

Inactivation of viable *Ascaris* eggs during faecal sludge co-composting with chicken feathers and market waste

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ABSTRACT

Faecal Sludge (FS) contains high concentrations of pathogenic microorganisms that are 10–100 times higher than those in domestic wastewater. Proper and sustainable treatment is required to inactivate these pathogens if FS is to be recycled in agriculture, so as to minimise public health and environmental risks. Composting is one of the common low-cost technologies of sanitising FS in Urban Africa; however, it is associated with longer pathogen inactivation periods that make it commercially uneconomical. This study investigated the effect of different organic wastes types and their mixing ratios with FS on the inactivation efficiency of viable *Ascaris* eggs (*suum* and *lumbricoides*) during composting. Dewatered FS was mixed with market waste (MW), chicken feathers (CF) and sawdust (SD) in different ratios. Compost piles of FS:MW:SD and FS:CF:SD both in volumetric ratios of 1:2:1 and 1:3:1 were set-up in duplicate (3 m³ each), composted and monitored weekly for viable *Ascaris* eggs presence for a period of 15 weeks. The results suggest that the organic waste types have a significant effect on the temperature evolution and pathogen inactivation efficiency while their mixing ratios do not. Piles containing CF achieved the shortest pathogen survival period of 4 weeks compared with 6–8 weeks for those with MW. The temperature–time factor was found to be the most important variable responsible for viable *Ascaris* eggs inactivation. However, other mechanisms such as microbial antagonism or antibiotic action induced by indigenous microorganisms and toxic by-products such as free ammonia were found to have also played an important role in *Ascaris* eggs inactivation. All piles attained 100% *Ascaris* eggs inactivation from FS, and therefore, the compost was safe for use in agriculture. The study findings suggest that composting of FS with CF can reduce *Ascaris* eggs inactivation periods by 42%, which may thus reduce the operational costs of FS treatment facilities.

Keywords: Faecal sludge; Composting; Helminth eggs; Viable *Ascaris* eggs; Chicken feathers

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