

Why

A dairy farm produces both domestic wastewater and farm wastewater. The farm wastewater includes rinse water from cleaning and disinfection of milking equipment, barns (and calf pens).

Agricultural farms are often located in areas without sewers or in areas where the sewers are not connected to a large-scale treatment plant. In these areas, the farmer himself is responsible for treating wastewater, unless the municipality takes the initiative.

Different rules apply to the discharge of domestic wastewater than to the discharge of industrial wastewater. When domestic wastewater is discharged together with company wastewater, the whole is considered company wastewater.

What

The pollutant load coming from a dairy farm consists mainly of biodegradable components. A system of biological treatment can therefore be used to treat this fraction.

Active sludge system

In an activated sludge system, bacteria attached to the activated sludge provide purification. Conversions occur in several stages. In a first stage, lots of oxygen is added and oxygen-loving bacteria start breaking down nitrogen and carbon compounds. Then, in a low-oxygen phase, nitrate is converted to nitrogen gas, which is released into the air. All other minerals and phosphates are largely left behind in the sludge. There are many variants based on this treatment system. In a plant system such as a percolation reed bed and an aerated reed bed, the microorganisms are trapped on the plant roots and substrate of the reed bed and an oxygen-rich and -poor phase is also created.

leachate field: (source: waterway guide brochure for livestock farmers)

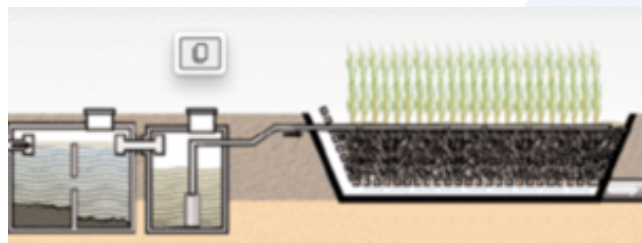
In a percolation reed field, after a preliminary sedimentation, the wastewater flows over a filter bed planted with reeds. There it infiltrates vertically and flows away through a drainage pipe at the bottom of the filter bed. For optimal purification, this irrigation is done intermittently. This can be achieved by 2 fields irrigated alternately or one field with a time-controlled pump operating intermittently. The intermittent irrigation ensures alternating aerobic and anaerobic conditions and therefore good nutrient removal.

Purification relies on the filtering action of the

sand and on the action of soil bacteria and other microorganisms. The plants themselves provide additional purification. The seeping water sucks in air, so the system does not depend solely on the plants for the supply of oxygen. In general, the leachate field guarantees a higher purification efficiency than other plant systems because the soil acts as a filter.

The filter material used should have a uniform grain distribution. The finer the filter, the better the purification, but the greater the chance of clogging. After several years, the permeability of the filter will decrease. However, if the leachate reed field is properly sized, the reed will keep it open and aerated even in the long term due to its highly branched and coarse rhizomes.

Obviously, fewer problems will occur if gravel or pebbles are used, but these do not give a sufficiently long retention time and are therefore more suitable as pre-purification (filtering).



(Principle drawing of a leachate field) Source: VMM – brochure waterway guide for livestock farmers

Aerated reed field (reed field Hooibeekhoeve)

The aerated reed bed uses gravel or Argex granules as substrate in the filter bed. A characteristic feature is the network of aeration pipes at the bottom of the reed bed. Through these pipes, the reed bed is supplied with additional air from below. This makes it possible to efficiently treat a larger quantity or more

heavily polluted wastewater on a smaller surface area.

Pre-purification

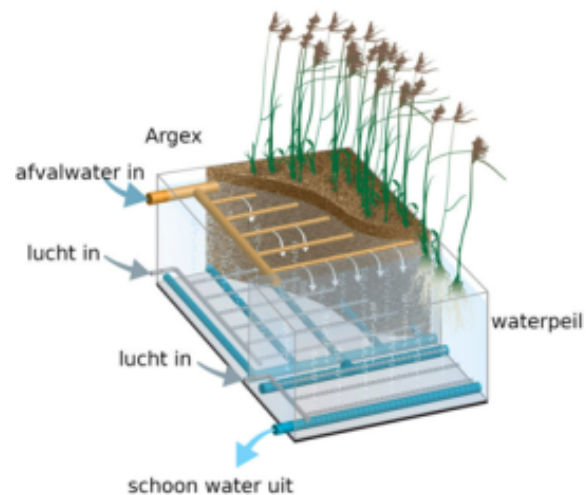
Thanks to a pre-settling well, coarser and settling particles are removed. This ensures that no solid particles are pumped onto the filter bed and clogging is prevented.

In order to purify rinse water from a milking plant, a good mechanical pre-purification stage such as a grease collection system and sand filter is also very important. This is because rinse water has a high fat content coming from the milk and fat is difficult to biodegrade. Therefore, fat must be mechanically captured.

Aftertreatment

The discharge standards for industrial wastewater are strict and it is not obvious to meet these standards with only biological treatment.

Especially the standard for **phosphate** is a challenge here. In most systems, the biological step is followed by **post-treatment** with a substrate that binds phosphates, such as apatite or torbermorite. Proper phosphate removal must be followed up, however, because the substrate can become saturated.



Aerated reed field source: reedland

Cost

Target price Reed Field Hooibeekhoeve: €90,000
but also other cheaper systems, firms, ...

Benefits

The farm wastewater includes the rinse water from the milking plants which, according to previous calculations, comprises up to 20% of the total water demand at the farm level (of Hooibeekhoeve). Purified farm wastewater, after treatment, can be reused for cleaning barns, machinery and equipment. Water consumption for cleaning agricultural machinery is estimated at Hooibeekhoeve at 90 m³ per year. For the cleaning of boots, 125 m³ of water was used at Hooibeekhoeve in 2024 (this includes the cleaning of boots of visitors and of students for practical lessons, so this consumption may be higher than at another dairy farm). By reusing treated wastewater, consumption of tap water or pumped groundwater can be significantly reduced.

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