MANURE SAFETY

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Ways to prevent injury, illness, or death when working around manure:

- Follow all safety and procedural steps put in place by dairy management
- Wear personal protective equipment and proper clothing, such as long sleeves and long pants, and protective eyewear, footwear, masks and gloves.
- Use a National Institute for Occupational Safety and Health (NIOSH) approved chemical cartridge respirator or self-contained breathing apparatus when working in the manure pit or in areas with low oxygen concentration.

WARNING SIGNS

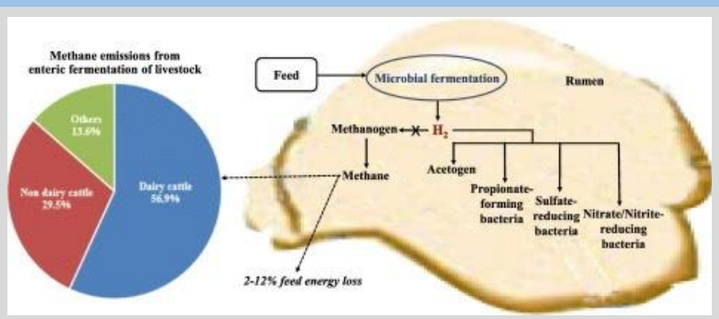
Warning signs notifying all persons of the potential dangers, procedures, and health risks should be posted in visible and multiple locations around the waste treatment areas.

WAYS TO PREVENT DROWNING

It is of the utmost importance to recognize the risk of drowning increases greatly as a result of the hydrogen sulfide, ammonia, and methane gas that is produced by the lagoon.

- ALWAYS ensure that the perimeter around the lagoon is completely enclosed.
- NEVER work alone around a lagoon or open manure pond, ALWAYS have someone with you.
- Proper fencing and gates must be CLOSED at all times and checked routinely.
- ALWAYS make sure you are wearing a life jacket and are tied off to a secure point or location when maintaining the lagoon.
- In case of an emergency, always have a life preserver in an easily accessible location.

DAIRY INDUSTRY EMISSIONS



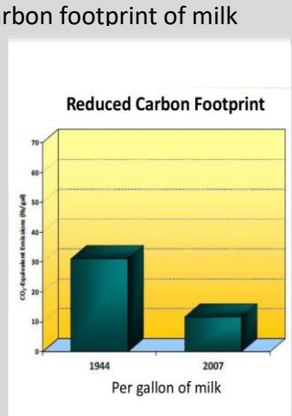
The agriculture industry makes up 12.5% of the annual greenhouse gas emissions. Methane emissions related to manure make up the larger portion of total dairy farm emissions with manure storage systems. Cattle emit lots of methane and ammonia, primarily through fermentation of their manure. This is due to the methanogens found in the rumen and hindgut directly related to the microbial populations within the ruminant. By finding a solution for methane emissions and developing mitigation strategies, the carbon footprint of milk can continue to be reduced.

Strategies used to reduce methane emissions:

1. feeding management and nutrition

2. rumen modifiers, such as hydrogen-utilizing bacteria

3. increasing animal production using genetics and breeding management



EQUIPMENT

The National Ag Safety Database recommends that machines such as, skid steers and tractors, maintain a safe distance from manure storage and settling basins to prevent equipment from tipping over. Safety precautions must be taken when using land application for spreading or injecting manure and when operating flush systems or honey vac tanks.

SYMPTOMS

Dairy farms can be a source of two types of bacteria, fecal coliform and *E. coli.* Exposure to *E. coli O157:H7* on surface waters can cause gastrointestinal illnesses.

There are over 160 volatile gaseous compounds that come from livestock operations. A lack of oxygen can cause permanent damage to organs including the heart and brain, so high concentrations of volatile gases should be avoided.

Symptoms of Volatile Gas Inhalation:

Gas	Odor	Characteristic	Effects
Methane (CH_4)	Odorless	- Lighter than air - Product of anaerobic activity	- Headache - Asphyxiant
Ammonia (NH_3)	Sharp, Pungent	- Lighter than air - Product of anaerobic and aerobic activity	- Irritation to eyes and nose - Asphyxiation may occur at high levels
Carbon dioxide	Odorless	- Heavier than air	- Drowsiness - Headache - Asphyxiation possible
Hydrogen sulfide (H_2S)	Rotten egg smell	- Heavier than air - Low odor threshold - Soluble in water	- Headache - Dizziness - Nausea - Unconsciousness