

A series of fortunate events

“This system actually makes money when we’re drying – it’s a no-brainer.”

Machinery On Farm Opinion

In a quest to make the most out of their on-farm energy generation, one farmer in Shrops has invested in drying floors powered by heat drawn from an anaerobic digester and ground source heat pumps. CPM paid them a visit.

By Charlotte Cunningham

As morning breaks over the village of Ruyton-XI, Shrops, a glimmer of sunlight bounces off of the colossal AD plant at Wykey farm.

A forage wagon arrives and starts to offload a fresh cut of lucerne onto the floor of the adjacent shed as farmer, Simon Gittins, explains how the energy generated from the AD plant will shortly power the drying floor the lucerne is currently piling up on.

With such an impressive, circular system in place, you’d be forgiven for thinking this infrastructure had been in place for a lifetime, however, Wykey farm didn’t always look this way.

Ten years ago, the farm was looking for a new direction — the local sugar beet factory had shut, and they had recently gone out of dairy and potato production, explains Simon. “Our dairy herd was bang in the middle of a growing village, there

was no opportunity for expansion and so with a heavy heart, we exited the sector.

“Today, we’re an all arable system, growing about 607ha of wheat and OSR, 161ha of forage crops for drying, and the rest of the land down to maize, beet, and hybrid rye — with a small area rented out for potatoes.”

Seismic shift

Simon returned back to the family farm full-time in 2010, and while the land has seen a seismic shift with the move away from dairy and large scale potatoes, the biggest change to the business has been the introduction of the on-farm AD plant in 2012, he says. “Today we run a 1.9MW plant, and it was the investment into AD that led to the installation of the drying floor systems we now run to dry both our arable and forage crops.”

Following the installation of the plant, the farm quickly realised they were generating a lot of additional heat from the engines. “We recognised that there was potential here to utilise this heat energy to our advantage and drying floors looked the perfect fit.”

As with any investment, Simon spent a long time prior to purchasing looking at different set ups, before settling on a Welvent system. “We were early adopters of controlled environment on-farm potato storage and consequently built up a good relationship with Mike Sharp, Welvent’s joint managing director. “Mike is very knowledgeable and, in my view, technically second to none. He doesn’t mess about and he will tell you how it is — which is

reassuring when you’re investing in new untested processes and markets.”

Initially, the farm installed two drying floors that were powered solely by the engine heat from the digester. “They use a maximum of 800kw of engine heat and initially we were using the floors just to dry our wheat and OSR. It worked very well, so then we started looking into what else we could dry to make the most of this comparative advantage.”

With a focus on getting more from their investment, the farm decided to get into growing alternative crops with a view of selling the harvested, dried crops locally to livestock producers. “For the livestock sector, there’s a growing emphasis on feeding homegrown protein sources. But historically making hay in the UK — whether that’s from grass or lucerne —



Wykey farm runs a 1.9MW plant, and it was the investment into AD that led to the installation of the drying floor systems, explains Simon Gittins.



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Weighing up the benefits

Though for Wykey farm the move to drying floors have proved to be financially beneficial, before investing in any new system, it's crucial to weigh up the pros and cons, says Mike. "To ground source heat pump systems and drying floors a worthwhile investment, they do need to be used over a long period of time — up to 100 days or more. I would say in general, this type of system doesn't suit someone who wants everything dry within two weeks.

"To get the most from them, they need a long season of drying, which is why it works so well here with the combination of both arable and forage crops."

There are also sometimes concerns over how evenly drying floors dry crops, compared with conventional systems. This can be overcome by investing in stirrers, although these aren't suitable for grass or lucerne, he adds. Instead, the farm gets over this by turning the floors daily with a telehandler and buckrake.

Looking to the pros, what often makes this kind of set up attractive is a readily available green electric supply, says Mike. "This is beneficial financially and also from an environmental viewpoint as it means not burning high value fossil fuels."

There's also quite often the option to adapt an existing system, which can help to keep overall investment costs down, he adds. "For example, Simon's drying floors were fitted inside existing buildings which were previously used for potato storage. There's lots of options for growers and it doesn't necessarily have to be costly."

For Simon, one of the biggest benefits, compared to a conventional system, is the low maintenance "Compared with other drying systems there are very few moving parts which means very little maintenance. We clean the floors between different crops and blow out the lateral tunnels annually, but that's about it."

has been very difficult due to the weather.

"So four years ago, we started experimenting with barn drying lucerne and grass. We've refined the process over the years, taking us to where we are today. We now dry forage rye, lucerne and Italian ryegrass mixes for a number of different animal feed markets and have found that lucerne is particularly popular."


To take advantage of the surge of interest in barn-dried lucerne, the farm made the decision to invest further to increase their capacity. "From this, we got into ground-source heat pumps. We have recently commissioned our second ground-source heat system which takes our drying floor capacity to 5.6MW, of which 4.8MW comes from ground source and 800kw from our digester."

On the arable front, all of the grain is



Following the installation of the AD plant, the farm quickly realised they were generating a lot of additional heat from the engines which could be used to their advantage.

dried on the floors too, explains Simon. "Wheat wise the farm grows about 25% milling wheat and 75% feed wheat. The feed wheat tends to go to local mills or direct to farm on some occasions, while milling wheat heads North to mills in ▶

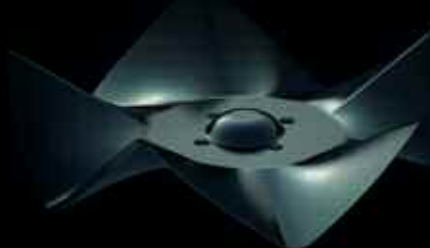


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On Farm Opinion



With a focus on getting more from their investment, the farm decided to get into growing alternative crops with a view of selling the harvested, dried crops locally to livestock producers.

► Manchester, and the OSR is usually sent to Liverpool.

"In a year like this one, the benefits of having such an efficient drying system

have come into their own. For cereals, we reckon we only use about 1.1-1.5kwh of heat to shift a kg of water — it's incredibly efficient."

Looking to the technical side of things, the digester-powered floors work by the heat exchangers and pump systems sending hot water to the drying floors, where large heat exchangers are used to take the heat from the water and heat the air, explains Mike Sharp, joint managing director at Welvent. "The fundamental principles of drying floors are incredibly simple — they work by continually blowing dry air into harvested crops, which takes the moisture away.

"Fans draw the heat from a heat exchanger and blow it through the tunnels under the crop and back through the shed.

"Each system boasts two 30kw fans and each is matched to 1000kw of heating coil to enable the drying process."

With the ground source floors, there are

65,000m of underground pipes at Wykey Farm which gather heat from the field and bring it back to a bank of heat pumps at the farm, he adds. "Those pumps extract and concentrate the heat — upgrading it from 10 °C to 40 °C — then operate in the same way as the AD-powered floors by pushing hot water to a heat exchanger and then blowing the subsequent hot air through the shed.

"Ground-source heat pump generates about three or four times as much heat than electrical source, so it's an environmentally-friendly and efficient way of doing things."

Though the process seems like a fine art, Simon says it's actually an incredibly simple way of doing things. "There's a lot of complicated ways of drying crops, but drying floors are simple. Before this, we were using a fairly old, continual flow dryer which worked well, but was very labour intensive and burnt a lot of gasoil.

Lucerne opportunities

Though lucerne — or alfalfa as it's known globally — is one of the biggest forage crops in the world, little is grown in the UK due to the fluctuating weather patterns.

To get the crop dry, it has to be turned in the field, but in doing so a lot of the leaf is lost — where the majority of the protein is found. However, with his setup, Simon is able to mow it, bring it straight in to the shed, with all of the leaf still attached, and dry it indoors. "The benefit of this is that we're able to produce a product with a much higher protein value.

"If you source lucerne from America, mainland Europe or even the UK, the typical protein content is about 16%, whereas, because we can bring all of the leaf in ours tends to be

more like 21-22% protein.

"It's homegrown, it's renewably dried and it fixes its own nitrogen, so it's an economically viable, environmentally friendly replacement for soya from South America."

At present the lucerne goes to high-end dairy production and also for calves and heifers.

"Lucerne is a sought-after feed source for calves in particular as it's very good for developing the rumen and contains lot of beta-carotene which is important for bone and hoof development."

The grass and forage rye currently go to breeding bulls, but the farm is also trying to test its validity in the dairy market too, he adds. "Effectively, it's dehydrated grass, meaning cows get all the goodness of fresh grass — as we're

cutting it a lot earlier than traditional grass hay — but in the form of a dry product that can fit into a wide range of diets as many producers are looking for a dry product that fits in with wet feed-stuffs to help scratch factor and digestion."

Simon believes this emphasis for homegrown protein will only increase over the coming years. "The demand is strong without a doubt, and supermarkets are pushing that way all the time too.

"Using renewable heat to replace expensive fossil fuels to dry all these crops is an environmentally positive way of accessing existing markets that have traditionally been hitherto inaccessible for UK farmers."

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“With the drying floors it’s just a matter of filling, monitoring and emptying once it reaches the correct moisture. A floor holding 150t will generally drop from 20% to 15% moisture in about 18 hours.

“The lucerne and grass do take longer to dry than the grain, but everything works based on the same principle. Touch wood, we haven’t had any moisture problems in all the years we’ve done it.”

One thing that’s worth nothing on the grain side of things is that while a lot of people go to the expense of having grain stirrers, Simon has found that this isn’t always necessary.

Perfectly mixed

“We have a spear that we use to determine the moisture and this might show that the bottom of the pile is 12.5%, the middle 14.5% and the top 16.5% but as long as that averages out below 15% we just move it into the main grain store, push it up, and it’s perfectly mixed by the time it goes out.

“Also, because you dry from the bottom up, stirring encourages some of the heat to come up and out. A drying floor is actually one of the most efficient ways of drying because all of the heat is absorbed and used before it gets to the top.”

When it came to designing the system, one choice the farm had to make was whether to install wooden or concrete tunnels into the shed. Because they had plans to use them so frequently, they opted for concrete. “This was definitely the right decision. Spending a little bit more money and going for concrete helps to increase the longevity of the system.”

Another option was deciding between

metal or wooden floors. “Metal is great, but our opinion was that because we were going to have a lot of very dry grass and lucerne on the floors, we didn’t want any risk of a spark, so we went for wooden,” says Simon.

With five drying floors now in situ and a profitable growing market for barn-dried lucerne, it’s definitely an option Simon would recommend considering. “In a time where margins are tight and prices fluctuate dramatically, the variety of crops and the different markets help us to minimise risk.

“And from a financial point of view conventional drying systems can cost you up to £5-6/t, whereas the system off the AD is free, and the ground source system is actually making money when we’re drying — for us, it’s a no-brainer.” ■



The fundamental principles of drying floors are incredibly simple, says Mike Sharp.

Farm facts

Wykey Farm, Ruyton XI Towns, Shrops.

- **Arable area:** 1294ha
- **Cropping:** Wheat; OSR; grass; lucerne; hybrid rye; forage rye; maize; beet and potatoes.
- **Soil type:** Sandy loam
- **Mainline tractors:** John Deere 6215R
- **Harvesting:** New Holland 8.90 Combine; Pottinger Torro Combiliner.
- **Loaders:** JCB 560.80; JCB 538.60; Manitou 741.
- **Cultivation equipment:** Lemken 4m combination drill; Sumo 4m Trio; 2 x Kuhn 6f ploughs
- **Staff:** Simon Gittins, managing partner of a family partnership, with 8 full-time staff.

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