



Meat Processing Industry



- Background**
- At Linde, we are making our planet more productive. Whether it is by providing industrial gases that are used in the meat processing industry or technologies that allow food processing facilities to reliably meet their wastewater treatment guidelines – Linde is helping companies improve their productivity.
 - The meat processing industry consists of two major groups – slaughterhouses and packing houses. A slaughterhouse is a plant that harvests animals and whose main product is fresh meat as whole or smaller meat cuts. A packinghouse is a plant that both slaughters and processes fresh meat to cured, smoked, canned and other prepared meat products.
 - The principal constituents of meat processing wastewaters are a variety of readily biodegradable organic compounds, primarily fats and proteins, present in both particulate and dissolved forms. Meat processing wastewater facilities are faced with a number of challenges in their operations, which could include:

High Fats, Oil, Grease and Suspended Solids loads

Challenge: The volume of water used (per unit of production basis, such as live weight killed (LWK)) can vary substantially (average 4500 l/1000 kg LWK) among processing plants but the wastewater always contains high concentrations of suspended solids (SS) and the contribution of fats, oils, and grease (FOG) to the overall strength of the wastewater stream is very important. Flocculation and coagulation are used to remove these compounds. The amount of coagulant and flocculent to use and the effectiveness of this process are dependent on pH and alkalinity of the wastewater.

Linde Approach: Linde's CO₂ application can be a more accurate and easier way to control the pH in the physico-chemical treatment. In some facilities, solids and FOGs removal is achieved using dissolved gas flotation systems where inert gases like Nitrogen (N₂) can be used.

High Strength Organic Loads

Challenge: Uncollected blood, solubilized fat, urine, and feces are the primary sources of BOD in meat processing wastewaters (2-15 kg/1000 kg LWK). For example, blood from beef cattle has a reported BOD of 156,500 mg/L with an average of 32.5 kg of blood produced per 1,000 kg LWK. Thus, the efficacy of blood collection is a significant factor in determining the amount of BOD in meat processing wastewater. Another significant factor is the manner in which manure (urine and feces) is handled at the facility.

Linde Approach: High purity oxygen systems enable wastewater facilities to treat a higher organic load, typically double or more, than what can be treated by a conventional air based system. With our efficient and proven oxygenation systems, mixing and oxygen transfer is decoupled. Providing enough oxygen to meet an increased organic load is as simple as turning up an oxygen supply valve to feed more oxygen to the wastewater process.

High Nitrogen Loads

Challenge: Blood and manure are also significant sources of nitrogen in meat processing wastewaters. Dairy wastewater contains milk based substances that include ammonium (from the amino acids) and ammonia nitrogen (TKN) as well as residual cleaning agents such as detergents.

Linde Approach: Pure oxygen devices offer an integral system for reducing organic matter and nitrogen. By allowing for effective nitrification and denitrification, we provide a comprehensive solution for allowing dairy facilities to meet their treatment goals. Using intermittent oxygenation, we enable facilities to utilize a single basin to achieve nitrification and denitrification. The solution is very flexible to changes in flow and composition.

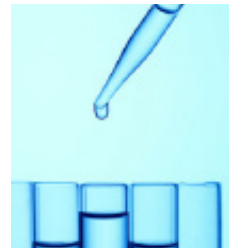
Fecal Coliform Bacteria

Challenge: Total coliform bacteria, fecal coliform, and fecal streptococcus of bacteria may be present in large quantities, due to the presence of manure in meat processing wastewaters. These bacteria are usually found in quantities of several million colony-forming units (CFU) per 100 mL, but are not usually pathogenic. However, they may indicate the possible presence of other pathogens such as *Salmonella ssp*, *Campylobacter jejuni*, and gastrointestinal parasites, including *Ascaris sp.*, *Giardia lamblia*, and *Cryptosporidium parvum*.

Linde Approach: Ozone produced using Linde high purity oxygen is extremely active as a disinfectant. The benefits are the strength of the disinfection and the lack of potentially harmful by-products like trihalomethanes (THMs).

pH Reduction with CO₂

Challenge: Process water, wastewater influent and wastewater effluent, often require pH control, however the use of strong acids pose safety risks. These risks are associated with storage, handling, corrosion and the possibility of overshoots. When a strong acid is added to reduce pH, a slight excess of the acid can make the treated water pH drop far below 7, which will cause hydrogen sulfide (H₂S) and other toxic gases to be released.



Linde Approach: Linde's CO₂ application for pH control allows facilities to effectively neutralize alkali wastewaters. Handling CO₂ is easier and less hazardous than the handling requirements of mineral acids. Carbon dioxide does not require spill protection or corrosion resistant piping. Carbon dioxide also eliminates the possibility of over treating because CO₂-water equilibrium conditions ensure that pH levels do not drop below 6.5.

- Conclusion**
- Whether your wastewater treatment system is an extensive aerated lagoon, or a compact wastewater process, our technology offerings will provide you with effective and reliable treatment.
 - Linde's tested and proven wastewater offerings have been deployed in a variety of food processing wastewater operations.
 - Call us today to discuss your particular wastewater treatment process needs, and let us help you improve your productivity.

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