

Non-CO₂ Greenhouse Gases: Methane

Source/Sectors: Agriculture/Manure Management

Technology: Aerobic digestion (A.3.2.2)

Description of the Technology:

In aeration processes, oxygen is transferred to a liquid primarily by mechanical equipment. The equipment serves to (a) provide the oxygen needed by the microorganisms to oxidize the organic matter and (b) keep the solids in suspension by mixing. A residual-dissolved oxygen concentration of at least 1-2 mg/L is an indicator that the rate of oxygen transfer is adequate to satisfy this oxygen demand aerobically for livestock waste. This requirement is usually met by large pumps operating in the range of about 50-125 HP (US Climate Change, 2005).

The methane emission can also be reduced by preventing anaerobic decomposition of manure during stabling of livestock (to keep it more aerobic). The way manure is stored and handled in stables determines the extent of methane production and emission. Higher temperature and longer storage periods favor growth of methanogenic bacteria. Storage of manure outside the stable may result in lower methane production because of lower out-door temperature in a moderate climate (de Jager *et al.*, 2001).

Effectiveness: Good

Implementability: Aeration processes may be feasible for secondary or tertiary treatment of livestock waste, where greater pollution control is desirable – or to further reduce nitrogen availability for crop uptake (US Climate Change, 2005).

Reliability: Good

Maturity: Good

Environmental Benefits: Methane emission reduction

Cost Effectiveness: Expensive

This option requires high investment and operating costs (including energy) to treat waste streams aerobically (US Climate Change, 2005).

Industry Acceptance Level: Aeration processes are basically applied to low-strength and dilute waste streams due to energy requirements. Their use has been limited for livestock liquid and slurry waste streams (US Climate Change, 2005).

Limitations: Aeration processes increase the volume of residual solids depending on the operating conditions necessitating removal and additional management. It may also volatilize 30%-90% of the nitrogen as N₂ or N₂O, which can contribute to global warming and other environmental problems (US Climate Change, 2005).

Sources of Information:

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