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ISSUE 21: Winter 2019/2020

FORAGER

HOME GROWN FEED FOR SUSTAINABLE FARMING



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SPECIAL



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FORAGER

HOME GROWN FEED FOR SUSTAINABLE FARMING

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WORKING TOGETHER FOR A SUSTAINABLE FUTURE



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Editor's

NOTE

Farmers have the tools at their disposal to positively impact climate change and help meet the government's 2050 net zero target, writes Aly Balsom.

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It's hard to escape the constant barrage of media and public negativity around farming and the environment. Most days we're bombarded with people telling us we're killing the planet.

It's depressing and somewhat puzzling when you're standing in a field of grass surrounded by cows and you're told that you're doing more damage than the thousands of planes above you.

The facts remain; just 5% of carbon emissions come from farming in developed nations like us, versus 80% from fossil fuel industries. However, sadly it's much easier to tell the consumer not to eat a burger than it is to criticise the multi-billion pound fossil fuel industry and tell people they shouldn't fly their family to Malaga on holiday his year.

Ultimately, it comes down to who yells the loudest and – compared to vegans and environmentalists – we aren't loud enough. It's time to stand up and shout above the din; farming is part of the solution to climate change, not the problem!

A lot of the issues surrounding farming and the environment come from the figures that are used to talk about global warming. All too often, these work off global figures which include developing countries. In these developing nations, farming does have a high environmental impact. However, in developed countries, like the UK, gains in production efficiencies mean we are producing more from less, which has a positive impact on our carbon footprint.

Farming is also one of the few industries that has a circular system. This means that although the industry is an emitter of greenhouse gases, the ability to put the nutrients and organic material produced by livestock back into soils, helps to offset these emissions.

The fact the grassland ruminants graze is the biggest natural carbon sink after the sea, also means that farmers have one of the biggest weapons against climate change in their control.

No one is saying that farming is blameless, and there's no doubt that farmers can make improvements when it comes to limiting

their environmental impact. Min-till systems are already reducing soil carbon losses into the atmosphere from ploughing. More and more arable farmers are reintroducing livestock into crop rotations to build soil organic matters and help control black-grass. This in itself helps the environmental story, with every 0.1% increase in soil organic matter per hectare resulting in nine tonnes of carbon stored – just ask micro-dairy founder and 'biological farmer' Oli Lee (see page 18).

Combining low trajectory spreading methods with high sugar grasses has also been found to reduce ammonia emissions by 40% and nutrient runoff by 22% (see page 16).

Adopting grassland management techniques that boost productivity also brings big environmental wins. For example, measuring grass and rotationally paddock grazing can reduce reliance on bought-in concentrates. This helps to reduce a

farm's total carbon footprint by reducing the "up-stream" effects associated with deforestation and loss of soil carbon in croplands for concentrate feed production. All these steps help to create more sustainable farming systems.

Ultimately, we all have a part to play in helping the environment, but rather than blaming farmers for climate change, it's time to see them as part of the solution. If you truly want to reduce environmental impact, buy local British meat and milk that efficiently utilises well

managed forage – and maybe take one less package holiday to Spain. See our **Environment & Sustainability Special** on pages 8-21. 

It's time to stand up and shout above the din; farming is part of the solution to climate change, not the problem!



Next generation

As part of the Next Generation series, Matt Mellor meets dairy farmer Marcus Ferraro, who believes critical mass is key to achieving his twin aims of sustainability and a rewarding lifestyle.

Modernisation and expansion have been the driving force for 27-year-old Marcus Ferraro since he returned home in 2013.

Thirteen years prior, the family farm had ceased production, leading Marcus to eventually seek work as an assistant herdsman elsewhere in Ceredigion. He then headed to Farthings Hook in Pembrokeshire, to work on the James family's 400 cow unit. It's here that he gained the inspiration that he still feeds off today.

"I still value the opportunity that was afforded to me by the James family as it really helped focus my mind and open my eyes to what might be possible back at home," he says.

Drawing on this experience, he returned home as soon as his father Richard went back into milk production. However, with outdated facilities and capacity for just 100 cows, the enterprise was a struggle.

Marcus realised that modernisation and increased scale were the only ways forward and in 2016 he took over financial responsibility. Since then he has begun significant expansion in partnership with wife Vicki, and Richard.

"Land has come available for rent, so we've effectively tripled our acreage and set our sights on milking a herd of 300 cows," he explains. "Autumn block calving suits our situation, and with investment in new buildings, reseeding and grazing infrastructure, and a big focus on making quality silage, we are targeting 8,500 litres per cow with at least half of production coming from forage."

Marcus has chosen to cross the existing Holstein base with Fleckvieh and Norwegian Red with the aim of breeding cows that will milk, but are also hardy, with good feet and fertility. Although he feels he can buy-in heifers cheaper, he's committed to rearing his own replacements as it helps to justify a level of staffing that he believes creates the optimum work-life balance for all.

"My philosophy is to have the workload for a pool of good, reliable people who are motivated and happy to be flexible," says Marcus. "So, in addition to family, we have Will (tractor), Geraint (feeding / relief milking), Sioned (milking) and Claire (vet support on a Monday). Nobody works more than one weekend in two and everyone is usually finished by 5pm, and there is always cover available when needed."

A reliable and motivated workforce is one of Marcus' key ingredients, the other being to keep things simple and not to underestimate the time and cost required when building a business. 



IN THE HOT SEAT

Name: Marcus Ferraro **Age:** 27

Farm: Sychpant Farm, Blaencillech, Newcastle Emlyn, Ceredigion. 227ha (560 acres) (65ha owned; 162ha rented).

System: Holstein / Fleckvieh / Norwegian Red autumn block calving, maximising milk from forage. Building to 300 cows and 8,500 litre herd average.

What is the biggest challenge faced to date?

Managing cashflow is without doubt the toughest challenge. We've invested in buildings and infrastructure and being block calving it can be 'feast or famine' but we are hopefully now through the worst period.

What do you think will be your biggest challenge in the future?

The lack of awareness of where food comes from, across the wider population, is an issue that we need to address as an industry.

What has been your greatest success?

I would have to say returning to milk production. It's something I have always wanted to do and the first day that I milked my own cows will always be one of my proudest.

Where do you see yourself in 10 years' time?

I'd like to think we'll be milking 300 cows and be on the way to being more than just a single business dairy farm. I'd like to be running more of a mixed farming system that will allow us to optimise soil health and spread the roles of staff across more diverse areas.

Name three things in your life which are key to your success?

My wife, Vicki, is a great support. I'd also like to give credit to my staff, without whom we wouldn't be where we are now. I also gained a great deal from the James family back in Pembrokeshire and will be eternally grateful for the encouragement they gave me.

What is the best piece of advice you've ever received?

My late mother always taught me that there was no such word as 'can't' and there is always a solution. She was an inspiration and set a great example right to the end of her life.

How to extend forage storage capacity

A forage contingency of 20-25% above requirements makes sense – especially considering increased weather volatility. Aly Balsom looks at options for increasing storage capacity.

Have you got the storage capacity to ensure the forage larder is stocked up in a good forage growing season to provide a buffer in the bad?

Last year's drought – which put pressure on many farmer's forage supplies – was probably a year that highlighted whether you had a sufficient forage contingency plan in place. If you haven't done so already, this spring could be a good time to assess how you can build a contingency into your system. This could mean extending existing clamps or looking at new storage options.

Consultant and nutritionist, Wesley Habershon from The Farm Consultancy Group believes it's worthwhile having a forage buffer of around 20-25% above requirements. The key is to first establish what your herd's requirements are (see box) and calculate forage needs from there. Next is ensuring you are maximising production off the acreage you have to meet these requirements.

Wesley says: "I believe only 25% of farmers achieve 20-22t of grass silage/acre/year and the others are compromising their performance. Not many people know how many tonnes/acre they produce – it's an important figure to know."

He urges farmers to count trailers off fields at harvest and ask if production could be improved by reducing compaction and reseeding for example.

If calculations suggest that



Bales offer greater storage flexibility, but are susceptible to damage and costly across large acreage.

forage storage capacity needs to be increased to provide a buffer, question if you can extend existing silage clamps. Is the effluent tank large enough and drainage correct to enable extension? Can you extend onto existing concrete surrounding the clamp?

Wesley believes concrete "lego bricks" – which are often produced by concrete merchants with waste concrete – offer a practical solution for farmers looking to extend clamps. They can be interlocked together as a wall extension. He estimates a cost of around £120-140 per brick measuring 1.6m x 0.8m x 0.8m. They are particularly attractive for tenant farmers who don't want to invest in permanent structures as these bricks can be

moved or sold when needed.

In comparison, a new clamp is a costly investment – especially after paying for concrete. Wesley estimates a 1,200t pit with effluent tank costing about £75,000. Ag bags and bales could be another option, however when you consider the cost of disposing of plastic and risk of forage wastage, cost per tonne of forage soon adds up (see table).

When a new clamp is the answer Wesley suggests designing it so it can be accessed from both the front and the back. This will enable older, preserved silage to be accessed whilst newer silage ferments at the other end. "Personally, I can't see why anyone would put in a closed back pit as you're hemming yourself in," he says. 

How to calculate forage requirements

(For simplicity this is based on 365 day housing)

The average weight of a Holstein Friesian is 680kg.
Feed requirement is 680kg x 2% of body weight in forage = 13.6kg forage DMI (Dry Matter Intake).

At 30% DM of combined forages (grass 28%DM, maize 32%DM, fed 50:50) and 45kg forage daily intake.

10 months (length of lactation) x 45kg forage daily intake + 2 months (Dry period) x 22.5kg forage daily intake = 15.1 tonne of forage/cow.

Based on 120 cows = 1,812t all year-round required forage.

Replacement rate (20% of 120 cows, all year-round calving) = 48 animals over 2 years old. First six months minimal forage intake, last 18 months before calving a higher forage intake = 330t AYR required.

20-25% extra forage carried over as buffer. This means you either produce more forage, buy-in or increase tonnes/ha.

Therefore, on a 120 cow herd with a 20% replacement rate they require 2,150t of forage.

+20% = 2,600t of forage required.

Forage storage options

Silage storage option	Pros	Cons	Cost/t of grass silage
Clamp	<ul style="list-style-type: none"> • Cost-effective long-term option. • Less plastic waste and the plastic and covers used can be reused. 	<ul style="list-style-type: none"> • Drainage and effluent tank needed. • Labour intensive both at harvest and sheeting the pit down. 	£28.32
Ag bag	<ul style="list-style-type: none"> • Cheaper than bales and less plastic waste. • Would suit storage of high value feeds and forages that need to be kept dry, like crimped wheat or lucerne. 	<ul style="list-style-type: none"> • Can only use once. • A lot of plastic waste. • Need hardcore or concrete base – risk of puncture on hardcore. • Higher packer costs (instead of buckrake). • Added contractor costs - slow to fill at harvest so another silage trailer is needed. • Susceptible to birds - netting recommended. 	£33.78
Bales	<ul style="list-style-type: none"> • Offer short-term storage option. • Attractive when farmers want to take their own, smaller, lighter cut of silage as less costly to make. • Provide flexibility of storage as can be moved and stored in different places. • No need for effluent base. 	<ul style="list-style-type: none"> • Large cuts/acreage are expensive to do with bales. • Larger variability between bales versus within clamps. • Susceptible to damage and leaking when handled. • Netting advisable to stop birds. • Hardcore standing is advisable. 	£39.57

Source: Costs calculated by The Farm Consultancy Group and consider establishment of grass, harvesting and ensiling costs, forage storage maintenance (plastic disposal) etc.
Grazed grass costs £9.60/tonne - so an extra £18.72/t is spent on ensiling, rather than grazing.

Mustard or turnips are broadcast seeded into standing wheat.

Working together for a sustainable future

Collaboration between arable and sheep farmers can bring big environmental and sustainability benefits. Aly Balsom speaks to sheep farmers Sam & Charlotte Clarke, and arable farmer James Price, to find out how grazing sheep on mustard and turnips grown as winter cover crops on arable land benefits both parties.

The arable farmer - James Price

For James Price, grazing sheep on cover crops seemed like a logical next step as part of his drive to improve water retention and overall soil health on his 405ha (1,000 acre) Oxfordshire arable farm.

Since 2003, James has been actively trying to raise soil organic matters to aid water retention on his Cotswold Brash soils, which are prone to drying out. This has included applying clean water sludge and compost and implementing a muck for straw arrangement with a neighbouring beef farm.

At the same time, a five year cultivation rotation has been put into action, involving two years of direct drilling, two years of min-till and one year ploughing. This aids organic matter retention and reduces soil carbon losses associated with ploughing. Such a strategy – along with a wide crop rotation – also helps black-grass control.

In 2009, James made the decision to grow a winter cover crop of mustard and graze it with stock from a nearby sheep farm. He explains: "I'd made the decision that leaving ground bare over winter wasn't a good idea. The soil almost goes



Having sheep on his arable land is part of James Price's drive to improve organic matters and water retention.

anaerobic – it just sits there going tight and horrible. And potentially you've got the risk of nutrient leaching. Our soils aren't that prone to that, but it was something we were aware of."

When that initial arrangement with a shepherd came to an end, James started a similar agreement with sheep producers Sam and

Charlotte Clarke. Now, mustard or turnips are broadcast seeded into winter wheat at Perdiswell Farm, Woodstock, and grazed by sheep after the wheat is harvested (see box 1).

James says: "I always say that sheep bring three benefits; firstly they destroy the cover crop, they transform a fibrous, not readily available forage into muck – which is readily available – and their hooves work the soils and encourage weeds to grow." This means that weeds can be sprayed off with glyphosate prior to the next crop being established.

James and the Clarks have just begun another arrangement, which will see the Clarke's beef cattle move onto the arable farm. A winter cattle shed is currently being erected. 6ha (15 acres) of a two year red clover and Italian ryegrass ley has also been drilled after wheat. The plan is to graze this with sheep in the spring and then shut it up to produce big bale silage for the cattle.

"It's a way of cleaning up fields from a weed point of view and we'll get muck back from the cows and Sam gets the straw," explains James.

James believes incorporating livestock back into arable systems in such a way is key to long-term sustainability. "We can't just keep doing what my generation has always

done, which is growing wall-to-wall crops," he says. "If I can bring livestock back into the system it will allow my business to grow into the future."

The sheep farmer - Sam & Charlotte Clarke

Out-wintering ewes on arable cover crops has helped improve lamb performance, reduce worm burdens and benefit spring grass covers, according to Sam and Charlotte Clarke.

"It's clean grazing so it reduces our disease risk and disease burdens. Our anthelmintic and antibiotic use has reduced. You don't get the worms, fluke or feet issues associated with overwinter permanent pasture," explains Charlotte of Manor Farm, Steeple Aston.

The Clarks run 700 conventional North Country Mules and Scotch Mules and 150 organic North Country Mules. 500 Scotch Blackface and 500 Mule lambs are also managed in a share farming arrangement.

Over the last four years, the pair have worked to improve production from forage with the view to creating a more low cost, sustainable system. This has involved overseeding permanent pasture with clover or planting multi-species or perennial ryegrass and white clover leys. This, combined with a shift to rotational mob grazing has enabled stocking rates and lamb production per hectare to more than double.



Out-wintering sheep on cover crops grown on arable land has improved spring grass growth and reduced worm burdens, say Sam & Charlotte Clarke.

The ability to move conventional ewes and ewe lambs off the grazing platform and onto James Price's arable land in September allows grass to be rested. This has benefited post-lambing, spring covers and subsequently, ewe performance. "We don't poach or have sacrifice fields where you feed out and you don't muddy round your water troughs," says Charlotte. "Our grass grows better in the spring because we've rested it in the autumn and not trashed it in the winter."

Having ewes on mustard and turnips also fits with the Clarke's drive to limit concentrate feeding and save costs. "If we had ewes on grass over winter, we'd have to feed them concentrates through the snacker to

keep their energy and protein up, along with forage," comments Charlotte.

The Clarks also have a similar arrangement with an organic arable farmer who grows red clover leys to build soil fertility into their rotation. Weaned lambs from the organic flock are finished here.

The fact James is putting in grass leys and a new cattle shed for the Clarks has enabled Sam and Charlotte to expand their beef enterprise. They have purchased 20 high health pedigree Aberdeen Angus heifers to join 10 pedigree Salers and 10 Herefords. The plan is to breed pedigree, polled animals that can be sold as breeding stock, with the lower end finished. They will calve for the first time in March. **P**

1. Cover crops and sheep grazing at Perdiswell Farm

- Arable rotation of: wheat, spring barley, oilseed rape, wheat, beans.
- 81-101ha (200-250 acres) of mustard broadcast seeded into standing wheat in July at 5kg/ha (40ha (100 acres) will be topped and the rest grazed).
- 35ha (86 acres) of turnips broadcast seeded into standing wheat at same time at 5kg/ha.
- Sam chooses varieties and James handles planting.
- Ewes and Mule ewe lambs graze mustard from mid-September to mid-November when it dies off from the cold. They then go onto turnips.
- Sam is responsible for managing the sheep, which are strip grazed using mobile electric fencing.
- Sheep need to be off ground around 14th February.
- No formal agreement and no money changes hands. "The benefits outweigh the costs at the moment," comments James.

2. Environment & sustainability benefits

James Price (arable)

Various strategies to improve soil organic matter – including grazing sheep on cover crops has:

- Raised soil organic matters from about 3% to 5-6%.
- Improved crop yields and yield consistency – winter wheat now averages 8.5t/ha versus a top yield of 7.5t/ha previously. This indicates better water retention.

Sam & Charlotte Clarke (sheep)

- Arable land provides clean grazing, which reduces worm and disease challenge and lowers wormer and antibiotic use.
- No concentrate or additional conserved forage fed over winter.
- Out-wintering on arable allows grass to be rested so ewes go onto strong covers post-lambing.
- Lambs can now be finished rather than stored – this is due to better ewe body condition from grazing cover crops which means ewes are milkier and lambs grow better. Lambs are also moving onto improved pasture for finishing which boosts growth rates.

Long, narrow breaks are best to enable all stock to access the crop at the same time and prevent localised poaching.



Making the most of brassicas

As we head into a wet winter, Germinal GB's Paul Morgan provides his top tips on how to maximise utilisation of brassicas, whilst minimising environmental risk.

- 1. Introduce them slowly**
Introduce stock to brassicas gradually on full stomachs to avoid digestive upsets. Start with two hours a day, gradually increasing over 7-10 days to unrestricted access.
- 2. Provide a run-back and protection**
A wide access run-back should have been factored in when the crop was drilled. This could be the grass headland or access to an adjoining field. These run-backs are essential for animal welfare and crop utilisation. Also, always provide shelter, such as a hedge or area they can get out of the wind.
- 3. Strip graze**
Long, narrow breaks are best to enable all stock to access the crop at the same time and prevent localised poaching. The fence should be moved daily.
Start grazing at the top of the hill and work your way down to reduce run-off and environmental risk. Double fencing is also advisable. A fence at the feed face can be looped round one end of the field in a U and used to make a second fence line behind. When stock are moved, the first fence line can simply be wound up. This eases stock movement.
- 4. Feed plenty of fibre**
Brassicas are generally low in dry matter at about 12-15% DM so fibre needs to be provided to provide scratch factor and promote rumen function. Fibre should make up about 20% of intakes. Straw will be adequate for dry cows, whilst better quality silage will be needed for growing animals. Bales should be put out ahead of grazing. Avoid driving tractors onto the field during the winter to limit poaching. Always provide drinking water.
- 5. Provide appropriate minerals**
Brassicas tend to be high in glucosinolates which can negatively effect iodine and Vitamin E uptake. They are also low in copper, iodine, phosphorous and magnesium so it's important to provide these minerals. Bolusing every animal is advisable to ensure they get the right dose. A mineral bag can also be cut open over the top of a silage or straw bale to provide mineral with every bite.

Fencing tip

If you're worried about brassicas shorting out the fence line, drive along the fence line in the quad first and put the stakes in the wheelings. Alternatively, drive through with a tyre trailing behind you and put the post on the flattened areas.

* It's important to provide an appropriate area of brassicas to meet stock requirement. Calculate what you need using the calculations on page 9 of AHDB Beef & Lamb's Using Brassicas for Better Returns manual available online.



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Clovers key to low carbon beef



Worcestershire beef farmer Ian Farrant's quest for sustainable low carbon beef production has been boosted by effective use of clovers. Luke James reports.

Use of white clover in rotationally grazed pastures, and inclusion of red clover in silage leys, has been integral to lowering the carbon footprint of beef production at Underley, near Tenbury Wells.

With the increased production of homegrown protein, the dairy-derived commercial beef operation

has significantly reduced reliance on bought-in rapeseed meal and cut finishing times by about two months – both factors that impact positively on carbon efficiency.

Progress has been aided by the farm's involvement in the five year Sustainable Forage Protein Project, which resulted in more effective

establishment and management of white clover as well as the introduction of long-term red clover in specialist silage leys for the first time.

Through the project, which was orchestrated by the Waitrose Farming Partnership, the carbon footprint at Underley was calculated

Rotational grazing

Coming from a dairy farming background, Ian and Jim Farrant adopted rotational grazing with relative ease, but accept that with growing animals the challenges are greater than for milking cows.

In order to maintain daily dry matter intakes of 3% of liveweight, cattle are weighed every month, paddocks are routinely measured by plate metre, and the AgriNet programme is used to provide daily grass growth predictions.

With as many as 600 at grass at any one time, cattle are managed in four or five comparably sized groups. Infrastructure is in place to allow the required level of management, including the option to bring cattle inside for buffer feeding should conditions become too wet.

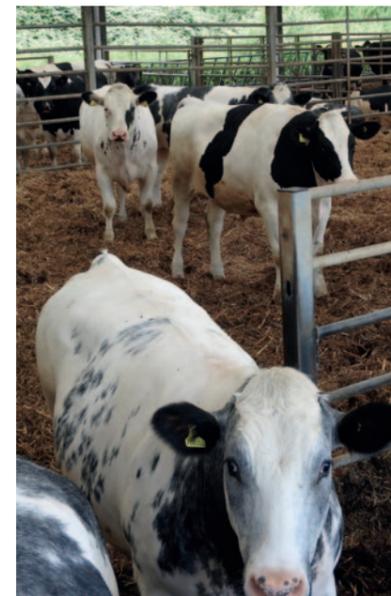
As a beef farmer, Ian Farrant values red clover for its forage protein contribution, but he also sees its potential as a break crop in arable rotations and believes it is important for pollinators.



to be 8.8kg CO₂ per kg of meat produced, which is around 25% better in carbon efficiency terms than the beef industry average of 11.93kg CO₂ per kg quoted by AHDB.

"I am on a quest to produce low carbon beef and therefore maximising use of forage has been a major priority," says Ian, who farms with his father Jim. "The increased use of clover has made all the difference to our system. We've reduced our feed costs, increased the growth rates in our cattle, and now produce beef with a lower carbon footprint. We're seeing multiple benefits, but the key point is our business is now more sustainable."

The 265ha (655 acres) mixed farm supports around 1,200 cattle at any one time. A large proportion are pure black and white or British Blue crosses bought-in from the family partnership's 630 cow dairy herd at 3-4 weeks of age. The forage based system rears cattle through rotational grazing and quality silage and finishes them inside on a ration including homegrown maize silage, wheat and chopped straw, as well as grass silage. Growth rates of 1.3kg/head/day (growing ration) and 1.5kg/head/day (finishing) are being achieved, with no rape meal or soya



Cattle are finished indoors on a ration including maize and grass silage, chopped straw and wheat. With red clover in the ration, growth rates of up to 1.5kg/head/day are possible with no supplementary protein.



Rotationally grazed cattle are allocated daily dry matter based on 3% of liveweight.

required when red clover silage is available. Blue cross cattle routinely produce R grade carcasses at 330-350kg dcw, to the specification required by Waitrose.

The farm's grazing and cutting leys are predominantly down to dual purpose Aber HSG 4, a mixture comprised of high performing Aber High Sugar Grass perennial ryegrasses with white clover. This provides the platform for rotational grazing and quality grass silage and is delivering more now that a good balance of white clover is being maintained.

"One of the key learnings from the Sustainable Forage Protein Project was around the successful establishment and management of white clover," adds Ian. "The move to using a shallow depth direct drill has helped establishment, in both full reseeds and when overseeding white clover into longer term leys. When overseeding, we find shallow direct drilling following tight cutting or grazing, and then rolling, works well on our silty clay loams. Timing is also important, with spring or mid-July to the end of August usually best."

Cut first in the middle of May, and with second and third cuts taken at monthly intervals thereafter, the white clover leys produce silage of around 11.5MJ/kg ME and 17-19% crude protein. This is an uplift of around 5% protein on what was previously achieved from pure ryegrass leys. For higher protein still, Ian is growing 20ha (49 acres) of Aber HSG perennial

ryegrasses with the long lasting AberClaret red clover. Productive into a fifth year, this ley produces silage that is typically 20-21% crude protein.

"The red clover ley receives no nitrogen fertiliser and produces silage that allows us to feed a finishing ration without any bought-in protein," says Ian. "It's important to cut no lower than 9cm, to avoid damaging the red clover crown, and we mow into wide swaths and use a rubber roller conditioner. We don't touch it again until we row up, ideally first thing in the morning and after 48 hours wilting. This high protein silage is an integral part of achieving sustainable low carbon production, in my view." **T**

Environmental benefits

- High protein red clover silage reduces carbon footprints in livestock production by minimising reliance on bought-in protein such as rapeseed meal and soya.
- Red clover can act as a break crop in arable rotations, providing benefits to soil health and fertility.
- Both white and red clover fix nitrogen, reducing the requirement for inorganic fertilisers that contribute significantly to greenhouse gas emissions.
- Red clover supports populations of bees and other pollinators.

Battling the elements in a sustainable system



Unpredictable weather means silage dry matters can vary: Malcolm Errington uses a proven additive on grass and wholecrop silages to make the best of what is produced.

Farming in a Less Favoured Area doesn't mean herd performance and sustainability have to suffer, as Forager discovers.

Maximising fertility, increasing production per cow and making the best possible forage, is part of Malcolm Errington's strategy to create a sustainable business in a Less Favoured Area.

Town Head Farm in Askham, Penrith, is located in an area noted for its harsh weather, on fields that don't face south and at 229-305 metres (750-1,000 feet) above sea level – something Mr Errington recognises as far from ideal.

But that hasn't stopped milk production increasing from 1.1 to 2.1 million litres on the 190ha (470 acre) farm since 2004, despite milking only 15 more cows. Moreover, as well as a yield of around 9,600 litres per cow, the farm maintains top-level fertility, with a pregnancy rate of 30% and a 386 day calving interval.

It's all down to attention to detail in lots of small areas, rather than anything radical: good breeding, good feeding, motivated staff and maintaining a healthy environment for the cows.

"We don't do anything different to lots of farmers," says Malcolm,

who milks just over 200 Holstein Friesians. "We trough-feed grass silage, wholecrop wheat, a concentrate blend and molasses with minerals and an acid buffer through a mixer wagon to about 25 litres, then top up in the parlour with cake. Grass silage and wholecrop are buffer-fed in summer."

Fertility

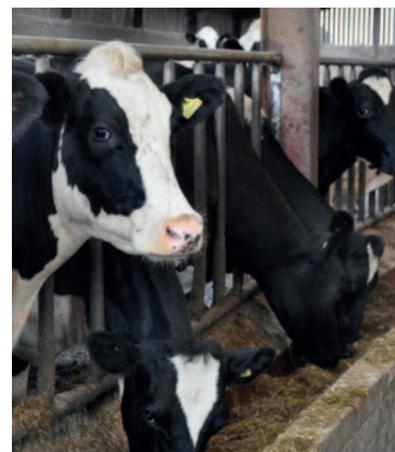
Malcolm believes high fertility starts with good dry cow husbandry and hygiene, and minimising animal stress to protect the developing egg. Just 24 mastitis cases were recorded during the last 13 months in 218 cows calved. Dry cows receive 4-5kg of straw and whatever silage is required, plus 2.5kg of cake with a calcium binder for a minimum of 18 days before calving to guard against milk fever. Ensuring cows get off to a good start means they are more likely to get in calf promptly, which also optimises milk production potential.

Forage

Making the best possible silage, despite the challenging growing conditions, also plays a part in

maintaining milk production and also creating a more sustainable system, less reliant on concentrates.

Sheep are grazed over winter to ensure fresh grass for spring. Unpredictable weather means only two silage cuts are possible per season, whilst wilting can also be a bit of a lottery. Cuts are taken in late May/early June and again seven weeks later.



High fertility and improved milk output from a similar number of cows are just two measures of sustainability at Town Head Farm. Every cow has feeding space and is housed one cow per cubicle.

Because of rain, first cut in 2019 needed up to 4 days wilting to achieve 28.4% dry matter (DM) silage, at 11.1 MJ/kg ME and 13.5% protein, whilst a sudden hot spell produced a second cut of 41.8% DM, with 10.8 ME and 14.8% protein.

"We take what dry matter we can get," explains Malcolm. "We try to be in the mid-twenties because 30% dry matter is difficult round here."



As well as fattening all the Holstein Friesian bull calves to 15.5 months, Belgian Blue cross calves are also reared at Town Head Farm.

While contractors are used for the bulk of the silaging operations, the farm does some mowing and carting and ensures there's a second machine rolling the clamp for good consolidation. All clamps are indoors with big square bales used on top of sheeting for plenty of weight. Consistent with making the best possible silage despite challenging weather, an additive is used on all clamps.

"We've used Ecosyl for years. We've tried others but come back to Ecosyl because it's proven," Malcolm explains. "We're trying to make the best of what we can get to reduce concentrates, and to get the best for the cow."

For the wholecrop, a different additive, Ecocool – combining the bacteria in Ecosyl with a second bacterium – has been used to keep the higher DM material cooler. This year's wholecrop analysed at 50.9% DM and 36.1% starch.

However, recognising that sun shining on the south-facing first cut clamp can also cause heating, Malcolm tried Ecocool across all three silage buildings this season. It has kept everything stable and cool. "It's a simple system," he adds. "We just try to move forward in little steps." 

Environmental benefits

- Producing more milk from a similar number of cows can help reduce a farm's carbon footprint.



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High sugar grasses offer quick environmental wins



Planting high sugar grasses and moving to low trajectory slurry spreading techniques could massively reduce dairy farming's impact on the environment. *Ally Balsom reports.*

Planting Aber High Sugar Grasses, covering slurry stores and spreading with a trailing shoe can reduce ammonia emissions by 40% and nutrient run-off by 22%, according to recent research.

The news is significant, considering the government's drive to reduce national ammonia emissions, as outlined in its January 2019 Clean Air Strategy Report. With farming accounting for 88% of UK ammonia emissions, it's a sector that needs to find practical solutions to reduce its environmental impact.

David Styles, Lecturer in Life Cycle Assessment at Bangor University, was part of a team of researchers who carried out the modelling work looking at the effects of grass leys, slurry storage and spreading on the environment. They modelled a 'typical' UK dairy farm and looked at various environmental effects (see box).

Dr Styles believes the findings are significant – particularly surrounding the use of Aber High Sugar Grasses (Aber HSG). For example, simply changing from conventional perennial ryegrass (PRG) leys to Aber HSG – whilst slurry was stored in an open tank and spread using a splash plate – resulted in:

- 6.8% higher milk yields and 3.5% higher dry matter intakes – this benefits production and also dilutes emissions.
- A 12% reduction in N excretion per kilo of energy corrected milk



Changing from perennial ryegrass to high sugar grasses resulted in 6.8% higher milk yields and a 12% reduction in N excretion per kilo of milk, says Dr David Styles.

- (kg ECM) at herd level – this is due to the increased level of water soluble carbohydrates in Aber HSG which helps rumen microbes utilise nitrogen-containing proteins released from forage more effectively.
- A 3% reduction in Global Warming Potential ("carbon footprint") per kg ECM.
 - A 4-6% drop in nutrient run-off per kg ECM.
 - A 7-10% reduction in ammonia per kg ECM.

However, the real wins were to be found in combining Aber HSG with storing slurry in a tank with a crust

What was modelled?

- 132 milkers and 188 heifers on 65ha of grazed grass and 40ha of cut.
- Cows housed for six months and grazed for six months.
- Averaged 6,853 litres per cow per year.

Various combinations of the following assessed:

- Conventional PRG or Aber High Sugar Grass (grazed and ensiled).
- Lagoon storage, slurry tank without crust, slurry tank with crust.
- Splash plate, trailing shoe slurry application.
- Open tank storage and splash plate application was the default assumption.
- Slurry injection was not looked at due to high cost of application and limitation in the soil type it can be used on.

or synthetic cover and applying it to ground using a trailing shoe. This resulted in:

- A 40% drop in ammonia emissions per kg ECM.
- A 22% reduction in nutrient run-off per kg ECM.

The model looked at a six month grazing period. Dr Styles says extending this would reduce the amount of slurry deposited in housing, stored and subsequently applied to land – processes

responsible for most ammonia emissions. This means that "the differential between high sugar grasses and conventional perennial ryegrass may be a little smaller if you're grazing for longer as the biggest benefits of high sugar grasses are seen during housing when emissions are higher," he says.

Dr Styles believes the quickest and most cost effective way to curb emissions is to opt for high sugar grasses. "Switching to high sugar grasses is definitely a win for reducing nitrogen excretion," he says. "Covering tanks and using low trajectory spreading will also lower emissions and particularly ammonia. But the cost of this means it's likely that it will need to be included in policy or made mandatory and a support system may need to be in place to support such an investment."

With the Clean Air Strategy saying that the government would "regulate to reduce ammonia emissions from farming by requiring adoption of low emission farming techniques," it's likely that this could occur sooner rather than later. **T**

Improve your grazing efficiencies to benefit emissions

Making more efficient use of grazed grass will help reduce your farm's overall carbon footprint by reducing reliance on brought-in concentrates.

The relatively low digestibility of grazed grass means it can lead to higher animal level emissions compared to concentrates. However, if you consider the 'upstream' effects associated with deforestation and loss of soil carbon in croplands for concentrate feed production, grazing systems have the potential to have a lower overall carbon footprint, says Dr Styles.

He says measuring grass and rotationally paddock grazing provides the potential to:

- Produce more milk with less concentrate - thus reducing the upstream burdens outside the UK or
- Increase stocking rates and free up land in the UK for alternative uses.

Freeing up quality dairy land – either from better grassland management or as a consequence of intensification - could also mean that beef production could be moved down from less productive, upland areas. This then frees up lower production areas to plant trees and offset emissions.

Environmental benefits

Using Aber High Sugar Grasses and trailing shoe slurry application resulted in:

- 22% reduction in nutrient run-off - prevents potential contamination of water courses and costly nutrient losses.
- 40% reduction in ammonia emissions - helps meet the government's Clean Air Strategy aims.



Applying slurry using low trajectory methods and growing high sugar grasses can help drive down a dairy unit's carbon footprint.

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Micro-dairy thinks big with biological farming



Improving soil organic matters through the use of herbal leys and mob-grazing is part of the 'biological farming' mindset adopted by one Devon young farmer, as Aly Balsom reports.

Every management decision that Oli Lee makes on his micro-dairy on the South Hams, is rooted in managing soil biology and harnessing the environmental benefits of grassland.

Oli runs 19 Ayrshire cows on a grass-based system, near Ugborough. Milk is sold through doorstep deliveries under his How Now Dairy brand.

As the biggest carbon sink after the sea, Oli is adamant that grassland farming has a huge role to play in offsetting the impact of farming on the environment. However, in order to harness its full

potential, he believes all farmers have an obligation to work with soil biology and specifically raise soil organic matters.

"Organic matter is hugely beneficial for the environment because for every 0.1% increase in soil organic matter per hectare, it's nine tonnes of carbon stored," says Oli – referencing stats from The Farming Carbon Calculator.

Organic matter

He cites traditional farming methods – that use a lot of nitrogen and routinely plough – as the reason for depletion in global soil organic matters. This is likely why soil organic matter levels of 3% are generally

seen as "good". However, Oli thinks 10% should be the minimum target. His own is 12-16%.

The benefits are numerous, he says; the humic acid and fulvic acids in organic matter "grab onto" metal ions, create micro-pores to allow more air in, hold water and limit leaching, whilst organic matter itself feeds soil microbes.

These principles all fit within "biological farming methods" which stem around harnessing soil biology to benefit production. This is applicable to both conventional and organic systems, although Oli is also certified organic.

Oli explains: "I'm focusing on soil health. Every decision in terms of cropping and how we graze is

A strong environmental message is attractive to consumers that subscribe to doorstep deliveries from Oli Lee's micro-dairy.

Farm Facts

- How Now Dairy set up in January 2019 - run by 26 year old, Oli Lee.
- 16ha (40 acres) of land inherited from grandfather.
- Rents 19 Ayrshire cows from local farmer, Russell Ashford.
- Invested in cow shed and six abreast parlour.
- New processing, pasteurising and packing facility built on site.
- 1,800 litres of milk sold per week across three doorstep milk rounds and one cafe run.

based on the soils. Our whole farming ethos is: Look after the land and the land will look after your cows. Look after your cows and they will look after you."

Detailed soil analysis was one of the first things Oli did on taking on the 16ha (40 acres) farm in 2017. Tests identified low soil pH of 5.3. Organic matters were relatively good at 8%, but below target. Since then, ground has been limed and slagged and pastures reseeded. This has focused on using mixed herbal leys which have varying root profiles which help to raise organic matters. Different plant species also help encourage a more diverse ecosystem above and below the soil.

Herbal mixes

Mixes have tended to include chicory and plantain – to help break up soils and bring up more calcium – perennial ryegrasses and species like, cocksfoot and Meadow Fescue. White and red clovers are also included for their nitrogen fixing abilities. This year, Oli is also developing specific cutting and grazing mixes. The cutting leys will include more Aber High Sugar Grasses and red clover and less chicory.

To control weeds and avoid using a plough, seedbed preparations are carried out in the autumn before a new reseed. A rye corn and vetch mix is spun-on in mid-October. The top 2-3 inches will be worked using a disc harrow and where compaction is an issue, a chisel plough will be used to



The farm is being reseeded with herbal leys which encourage a more diverse ecosystem both above and below the soil.

alleviate issues. The aim is to avoid these invasive methods once historic compaction issues have been addressed. This will limit soil carbon losses.

"The rye corn mix outcompetes most of the weeds. By early April we take a crop of silage off for round bales and use it for milkers or dry cows," explains Oli. Ground will then be disked and a wholecrop oats, peas and barley drilled. The herbal mix will then be spun on top.

Grazing

Oli thinks grazing these mixes – or indeed any grassland – is the best way to raise soil organic matter: The manure from stock boosts organic matter, whilst the leaf seen on the surface is mirrored with plenty of root below ground – again adding to organic matter.

Next season he is also going to experiment with mob grazing to boost organic matters. At present calculations stem around grazing 24 cows on one eighth of a hectare grazed in 12 hour paddocks. Next year the same number will be

stocked on one sixteenth of a hectare. Stock will also go onto covers at roughly 3,000kgDM/ha and graze down to 2,000kgDM/ha.

Oli explains: "The cows end up trampling in a fair proportion of grass and they muck over it. You provide a mat of vegetation that breaks down and increases organic matter for the soil bacteria."

His concern is that milk yields may drop as cows will not be grazing at the optimum three leaf stage, but time will tell.

Marketing

Farming with the environment is also a message that fits well with the customers that subscribe to his doorstep milk deliveries. In fact, Oli thinks it's a message that farming needs to shout more about. "The young generations are really concerned with the environment and are starting to buy products with an environmental message. And our consumer research shows that most people are willing to pay more for a product that's benefited the environment," he says. 

Environmental benefits

- Carbon sink - grassland systems act as a carbon sink.
- Builds soil organic matter - high organic matters can increase crop yields with less inputs, whilst ground will be better able to cope with drought and flood.
- Low food miles - doorstep and local deliveries.
- Less plastic waste - milk from How Now Dairy is packaged in low density polyethylene bags, which use 70% less plastic than plastic bottles and can be recycled.



Jim Clark, Cumbria based agronomist for Hutchinsons says growing maize under film in challenging areas can help promote early maturity for early harvest.

Growing maize under film in a tough environment

Fast establishing, early maturing maize varieties are essential for growers in high rainfall areas who want to avoid the environmental risks of a late harvest, writes Laura Wise.

In areas of high rainfall, combining an early maturing maize variety with growing under film is a sure-fire way to maximise yields and get the crop off early before the risk of wet weather.

Failure to get the crop off before rain sets in can lead to those all too familiar wet, muddy conditions, which can create multiple environmental issues including soil erosion, compaction and nitrogen leaching into water courses.

With this in mind, Jim Clark, Cumbria-based agronomist for Hutchinsons, believes growing maize under film is well worth considering in challenging maize growing regions where variable heat units from sunlight and high rainfall can be a problem. The film will promote

early maturity and early harvest along with that all important balance of quality and yield.

"In this part of the world, the 'Holy Grail' of maize varieties needs to deliver at least 30% starch, 30% dry matter and 6tDM/acre when harvested in late September," explains Jim. "In order for it to be a reliable, cost-effective feed source, it must also be grown under film."

For the last seven years, Jim has been working with dairy farmer, John Ferguson, to produce maize under film at Blencogo House Farm near Wigton. Of the 156ha (386 acres) family owned farm, 35ha (87 acres) are in maize, 32ha (79 acres) are in cereals and 89ha (220 acres) are in grazing and multi-cut silage leys. Not including cereals in the figures,

homegrown forage accounts for 3,000 litres of the 11,000 litre average in the year-round calving herd of 240 commercial Holsteins.

"Land doesn't become available for sale very often in this area, and when it does, it is very expensive. It is essential that we maximise the land resources we have available to grow as much homegrown feed as possible," says John.

"Growing maize under film helps to ensure rapid establishment. This is essential to get the crop harvested before autumn rains set in because harvesting in wet conditions will cause significant erosion issues to our soil. Maize under film also allows us to grow a high quality, cost-effective feed with a lot of bulk to optimise land production."

Cost of Growing Maize Under Film

Yield DM t/acre	£/acre	£/t DM	Contractor costs/acre	Contractor costs/t DM	Total costs/t DM	Cost rent/t DM (£100/acre)	Cost inc. rent/t DM
6	£231.32	£38.55	£132.00	£22.00	£60.55	£16.67	£77.22
5.3	£231.32	£43.65	£132.00	£24.91	£68.55	£18.87	£87.42
4	£231.32	£57.83	£132.00	£33.00	£90.83	£25.00	£115.83

Figures provided by Jim Clark, Hutchinsons

Jim Clark's advice for successful maize crops

1. Test soils for efficient nutrient management.
2. Select varieties for a balance of quality and early maturity.
3. Apply a pre-emergence herbicide at drilling to avoid issues from weed competition.
4. Utilise a slow release nitrogen to feed cobs for early maturity.
5. Judge a maize crop based on cob growth, not plant height.
6. In tough climates, grow under film for a more consistent crop.

Growing a successful maize crop

Before any maize varieties are grown on farm, they are trialed by Hutchinsons for two to three years in local research plots. This is to determine the best establishment methods and to ensure they are suitable for the regional climate.

Jim says: "While growing maize under film will add to the cost of production compared to growing it in the open, our trials and farm results have found improvements in quality and fresh weight yield will make up the difference. We want maize under film to yield at least 6tDM/acre. Including all growing, contractor and rent costs, you're growing a high quality feed source for £77.22tDM (see chart).

"In order to be a cost-effective feed, maize must have the right growing conditions – which includes adequate heat units – otherwise the mature crop will be very inconsistent."

Following positive trial results in 2017 that yielded 16,884tDM/ha (6.8tDM/acre), 33.6% DM, 11.6 ME and 27.7% starch content, Cardif was selected for the 2019 planting season. This new variety from Germinal was added to the British Society of Plant Breeder's 2020 Forage Maize Less Favourable Descriptive Lists for its ability to produce high quality silage in challenging conditions.

Thanks to a combination of variety traits and good management, the 2019 harvest at Blencogo House Farm, saw a dry weight yield of 6.2tDM/acre, 30.3% DM, 11.7ME and 32.3% starch. The crop was planted on April 10 and harvested in late September.

Targeted nutrient application has been an important factor in hitting yields and an early harvest. Prior to planting, John had fields soil tested and applied N, P, K and lime accordingly. When fields were drilled in conjunction with Samco Green Film application, 45kg N/ha was applied to the seedbed with a pre-emergence herbicide. To stay on top of weed competition, the maize crop was treated with a broadleaved weed and grass weed herbicide six weeks after establishment.

In the first week of July, 20 litres/ha of N Durance was applied. This is a slow release fertiliser that contributes 40kg/ha of nitrogen over the course of six weeks.

"Fertiliser application is one of the most important elements to feed the cob so it can reach early maturity for cob size and grain fill," adds Jim.

Environmental benefits

Selecting an early maturing variety will increase the chance of harvesting during ideal conditions before autumn weather sets in. This reduces the risks of soil erosion, compaction and nitrogen leaching into water courses from harvesting in wet, muddy conditions.

“USING SEXEDULTRA 4M IN A JERSEY CROSS BLOCK-CALVING SYSTEM IS A NO BRAINER. IT REMOVES THE ISSUE OF THE LOW VALUE BULL CALF.”

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Utilising Cogent's SexedULTRA 4M has led to significant financial gains for farmers like George Holmes.

Over 12-months ago Dorset dairy farmer George Holmes began a trial with Arla and Cogent looking at the potential role of SexedULTRA 4M within a sexed and beef strategy. With concerns over low conception rates usually discouraging spring block-calving herds from using sexed semen, George has proved performance needs not suffer.

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Semen Type	Littlewood + Longlands			Straws /Conception
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Longlands SexedULTRA 4M	51%	211	107	2.00
Littlewood Conventional	54%	175	95	2.09



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Cows are consuming 12-13kg of forage dry matter in their daily ration.

Digestibility driving forage intakes

For one mid-Wales dairy farmer, high output from homegrown feed is the ultimate route to sustainable milk production. Luke James reports.

James Evans' drive to produce more litres of milk, more efficiently, is underpinned by a focus on conserved forage.

More specifically, he has increased his use of grass silage, making bigger quantities of higher digestibility fodder to create a 50:50 balance with maize as opposed to 70:30 (in favour of maize) previously. This has led to greater overall forage intakes – with 50-60% of ration dry matter now from forage – as well as lower bought-in feed costs, better herd health and fertility, and

outstanding milking performance.

A major reseeded programme to change the quality and production potential of his grass silage leys has been a key element, along with a switch to a multi-cut system that has seen quality in the clamp increase significantly. Maize silage feed value has also been increased, simply by raising the cutter bar to around 35cm to reduce the proportion of low quality fibre ensiled.

Priddbwl Mawr, near Llangedwyn, Oswestry, is currently home to 640 all-year-round calving

Holstein Friesian milkers, with numbers having increased from around 275 in the few years since James took control. With such rapid expansion and all replacements being home reared, the herd has a large proportion of heifers, so a current herd average of over 12,200 litres/cow is impressive, even from three times daily milking.

Cows are housed all year round in light airy buildings, and – with the completion of the latest construction – there will be capacity for 850 cows. Around 142ha (350 acres) of land

The nutritionist's view

According to independent nutritionist Malcolm Graham, the higher digestibility grass silage is a key driver at Priddbwl Mawr, so maintaining a frequent cutting discipline to avoid lignin in the grass is essential.

Feeding such high quality forage does allow James to replace bought in concentrate feeds but requires a

constant focus on forage management. Regular analysis is essential to pick up any variability quickly.

In addition, because forage intakes are so high, any supplementary feed needs to be highly concentrated, as rumen space is limited.

Having good nutritionist support is important, as is a strong interest in cow Key Performance Indicators (KPIs) including feed intake and rumen function.

close to the dairy unit is mainly down to Aber High Sugar Grass leys specifically designed with a narrow heading date range for a multi-cut approach. Maize is grown on 162ha (400 acres) of additional ground away from the unit.

"We shifted our mindset on forage from being mainly about high starch to focusing on fibre digestibility," explains James. "We now have the highest quality grass leys and take a first cut in the last week of April and cut every 30 days thereafter. We'll take six cuts in a season overall, yielding about 20 tonnes freshweight per acre."

The aim is to cut in the evening, ted the crop out directly after the mower conditioner, and wilt for 24 to 36 hours before picking up. The drier the crop, the finer the chop, with the range being from 12 to 16mm. Using a Silapactor on the clamp to complement a JCB loading shovel creates all-important compaction and enables an extra 12-16ha (30-40 acres) to be contained in the existing clamp space.

"We're now consistently producing silage of over 12.0 MJ/kg ME and 19-20% crude protein," adds James, "and crucially with high NDF digestibility. We include this alongside higher quality maize as part of a TMR that is fed out twice a day whilst the cows are being milked. Having the cows eating before they lie down after milking is a factor that helps drive intakes."

With high quality forage comprising over half of the total dry matter intakes, purchased feed costs have been cut by as much as 2ppl, and overall herd health and fertility are on the rise.

"Our pregnancy rate is better, typically in the 28-32 range, and we're operating with a mastitis rate of less than 10%, so the overall picture is good," says James. "With genomic testing of heifers, we're accelerating our



High quality Aber High Sugar Grass leys provide high digestibility grass silage as the basis of James Evans' forage-based system.

breeding progress towards smaller cows with increased body depth and width for greater rumen capacity. This should help us to continue to increase what we produce from homegrown forage." 



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Follow the leader for peak performance

Giving priority livestock first access to new forage leys has yielded significant results for Jim Logan, the 2019 winner of the Farmers Weekly Sheep Farmer of the Year Award. Laura Wise reports.

In the last six years, Pirntaton Farm on the Scottish Borders has reduced its usage of bought-in concentrates by up to 300 tonnes per year, while simultaneously raising stock numbers.

According to Jim Logan, an overhaul of the grazing platform and a change of direction in livestock genetics have been drivers behind a 72% increase in farm output from 2015 to 2018. During this time ewe numbers have increased from 1,300 to 1,950 and suckler cows from 105 to 120 head. New Zealand Romney, Abertex and Lleyn genetics have replaced the original stratified flock, whilst Stabiliser genetics are now being introduced to the Angus x Hereford suckler herd to bring down mature cow size.

"When the decision was made to

get Pirntaton operating above the subsidy line, forage production and utilisation had to be increased. Grazed grass costs around 2.5p-4p per kg, which is significantly lower than bought-in concentrates," explains Jim. "We were only going to maximise profitability if we matched our livestock management and genetics to our forage production."

/// The key to profitability has not been about growing as much grass as we can. It has been about growing as much as we can utilise while still maintaining high quality. ///

Jim is the third generation to manage the family owned upland farm in the rugged Scottish Border hills just north of Galashiels.

Pushing forage production

540ha (1,334 acres) of the 632ha (1,562 acre) farm is utilised for forage production. However, with

an elevation range 230m-520m (755-1,706 feet) and mixed soil types from heavy clay to peat based, Pirntaton is in a tough environment for quality forage production. While 170ha (420 acres) of the farm remains in rough grazing, Jim has improved 200ha (494 acres) of permanent upland pasture with a mixture of intense rotational grazing and reseeding.

"This pasture was reclaimed by my grandfather nearly 50 years ago and is now being incorporated back into our reseeding programme. In recent years, we've been able to increase forage production on these older leys upwards of 50% with a combination of rotational grazing and nutrient management," he adds.

As part of the reseeding plan for this upland farm, 50ha (124 acres) is drilled each summer to brassicas and fodder beet to out-winter livestock



Pirntaton Farm Facts

- 632ha (1,562 acres)
- 85ha (210 acres) of forestry
- 230-520m (755-1706 feet) elevation
- Mixed soil types
- 1,950 ewes
- 120 suckler cows
- 320 hinds

Jim Logan's top tips for successful multi-species use

1. You will see improvement to soil health and structure, but not overnight. Be patient.
2. Graze tight to help manage white clovers.
3. It's easily overgrazed and not suitable for winter grazing.
4. Extensive periods of snow cover will result in winter kill so don't overcommit.
5. The seed investment isn't cheap, but the high-quality forage will give you significant payback in animal performance.



before being drilled to a mixture of Aber High Sugar Grasses. Once weeds have been controlled in reseeded leys, typically in two to three years, they will be overseeded with white clover. As part of the intense rotational grazing plan, 50ha of the farm has also been sown with multi-species leys, consisting of Aber High Sugar Grass varieties, white clovers and Tonic Plantain.

"Reseeding and overseeding has been essential for us to reduce overall costs of production while increasing output per hectare. It has also allowed us to increase the quality of forage we are producing," explains Jim.

Boosting utilisation

Initially, rotational grazing was implemented to help Pirntaton Farm go from an estimated 50% forage utilisation to upwards of 80%. However, Jim soon realised the farm could further improve the utilisation of quality forage by aligning livestock nutritional requirements with the grass growth supply and demand. By pushing lambing back

three to four weeks later to begin on April 25, the farm was able to increase ewe numbers by 40% while decreasing compound feed by 90%.

"We have gained a lot by understanding the demand at each stage of the production cycle and when the best payback from the feed resource is," explains Jim.

Rotational grazing multi-species leys

The most impressive increase in performance has been achieved through a leader/follower rotational grazing system on the multi-species leys. The system is simple: high priority stock, like fat lambs or ewes with triplets, generate 30-35% of the grazing demand and get first access to high quality new growth. Once demand is met, they are moved on and the ley is cleaned up by stock only needing to maintain their current body condition.

Because sheep are selective grazers and pick out high quality species like clover first, the best results have been seen when triplets and gimmer twins are used as

leaders, and the suckler herd follows.

"The biggest success on multi-species has been for lactating ewes. We've been able to let ewes rear triplet lambs and average 35.8kg at 100 days," explains Jim. "It has also proven to be an effective way to increase production on weaned lambs, resulting in average growth rates in excess of 200g/day."

Continuing to move forward

Jim has further management plans to continue to move the farm's production efficiency forward for a profitable and resilient future. With that, forage production and utilisation will remain at the core of all business decisions.

"The key to profitability has not just been about increasing the grass that we grow. It has been about making sure that we then maximise its utilisation, which in turn helps maintain high quality," concludes Jim. "In order to have a profitable and sustainable future in livestock production, we must achieve that balance." **I**



Maintaining standards

Bedding is carried out three days a week over a 10-month period, with operations taking a full day when cattle and lowland ewes are being housed.

High capacity bedders are key to operational efficiency on a unit with as many as 8,000 animals indoors at peak housing. Luke James reports.

Beef production remains the most profitable enterprise at the 12,140ha (30,000 acres) Lilburn Estate, despite highly challenging markets, and that's a testament to the efficiency and professionalism with which the operation is run.

According to farm manager Dominic Naylor, who has overseen significant expansion of the suckler herd during his eight years at the Northumberland estate, attention to detail is the key, and more so when margins are thin.

"It's important that we up our game when the markets are against us, and not seek to cut corners," he says. "The need to present a product to our customers that is as good as it can be is vital."

The suckler herd extends to 2,500 Stabiliser breeding cows, all calving outside unassisted. This allows the system to operate with one labour unit to 400 cows.

"We calve 1,500 outside on pastures in March and April and 1,000 in the autumn block calve on arable stubbles in September and

October," explains Dominic. "Easy calving is a key trait and is one of the main reasons we can operate with twice the number of cows per man than herds with continental breeds."

Housing

Whilst the operation is as extensive as possible, the autumn calving cows and calves will come inside from November, as will calves weaned from the spring calving block. With intensively finished bulls and finishing heifers also inside, there can be as many as 3,000 head in sheds during the winter months. Add over 5,000 lowland ewes coming inside pre-lambing and the need for an efficient bedding operation is paramount.

"Bedding down is a major operation and is one of those areas where we certainly do not want to skimp," adds Dominic.

"Maintaining dry beds is an important part of avoiding respiratory diseases and we certainly don't want to present dirty stock to our customers."

Overall, the estate is using around 280 big square bales a week across all parts of the beef and sheep enterprises. Two 15m³ trailed Kuhn Primor feeding and bedding machines shoulder much of the burden and have become integral to the operation in recent years.

These large capacity machines are a good example of how Lilburn Estates takes advantage of economies of scale, adding to the efficiency of operations. The Primor 15070 M can carry as many as four large rectangular bales, but at Lilburn - where bales are loaded as the machine is discharging bedding - the carrying capacity becomes almost irrelevant.

"We've designed the cattle sheds in a way that allows the JCB to load the bedder whilst it is in operation, so bedding can be continuous, without the machine going to and from a bale stack," adds Dominic. "There is a multi-directional chute that throws the straw to either side, as far as we need it to go, so maintaining clean,

dry beds – and healthy stock – is less onerous than it might be."

High bedder output

A large proportion of the cattle bedding comes off the estate, with wheat and rape straw most commonly used. High output performance is therefore essential in the bedder, with two powerful intake rotors feeding the full 1,700mm width of the turbine's input area. A bank of six hydraulic tines above the feed rotors enables intake settings to be adjusted and regulated according to the type of product being used and to feed the turbine with an even supply of material. The turbine itself can blow up to 18 metres and is fitted with eight bolt-on blades for pneumatic fodder separation.

The Primor 15070 M uses Kuhn's hydraulic unroll system to clamp subsequent bales in place and stop them from rotating while the first bale is being discharged. It is also equipped with a hydraulic tailgate with a 1.2 tonne lifting capacity for loading round bales. The floor of the body is fitted with a 14mm diameter chain conveyor with an optional boost floor available to provide extra feed conveyor torque for the distribution of heavier products such as grass silage.

"In addition to high capacity performance, we need reliability," concludes Dominic. "These are complex machines, so maintenance is important, as are competent operators at the wheel. It's also vital to be able to rely on the service back-up, and, by buying from a well-respected manufacturer with a good local dealership like Thomas Sherriff, we most certainly get that." 

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On farm DM testing a must come rain or shine

To ensure cows are receiving the ration you think they are, routine on farm forage dry matter testing is a must – especially in wet weather, as Aly Balsom finds out.

Uncovered silage clamps that are open to the rain are one of the biggest causes of forage dry matter variability, which makes routine on farm forage dry matter testing a must on any unit.

All too often, extended periods of wet weather can coincide with cows suddenly clearing up a TMR which has met demand in the weeks previous. Nutritionist, Hefin Richards of Rumenation Nutrition Consultancy says it simply comes down to reduced dry matters as a result of forages taking on rain water. As a result, cows have to eat more to meet their needs.

“If we’re trying to improve efficiency and accuracy; with outdoor clamps and wet weather, that’s the biggest variable we have,” says Hefin. “Maize silage is generally quite consistent at around 32-33% dry matter under normal conditions. If the face is open and there’s several days and nights of rain, that can go down to the mid-twenties.”

Elongated silage ramps can make matters worse if the sheet is cut and rain runs down into the opening. This can cause “massive distortion” in dry matters.

For example, if the aim is to feed 6kgDM of maize silage at 33% dry matter, that’s a requirement of 18kg FW. If rain causes that to drop to 27%DM and cows continue to be fed 18kg FW, only 4.85kgDM of maize is actually being fed. This means an energy shortfall of over two litres of milk from an 11ME silage, potentially leading to milk depression if left unaddressed. Costs may also increase if more of the total diet is fed to meet cow requirements.

Extended spells of hot weather in the summer can also have the reverse affect on silage dry matters. However, without testing silages it’s impossible to know how much dry matters have been affected by environmental factors.

Hefin advises carrying out routine on farm forage dry matter

testing every week as a routine check (see box). Alternatively, forages should be tested when you see a problem with cows suddenly clearing up the ration following a weather change. “As long as we



Various hand held devices are available to give instant DM results on farm.

know how much extra water there is, we can counter that and react to that,” explains Hefin.

These quick farm tests should be carried out alongside routine, monthly, full silage analysis through a lab. This more in-depth testing gives an idea of how forages are changing as you go back through the clamp, the crop ferments more and fields change.

“The main thing you’re trying to do is establish; has it changed, how much has it changed and what can I do about it?” explains Hefin. This may mean increasing the total amount of maize silage fed in the short-term or bridging the gap with another feed, for example. **IP**



Rain can cause “massive distortion” in silage clamp dry matters, says Hefin Richards.

On farm dry matter testing - how to do it

- Put a known amount of forage into a heat proof container - 100g of forage is an easy amount to work with as it’s simple to calculate percentage dry matter.
- Place it in your chosen heating device (eg. air fryer, oven, Koster tester) and dry it down for a few minutes.
- Take it out and weigh again - note the weight.

- Put the sample back in the drier and take it out again after a few minutes. Weigh and repeat.
 - As soon as the weight remains constant, you know that you’ve removed all of the water. If your constant weight is 35g in an original 100g sample, you know that it’s 35% dry matter.
- * Any system that safely removes water from forage can be used. Be careful when using microwaves as there is increased risk of burning and fire.

Example on farm dry matter testing equipment

Product	What is it?	Cost	Contact
Kitchen weigh scales	Conventional kitchen scales	£9 and upwards for electronic weigh scales (Amazon)	Most retailers selling kitchen equipment
Air fryer	Air fryer made for frying food like chips and chicken	£37.99 for a 3.2 litre air fryer (Argos)	Most retailers selling kitchen equipment (Argos, John Lewis etc)
Oven	Conventional kitchen oven	Free - unless being used to cook the Sunday roast. You may choose to buy a second-hand oven just for DM testing forage	The in-house chef for permission
SCiO dry matter analyser	Pocket-sized dry NIR tester that analyses dry matter. Linked to app. Device is held over a representative silage sample and provides average dry matter reading based on 10 readings (grass and maize silage only)	£400 to buy device and then £600 yearly subscription, which includes 20 dry NIR tests or £90/month total for device and 20 tests (in year one)	Ricardo Lanfranco at Eurofins Agro, Tel: 0779 5612529
Koster moisture tester	Purpose-built forage moisture tester. Dries sample and provides DM and moisture reading	€302.99 (£235.07) for tester without scales or €428.99 (£332.83) for tester with scales	buykoster.com
X-NIR hand held NIR analyser	Hand held device providing basic forage analysis on farm (DM, CP, NDF, ME etc)	£10,500+VAT (Includes testing for 3 ‘families’ eg, maize, grass, TMR)	greenforage.co.uk
NIR4Farm	On farm NIR tester (Near Infrared Reflectance) providing basic forage analysis on farm (DM, CP, etc)	Available FOC through nutritionists or feed merchants	abvista.com
<i>Inclusion does not suggest recommendation. Guide only.</i>			

CHEWING THE CUD



Producing food efficiently without detriment to the environment is an integral part of modern sustainable farming. Matt Mellor speaks to David Cotterell, who manages the 300ha mixed farm at Kingston Maurward College within the Poole Harbour Catchment Initiative (PHCI).

MM: Aside from any additional challenges arising from being within the PHCI, what are your current priorities for keeping the 150 cow milking herd sustainable?

DC: Our situation within the college means we're restricted to a herd size of around 150 cows, so it's about maximising efficiency as much as possible. Our priorities are to keep the (early autumn) calving period tight, maintain herd health and make as much as we can from homegrown feeds including grazed grass.

MM: With an autumn calving herd, conserved forage must be a big priority?

DC: Absolutely, and with our situation (using contractors) we rely on a quality first cut as the mainstay of the winter ration. Although our leys are fairly old, they are based on Aber High Sugar Grass leys,

which – cut at the right time – consistently achieve D-values in the 70s (over 11.5MJ/kg ME) and protein levels of 14%. We're also growing forage maize within our arable rotation and this typically makes up 60-70% of the forage ration.

MM: Maize often has its detractors from an environmental perspective, so how do you ensure it fits with your broader sustainability objectives?

DC: Actually, we see maize as an integral part of our sustainable system. It's a crop that soaks up nitrogen in the summer months, when the uptake of other crops is slowing, which is important in a catchment sensitive area. We're also looking to grow earlier maturing varieties that allow us to harvest, ideally, in mid to late September. That will create the opportunity to establish either cover crops or winter wheat directly after maize.

MM: How big a contribution does grazed grass make?

DC: It's vital that we maximise production from grazing, so turning out by mid-March and rotationally grazing as effectively as we can through to early July, when we are drying cows off. Reseeding with the best available grasses is becoming more important, to ensure we have early spring growth, quality feed value into the summer and tolerance of drier conditions when they arise. Nitrogen use efficiency is another factor we need to consider going forward.

MM: How does being within the Poole Harbour Catchment Initiative impact on your drive for efficiency and sustainability?

DC: We're working collaboratively and proactively with Catchment Sensitive Farming and Wessex Water – not only as part of the PHCI, but also because we have a large public borehole on the farm. It's a relationship that has spanned my 15 years as farm manager at Kingston Maurward. Along with other local farmers who have engaged with their advice and practical demonstrations, we have helped Wessex

Water to reduce the nitrate level in the borehole to a comfortable level – a shared success that is actually a very positive and beneficial collaboration.

MM: Can you give examples of how this collaboration is beneficial?

DC: Wessex Water will monitor field leaching, particularly over the winter period, and we've learned how to manage the farm to keep nitrogen available to the crops and out of the water. That's a big efficiency factor and ultimately results in cost savings. We know, for example, what's lost from the soil if fields are left bare, and the comparative benefit of establishing cover crops that can help retain as much as 50–80kgN/ha. That's valuable nutrition for a following crop that would otherwise be lost, and there is also a big positive for soil health.

MM: You mention soil health, so is that for you an essential part of sustainable farming in the future?

DC: Without a doubt, and we're managing our rotations with soil health as a priority. As a mixed farm we've the opportunity to maintain organic matter levels with good use of manures, but we're also using cover crops and minimum tillage techniques to ensure we look after our soils. This year, with help from Wessex Water, we've tried undersowing our maize with a quick growing ryegrass, to ensure there's a crop as soon as the maize is off. Early results have been encouraging, so this is another good example of how the collaboration is working well.



David Cotterell in a field of linseed, buckwheat and phacelia, grown as a cover crop as part of the farm's commitment to improving soil health.

MM: Looking ahead, what other areas do you think livestock farmers need to consider in order to keep their businesses sustainable?

DC: I certainly think climate change is a factor that we all need to take into account, whether that's growing more drought tolerant forages or looking at flood mitigation strategies. We should also think about greenhouse gas emissions, which are a contributor to climate change and – like it or not – farming will always be under the spotlight. Increasing efficiency through

effective use of new forage varieties will, I'm sure, reduce the impact of farming on the environment, so that's got to be a valuable priority. **1**

The Poole Harbour Catchment Initiative (PHCI) aims to achieve sustainable farming development, water use and sewage treatment that supports healthy rivers and groundwater in the Poole Harbour Catchment, whilst improving biodiversity. Find out more at wessexwater.co.uk

