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Canada

Producing Quality Compost from Livestock Manure

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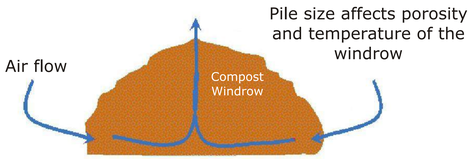
INTRODUCTION

As livestock operations continue to grow in average size, one common problem is managing the waste not only in terms of labour, but also in terms of good nutrient management. It is not just manure, there is also spoiled feed, moldy hay and other waste organic materials from farming activities. Stockpiling manure for fall application is an alternative but it poses some safety concerns. There is the possibility of leachate moving off-site. If stockpiled manure is spread in the fall it should be incorporated to prevent runoff of nutrients and loss of ammonia nitrogen. Composting livestock manures can reduce the total volume by 50% or more depending on the amount and type of bedding used in the operation. Composting by active aeration reduces odour, viable weed seeds, plant and human pathogens and discourages fly activity.

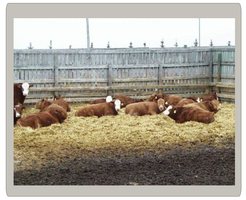
EFFICIENT DECOMPOSITION OF MANURE

Component	Ideal levels
C:N ratio	30:1-50:1
Moisture	50-60 %
O_2 concentration	> 5%



Total mass water removal occurs by 3 mechanisms:
- 56-79% evaporates from the windrow surface
- 21-31% evaporates via air flow from natural ventilation
- only 6-10% is attributed to windrow turning

Turning activities have to be optimized for climatic conditions either to conserve or remove excess moisture.

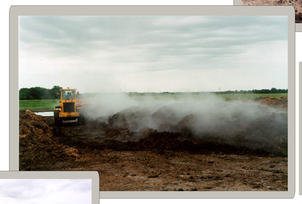


Some mixing of the less soiled bedding material can be done when the material is collected for transport to the composting site.

Stockpiling manure is a common management method but even after 12 weeks little decomposition has taken place, weed seeds and pathogens remain viable and the pile can be odourous when opened. When stockpiling manure close to corrals, flies become a problem.

After 4 weeks of weekly turnings the thermophilic stage of composting is complete. The mesophilic stage, where temperatures stabilize around 40C, continues for a number of months. Continued turning once every two weeks ensures that all material is processed.

Courtesy of Manitoba Agriculture and Food



Thermophilic stage of composting where temperatures reach 55-60C. More frequent turnings are required at this stage.

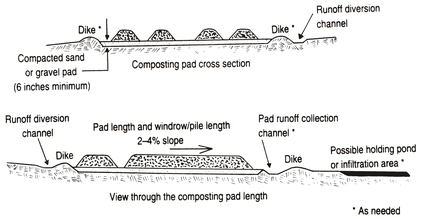
Windrow grooming ensures that all material will be processed at high temperatures necessary for pathogen and weed seed inactivation.

Beaters on the transport equipment effectively mix the material as the windrow are formed, initiating biological activity.

Compost can be uniformly applied using conventional solid manure spreaders either in the fall or in spring prior to seeding. Crops can be directly seeded into the compost. Research has shown that nitrogen loss from surface applied compost is minimal.

SITE CONSIDERATIONS

The composting site should be developed with the aid of an engineer. Good drainage at the site and a firm surface of coarse material is essential for open windrow composting. Surface runoff should be collected in a basin or directed to a pasture or grassed infiltration strip where the runoff nutrients can be recovered.



COMPOST VALUE

- The further the distance that manure must be hauled from the feedlot to the field, the greater the relative costs of handling fresh manure compared to compost.
- Increased costs associated with composting total approximately $6 to $8 per tonne of compost (1).
- The value of compost will be higher on marginal land and when used for horticultural purposes as an organic fertilizer.
- Compost as a soil amendment provides a source of relatively stable slow-release fertilizer, stabilizes erodible soil and acts as a mulch to conserve soil moisture.

Research at Brandon indicates that when compost is applied according to the rate of mineralization in the first year, crop yields are similar to that of chemical fertilizer. In subsequent years application rate is reduced.

References
(1) Freeze, B., Heigh, J., Larney, F.J. And Olson, A.F. 1999. Economics of windrow composting and land application of manure. *In* Proceedings of the Tri-provincial Conference on Manure Management, June 22-25, 1999, Saskatoon, stock. pp. 311-319.

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