

SOLUTION FOR COW FARTS

Ten Wageningen students plan to make a biofilter that removes methane and ammonia in cowsheds. They will use bacteria to convert these gases into less harmful forms. They are taking part in iGEM, the international competition for synthetic biology. In October, they will present their project in the finale at the iGEM Jamboree.

Infographic Pixels&inkt

Methane and ammonia

A lot of ammonia and methane are released from cows' urine, manure, farts and burps. Methane (CH₄) is a powerful greenhouse gas while ammonia (NH₃) acidifies the soil after it has been converted into ammonium.

Extraction

The polluting gases are emitted in the shed and slurry pits. They are passed from the shed and pits via an extraction system (Farm Technology Group) into the biofilter.

Filter

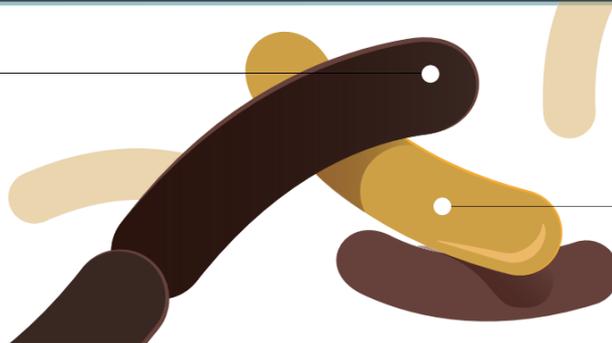
Bacterial biofilters are often large. The students want to make their biofilter as small as possible by using a smart design. They are also consulting dairy farmers on the filter design.

Modified bacteria in the filter

How does that modification process work and can it do harm?

Methane conversion

The bacteria will convert methane (CH₄) into CO₂. To do this, the students will insert the genes of a methane-eating bacterium into another bacterium that is more suitable for biotech applications. The filter needs to remove low concentrations of methane in the shed.



Ammonia conversion

The students are using enzymes from two types of bacteria for the ammonia conversion. One of these bacteria converts ammonia into nitrate and the other converts nitrate into nitrogen gas (N₂). The aim is to create one bacterium that can do both conversions.

Kill switch

The students will tinker with the bacteria until they can carry out the desired conversions. But are those modified bacteria safe? The students plan to incorporate a kill switch in the bacteria so that they only work in the biofilter and die outside it.

