

Waste Management Alternatives

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Waste generation is accelerating at an unprecedented rate in the United States. Almost every phase of production, regardless of the sector of society (industrial, municipal, domestic or agricultural) you choose to explore, produces waste. In some cases, waste products have been integrated into other processes. However, for the most part it seems that we have become a throw away nation that would rather pay for losses in product and possibly environmental quality than a loss of personal time.

Attitudes are rapidly changing, however, with the increased visibility of environmentalists, media exploitation of human induced pollution, and increased costs of waste disposal, abatement and remediation. Governments, municipalities and the public are beginning to sense the magnitude of the situation and the seemingly limited number of technical options available to combat the problems. The need to know unbiased facts about waste management and reduction, as well as, pollution prevention and remediation is great. The "teachable moment" has arrived.

North Carolina, like the rest of the nation, has waste concerns. The current population is expanding at a rate equivalent to a city of 100,000 people every year. This increase in growth is accompanied by an increase in demand for consumable goods and waste disposal including solid goods, municipally treated waste water and sludge, septage and industrial byproducts. Municipal sludge alone amounts to over 116,000 dry tons per year. Animal production is also growing in the state as with it the amount of manure (20,713,427 wet tons/year), animal processing wastes and dead animals requiring disposal.

Waste management strategies are generally based on three options: waste reduction at the source, alternative uses and disposal. The remainder of this paper will discuss waste management alternatives that relate to either agriculture usage or generation.

Many waste products of industries, municipalities and agriculture contain nutrients from the organic material in the waste. If the product can be placed in an environment that permits biological decomposition,

these nutrients can be released and made available for plant growth. The recycling of nutrients from waste products through the soil/plant ecosystem is an excellent alternative to disposal. The key to a successful land application operation is knowing the characteristics and contents of the waste product, the nutrient requirements of the plant system and the potential risk of contamination due to specific site conditions. With a comprehensive knowledge of these factors, an efficient and environmentally safe management plan can be implemented for most waste products.

Waste products, such as dead animals, are not amenable to direct land application systems. Because of this most dead animals are either buried or put in underground disposal pits. Both these methods pose a potential risk to groundwater contamination. When large animals or large quantities of small animals are buried and begin to decompose, nutrients are released and the volume of the organic matter decreases. This decrease in volume permits the soil above the buried animals to settle forming a concave depression at the soil surface that promotes water infiltration to the decaying organic matter. Likewise, while a properly constructed disposal pit that sheds water is less likely to promote water infiltration, there is still a concentration of organic matter that will decompose with no opportunity to recover the released nutrients. Management alternatives for these types of waste can include composting and/or rendering.

Rendering is a process that recycles dead animals and animal parts into a marketable feed like dog food. This is an excellent alternative to burial that is environmentally sound and has little residue that would require final disposal in a landfill. Rendering, however, is limited by the availability of a specific market/industry.

Composting is a process that promotes the microbial decomposition of organic matter. The process relies on a supply of carbon and energy (nitrogen) and can be performed in the presence or absence of oxygen. The end product of high temperature composting is a stable product low in nutrient availability and with few pathogens. Composting, however, is not a complete disposal alternative in that a product still exists. Final use of the product can be through marketing as a potting media, or land application.

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Another alternative to disposal that may exist for some waste products is direct feeding to livestock. Many food industry and some pharmaceutical by-products contain sufficient quantities of amino acids, proteins and nutrients to serve as a feed. When fed, some animals are less efficient at extracting nutrients from feed than others and many of the nutrients are excreted in their feces. This in turn can be feed to a more efficient animal group that is capable of further extracting the nutrients. This type of feed recycling is practiced in many underdeveloped nations with limited resources. Principal drawbacks to this type of system

is the need to have the different animal groups within a reasonable distance of each other to reduce the cost of handling and transportation.

Summary

Waste disposal in landfills should be the last option employed when all other management alternatives have been exhausted. Other waste management strategies include reduction at the source and alternative **uses** including: land application, composting, rendering and direct feeding.