

WASTEWATER MANAGEMENT: MILKING CENTERS



BASICS

OVERVIEW

- When formulating a dairy waste management plan, many times the practitioner is called upon to evaluate a waste disposal system and its function. Milking center wastewater is often overlooked.
- Milking center wastewater is produced from prepping of cows prior to milking, cleaning and sanitizing milking equipment and bulk tanks, discarding contaminated milk, cooling milk prior to entrance to the bulk tank, and washing up milkhouses, parlors, and holding areas.
- Environmental consideration of this system should include volume of flow, quantity of organic solids, composition, and the potential for treatment and recycling of milk house water use.
- Milking center wastewater includes organic debris, milk, acid cleaners, detergents and other cleaning agents, bedding material, wash water, bacteria, and nutrients including nitrogen and phosphorus.
- Improper wastewater management has potential to contaminate ground and surface water.

GEOGRAPHIC DISTRIBUTION

Wastewater quantity and management is largely dependent upon facility type, environment, and regulations which vary largely by location.

SYSTEM PLANNING

- The composition and volume of wastewater discharge from milking operations vary predicated upon a number of on-farm factors. These include number of cows milked, type of milking equipment, cleaning and dipping agents, size of milk holding tanks, the type of cleaning equipment, length of time in the holding area, and feed access in parlor. If the holding area water is included with the milk house and milking parlor discharges, then large volumes of slurry will also be assimilated into the wastewater.
- Scraping and mechanical removal of manure, wash down water, and large volumes of flush tank water will all affect the composition and volume of discharge.
- Quantity of milk house wastewater must be estimated to properly design a functional management system. Quantity should be measured by installing a flow meter and monitoring daily for at least two months.
- On-farm milk processing plants for the production of milk, cheese, ice cream, and bottling of products present substantially more wastewater than the producer who ships milk in bulk.

Water conservation

- The quantity of wastewater discharged to a treatment system depends on the ability of the dairy operator to conserve and reuse much of the wastewater. For example, a dairy farmer milking 100 cows may use more than twice the water as a dairy milking 300 cows with conservation practices in place. Estimates range from 5-15 gallons of wastewater/cow/day from the milk house alone; however, these values are extremely variable between farms.
- Recycling of treated water is the best on-farm option for milk house waste. Water from automated milking system cleaning and pre-cooling are examples of recyclable water.
- Efficiency of water use can be obtained through practices such as manually rinsing the bulk tank rather than setting automatic rinse cycles, scraping floors prior to rinsing, etc.

Pollutant considerations:

- Hospital and treatment area wastewater may contain a large quantity of pathogenic bacteria. Special care must be instituted to prevent the spread of disease from this source.
- Cleaning and sanitizing agents generate a substantial level of pollutants.
- Direct discharge of wastewater without treatment will lead to water contamination with not only the above biologic pathogens and chemical pollutants but also higher than normal nutrient densities. The nutrients of most concern are phosphorus, ammonia-nitrogen, and chlorides. Their largest impact is upon aquatic ecosystems.

ORGANIC SOLIDS

- Milk commonly discarded from fresh cows, colostrum, and residue-containing milk should be regarded as a special pollutant source and be treated differently from milk house wastewater.
- Waste discharge containing large volumes of milk maintains large volumes of organic solids as well as dissolvable organisms and pathogens. Serious pollution issues can result from the discharge of untreated milk house wastewater. It is estimated that each pound of milk solids in dairy wastewater will require 1.2 lb of environmental oxygen for bacterial oxidation to occur. This bacterial oxidation allows the conversion of these solids to a more stable organic form.
- Biochemical oxygen demand (BOD) is a common measure of the composition or quality of wastewater containing organic wastes. BOD reflects the amount of oxygen consumed within a system. The biochemical processes in the oxidation of organic compounds allows a simplification of breakdown components. BOD of wastewater varies with the quantity and quality of pollutants.

ON-FARM WASTE MANAGEMENT

- On-farm treatment options are an important consideration when evaluating milk center wastewater processing. These systems all have their merits.
- Historically, septic tanks similar to those found in households were used for milk wastewater. However, due to contaminant levels 3-5 times higher than those in household discharge, these systems are not ideal.
- Farms using manure storage in combination with liquid manure application systems can easily incorporate the milk house wastewater. Farms without long-term liquid manure storage or farms choosing to treat milk house wastewater separately should consider the options below.
- The practitioner is advised to consult state and local environmental planning agencies in the appropriate choice of milk house pollution reduction and recycling systems.

On-farm Waste Treatment Options

- Municipal sewage treatment system
- On-farm septic fields separate from other systems
- Sprinkler irrigation system (may aerosolize pathogens)

- Oxidative pond/lagoon
- Sloping leach/infiltration system
- Constructed wetland



MISCELLANEOUS

ZOONOTIC POTENTIAL

Potential spread of zoonotic pathogens through aerosolizing manure

ABBREVIATION

- BOD = biological oxygen demand

SEE ALSO

- Manure Microbiology and Zoonotics (www.fiveminutevet.com/ruminant)
- Manure Management and Environmental Planning (www.fiveminutevet.com/ruminant)

Suggested Reading

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