Heat partition during composting process of cattle manure

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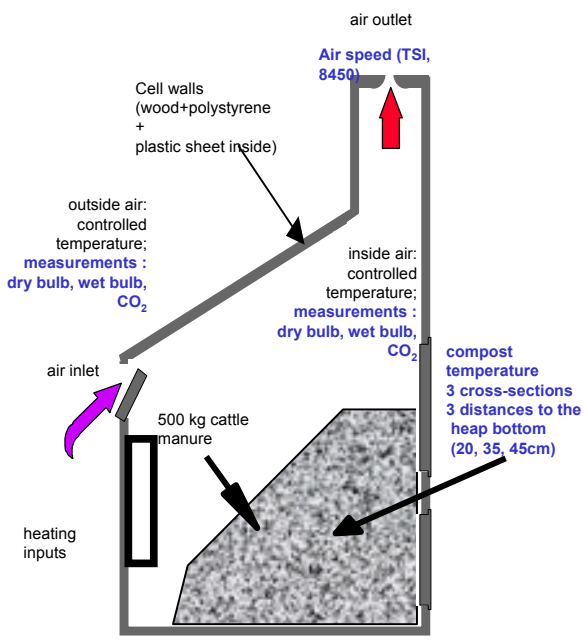
Introduction

Most of the literature deduce the heat production of the composting process from combustion heat of initial and final compost. There are few data on the heat partition during the composting of livestock manure.

Material and Methods

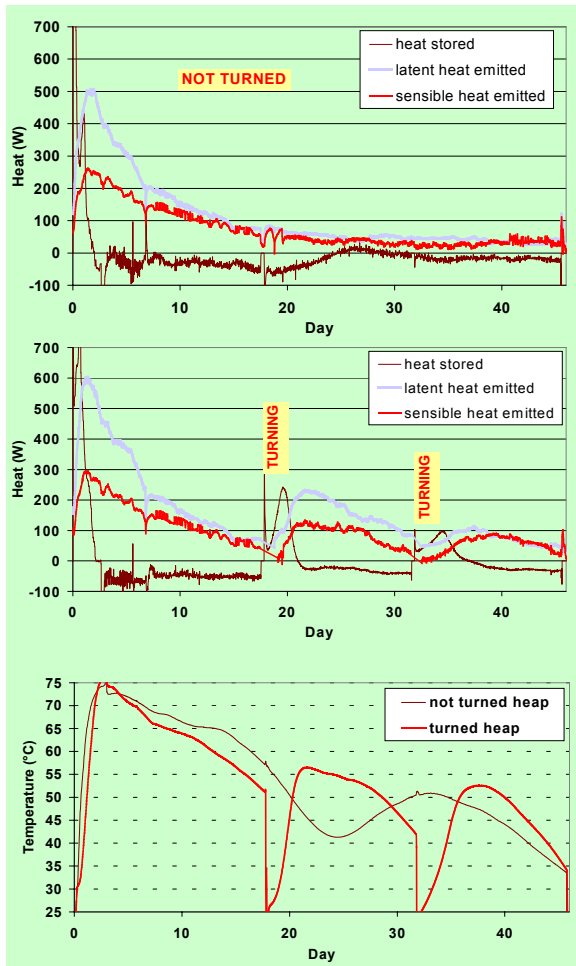
- continuous measurements during six weeks in controlled conditions;
- cattle manure from a commercial dairy cow housing;
- one ton homogenised, and disposed in two small cells. One heap was turned twice and the other not;
- measurements of sensible heat, water vapour and carbon dioxide lost by the cell;
- compost heat capacity estimated from the literature (Mears et al, 1975).



Results and Discussion

TABLE 1 : MASS AND VOLUME OF THE TURNED OR NOT TURNED HEAP

	not turned		Turned			
	0	46	0	18	32	46
Volume (l)	1351	974	1346	999	814	616
Mass (kg)	548	302	555	359	269	221
Water (kg)	429	220	433	266	192	159
Moisture (kg water/kg mass)	78%	73%	78%	74%	71%	72%



- Increase in mass reduction (table) and heat production (graphs) by the turnings
- Most of the heat production is water evaporation
- Heat stored represents about half heat production after turning until the maximum temperature is reached
- Sensible heat ranges between 100 and 500 W per ton
- Both heaps keep warm whatever the turning
- These results suggest that cattle manure can supply significant heat on a farm even with extensive heat retrieval and without turning