



Turning slurry from nuisance to nutrient

Updating storage and manure management is reaping environmental – and financial – dividends for farmers, as **Debbie Beaton** finds out in the fourth in the best farming practice series supported by the Environment Agency

THE PRESSURE on slurry and manure management is becoming more and more intense as hard-pressed dairy and livestock producers expand to reduce capital costs to stay in business.

“How to manage more slurry, once herd size is increased, is crucial but it’s the question that everyone seems to avoid until they are faced with the problem of having too little storage,” says the Environment Agency’s Martin Price.

“But for many dairy businesses managing slurry and manures more effectively will bring financial – as well as environmental – benefits to their businesses,” he says.

That has certainly been the case in Wales where farmers are seizing the opportunity to improve their slurry storage and management with the help of grants from Farming Connect. “The Welsh Assembly is giving farmers a lot of support; after all 85% of the land area here is in farming. Tourism is vital to the economy, so to keep the landscape attractive to tourists it must continue to be farmed sensitively,” says Mr Price.

YOUNG FARMERS

“The incentives are designed to encourage new farming businesses and young farmers – the average farmer in Wales is currently 58 years old,” he explains.

So anyone under the age of 40 is eligible to claim 40% of the total cost of updating their slurry storage from Farm Connect, and 30% if they are older than 40 years.

Mr Price has been instrumental in helping two Welsh farmers set up new slurry storage facilities. The knock-on effect for their businesses has been enormous – not only helping to use animal manures more effectively and cut back on bagged fertiliser, but also in saving time spent emptying their

HWYLFA DDU FARM

- **Location:** Nant y Rhiw, Llanrwst, Wales
- **Area:** 44ha (110 acre) home farm; 63ha (155 acres) rented
- **Cropping:** Permanent and long-term grass
- **Livestock:** 200 Welsh Mountain and Hill Speckled Face ewes; 300 cross-bred ewes; 30 suckler cows (Limousin crosses)



Left: Tudor Hughes (right) and the Environment Agency’s Martin Price.

old slurry systems. “He is now able to choose when to spread slurry rather than being dictated to by stores overflowing with rainwater.”

Tudor Hughes farms 105ha (260 acres) of owned and rented land at Hwylfa Ddu farm, Nant y Rhiw near Llanwrst in the Conwy Valley. Much of his land lies 270m (900ft) above sea level. On a good day there’s a glorious view of Snowdon – but for much of the year this is an exposed, windy site with high annual rainfall.

Those climatic and landscape factors played an important role in Mr Hughes’ final decision on the type of storage he would need for the

slurry from his 40 beef suckler cows, which are overwintered indoors.

“Nine inches of rain fell in just two days in the Conwy valley last year – the old slurry tank was full to overflowing and we just couldn’t get on the land to spread it,” explains Mr Hughes.

RAINFALL

“That was an exceptional incident but it highlights the problem of rainfall here – 60% of our annual 1500mm falls during November to March. So one objective of the new system was to minimise the amount of surface water entering the slurry collection – and it was important that the new store was out of the line of sight of Snowdonia walkers,” says Mr Hughes.

Another priority was to maximise the amount of time he could store the slurry “so that the decision to apply slurry rested with me – on the best timing for grass production – and not simply what the weather dictated.”

The options available were simply an earthbank or concrete lagoon, or an above-ground tank. He went for the above-ground option, partly because of the sloping land surrounding the yard, which meant that one wall of a concrete lagoon

would be the same height as the yard: “It was too big a safety issue – even with a fence,” says Mr Hughes.

The new slurry tank is circular and holds 540,000 litres (120,000 gals) or the equivalent of four months’ storage. It has a smaller footprint than a conventional square slurry store. This means there is a smaller surface area for the rain to fall on, reducing the overall amount of rainfall entering the tank. “It coped with 7.5in of rainfall in 24 hours in February this year, when I was able to ride out the storm and spread the slurry after the ground had dried sufficiently,” reports Mr Hughes.

Careful separation of dirty and clean water has helped to significantly reduce the amount of water entering the slurry system. “Clean water used to run through the silage clamp and into the slurry store; we have directed the roof water away from the clamp and new store where possible,” reports Mr Hughes.

There’s still enough rainwater entering the tank, though, to mix with the slurry and ensure it is consistent enough for spreading on the land. “If the slurry is too thick it is difficult to spread accurately; too thin and it will



Tudor Hughes with the farm’s 540,000-litre circular slurry tank.

“It coped with 7.5in of rainfall in 24 hours in February this year”

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Tools to help

THE BEST WAY TO SPREAD

Is the way you apply slurry making the best use of its value? SPREADS, a decision support system from ADAS, allows you to compare the costs of different application techniques, such as shallow injection or surface banding as well as broadcasting, with the benefits of more precise application and reduced ammonia losses. The work has been commissioned by DEFRA and is available as a CD from Dr Ken Smith at ADAS. Email manureandsoils@adas.co.uk

HOW MUCH TO APPLY

RB209 FERTILISER

recommendations for agricultural and horticultural crops is the bible for nutrient management. It can be downloaded, for free, from the defra website at www.defra.gov.uk/enviro/pollute/rb209 or contact The Stationary Office (TSO) on 08700 600 5522 or order on the web www.tso.co.uk/bookshop.



MANNER (MANure Nitrogen Evaluation Routine), another ADAS decision support tool, helps growers predict the crop availability of manure nitrogen following application. A new version (4.0) includes a climate database which enables users to select data on monthly rainfall and evapo-transpiration rates for their farm. MANNER 4.0 costs £30 plus VAT from ADAS Gleadthorpe, Meden Vale, Mansfield, Notts NG20 9PF. MANNER 3.0 is free of charge. For more information contact Brian Chambers on email brian.chambers@adas.co.uk

MANAGING Livestock Manures booklets on arable land, grassland, spreading systems and organic manures are available for free. Compiled by ADAS, IGER and Silsoe Research Institute, with DEFRA funding, they are available from ADAS Gleadthorpe at the address listed under PLANET.

PLANET is an electronic version of RB209, which also incorporates MANNER. Funded by DEFRA and the Environment Agency, it is designed for routine use for each field, each year. It should be widely available in the next couple of months. A free CD can be obtained from PLANET, ADAS Gleadthorpe, Meden Vale, Mansfield, Notts NG20 9PF. Tel: or visit www.planet4farmers.co.uk.

WHAT'S IN THE SLURRY?

There are several quick and easy to use kits on the market which use a chemical reaction to measure the nitrate content of the slurry. Each kit comes with a reagent, containers and measuring device.

Quontofix Nitrogen Meter: The Quontofix uses a liquid reagent, which is very cheap to replace. The cost of the kit is £200 plus VAT. There’s also a hydrometer from the same company which calculates the amount of phosphate in the slurry dry matter for £35 plus VAT. Contact Martin Sykes at Cwmwyntell, Letterston, Haverfordwest, Pembrokeshire, SA62 5TJ. Tel/fax 01348 840 420 or email martinsykes@farmline.com

Agrolister slurry N tester: Uses a powder reagent and the kit costs £350 plus VAT from slurry spreading contractors, Tramsread. The company also sell flow meters. Contact Tramsread at Hobbies Lane, Mendlesham, Stowmarket, IP14 5SZ. Tel 01449 766 133.

Agros Nitro Check: Uses a powder reagent to measure N in muck, slurry or sewage. The kit includes a hydrometer, which measures P. Cost is £357 plus VAT from Qualex. The company also sells a slurry hydrometer which uses gravity to measure nitrate content for £41.50 plus VAT. Contact Qualex, 51 Dauntsey, Chippenham, Wilts SN15 4HN. Tel: 01249 890 317; fax 01249 892 323 or email Robert@jpainting.freeseve.co.uk

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run-off and create potential leaching and pollution problems,” explains Mr Price.

The old concrete effluent tank, which provided about two months’ storage, is now the reception pit for the new above-ground tank. The reception storage is more than adequate to accommodate the 48 hours storage period required under the Silage, Slurry and Agricultural Fuel Oil Regulations.

“Using or adapting older systems can often provide a cost-effective solution to problems – providing they comply with the regulations. In Tudor’s case it meant a big saving, between £5000 and £10,000, by not having to build a reception pit as well,” confirms Mr Price.

The capacity of the old slurry store meant that Mr Hughes was forced to spread slurry every six weeks: “We used to have to spread in December and January – at a time when the manure has no value to the grass. The conditions are also normally wet at that time so there was also the risk of leaching and poaching the land,” he explains.

“Although we have no water courses close to the farm buildings, we are conscious of the pollution risk,” adds Mr Hughes.

LIGHT COATING

Now he can spread the slurry on to grass at the end of February and beginning of March, and, at the beginning of June on to the silage fields (plus 2 bags of 20:10:10). Then, after the silage is cut in mid-July, he applies another light coating with a bag of fertiliser to encourage the aftermath.

Soil testing has become an integral part of the farm’s nutrient management to identify the appropriate amount of fertiliser to improve productivity and yet keep costs down.

He has already seen the benefit of identifying what nutrients are needed and being able to apply the slurry to the crops when they need it, which means he has been able to cut back on bagged P and K.

“I don’t buy in P and K for the silage land any more and I am also hoping to achieve a 20% reduction on N fertiliser as we adjust to the new slurry system,” says Mr Hughes.

The new store also gives Mr Hughes much more flexibility for the future: “I can add another ring which would give an additional 40,000 gallons storage if I wish to expand the livestock business further. There’s also the facility to spread the slurry from the tank using an umbilical system.” ■



Tudur Jones is looking forward to spending more time with his family.

New slurry lagoon and parlour bring welcome time savings

MANAGING A 65-cow dairy herd at the top end of the Conwy valley at an altitude of 300m (1000ft) and annual rainfall of 1500mm (60in) is challenging enough. But add inadequate slurry storage and antiquated housing and parlour buildings and it becomes a daily nightmare as Tudor Jones at Tyn Rhos, Pentrefoelas near Betws y Coed can testify.

“During the heavier rains early this year I was having to empty the slurry store every day,” he says. The effluent storage facility then was a hollow in the field with a soakaway on to his neighbour’s land. “He has been extremely tolerant of the effluent

going onto his field, but I knew that the situation just could not continue. It was not only ruining one corner of his field, but it was a complete waste of valuable nutrient off my land,” he says.

Constant muck in his front yard is another daily nightmare for Mr Jones and his family. The cows are housed in a building to the side of the farmhouse and have to almost cross his front doorstep every day for milking. “My wife’s had enough of wading through muck every day!”

His working day started at 5am and would often not finish until 9pm with the twice-daily struggle of getting the cows from their stalls and through

the parlour – as well as dealing with the slurry.

Grant aid from Farming Connect is helping to provide the solutions. The hollow in the field is now an earth-bank-lined slurry lagoon. It can hold up to six months’ storage, rather than the statutory four months, to allow him to expand his dairy herd. “The calculations are based upon annual rainfall, the amount of muck produced per cow, parlour wash-water and rain falling into dirty yard areas,” explains Mr Price.

The footprint of the lagoon has been kept as small as possible, by going deeper rather than wider, because of the high rainfall in this area, adds Mr Price. The cost of the lagoon is about £12,000-£14,000, but a new concrete store would have been nearer £40,000.

With the money saved, he has invested in a new cattle building. A new dairy parlour is also being installed, with Farming Connect grant aid. Being under 40, Mr Jones is able to obtain 40% of the total costs.



The lagoon at Tyn Rhos can hold up to 6 months’ storage.

The new buildings will help to keep the yard outside the farmhouse clean from now on, but the combination of a new parlour and slurry store will free up at least 4-5 hours of his day. “It will be good to have some of my life back and focus on my family as well as running the business more efficiently,” says Mr Jones.

As for fertiliser savings, he reckons that he can now use the nutrient value of his cows: “The muck from each cow is worth £30 in nutrients according to published figures in the Water Code. So with 65 cows that is at least £1800 worth,” points out Mr Price.

Regular soil testing in the rotation and nutrient analysis of the slurry will help to minimise the amount of bought-in inorganic fertiliser in the future. ■

“Each cow is worth £30 in nutrients”

Umbilical cord slurry spreading system

Rate, timing and location are crucial to getting the most from umbilical cord slurry spreading systems. Get those right and there are many potential benefits – such as reduced soil damage or compaction, flexibility in operation, reduced costs and reduced wind drift compared to vacuum tankers or older “umbilical splash-plate systems”.

Applying slurry at too high a rate with umbilical cord systems, or at the wrong time, or on steeply sloping land will not only waste valuable fertiliser but can lead to serious water pollution and prosecutions of farmers and contractors.

Here are some questions for you and your contractor to ask to get the most from your fertiliser and avoid potential polluting problems:

FARMERS: DOES YOUR CONTRACTOR HAVE A SYSTEM THAT:

- is used by properly trained staff?
- is well maintained and does not have visible wear and tear (especially to hose couplings and hoses)?
- has instant communication between the pump at the slurry store and the tractor cab?
- has a warning system at the tractor cab or pump if a hose bursts or coupling fails?
- has immediate shut down facility within the tractor cab?
- protects the delivery hose when crossing a road?
- accurately estimates or records volumes applied and application rates?
- completely empties the hose to land, or better, back to the slurry store?
- reduces pumping rates from the tractor cab when turning?

- can spread slurry across, not down, field slopes?
- can spread accurately – avoiding the “no-spreading areas” in the Water Code?
- provides an on-farm test of nutrients?

CONTRACTORS: DOES YOUR CLIENT FARMER PROVIDE:

- a map clearly showing ditches, streams, springs, wells, no-spreading areas and land that has been under-drained and “high risk” or “very high risk” land – as defined in the Water Code?
- a Farm Waste, Slurry, or Nutrient Management Plan – which includes these areas: Sufficient land that is suitable for spreading slurry – not water logged, steeply sloping or frozen (see the Water Code for more details); land that can be accessed without crossing streams or has permanent piping at stream crossing points; has a plan to deal with emergencies, with someone ready to help deal with accidents, or unforeseen difficulties, such as where to block drains in case of a major leak?

TOP TIPS FOR FARMERS ON NUTRIENT PLANNING FOR MANURES

Nutrient management planning on farms is of real economic benefit to the farmer, avoiding money literally being washed down the drain and helping to minimise/diffuse pollution problems



TEST YOUR SOIL

- Base application rates on soil analysis and crop needs to ensure efficient use of N, P, K and trace elements
- Use soil analysis results to guide fertiliser applications. Seek advice if you have a P index of 4 or more
- Analyse soils for nitrogen in late autumn or spring to check nutrient availability, where organic manures are applied every year

APPLYING SLURRIES AND MANURES

- Test the nutrient content of a representative sample of slurry or manure, or use DEFRA tables as a guide to the typical nutrient availability
- Use timely applications and equipment that does not damage soils in early spring
- Use a manure management plan, identifying “no-go” spreading areas; very high-risk areas where manures should not be spread in winter; and high-risk land for reduced applications
- Calibrate equipment to apply manures evenly at the rate you have decided is needed
- Consider rapid incorporation, injection or band spreading of slurry and manure. This ensures more nitrogen is available for crops than broadcast spreading because less is lost as ammonia
- Identify optimum windows for application. Slurries, poultry manures and liquid digested sludges with high readily-available nitrogen should be applied in spring. Their value is greatly reduced if applied in autumn because of losses from leaching (particularly on sandy or shallow soils)
- Farmyard manure and de-watered cakes can be spread in autumn or winter because they have less readily-available nitrogen and therefore undergo less leaching over winter
- Apply “readily available” nitrogen to satisfy known crop requirements. Do not apply more than 250kg/ha of total nitrogen in organic manures in any 12 month period

COMPOSTING MANURES

- Make the compost as near to the site of manure production as possible to reduce costs. Existing concrete areas, stores or even silage clamps, ideally roofed, may be suitable for part of the year
- If stored outside, build the piles so they shed excess rainfall (to a maximum height of 2.5m)
- Turn the piles at least once using a tractor

- with a front-end loader. More turns can benefit the process but add to costs
- Aim for a temperature of between 45C and 55C (with short periods of higher temperature to kill weed seeds and pathogens) and starting moisture of 45-60%. It is useful to use a temperature probe
- Carbon dioxide, water vapour and ammonia are the main losses from composting. Increasing the straw content of manure can reduce ammonia losses
- Collect leachate and re-use to moisten the heap if necessary

STORING SLURRIES AND MANURES

- Calculate the amount of manure and slurry generated by livestock
- Determine volumes for “dirty water” generated
- Decide on the storage capacity needed so that manures can be spread safely without causing pollution and to make the most of their nutrient content
- Ensure that rainwater from roofs, open yards, tracks and land does not drain into stores
- Consider the cost benefit of roofing concrete areas used by stock to minimise production of dirty water
- Cover stores to reduce nutrient losses (eg ammonia)

APPLYING INORGANIC FERTILISERS

- Check the quality of fertilisers
- Check the application rate of fertiliser on to the distribution mechanism of the spreader
- Spread patterns should be tested for evenness for each fertiliser product used and ideally vary by no more than 20%
- Fertilisers can be wasted if applied in windy conditions
- Ensure that fertilisers are not applied to field boundaries or within 10m of a watercourse.
- Do not apply fertiliser to wetlands, fields where soils are waterlogged or when the ground is frozen
- Ensure fertiliser applications always allow for the nutrients supplied by organic manures that you have applied
- Consider monitoring crop nutrient status as a means of accurately applying fertilisers throughout the growing period
- Consider altering rates of fertiliser application within the field to match variable soil nutrient reserves