LIVESTOCK

A new type of AD plant could offer farmers a much cheaper, practical way of generating heat and power on-farm using slurry alone. **Emma Penny** investigates the costs, the theory and the reality of an alternative to more slurry storage.

New anaerobic digester could be a profitable option for slurry disposal

EXCLUSIVE

Could your farm's slurry be working harder for you? The answer, according to new on-farm research at Reaseheath College, is 'yes'.

Add to that the rising cost of fertiliser, spiralling energy bills and the need to meet new NVZ regulations from January 1, and it makes a convincing argument.

Mention the solution is based on an anaerobic digestion (AD) plant and most farmers will discount it. They see it as costly, complicated and often requiring dedicated land for growing energy crops, rather than for livestock – something many disagree with.

Daniel Galloway

Mark Yearsley

But a new 'plug and play' AD plant at Reaseheath – the first of its type in Britain – could help. Costing less than quarter of the price of a traditional AD plant and fuelled by slurry alone, it promises to be a low-cost, easy way to manage slurry, generate heat and power, and produce a quality fertiliser.

Farm manager Mark Yearsley says while initially he was an 'AD sceptic', after a few months of operation he has changed his views.

"I had heard a lot of negative feedback about AD plants and that they weren't very productive, but this one seems easy to manage, will save us money on fertiliser and power the college," he says.

The 'plug and play' anaerobic digester can be installed in about three weeks, at a quarter of the cost of a traditional AD system.

Savings

In a full year, the college expects to cut 15 per cent from its £30,000 fertiliser bill and 10 to 15 per cent from its £450,000 energy costs.

Reaseheath is running the plant alongside a more traditional AD system, but sustainable technologies specialist Daniel Galloway says the 'plug and play' option is much cheaper to start with, at about £175,000 rather than £650,000.

The 'plug and play' system was delivered to site, fitted on to a pre-prepared base and took about three weeks to build, he says. The glass fibre tank, where digestion takes place, can also be buried.

At the start of the system, a pump feeds slurry into the tank every hour via an 20cm (8in) stainless steel pipe. It takes six tonnes of slurry per day.

The first pump fitted was not powerful enough to cope with the 11.5 per cent DM slurry produced by the college's 250 dairy cows. The herd, which averages 10,000 litres, is housed all year round and is fed a high protein TMR. It produces high DM slurry, which proved more difficult to pump than predicted, says Mr Yearsley.

However, once rectified, there have been few problems, he says.

"It is like a cow's rumen – you have to keep a practical approach to it. We are feeding the plant a consistent diet of suitable feed, rather than chopping and changing what is going in."

He believes feeding the plant an inconsistent diet means it becomes more 'gurgly'.

The dairy ration at Reaseheath, which features a 25 per cent protein blend, is another reason for the 'plug and play' plant's success.

A high proportion of soya and rapeseed, balanced with energy feeds, maize and wholecrop in the

Comparative costings: AD plant v slurry store

Does not take into account interest foregone on capital. Figures based on intensive system with cows housed all year round.

	Reaseheath plug and play digester 60,000kW/hrs from 11.5% DM slurry	Plug and play 40,000kW/hrs from 8% DM slurry	Slurry store no roof	Slurry store with roof
Gas produced/year	30,000cu.m	20,000cu.m	-	-
Capacity ❄	100cu.m	100cu.m	-	-
Cost to buy	£175,000	£175,000	£35,000★	£45,000★
Income/year				
FiTS at 14.5p/kW/hr	£8,700	£5,700	-	-
RHI at est. 6.5p/kW/hr	£3,250	£2,100	-	-
Cost savings				
Electricity and heat	£7,500	£4,500	-	-
Fertiliser✧	£5,000	£5,000	-	-
Total savings/income/year	£24,450	£17,300	-	-
Reaseheath breakeven ■	-	-	5.7 years	5.3 years

Notes

❄ 1,000cu.m storage = 100 cow herd in NVZ zone ★Based on cost of a steel tower slurry store

✧ Reaseheath annual fertiliser bill of £40,000, 12.5 per cent replaced by digestate from plug and play

■ Payback (at Reaseheath production levels) – the difference between plug and play and slurry store (no roof) is £140,000. Breakeven after 5.7 years, then generates income/cost savings. Life expectancy of AD plant is 25 years

■ Payback (at average farm production levels) – difference in cost £140,000 as above. Breakeven after eight years and then generates income/cost saving

How does AD work?

AD is the breakdown of organic molecules in the absence of oxygen, producing biogas rich in methane. In the process, micro-organisms secrete digestive enzymes which initiate the breakdown. This living process needs pH, temperature, nutrient content and retention time in the plant to be correct to ensure efficient digestion.

The biogas produced contains 50-60 per cent methane, which can be burnt to produce heat and electricity, while the nutrient-rich digestate can be used as a replacement for fertiliser and soil conditioners