Find out more about Reaseheath's AD plant in *Farming Sunday* on Horse and Country TV, Sky Digital 280, this Sunday at 5pm and 9pm.

The 250 high-yielding dairy cows are fed a high protein TMR, which produces an energy-rich slurry for the AD plant.

Comparison of nutrients in slurry and digestate

	Dry matter (%DM)	Total nitrogen (kgN/t)	Ammonium nitrogen ($kgNH_4$-N/t)	Nitrate nitrogen ($kgNO_3$-N/t)	Total phosphate (kgP_2O_5/t)	Total potash (kgK_2O/t)	Total sulphur ($kgSO_3$/t)	Total magnesium (kgMgO/t)
Typical cattle FYM	25	6	0.5	0.1	3.2	8	2.4	1.8
Typical cattle slurry	6	2.6	1.2	-	1.2	3.2	0.7	0.6
Reaseheath (RH) slurry	11	4	1.74	-	0.91	3.67	0.82	1.45
RH separated solids	25	5.58	1.73	-	1.82	4.11	2.21	2.02
RH separated liquid	5	3.5	2.13	-	0.87	4.81	0.57	1.31

1. Feedstock in and digestate out will not perfectly correlate in terms of nutrient content, as digestate out will be mix of the input slurry from over the course of a month (typical digester retention time 30 days)
2. Reducing the volume of material through the production of biogas means concentrating the mixture
3. Same principals work for the separated solids and liquids. In comparison there will be a much larger volume of liquid compared to solids, and so nutrients in the solids are effectively concentrated

On farm

THE gas and digestate yield at Reaseheath is high because of the quality of slurry fed into the plant, so how would a farm with a more traditional system – cows housed in winter, out in summer – find the system?

Daniel Galloway believes it should not be too much of an issue: "If you are turning cows out, you don't have to stop the plant – you can slow it down and it will be easy enough to bring it back to life in autumn. You could also choose to empty your slurry tank over summer to keep it going. It will also work on dirty water, but will have a lower output."

Organic farms, in particular, could benefit from this type of 'plug and play' system, with energy generation and fertiliser production from slurry alone.

TMR, creates an energy-rich slurry for the plant. The rapeseed husks, in particular, help to boost output. Rather than an accepted yield of 10-20cu.m of gas per tonne of slurry, the plant is producing 30-40cu.m of gas per tonne of slurry.

During digestion at 42degC, the plant produces biogas and digestate. The biogas is pumped into a gas holder, then into the combined heat and power (CHP) plant and boiler to produce heat and electricity, which is used on campus and keeps the plant going. Some biogas is recirculated in the digester to ensure effective mixing.

The solid digestate can be spread with a muck spreader.

Digestate

The digestate is separated into liquid and solids before storage. The liquid digestate is applied to silage aftermaths via an umbilical system and dribble bar, and Mr Yearsley says he has seen 'tremendous' results so far compared with applying slurry.

"We saw faster re-growth which was a darker colour with the digestate. I think it is because nitrogen is more available than in slurry.

"I was surprised at the response – and I can see the pound signs diminishing in my fertiliser bill." Next year a more scientific trial will take place.

The solid digestate, which is friable and stored in a heap before use, can be applied to crops and grassland using a muck spreader.

"Because it is friable, it will break down more easily than farmyard manure," he says. "This makes it suitable for spreading on land which might usually just receive slurry and so it will help soil condition too."

Other than the pump, there is little which can go wrong with the system, and while the Reaseheath system is fully-automated, Mr Yearsley believes a non-automated pump system would fit well on-farm too: "You could just switch on the slurry pump when you were feeding in the morning."

While requiring only a low level of maintenance and attention, Mr Galloway is keeping a closer eye on it than many farmers would and records even the smallest change.

The plant took time to reach operating temperature (up 0.5degC each day to 42degC), but the only operational issue was foam production when it was 'over fed' with slurry, but this was resolved.

The trial system was paid for by the North West Development Agency and Rural Development Programme for England, so is not eligible for Feed-in Tariffs (FiTs) or the Renewable Heat Incentive (RHI).

However, figures compiled by Reaseheath *(see table, left)* including FiTs show it should, if run commercially, provide a return on the initial £150,000 investment in less than six years, compared to a slurry store at a cost of £35,000.

After that initial period, the plant should generate cost savings/income, and is likely to have a life expectancy of 25 years.

If the plant is successful longer-term, it could become a viable alternative to expanding slurry capacity and provide power, heat and financial savings for a sensible initial investment.

It could also be a valuable selling point to milk buyers, who are increasingly under pressure to 'green' their supply chain.