

Enzymes improve processes in biogas plants

Andreas and Ralf Exeler's farm in Rheine in Westphalia has 1,300 sows, 4,000 piglet places and 9,000 fattening places. In 2015, a new part of the business was added: a biogas plant with a rated output of 500 kilowatts. This will supply more than 1,000 households with electricity from renewable energies. The engines have a total installed capacity of 1.3 megawatts in order to be powerful with a flexible driving style, especially during the intensive demand times in the morning and evening.

"We have built the biogas plant as a second pillar alongside pig farming," reports Ralf Exeler. "We can use the heat to warm the piglet house containing 4,000 piglet places and thus significantly reduce our energy costs. For this purpose, the barn is supplied with heat via a hot water pipe." A third reason why the Exelers decided to build the plant is the total recycling of liquid manure from their farm. This is because the plant is not fed with maize, but exclusively with the manure produced on the farm as well as chicken and cattle manure from farms in the region. The main component is the pig manure from our own fattening farm, which is pumped directly to the biogas plant through an underground pipeline. The solid manure is collected by two of the company's own trucks from the neighbouring plants.

The Exelers are real pioneers, because there are few biogas plants of this kind.

"Accordingly, our motto in the first few months was 'Learning by doing'," reports Ralf Exeler with a smile. "We had to learn slowly also from our mistakes." The biology in a pure slurry and solid manure plant is more demanding than for maize. The process conditions and operating requirements are more demanding than for NawaRo biogas plants. Nevertheless,

tance (DS) and acid contents are checked monthly.

The plant is fed with 50 cubic metres of slurry and 40 tonnes of solid manure every day. The use of manure, especially solid manure, increases the sulphur content of the fermenter. Iron hydroxide is used to bind the harmful hydrogen sulphide

"For us, pig farming and biogas plants are a suitable combination to ensure our own recycling process."

Ralf Exeler, farmer

maize was out of the question as a biogas substrate for the operators, due to the constellation of areas. "For us, pig farming and biogas plants are a suitable combination to ensure our own recycling process," stresses Ralf Exeler. "We have ideal and cost-effective substrates in operation, that can be converted into high-quality biogas."

Andreas and Ralf Exeler, together with Dennis Möllerfrerk, who is responsible for the plant, fought their way into the biogas topic. Gas yield and gas quality are measured several times a day, the substrate production is controlled and the process biological parameters such as dry sub-

in order to prevent biological disturbances and damage to components of the biogas plant and the CHP. "The iron hydroxide product MethaTec Detox S for desulphurization is added daily, depending on the manure composition and biology," explains Dennis Möllerfrerk. "In addition, we use MethaTec Nmin as a nitrogen binder. This binds ammonium and thus prevents the release of harmful ammonia."

MethaFerm Gras liquid has also been added for six months. The icing on the cake for the Exelers is to optimize the system once again at various points. TerraVis consultant Benedikt Ahmann

Currently around **9,300 biogas plants** are operating in Germany.



The Exelers biogas plant supplies over 1,000 households with electricity and the company's own piglet house with heat.



Ralf Exeler (right), TerraVis sales representative Benedikt Ahmann (centre) and Dennis Möllerferk attach great importance to daily monitoring of the process steps in biogas production.

explains the advantages of using enzymes: "High DS contents in the fermenter disturb the flowability of the liquid manure. The problems with substrate production lead to disadvantages in biology and to a lower gas yield. MethaFerm Gras liquid improves gas yield and flowability by degrading cellulose, hemicellulose and other components". Strong process fluctuations and problems with substrate transport were also the reasons for the Exelers to test the use of the

enzyme product. "We know how enzymes are used in pig farming," explains Ralf Exeler. "It was therefore a logical step for us to improve feed conversion and nutrient utilisation in biogas production as well. Looking back over the last six months, we have succeeded in doing so. Improved activity is already visible on the surface of the fermenter. The flowability has improved, acids are no longer present in the later degradation stages."

The enzyme mixture is added automatically with a pump. To start, it took 20 days four litres a day to get the process going. Since then, two liters a day have been supplied in several doses. Dennis Möllerferk regularly checks the scale as to whether the dosing at the pump is correct. "Too much' or 'too little' is not conducive to the process – we have already noticed this at various points," states Ralf Exeler from his experience. "Just like pigs the biogas plant has to be fed the right way. And with a slurry and solid manure plant, we have to look twice in some places to have the optimum process."

Further information is available from TerraVis product manager **Benedikt Baackmann**, phone 0251 . 682-2645, benedikt.baackmann@terraavis-biogas.de, www.terraavis-biogas.de.



Information box:

Farm Exeler in Rheine

- 140 hectares of farmland (barley, triticale, corn)
- 1,300 sows
- 4,000 piglet places
- 9,000 mast places
- Biogas plant with 500 kilowatts

Better feed conversion

Plant managers Andreas and Ralf Exeler add the enzyme mixture MethaFerm Gras liquid to the substrate. Ralf Exeler explains in an interview how the challenge came about and what has changed since then.

How did you discover enzymes for the biogas plant?

Exeler: Our company originates from pig farming. There we have been using enzymes for years to improve feed conversion and nutrient utilization, keyword N- and P-reduced feeding. That is why we are familiar with the subject and were certain that the enzymes can also make an important contribution to better feed conversion in the biogas plant.

What challenges did you face?

Exeler: The exclusive use of manure in the biogas plant made it difficult to control biogas production. High DS contents in the fermenter had a negative effect on the flowability of the liquid

manure. Reduced substrate led to problems with the biology in the fermenter. In addition, acids were formed which are undesirable and inhibit the process. All in all, these conditions led to a lower gas yield.

What has changed since the addition of the enzyme mixture?

Exeler: We have achieved very good flowability and mixing. Within a very short time the acids were no longer present, which has increased the methane yield. It is of course the case that changes in pig farming can be measured through the use of enzymes, but it is more difficult with the biogas plant. However, a higher and more uniform activity is visible on the surface of the fermenter. In addition, we can determine a stable quality process and a better degradation rate based on the analysis results of the samples from the fermenter. The enzymes can therefore have as many advantages in the biogas plant as in pig farming.



Farmer Ralf Exeler uses enzymes in pig farming for a long time and for six months now also in the biogas plant.