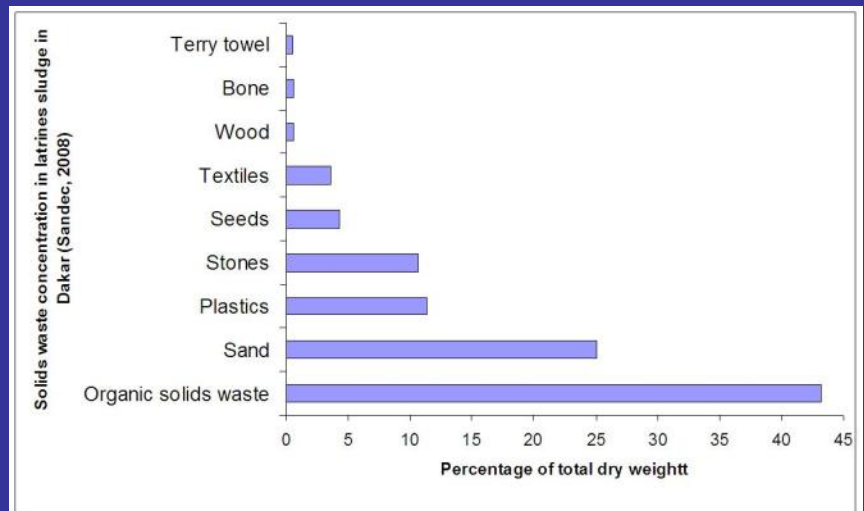
Objective

- promote health
- separation of people from excreta
- make excreta safe

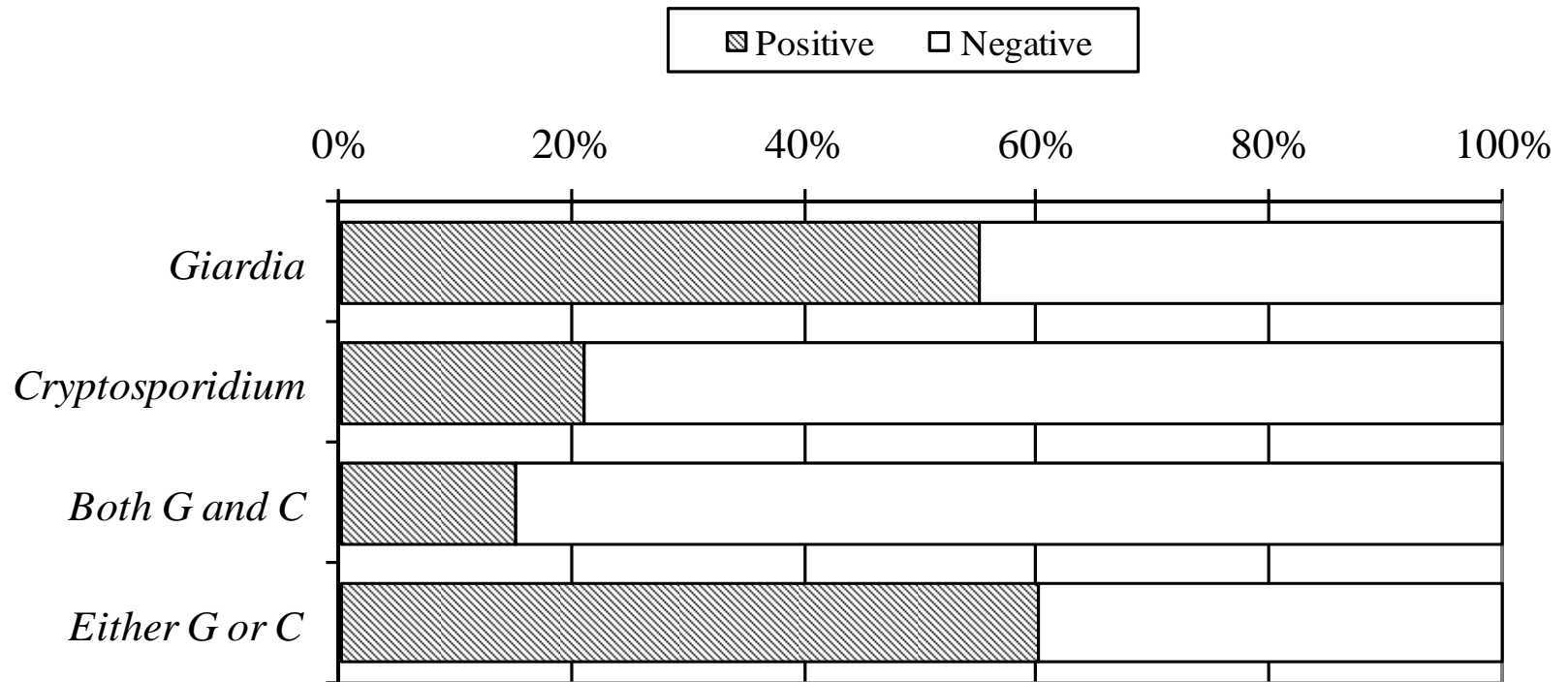


Excreta and Pit Contents

- 51 kg faeces per person per year
- 11 kg dry faeces per person per year
- 550 kg urine per person per year
- 21 kg dried urine per person per year
- 6 people per dwelling
- 1 cubic metre in 3 years (no degradation)
 - greater volume if non-faecal material is included



Community Health



Distribution of protozoan parasitic infections for the 2 communities sampled
(n=124)

Nematodes and Protozoans

- ***Ascaris lumbricoides***
 - Maximum: 615 ova/g UD waste
- ***Taenia* sp.**
 - Maximum: 315 ova/g UD waste
- ***Trichuris trichuria***
 - Maximum: 208 ova/g UD waste
- ***Giardia***
 - Minimum: 3 800 cysts/g UD waste
 - Maximum: 8 800 000 cysts/g UD waste
- ***Cryptosporidium***
 - Minimum: 5 800 oocysts/g UD waste
 - Maximum: 2 100 000 oocysts/g UD waste

Trichuris trichuria



***Taenia* sp.**

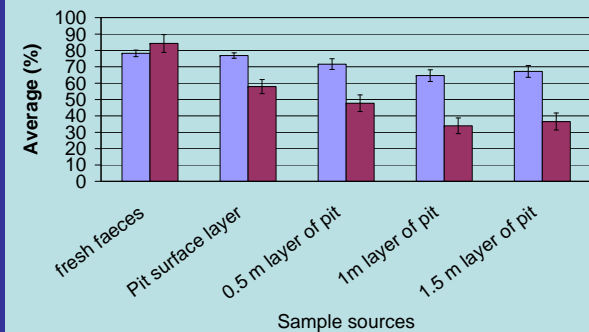
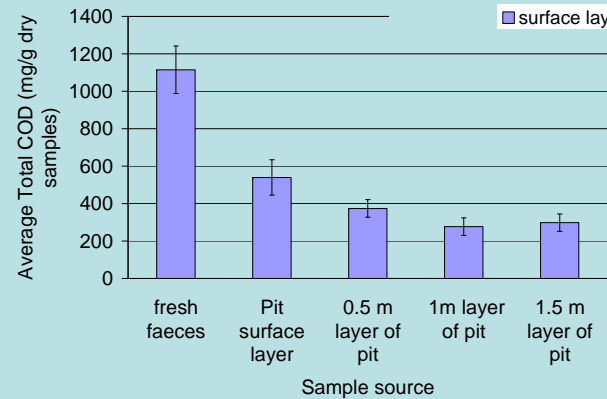
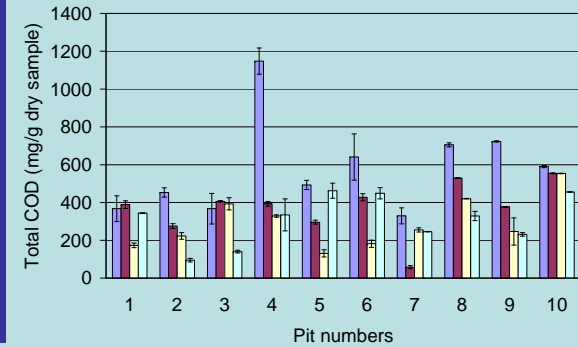
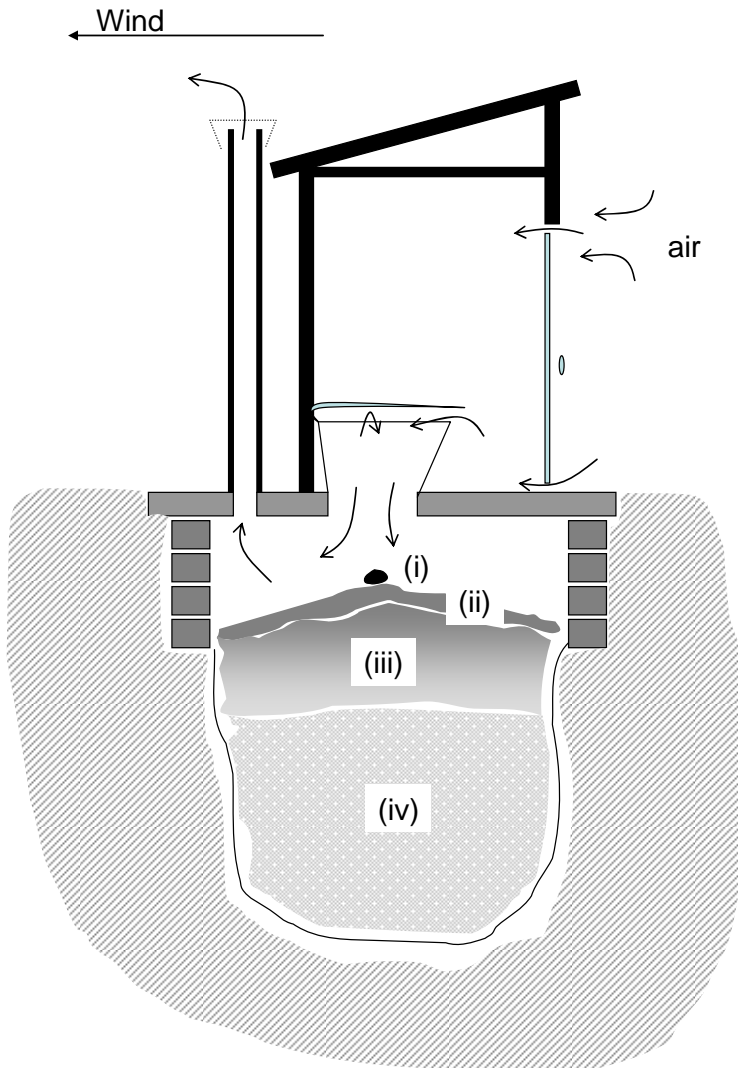


Ascaris

Defeating the Objective



Changes in a Pit



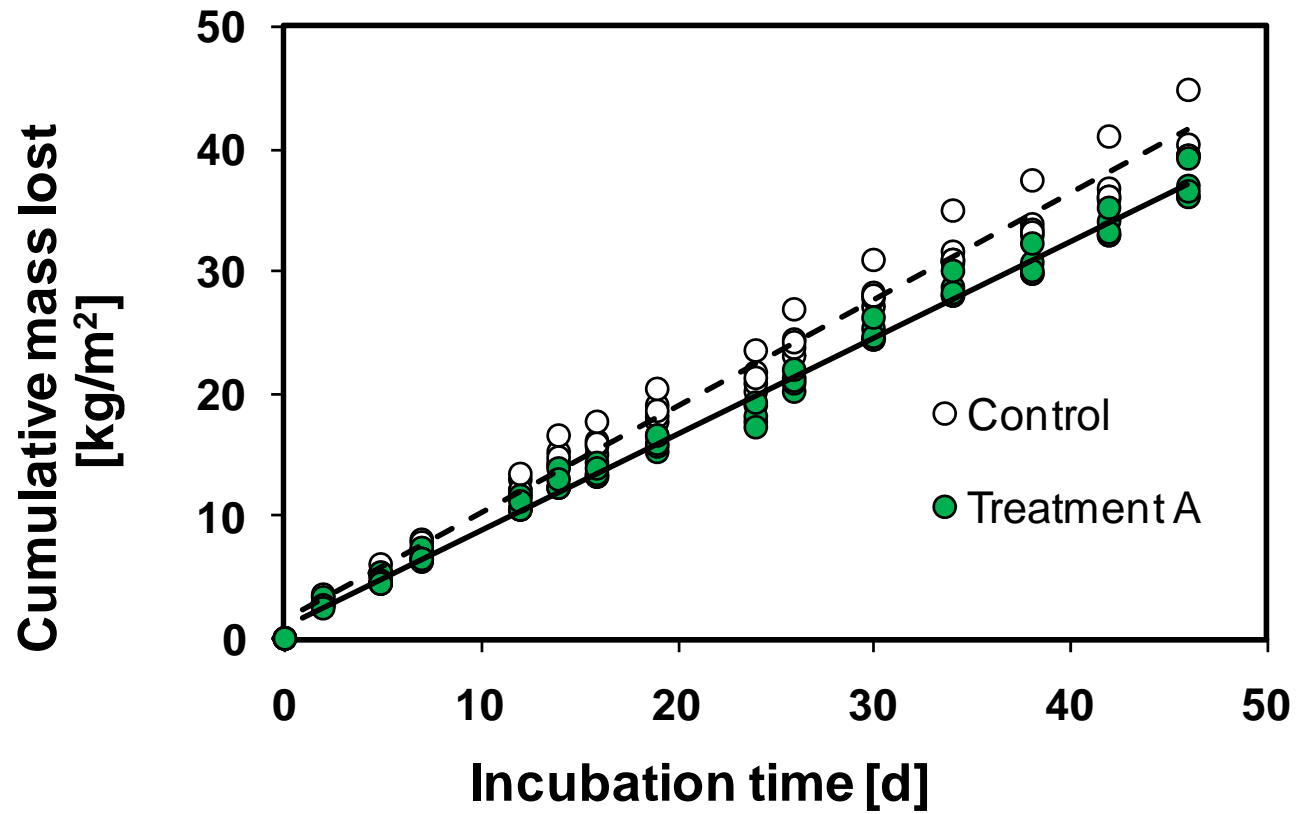
moisture(% per g wet sample)

organic solids%gVS per g wet sample/gTS per g wet sample

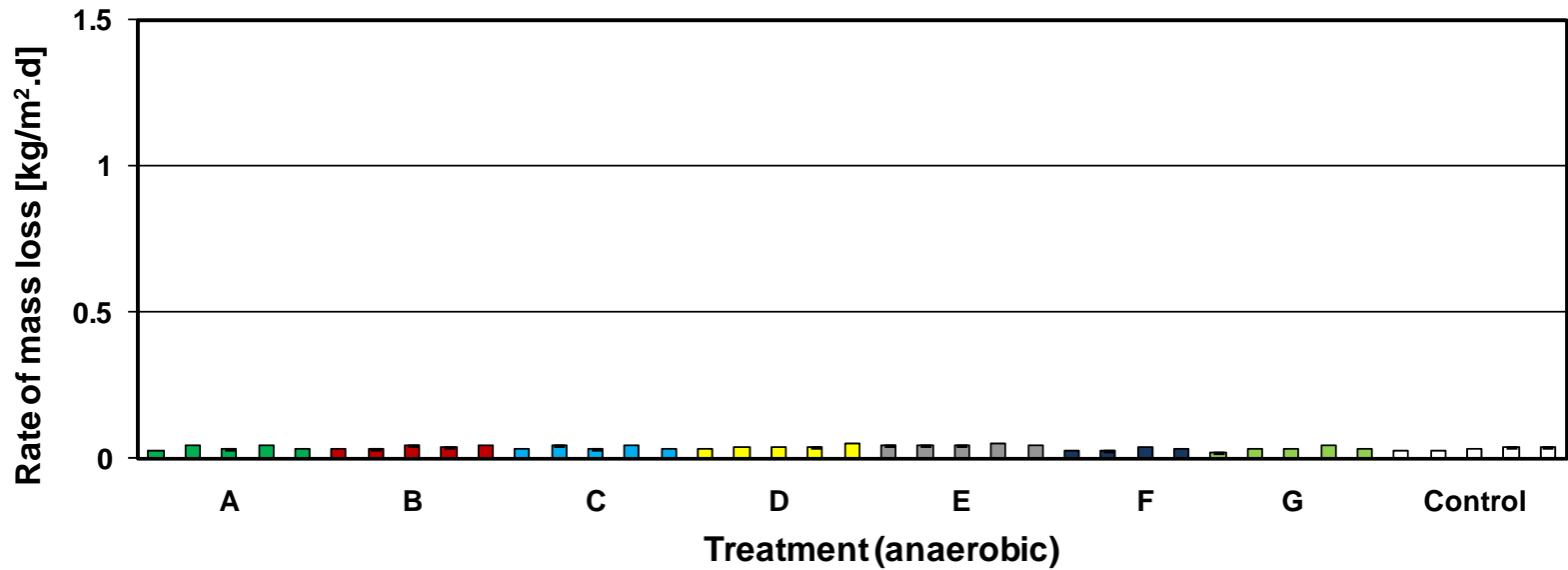
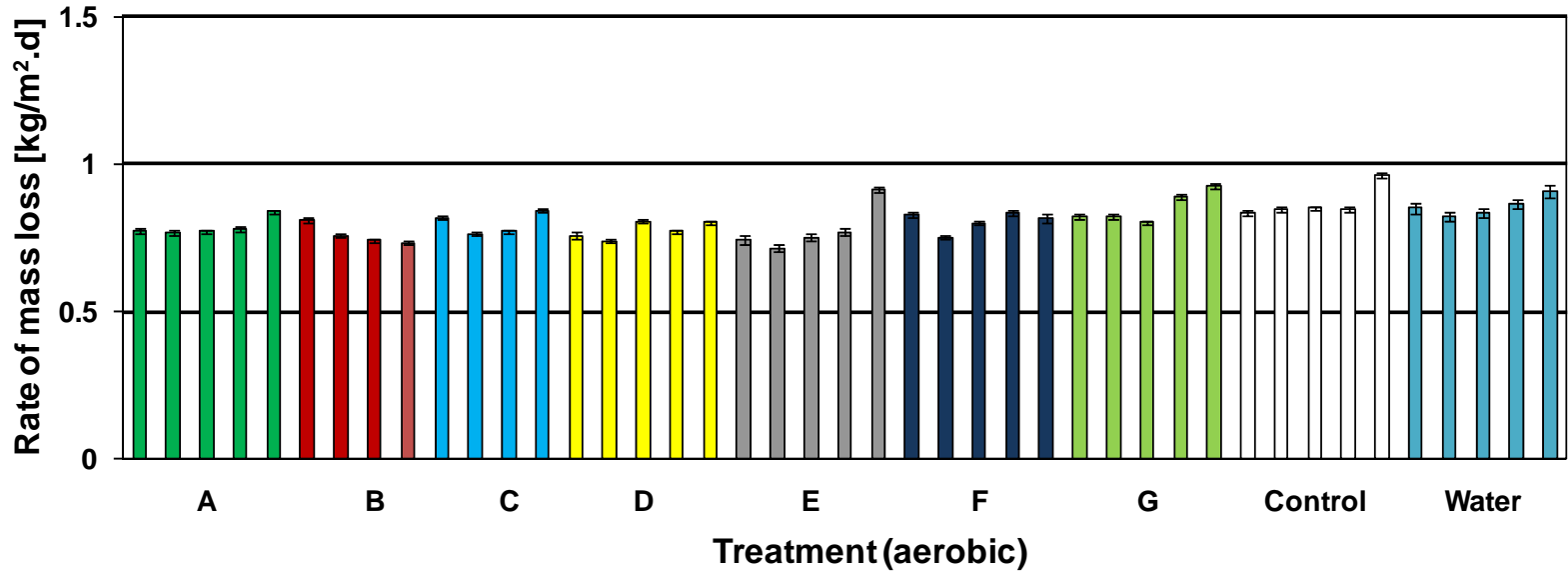
Bio-augmentation Additives

- claims
 - marketed for their ability to **reduce pit contents**, odour and fly problems.
 - typically a blend of freeze-dried micro-organisms and enzymes.
 - bio-augmentation has been proven effective in certain applications (e.g. cleaning up oil spills)
does it work for pit latrines?

Typical Laboratory Result



Comparison Between Treatments



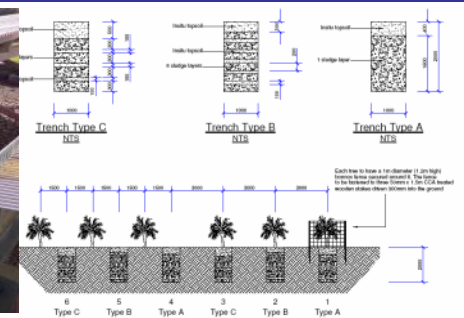
Laboratory Trial Conclusions

- all samples showed some mass loss
- rates of mass loss varied due to differences in sample contents
- no significant variations attributable to different treatments
- **no evidence that commercial pit latrine additives can significantly influence sludge accumulation rates in pit latrines**

Disposal of Pit Contents



- wastewater treatment works
- bury on-site
- bury off-site
- specific sludge treatment
- compost or co-compost
- reed beds



Low volume
receptacles

Frequency
of emptying
process

Storage
volume at the
house

Large volume
pits needing
emptying
every 5 to 10
years

High operating costs
Low capital cost

Low operating costs
High capital cost

Possible options ?

- weekly collection for 12 L bucket
- monthly collection for 50 L bucket
- six monthly collection for 200 L plastic bins