

Dairy Application Definitions

Active Composting:

Compostable material that has undergone the time/temperature Process to Further Reduce Pathogen (PFRP), and is undergoing or capable of undergoing rapid decomposition but isn't sufficiently stabilized as a soil amendment; not horticulturally or agronomically beneficial in its present condition.

Aerated Static Pile:

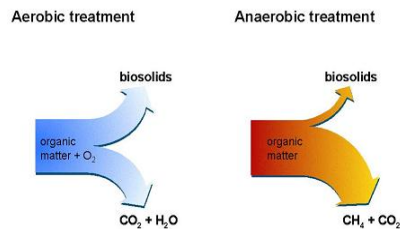
Composting system that uses a series of perforated pipes (or equivalent) with an air distribution system running underneath a compost pile and connected to a blower that either draws or blows air through piles. Little or no agitation or turning is performed.

Aeration in Compost:

The process by which oxygen-deficient air in compost is replaced by air from the atmosphere to allow microbial aerobic metabolism (biooxidation).

Aerobic Digestion:

Decomposition of organic matter carried out by microbiological organisms (microbes) in the presence of O_2 . During this oxidation process, pollutants are broken down into CO_2 , H_2O , nitrates, sulphates and biomass (sludge). The figure below simplifies the comparison between aerobic and anaerobic digestion:



Source: http://www.biotank.co.uk/anaerobic_digestion.htm

Ammonia:

A gaseous inorganic compound comprised of nitrogen and hydrogen; ammonia, which has a pungent odor, is commonly formed from organic nitrogen compounds during composting.

Anaerobic:

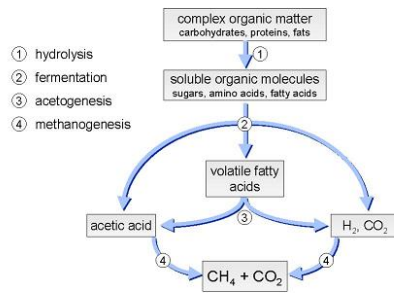
Occurring in the absence of free or dissolved oxygen; capable of living and growing in the absence of oxygen, such as anaerobic bacteria.

Anaerobic digester:

An enclosed basin or tank for anaerobically digesting wastewater. In it, anaerobic bacteria produce biogas, which is typically exhausted continuously and collected for use as a fuel or for a reagent for some industrial chemical reactions. Some types of digesters that can be used for dairy manure are covered lagoons, complete mix, plug flow, thermophilic (operate between 110-160 °F), mesophilic (operate between 68-105 °F) and fixed film.

Anaerobic Digestion:

Decomposition of organic matter by microbes in the absence of oxygen (O_2). During the digestion process, a gas *primarily* composed of methane (CH_4) and carbon dioxide (CO_2), known as biogas, waste gas or digester gas is produced. However, biogas also consists of relatively small amounts Nitrogen (N_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), Ammonia (NH_3) and various Volatile Organic Compounds (VOCs), when compared to the amount of CH_4 and CO_2 produced. Small amounts of sludge are also produced as a result of anaerobic digestion. The following figure summarizes the main stages of biogas production process due to anaerobic digestion:



Source: http://www.biotank.co.uk/anaerobic_digestion.htm

Anaerobic Treatment Lagoon:

A waste treatment lagoon in which livestock or poultry manure is stabilized using anaerobic microorganisms to reduce organic compounds to methane and carbon dioxide.

Anaerobic lagoons should be built as deep as possible, with a small surface area, consistent with construction limitations and groundwater conditions. Anaerobic lagoons have depths from 6 to 30 feet. The depth of the lagoon is not restricted by light penetration as for naturally aerobic lagoons.

Animal Unit (AU):

An Animal Unit (AU) is a unit of measurement used by EPA and USDA to measure the size of animal feeding operations. An AU is equal to approximately one beef cow. Therefore, 1,000 beef cows equal 1,000 AU. There are multipliers for other types of animal feeding operations. For example, 1,000 AUs equal 700 mature dairy cows, 2,500 swine, 10,000 sheep, 55,000 turkeys and between 30,000 and 100,000 laying hens or broilers depending on the animal waste management system.

Biofiltration:

A device for removing contaminants from a gas in which the gas is passed through a media that supports the microbial activity by which the pollutant is degraded.

An established type of biofilter involves a porous medium (typically soil, compost or wood chips - green waste), that contain large populations of microbes. This type of system can be used as an after control assuming captured biogas, like with a digester.

Composting:

The controlled biological degradation of organic solid waste yielding a product for uses as a soil conditioner; a managed process that controls biological decomposition and transformation of biodegradable material into a humus like substance called compost.

Holding / Storage Pond:

A small basin designed for *temporary* collection and storage of organic waste such as animal manure. A holding / storage pond is not a waste treatment lagoon since little bacterial degradation of organic matter takes place since treatment is not considered in the design of a holding pond. Holding ponds are completely emptied when pumped, and the design storage periods are about 90 to 180 days.

Hydraulic Retention Time (HRT):

Volume of the lagoon divided by the daily influent flow as measured in days.

Impermeable:

Not permitting water or another fluid to pass through

In-vessel:

A diverse group of composting technologies in which composting materials are contained in a reactor or vessel.

Mechanically Aerated Lagoon:

A waste treatment lagoon in which the organic material is treated due to mechanical promotion of aerobic decomposition. Complete aerobic digestion is the best way to reduce malodorous air emissions. Aeration can be achieved with floating, submerged or fixed aerators. Aeration can be performed with injection of tiny air bubbles into the lagoon water, mixing of the lagoon water or spraying of the water into the air. For each type of aerator, the O₂ from the air supports natural aerobic bacteria.

Naturally Aerobic Lagoon:

A waste treatment lagoon in which the organic material is treated due to naturally occurring aerobic decomposition. Because oxygen must be absorbed from the air, and sunlight is necessary for the growth of oxygen-producing algae, design aerobic lagoons on the basis of surface area. The depth of a naturally aerated lagoon should be from 3 to 5 feet. Shallow depths are required to allow adequate penetration of sunlight for algae photosynthesis. Aerobic lagoons are normally not practical for animal manure treatment because they would need such a large surface area. A major advantage is that the naturally aerobic lagoon is odor free (as holds true for mechanically aerated lagoons), as long as sufficient oxygen is provided to insure the activity of the aerobic bacteria.

Separated Solids:

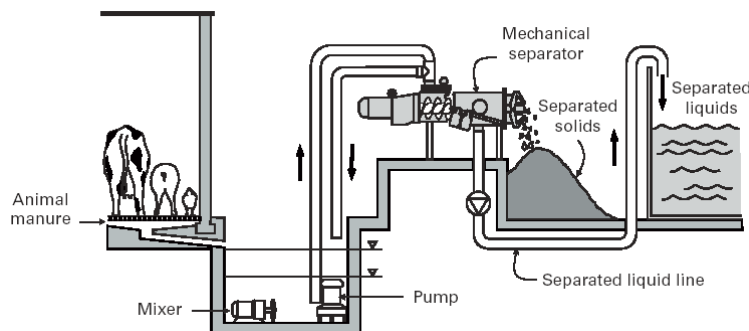
Separated solids are organic and inorganic solids that have been separated from the liquid and slurry manure prior to the treatment lagoon or storage pond. Removal of fresh solids from manure slurries reduces the nutrient content of manure, prolongs the life of storage structures, improves the effectiveness of biological treatment, and minimizes odors. Beneficial uses of the recovered solids include bedding materials, animal feed supplements, composts, and soil amendments.

Solids Separation:

Solids separation is the partial removal of organic and inorganic solids from liquid and slurry manure. Solids separation is primarily performed by sedimentation (solids settle by gravity) and/or by mechanical separation.

Settling basins are structures designed to separate solids from liquid and slurry manure by sedimentation. The inflow of manure is restricted to allow some of the solids to settle out. The liquids gradually drain to a holding pond, treatment lagoon or to some other storage structure. Solids remaining in the basin are left to dry and then are removed.

Mechanical separators include screen separators, centrifuges, hydroclones and presses (screw or belt type). Below is a basic arrangement for a mechanical solids separation system:



Source: http://www.lpes.org/Lessons/Lesson43/43_3_Solid_Liquid_Separation.pdf

VOC (Volatile Organic Compounds):

Any compound containing at least one (1) atom of carbon except for exempt compounds specified Section 3.53 of District Rule 1020.

Waste Treatment Lagoon:

A basin used to store and biologically treat organic waste such as animal manure. Treatment lagoons handle a frequent stream of animal waste and may be generally classified as anaerobic, facultative, or aerobic. A waste treatment lagoon will always have a permanent pool or residual volume that provides a bacterial seedbed to help assure continued digestion after pumping.

Windbreak (Shelterbelt):

A windbreak, or shelterbelt, is composed of one or more rows of trees and/or shrubs, which are planted in a manner that breaks up wind and reduces the force and speed of wind downwind of the windbreak. Windbreaks can be used to prevent soil erosion, improve air quality by intercepting dust, chemicals, and odors, to protect crops, and to provide habitat for wildlife.