White Paper

Improving the Efficiency and Safety of Dairy Lagoons

Introduction

Eliminating odours and reducing sludge, H2S, and corrosion

Dairy lagoons work best when the natural bacteria already present in the system can break down organic material efficiently. When oxygen availability is limited, the breakdown process slows, sludge accumulates, odours increase, and hydrogen sulfide, commonly written as **H_2S**, can become a serious health safety and operating concern.

This handout explains a practical treatment approach centered on increasing usable oxygen availability for native lagoon bacteria. By supporting the natural biological process, the treatment objective is to improve waste breakdown while reducing odours, sludge, H_2S-related safety exposure, corrosion, and operating risk around dairy waste systems.

Customer priorities	Operational value
Odour reduction	Reduces nuisance odours and complaint risk.
Sludge reduction	Supports & accelerates more complete breakdown of organic material.
H_2S mitigation	Reduces hydrogen sulfide formation and related exposure concerns.
Corrosion control	Protects lagoon-area structures, equipment, and working conditions.

Author: Alan Rein, DRP Chemicals, May 2026

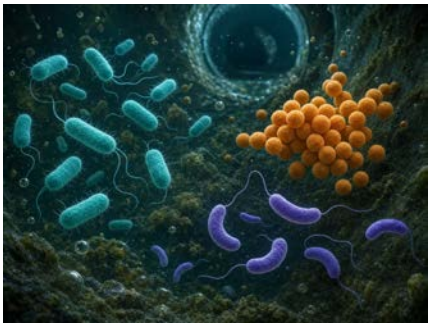
A Different Technology

Increasing bacteria efficiency and improving safety by eliminating H_2S

DRP Accelerator® is very different from traditional bacteria, enzyme, and aeration-only approaches. Rather than relying on the addition of new organisms, the technology is intended to support the bacteria already living in the lagoon by increasing the usable oxygen available to them.

In dairy lagoons, bacteria do the work of breaking down organic material. Treating a lagoon with Accelerator® improves the conditions that allow those bacteria to function more effectively. When the native bacteria are better supported, the system can process waste more completely and reduce conditions that lead to odour and sulfide gas formation.

Traditional approach	Common limitation	DRP Accelerator®
Aeration	Dissolved oxygen in water has practical limits, (8 ppm Max) and simply bubbling more air will not fully solve the oxygen bottleneck.	Supplies usable oxygen in an environmentally safe chemical form to support bacterial activity.
Added bacteria	Performance can depend on knowing what organisms are already present and whether added organisms will survive.	Works with the existing natural bacteria rather than replacing them.
Oxygen-rich compound	The material must be compatible with lagoon conditions and waste chemistry.	Provides oxygen in a form usable to bacteria - designed for waste-management environments.



Three typical bacteria found in waste.
Teal – Bacilli * Orange – Cocci
Violet - Vibrios

Adding DRP Accelerator®
increases Bacteria populations

Author: Alan Rein, DRP Chemicals, May 2026

How Bacteria Breakdown Works

Organic-material breakdown is a biochemical process. Like any process, it can only proceed as fast as the slowest limiting step. In lagoon treatment, the goal is to identify what is slowing the system down and then improve that condition so bacteria can continue breaking down waste.

Dairy lagoons normally provide several of the conditions bacteria need. They contain moisture, organic material, nutrients, and a biological population naturally adapted to the waste environment. The primary condition that is the real limiting factor is **oxygen availability**. When usable oxygen is not available in sufficient quantity, faster aerobic breakdown is limited, and less desirable anaerobic reactions will dominate.

Required condition	Relevance to dairy lagoons
Warm, moist environment	Lagoon and waste environments commonly provide the moisture needed for bacterial activity.
Suitable pH	A compatible pH range helps natural bacteria remain active.
Nutrients and organic waste	Dairy waste provides the food source bacteria break down.
Oxygen	Oxygen availability is the key bottleneck addressed by this treatment approach.

The practical treatment question is: **what must be accelerated to increase the rate of breakdown?** The answer is not simply more waste handling or more mechanical movement. The process must improve the limiting condition that keeps bacteria from working at their full potential.

The limiting factor in the bacterial action in a lagoon is the chemical fact that **ONLY 8 PPM OF GASOUS OXYGEN CAN BE DISSOLVED IN WATER** at any given moment.

When the oxygen bottleneck is eliminated, the natural bacteria can process organic material more efficiently. The improved breakdown is directly connected to the operators' outcomes that matter most: less sludge, lower odour potential, reduced sulfide gas formation, and better overall lagoon manageability.

Author: Alan Rein, DRP Chemicals, May 2026

Oxygen Availability Is the Bottleneck

Why more usable oxygen is needed

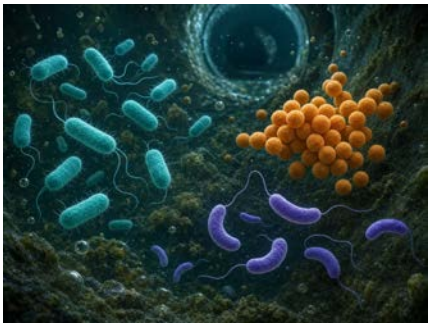
Aerobic bacteria breakdown organic waste faster and more efficiently than anaerobic bacteria. Their performance depends on oxygen availability. The challenge is that ordinary dissolved oxygen in water is limited, so simply adding more air may not provide enough usable oxygen to meet the biological demand in a high-load lagoon.

Typically, **oxygen demand will exceed ordinary dissolved oxygen availability**. When that happens, bacterial activity can shift toward pathways that are slower, less efficient, and more likely to create odours and sulfide gases.

Treatment logic	Practical meaning
Aerobic bacteria work more efficiently.	Supporting aerobic activity improves the speed and completeness of organic breakdown.
Anaerobic bacteria activity also requires available oxygen in chemical form.	Without enough usable oxygen, the bacteria cannot perform at the desired rate.
Water has a dissolved oxygen limit.	Bubbling air into water alone will not overcome the oxygen limitation under lagoon conditions.
More usable oxygen is needed.	A different oxygen-delivery approach can help address the bottleneck.

> **Practical implication: To maximize removal of organic waste and sludge, the treatment process must deliver more usable oxygen to the water and the bacteria working in it.**

This is the foundation of the treatment strategy. Instead of treating odours as the first problem, the approach focuses upstream on the biological conditions that cause odours, sludge accumulation, and sulfide formation.



Adding virtually unlimited chemically available OXYGEN with **DRP Accelerator®** increases the bacteria population by as much as 30 to 40 times.

Author: Alan Rein, DRP Chemicals, May 2026

The Solution

DRP Accelerator® provides the naturally occurring bacteria in the lagoon with usable oxygen beyond ordinary dissolved-oxygen limits. The product supplies both anaerobic and aerobic natural bacteria with oxygen in the form of a large inorganic salt molecule with many oxygen ions attached.

Claim	Customer meaning
Supports natural bacteria	The process is designed to work with bacteria already present in the lagoon environment.
Increases usable oxygen	Additional usable oxygen helps overcome the oxygen-availability bottleneck.
Uses an inorganic oxygen-carrying form	DRP Accelerator® is not an enzyme and does not add bacteria.
Applies to waste-management environments	The treatment is positioned for lagoons, slurries, and related organic-waste systems.

DRP Accelerator® also eliminates H_2S.

Hydrogen sulfide formation is linked to insufficient oxygen in the waste environment. When Anaerobic bacteria do not have enough readily usable oxygen, they will use sulfates as an oxygen source. That process releases sulfide ions, which can then form sulfide gases, including hydrogen sulfide.

Step	Process	Operational consequence
01	Oxygen becomes insufficient.	Bacteria operate in waste where available oxygen does not meet process demand.
02	Bacteria use sulfates.	Bacteria obtain needed oxygen by utilizing sulfate compounds.
03	Sulfide ions are released.	Using sulfate as an oxygen source can release sulfide ions , forming H_2S.
04	Odour, corrosion, and hazard result.	Sulfide gases are foul-smelling, corrosive, and dangerous to people and animals.

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Why H2S Matters

Odour, safety, liability, corrosion, and lagoon-chemistry management

Hydrogen sulfide is one of the most important gases to manage around dairy lagoons because it is associated with foul odours, worker exposure risk, animal-health concerns, corrosion, and complaint potential. H2S-related odour is more than a nuisance.

Concern area	Why it matters to a dairy operation
Odour and public complaints	Foul odours create visibility, complaint risk, and possible liability concerns for the operation.
Worker and site safety	H_2S exposure can create health risks for people working near lagoons, pits, pumps, or enclosed areas.
Animal-health exposure	Cattle can also be affected by air-quality conditions, and the daily presence of H_2S may contribute to production and health concerns.
Corrosion and asset life	H_2S can contribute to acid formation on wet surfaces, damaging concrete, steel, wiring, and exposed infrastructure.

Lagoon chemistry also matters. The DRP Accelerator® treatment emphasizes avoiding unwanted chemical contributions that could create additional odours, ammonia, nutrient, or mineral-management problems. DRP Accelerator® contains no sulfur, nitrogen, potassium, magnesium, phosphates, or other ions that could negatively affect lagoon chemistry.

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H2S Exposure Risks for People

Hydrogen sulfide safety considerations for lagoon operations

Hydrogen sulfide is a serious safety concern because exposure effects can escalate quickly as concentration increases. Odour should be treated as a warning sign, not simply as an inconvenience. Operators should always follow current occupational safety requirements, use appropriate monitoring equipment, and follow site-specific confined-space and manure-gas procedures.

Exposure range	Severity framing	Effects described
Repeated daily exposure at even very low levels	**Chronic concern**	**Headaches, fatigue, irritability, and concentration or memory problems.**
50–100 ppm	Irritation	Eye and respiratory irritation, plus digestive upset.
100–200 ppm	Severe	Gradual increase of symptoms, with possible death after extended exposure.
200–300 ppm	Acute danger	Severe respiratory tract irritation in an hour or less.
500–700 ppm	Life-threatening	Collapse in five minutes or less; death can occur within a short period.
700–1,000 ppm	Deadly	Immediate collapse; death can occur very rapidly.
1,000 ppm and up	Extreme	Nearly instant death.

These values reinforce why H_2S control is a priority concern in a lagoon-management discussion. A treatment approach that reduces the conditions leading to H2S formation can support a safer operating environment, but it does not replace gas monitoring, training, ventilation, lockout procedures, confined-space controls, or emergency-response planning.

Operators should treat H_2S as both an operational and safety-management issue. The better the lagoon performs biologically, the lower the potential for sulfide formation, odour release, corrosive exposure, and dangerous gas conditions.

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Effects on Cattle and Dairy Operations

H_2S and herd-performance considerations

H_2S affects cattle in similar ways to people. Even low-level daily exposure may contribute to decreased animal health, lower production and reproduction, and higher veterinary costs. For dairy operations, this makes air quality and lagoon-gas control part of broader herd-performance risk management.

Reported cattle effect	Production implication	Operational concern to monitor
Decreased food consumption	Reduced intake can decrease production.	Feed intake trends, milk yield, and weight condition.
Decreased water consumption	Lower water intake can decrease production and increase stress.	Water access, intake patterns, heat-stress interactions and milk production.
Immune suppression	Reduced resilience may increase disease vulnerability.	Health events, treatment frequency, and recovery time.
Increased respiratory infections	More respiratory burden may increase veterinary costs.	Respiratory symptoms, barn-air quality, and veterinary records.
Lower conception rates	Reproductive performance may be affected.	Breeding outcomes, conception rate, and days open.

> **H2S control is both a lagoon-management issue and a herd-performance risk-control measure.**

These effects apply to Dairy Cattle. Beef Cattle, as well as any other animal production facility.

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H_2S and Corrosion

When H_2S contacts a wet surface, it forms sulfuric acid. This creates a corrosion pathway for concrete, steel, wiring, roofing, fencing, pumps, motors, and other lagoon-area infrastructure.

Corrosion mechanism: H_2S plus a wet surface can lead to sulfuric acid formation, increasing the risk of damage to exposed materials.

Asset category	Corrosion concern
Pumps and motors	Increased maintenance, reliability, and replacement risk.
Tin roofs	Material deterioration from corrosive exposure.
Concrete floors or walls	Potential surface and structural damage over time.
Electrical-box wiring	Reliability and safety risk where corrosive gases reach electrical components.
Chain-link fences	Premature degradation of exposed metal infrastructure.

H_2S Corrosion creates ongoing maintenance expenses, unexpected downtime, shortened asset life, and increased exposure for employees who must repair or replace equipment around difficult waste-handling areas.

Reducing H_2S will reduce odours, hazards, and corrosion. For a dairy operation, that can mean improved working conditions, lower maintenance pressure, and longer useful life for equipment and structures located near the lagoon.

The DRP Accelerator® Process Works Wherever Bacteria Perform a Positive Role!

Treatment-system applications for organic-waste environments

The DRP Accelerator® treatment process is applicable anywhere in a waste-management system where organic waste, sludge, odour, and sulfide conditions need to be managed. In dairy operations, the most visible application is the farm animal waste lagoon, but the same operating logic can apply across related liquid-waste and treatment-system areas.

Application	Intended operational relevance
Pumping stations	Helps reduce odour and sulfide conditions before they migrate through the system.
Primary treatment	Supports waste processing where organic load and oxygen demand are central concerns.
Secondary treatment	Helps maintain biological activity and improve organic-material breakdown.
Wash-down slurries	Helps manage odour, sludge, and organic-material handling in liquid waste streams.
Farm animal waste lagoons and solid-waste reduction	Addresses lagoon efficiency, H_2S mitigation, sludge reduction, and animal-area odour exposure.

The results are a cleaner, more manageable lagoon environment. In practical terms, customers should look for improved waste breakdown, reduced sludge burden, lower odour potential, and reduced H_2S-related safety and corrosion exposure.

Because every lagoon is different, site conditions such as waste load, lagoon volume, weather, agitation practices, pumping schedule, and existing sludge depth should be considered when planning a treatment program.

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Benefits Summary

DRP Accelerator® will reduce operating costs by improving lagoon biology, reducing waste burden, and reducing odours, H2S, corrosion, health, accident, and maintenance exposure. The most important benefit is that multiple operating improvements can come from the same root strategy: **support native bacteria with more usable oxygen.**

Benefit area	Customer value
Waste handling	Reducing the quantity and thickness of waste can lower handling burden.
Pumping efficiency	Thinner waste is easier to pump and more manageable in the lagoon system.
Fertilizer value	Better-managed waste will improve usability and handling, as well as higher value fertilizer when applied appropriately.
Electrical usage	Pumping thinner waste can reduce the load placed on pumps.
Maintenance	Reduced corrosion can reduce maintenance costs for equipment and structures.
Insurance and liability	Lower hazards and fewer odour complaints may reduce risk exposure and regulatory complaints.
Employee conditions	Improved working conditions support employee health, comfort, and safety.
Cow health	Reduced H_2S exposure supports cow health and dairy production.
Accident prevention	Reducing hazards may reduce the possibility of an incident.
Unexpected expenses	Lower accident and corrosion risk can decrease unplanned costs from failures or emergencies.

This muck in a goat waste lagoon at a University Goat Research farm -

Was cleaned so well that the lagoon was pumped entirely empty with 2 inch pumps.

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ACTUAL BEFORE AND AFTER PICTURES FROM A DAIRY LAGOON.

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