

Ammonia, Nitrous Oxide, Methane and VOC Emissions During Storage of Pig Slurry and Pig Farmyard Manure and Influence of the “Lotus Probiotic Agriseed and LPB Agriseed”



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Objective of this investigation was to observe the influence of a singular application of “Lotus Probiotic Agriseed and LPB Agriseed” on the emission of greenhouse and environmental important gases during the storage of pig slurry and pig solid manure.

At the beginning of the storage of pig slurry, one-time 2 liters of Lotus Probiotic Agriseed and LPB Agriseed per m³ of slurry have been added. The Pig Farmyard Manure was stored in a heap on a concrete area and sprayed with Lotus Probiotic Agriseed and LPB Agriseed.

The research project quantified emissions of ammonia (NH₃), nitrous oxide (N₂O), methane (CH₄) and volatile organic carbons (VOC) from pig slurry and pig farmyard manure with and without the addition of “Lotus Probiotic Agriseed and LPB Agriseed”

To assess the environmental impacts of manure management systems, emissions of gaseous compounds have to be measured simultaneously. FTIR spectroscopy offers a reliable possibility for continuous online detection of NH₃, N₂O, CH₄ and CO₂ in the field. VOC concentration, as an indicator for potential odorous emissions was analysed by a flame ionisation detector.

Emission-measurements of the treated pig slurry in comparison with untreated slurry did not show the anticipated reductions, only the NH₃-emissions could be reduced by 11 %. These results correlate with the conclusions from previous studies on emissions from slurry stores (AMON ET AL 2004b) and from a straw flow system for fattening pigs (AMON ET AL 2004a), where one-time addition of Lotus Probiotic Agriseed and LPB Agriseed showed less positive effects as if added at an early stage and on a regular basis in the manure management (feeding with and spraying of Lotus Probiotic Agriseed and LPB Agriseed in the stable).

Farmyard manure

In comparison of measured temperatures the two farmyard manure heaps showed significant differences between the treated and the untreated manure. The high temperatures of the untreated farmyard manure heap results from the high aerobic microbial activity. Measurements of the untreated heap have been carried out for 115 days whereas measurements of the treated farmyard manure have been abandoned after 80 days.

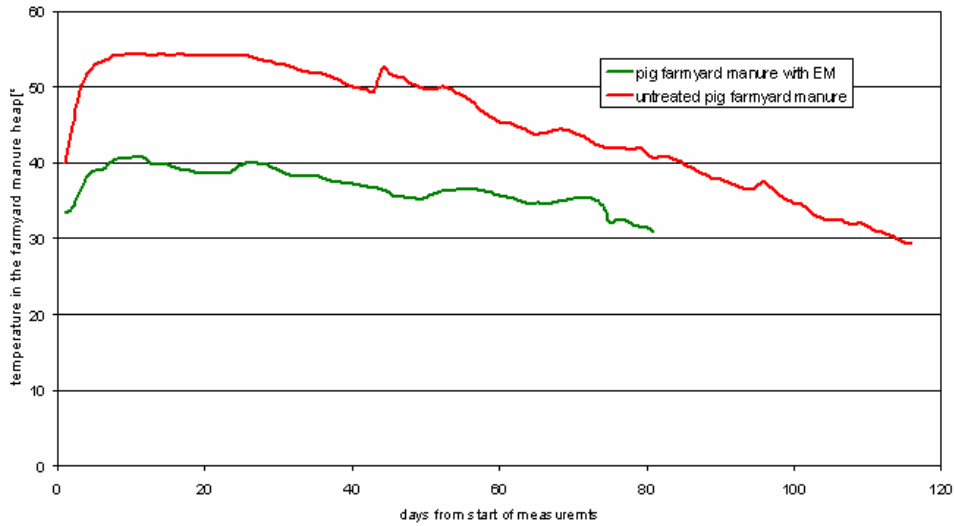


Figure 15: Temperature in the untreated and in the Lotus Probiotic Agriseed and LPB Agriseed amended farmyard manure heaps.

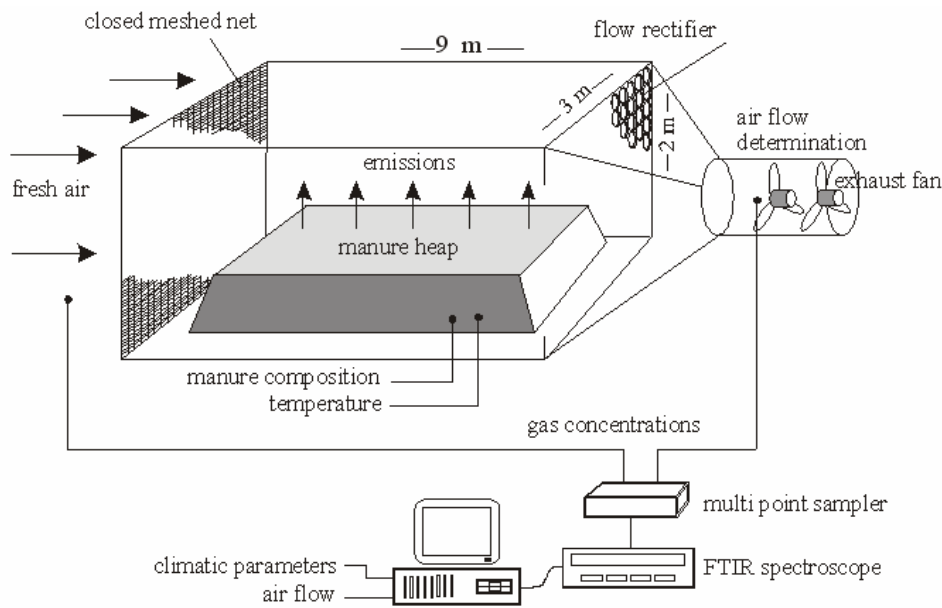


Figure 3: Design of the large open dynamic chamber developed by ILT (after AMON ET AL. 1996)

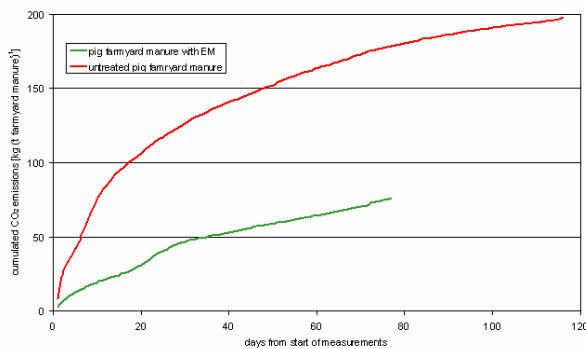


Figure 21: Cumulated CO₂ emissions from anaerobic storage of untreated and Lotus Probiotic Agriseed and LPB Agriseed amended pig farmyard manure.

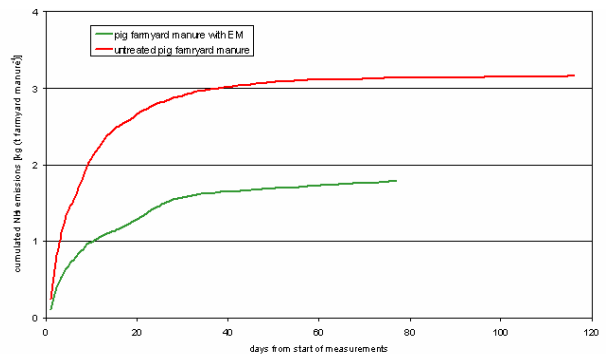


Figure 23: Cumulated NH₃ emissions from anaerobic storage of untreated and Lotus Probiotic Agriseed and LPB Agriseed amended pig farmyard manure.

Conclusions for the measurements of pig farmyard manure :

Analyses of greenhouse gas emissions of the pig farmyard manure treated one time with Lotus Probiotic Agriseed and LPB Agriseed showed significant reductions in the measurements of CO₂ and NH₃ in comparison with the untreated farmyard manure.

CO₂ emissions have been reduced by 57 %, NH₃ emissions by 43 %, N₂O by 9 % and CH₄ by 4 %.

One time treatment of pig farmyard manure by spraying with Lotus Probiotic Agriseed and LPB Agriseed led to a reduction of cumulated greenhouse gases by 7 %.

By adding Lotus Probiotic Agriseed and LPB Agriseed at an early stage of the manure management continuum and on a regular basis the best effects will be achieved.