

# Vermiculture: A method for the production of hygienically safe compost from human faeces



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## Introduction

Faeces are traditionally used in many parts of the world as a fertiliser on the fields. In the future, an even more extended use is expected, especially for faeces solved in wastewater due to water scarcity and population growth. This is not only beneficial, it also results in health risks for the population. Many diseases can be transmitted via the faecal-oral route and human wastewater contains many excreted pathogens. Some of these pathogens survive in the environment for days, some even for months and when faeces or wastewater are used in agriculture this has to be done in a hygienically safe way, to protect farmers, their families and customers.

## Why Vermiculture ?

- Provides a high-quality compost and lots of earthworms
- Offers two income sources for farmers, selling compost and/or earthworms.
- Earthworms can be even more valuable than the compost, because they serve as fodder for chicken, turtles etc.



## The Project area

The Lambertsmühle is a historical watermill, situated in Burscheid, North-Rhine/ Westphalia. After restoration the mill is used as a museum, meeting place and research location for decentralised water management system projects. It is equipped with separation toilets and the grey water is treated in constructed wetland. The faeces are collected in a rotten bag and composted by vermiculture.

Fig 1+2: The Lambertsmühle farmstead



Fig 3: Scheme of the wastewater system at the Lambertsmühle

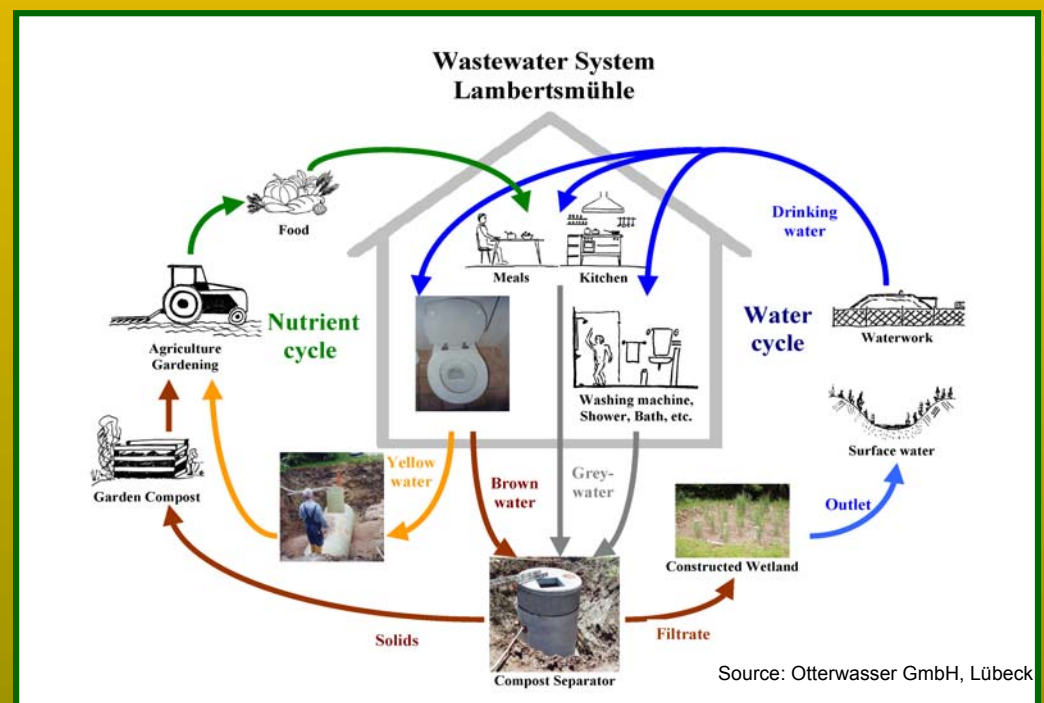
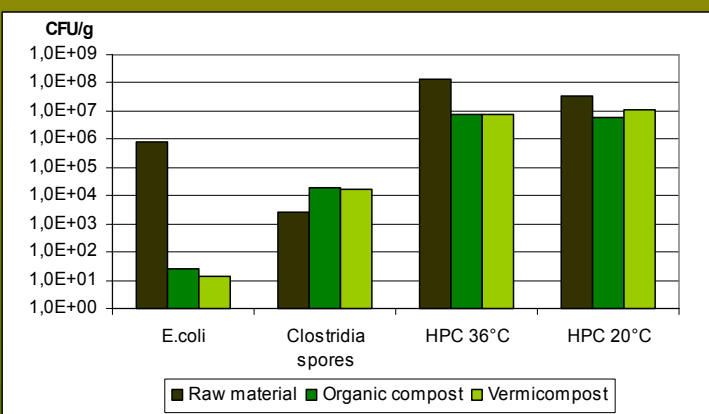


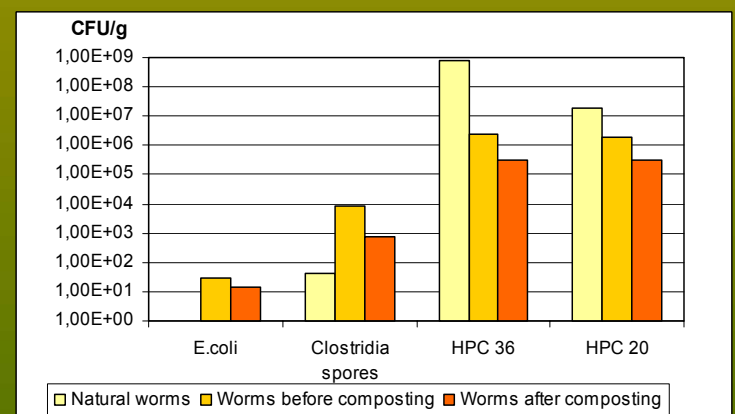
Fig 4: Bacteria reduction in the vermicompost compared to organic compost



## The method

The faeces were collected in a rotten-bag, which was emptied when full. Faeces were mixed with matured compost as starter and the earthworms were added. After two and six months, the worms and the compost were harvested and examined for the occurrence of *E. coli*, *Salmonella*, *Clostridia* spores and heterotrophic plate count.

Fig 5: Bacteria concentrations in earthworms composting human faeces and natural earthworms



## Results

- No significant difference between organic compost prepared from garden waste/sheep faeces and the human faeces compost (Fig. 4)
- No difference between wild earthworms and cultured earthworms that had been composting faeces (Fig. 5)
- Earthworms are no reservoir for pathogens and their gut is no habitat for pathogenic human gut bacteria.
- An adequate reduction of pathogenic bacteria in the compost was already observed after the first harvest, with results getting even better during the following composting.

## Conclusions

- There is no higher risk by using compost obtained from human faeces than using "regular" compost
- Detailed data about load and reduction of microbes in composted faeces in tropical climates are missing
- Research has to be done in countries where compost and earthworms are valuable goods and many diseases are still spread due to lack of proper and cheap sanitation systems.
- Vermiculture could be a system closing loops in sanitation systems, helping to achieve the Millenium Development Goals in 2015.