

Reliable Treatment for the Wide Range of Dairy Effluents

Wastewaters from the production of dairy products are as diverse as the range of products itself.

It is advantageous to treat those effluents with a process combination particularly designed for the respective effluent type and treatment objective.

A good plant constructor thus offers a wide range of treatment solutions to find the most economical solution for the different treatment challenges.

Those solutions must be capable of properly coping with the particular characteristics of dairy wastewater:

- ▶ oils and greases have negative effects on filters and membranes
- ▶ COD peaks overstrain conventional sewage treatment plants
- ▶ precipitations (e.g. calcium carbonate) embrittle aeration membranes or modify the characteristics of MBBR carriers
- ▶ cleaners and disinfectants have negative effects on microbes
- ▶ etc.

There are two main processes for the biological elimination of organic carbon compounds:

▶ anaerobic (without air) – converts COD into CH₄ (= biogas), N or P is not decomposed: suitable for an energy-saving depollution of very highly loaded wastewaters, often with subsequent aerobic treatment stage

▶ aerobic (with active aeration) – converts COD into CO₂, N and P are decomposed: suitable for lowly, medium and highly loaded wastewaters

Often both technologies are combined – a primary anaerobic treatment stage to generate biogas and a secondary aerobic treatment stage to comply with the wastewater limit values.

For both categories, WEHRLE offers different technologies and is able to use tailor-made processes or process combinations for the wastewater. Not only the technical solution but also the best possible cost-effectiveness of the plant is thus a priority to us.



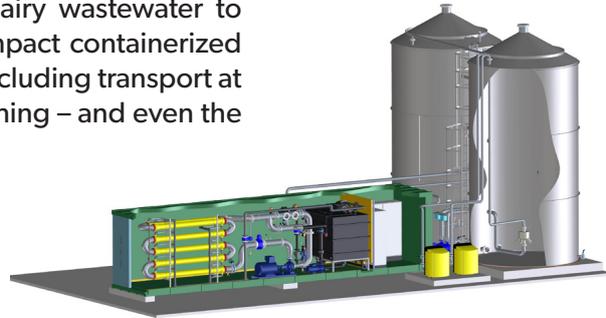
Overview Process Technologies

AEROBIC	SBR Sequencing Batch Reactor	Standard technology for the treatment of wastewaters with low and medium loads in moderate climatic zones
	BIOMEMBRAT® High-performance MBR	Versatile, robust and odourless treatment technology for rapidly changing wastewaters
	BIOSTREAM® Jet zone reactor	Energy-optimised aerobic treatment for the depollution of highly loaded wastewaters, as alternative to anaerobic treatment or in case of extremely limited space
ANAEROBIC	BIODIGAT®-SB EGSB reactor	Very compact and efficient treatment technology to reduce or avoid surplus sludge and to generate biogas from soluble COD
	BIODIGAT®-AS Anaerobic activated sludge reactor	Anaerobic treatment technology which is optimised for biogas yield and also converts undissolved COD (greases, oils and organic solids) into methane

Aerobic Treatment of Dairy Wastewater by a Practical Containerized Plant

Is the principal purpose of a wastewater treatment plant for the dairy industry to comply with the wastewater limit values, aerobic processes are the most economical treatment method. Especially in case of highly loaded wastewaters, the maintenance-free WEHRLE aeration system additionally saves energy in comparison with conventional technologies. In order to cope with the great variety and complexity of dairy wastewater, WEHRLE moreover attaches particular importance to a smart combination of pre- and post-treatment technologies or the integration of existing plant components.

Example **Dairy Crest, Foston / UK** Treatment of dairy wastewater to achieve direct discharge quality by integrating a compact containerized BIOMEMBRAT® MBR plant into the existing system – including transport at a favourable price, simple assembly, quick commissioning – and even the possibility to change the plant site.



Flow rate	650 m ³ /d		
Component	Inlet	Outlet	Performance
COD	3,000 mg/l	< 50 mg/l	> 98 %
NH₄-N	100 mg/l	< 5 mg/l	> 95 %

Aerobic Treatment of Wastewater from Seasonal Cheese Production

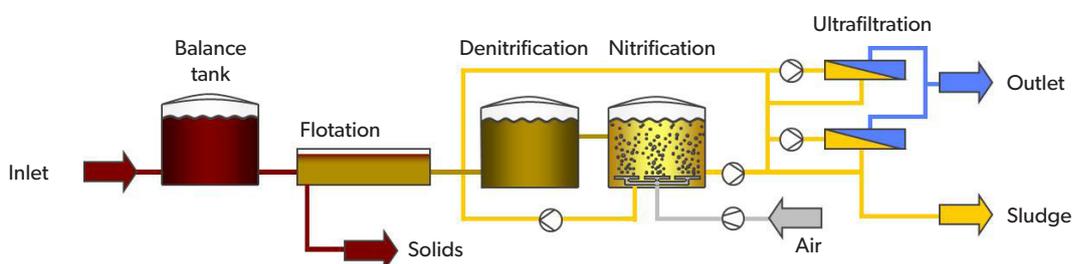
Not only the great variety is one of the differences between municipal wastewater and dairy wastewater but often also the hourly, weekly or seasonal changes of the wastewater volumes. A flexible plant and a simple, user-friendly operating concept support the operator in plant control, including an automated stand-by-mode for seasonal production rests – in the end the plant should adapt to the production and not vice versa!



Example **FONTERRA Cooperative Group, Ltd., Stirling / NZ**

Treatment of wastewater from seasonal cheese production by using a BIOMEMBRAT® high-performance MBR to achieve direct discharge quality. The client especially appreciates the quick start-up time when the season begins, the high plant availability and the high membrane lifetime.

Flow rate	3,100 m ³ /d		
Component	Inlet	Outlet	Performance
COD	1,858 mg/l	< 100 mg/l	> 95 %
NH₄-N	< 127 mg/l	< 15 mg/l	> 90 %

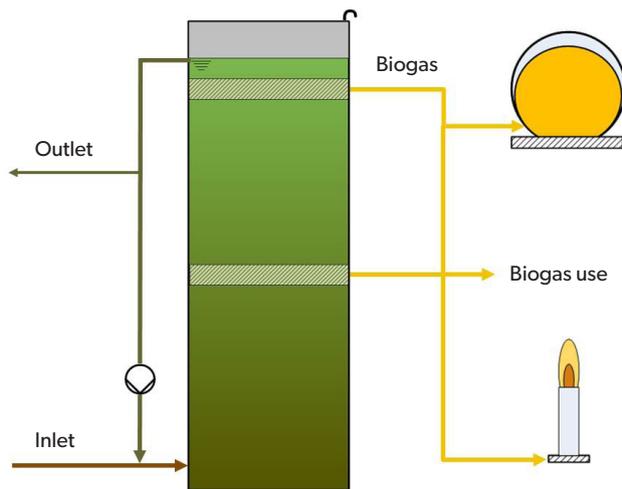


Anaerobic Treatment of Wastewater from Ice Cream Production

Anaerobic technologies produce no or only little surplus sludge and also convert the organic carbon compounds from the dairy wastewater into biogas which can be used for electricity and heat generation. This makes a profitable wastewater treatment possible – even if a post-treatment is often necessary to achieve the wastewater limit values or to make water available for reuse.

For example **UNILEVER, Gloucester / UK** – The treatment of production wastewater from ice cream production containing calcium using the anaerobic high-performance BIODIGAT®-SB reactor saves costs by avoiding surplus sludge.

Flow rate	800 m ³ /d	
Inlet / COD	6,250 mg/l	5,000 kg/d
Outlet / COD	< 500 mg/l	< 400 kg/d
Performance	> 92 %	



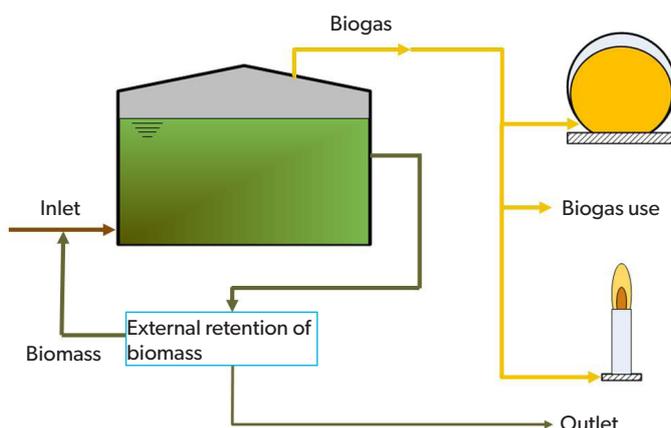
Anaerobic Treatment of Dairy Wastewater with Optimised Generation of Biogas

The BIODIGAT®-AS, which has especially been developed for dairy wastewater, does not only eliminate the dissolved organic carbon compounds but also converts the milk fats and other organic solids into biogas. The results are a particularly high biogas yield and a usual elimination rate of significantly over 90 %.

thus produced and the compounds rich in energy can also be converted into biogas.

Example: Treatment of wastewater from the production of quark and cheese by using a BIODIGAT®-AS:

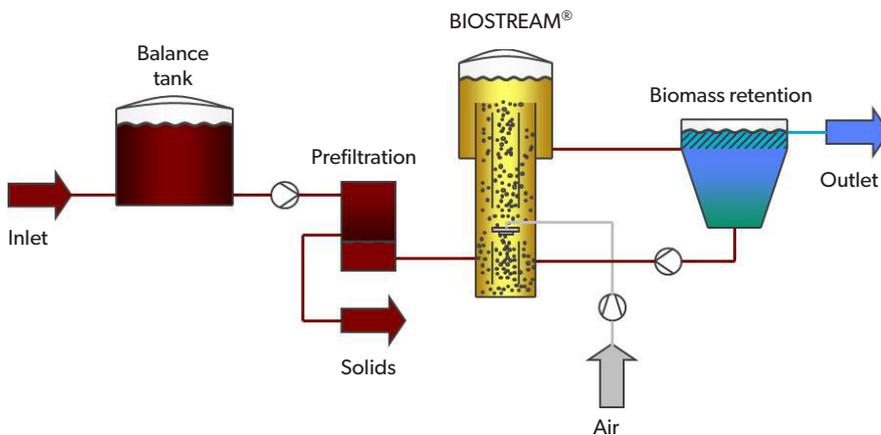
The usual flotation pre-treatment is not necessary. No flotat sludge which has to be disposed of is



TSS	7 g/l
Inlet COD	70,000 mg/l
Outlet COD	< 2,000 mg/l
Performance	> 97 %

BIOSTREAM® - the Energy-Optimised Alternative to Anaerobic Treatment

For clients who need a treatment for highly loaded wastewater but do not want to install an anaerobic treatment system for reasons of plant flexibility, space requirements, compliance with the discharge limit values or the effort linked to biogas generation, WEHRLE offers the BIOSTREAM® process technology which reduces the operation costs to a minimum due to an energy-optimised aeration technology. Compared to anaerobic technologies, the BIOSTREAM® reactor can also decompose nitrogen and particularly distinguishes itself by a very high flexibility in case of load variations.



WEHRLE Umwelt GmbH

Plant engineering and services from one source

Since 1982, WEHRLE Umwelt GmbH sets benchmarks as pioneer and technology leader for the treatment of very difficult and complex wastewaters. The wide range of available process technologies allows intelligent process combinations to fulfil the requirements and expectations of the client in the best possible way. WEHRLE consults, plans and builds plants and also offers corresponding services such as piloting, efficiency optimisation and retrofit of existing plants.

Especially for applications in the industry also factors beyond the used technology are important: a reliable performance in case of possible variations of wastewater volume and loads in the industry (e.g. caused by seasonal production or changes of product lines) and by all climate conditions, as well as a modular design for future upgrades of the production and easiest operation, to enable a simple outsourcing of the plant operation. The stable high effluent quality of WEHRLE plants allows an easy, optional upgrading,

e.g. to use the treated water for reuse / recycling and therefore, to save costs for process water, heat energy and possible softening.

WEHRLE is dedicated to the company's history: As family-owned company reliability, longevity and openness with clients and partners are our top priorities. The clients of WEHRLE trust in this philosophy – in over 40 countries and on 5 continents – for example, Fonterra, Dairy Crest, Müller, Mondelez, Unilever and many more.

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Company video