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FORAGE USE SURVEY WINNERS

Congratulations to Andrew and Gemma Fenton, winners of 'his and hers' gilets in our Forage Use Survey prize draw. Milking 120 cows, the Fentons are the fourth generation of the family farming at Bryning Hall Farm in Cumbria.

Like a great majority of the 560 participants in our survey, the Fentons place great importance on homegrown forage, ranking it as the most important factor in the long-term profitability and sustainability of their business. They are pictured with Helen Mathieu of Germinal (right).

Runners up, receiving a pair of cashmere blend shooting socks, were Rob Beavan of Chirbury in Powys and Struan McGregor from Tarbolton in Ayrshire.



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EDITOR'S NOTE

Aly Balsom draws on two recent industry surveys to highlight the huge scope for farmers to improve forage management in the year ahead.



We've all heard the old adage; proper planning prevents poor performance, and it's a statement which is worth putting at the forefront of minds as we head into a new forage season.

Cautious optimism seems to be in the spring air, with all the signs looking as if we could at least have a good start to the grass growing year (please excuse me if it chucks it down with snow between me writing this and it going to print!). But as things start to warm up and the shed doors get thrown open on some farms, are you 100% sure you've put plans in place to ensure all the cards (that you have control over) are stacked in your favour?

Two separate farmer surveys recently carried out by Germinal GB and Volac, showed that over 90% of farmers saw forage and better use of grass silage as playing a central role in the future of their businesses. However, their answers to the specifics of their grassland management showed they could be falling short in several vital areas of grass and silage production.

For example in Germinal's survey of 560 UK livestock farmers, only one in five respondents stated they were reseeding more than 10% of their grassland each year and almost half were reseeding less than 5% each year. This means they are

Perhaps now's the time to sit down and plan silage management and refresh the team's memory as to the importance of the basics

seriously compromising the performance of their land, and potentially shooting themselves in the foot when it comes to their ultimate goals of maximising forage use.

The Volac survey of over 100 farmers highlighted that despite silage being viewed as a vital component to system success and reducing bought-in-feed costs, there were shortcomings in silage-making techniques.

Volac's Derek Nelson summed it up well: "More than 80% of

dairy farmers in the survey were looking to reduce bought-in feed costs. However, UK silage quality does not seem to be improving," he said.

The question is, how can you improve what you put in and take out of the clamp this season?

The constant, hectic nature of farm life means it can be so easy to forget the simple things. So perhaps now's the time to sit down and plan silage management and refresh the team's memory as to the importance of the basics such as cutting, wilting, harvesting, clamping and feeding - just some of the areas where farmers were falling short in the survey.

Around two-thirds of respondents said they were actively striving to do a better job with forage management. If you're one of them, better grass utilisation at the start of the spring could be one area for attention. After all, every additional ton of grass utilised/ha has been shown to increase net profit by €180/ha (£158/ha) (see our report from the Positive Farmers Conference on page 6).

Adopting a new approach to grassland management using the new "Technograzing" approach from New Zealand (page 24), could also be a solution for livestock farmers looking to boost performance on their best land.

The main thing to take home from both grassland surveys is the huge potential for many farmers to do better. And as volatility looks to continue and Brexit brings even more uncertainty, can you afford not to improve?

FORAGE BITES

Digestible knowledge for all things forage.

New better silage initiative launched

With a recent Volac survey finding that 90% of dairy farmers rated greater use of grass silage highly in helping to reduce bought-in feed costs, the company is launching a new initiative to help.

Called 'Cut to Clamp', it aims to help farmers produce consistently better silage by focusing on best practice in six key areas – cutting, wilting, treating, harvesting, clamping and feeding.

Cut to Clamp will be rolled out over coming months via a dedicated website, plus videos and tools to help farmers benchmark their silage-making, and via a number of silage audits carried out by Volac on-farm experts.



First EBV for Net Feed Efficiency

A significant breakthrough in UK cattle breeding has been achieved with the development of the first Estimated Breeding Value (EBV) for the trait of Net Feed Efficiency (NFE).

The new genetic indicator will apply to the UK's fastest growing cattle breed, the Stabiliser, and will allow beef producers to adopt new breeding strategies to reduce feed costs, whilst also improving their environmental credentials through lower greenhouse gas emissions.

The Net Feed Efficiency EBV has been developed through a five-year project funded by the UK's innovation agency, Innovate UK, as part of a drive to improve sustainable protein production. It has been managed by the Beef Improvement Group (BIG) with support from JSR Farms, Alltech/Keenan and SAC Consulting. The project has involved accurately measuring and recording feed intakes and weight

gains of over 1,000 Stabiliser bulls and finishing steers at a specially designed unit in East Yorkshire.

The success of the project will be celebrated at an open day at Wold Farm near Pocklington on 24 May 2017 when BIG and the project partners will present the results in detail and explain the future implementation of the NFE EBV. Anyone with an interest in progressive beef production will be welcome to attend, with further details available from the Beef Improvement Group at www.bigbeef.co.uk



Project looks to reduce grass staggers risk

Farmers turning livestock out onto lush spring grass must be mindful of the low magnesium levels that so commonly cause hypomagnesaemia (grass staggers). Magnesium is not stored by animals, so when levels in forage are lower there is a need for supplementary sources to minimise the risk of problems.

An alternative approach would be to increase the levels of magnesium that occur naturally in forage. This potentially cost-effective solution will be a future plant breeding objective of the five-year MAG-NET project.

As a livestock farmer, you can play your part in the MAG-NET project by taking part in an online

survey about your own experiences with grass staggers.

MAG-NET is supported by BBSRC, NERC and other sponsors.

Simply complete the survey at: www.magnesium-network.uk/survey.html

Five steps to improving pasture use



One of the new features at the triennial Grassland & Muck event in 2017 will be a live demonstration of intensive rotational grazing, showing different types of temporary fencing.

The demonstration will

provide a focus on improved grazing methods, which will be one of five top tips from consultant Charlie Morgan for getting more from pasture.

The other five top tips will be to carry out a physical

assessment of your fields, evaluate plant species, assess nutrient status and examine soil structure.

For more information visit www.grasslandevent.co.uk

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USE GRASS TO TURBOCHARGE PROFITS

“Turbocharging profits” was the theme of this year’s Positive Farmers Conference in Cork, Ireland. Aly Balsom gives an overview of some of the grass-focused presentations in Forager’s first instalment from the event.



Grazing cows on grass and clover mixtures has been found to bring a net cost benefit of €594/ha (£521/ha) compared to grazing on grass alone, with profitability rising even further when grazed with crossbred cows. A three-year farm trial (see top right) carried out by Teagasc at Clonakilty Agricultural College in West Cork, found that cows produced an average 59kg more milk solids per cow per year on clover leys versus

grass only swards. The College's spring herd was made up of 40 first cross, Jersey cross Friesians and 40 Holstein Friesians. The extra income received in milk sales equated to €720/ha (£633/ha), with added costs from extras such as bloat oil and clover seed bringing the total net cost benefit to €594/ha. **Breed effect** When the breed of cow was taken into

account, the trial demonstrated an even greater benefit from grazing spring calved, crossbred animals on grass and clover leys compared to grazing Holstein Friesians on grass only leys. This equated to a 41% increase in farm profits or €860/ha (£756/ha) more when taking into account the higher average longevity of the crossbreds. The Jersey/Friesian animals grazed on clover mixes produced 27% more milk solids per kilo of body-weight versus Holstein Friesians managed on grass alone (see table). Overall, the crossbreds had better feed conversion efficiency than Holstein Friesians, producing 103% of their bodyweight in milk solids when grazed on clover mixes and fed just 350kg of concentrate (see table). Farmer and Positive Farmers Conference co-founder, Michael Murphy said this “off the scale” production was 100% due to the effect of the grass and clover leys combined with cow genetics. He believed the research findings were some of the most significant he had seen in his career and created opportunity for even the top performing herds to lift their profits. The findings also showed that grazing crossbreds on grass clover mixtures could help protect against milk price volatility.

For example, at a milk price of 29.5 cents/litre (25ppl), profits from crossbreds grazed on grass and clover were 52% higher versus Holstein Friesians on grass alone, and 40% more at 34.5 cents/litre (30ppl). However, at a low milk price of 24.5 cents/litre (21ppl) profits rocketed to 98% more. Mr Murphy concluded: “It’s a massive difference and our (Ireland’s) competitive advantage. It is a game changer, but only if we act on it.”

Performance and profit comparison with different breeds grazed with or without clover				
	Holstein Friesians on grass	Crossbreds on grass	Holstein Friesians on grass and clover	Crossbreds on grass and clover
Kilos of milk solids per kilo of body weight.	0.81kg	0.92kg	0.91kg	1.03kg
Profit/ha € (£)	€2,090 (£1,837)	€2,438 (£2,143)	€2,631 (£2,312)	€2,950 (£2,593)
<small>(at a milk price of 34.5cents/litre (30ppl), adjusted for higher longevity of crossbreds)</small>				

Clonakilty grass clover trial summary (2014-2016)

- Four different diploid perennial ryegrasses (PRG) and four tetraploid PRG were sown with or without white clover.
- Two white clover varieties were used with 1kg/acre of each included in the mix.
- 250kg of nitrogen/ha per year was applied.
- Cows stocked at 2.75 cows/ha.
- Cows entered fields at 2,800-3,000kgDM/ha and grazed down to 1,700kgDM/ha.

- Michael Murphy’s tips for getting the most from clover**
- 1 Sow at a rate of 0.5-1kg/acre on new leys and 1.5-2kg/acre when stitching in.
 - 2 Use specialist machinery to spread clover on existing swards - using a fertiliser spreader can be ‘hit and miss’ as the clover seed is so small.
 - 3 Only over-sow when there is enough soil moisture - probably April or May.
 - 4 Put on 50kg/acre of phosphate and potash with the clover seed.
 - 5 Ensure swards are grazed out fully and quickly during the first 3-4 grazings, particularly when stitching in. This allows sunlight to reach the clover seed.
 - 6 Enter new clover swards at 2,700-2,800kgDM/ha.
 - 7 Graze tightly to 1,500kgDM/ha.
- To hear more of Michael’s thoughts on grass management, turn to Chewing the Cud on page 30.*

PLACE ATTENTION ON SPRING GROWTH FOR LONGER BENEFITS

Farmers could make big strides to improve grass utilisation and hence profitability by placing greater attention on spring grass growth, according to John Maher of Teagasc, Moorepark. Mr Maher highlighted the fact that grass utilisation was clearly linked to farm profitability with every additional tonne of grass utilised/ha increasing net profit by €180/ha (£158/ha). At the same time, each additional day of grazing in spring could increase farm profits by €2.70 (£2.37) per cow per day through improved milk constituents and lower feed costs. “This figure does not include any benefits to pasture production or utilisation. Well controlled grazing management during the springtime will set up the farm for excellent milk production from grazed grass for the remainder of the year,” he said. He said ideally farmers should be utilising 1tDM/ha in the first rotation, starting in February, on a spring block calving system. However, PastureBase figures from Irish farms showed this varied from 0.5-1.5t which showed many producers were missing out.



- Some of the areas to improve spring growth included:**
1. Using the Spring Rotation Planner - Target 30% of the farm grazed by 1 March, 65% by 17 March and begin the second rotation on 5 April.
 2. Applying the first application of nitrogen early in the latter half of January when ground conditions were suitable, and allow two mild days for nitrogen uptake (without serious levels of rainfall). The average response to early nitrogen (fertiliser and/or slurry) application in spring 2016 was 10kgDM of grass per kilo of nitrogen applied (PastureBase).
 3. Monitoring grass supply and regrowth.
 4. Utilise grass in difficult/wet grazing conditions by:
 - Avoiding long, narrow paddocks and instead graze square ones.
 - Identifying and grazing paddocks with lower covers.
 - Avoiding paddocks with poor grazing infrastructure.
 - Being willing to adapt.
 - Using a back fence.

INCORPORATING LAND INTO SHARE FARMING CONTRACT OFFERS WIN-WIN



By including land in the share farming arrangement, Will and Kim Grayling are able to capture any increase in land value.

Incorporating land ownership into a share farming agreement could bring benefits to both parties by improving land productivity and increasing equity.

Kiwi producers, Will and Kim Grayling, are one of a small number of share farmers in New Zealand that have incorporated land ownership into their agreement. As part of their contract with Jim and Sue van der Poel, the pair own 9% of the farm's land (see box).

Whereas traditionally there would be one land owner in such an arrangement, Will said this type of contract provided a win-

win for everyone.

"The biggest benefit for us is we own land and we capture any increase in land value. Land has appreciated (it's increased 15%), so we've managed to capture that, which means there's more to borrow against as a share milker," he explained.

Having a share in the land also meant any decisions made by the Graylings would consider both businesses (see box). This meant the van der Poels could be confident that any decisions were being made for the benefit of everyone.

In general, Will believed the

land aspect of this type of agreement also meant that the main land owner could benefit from the share farmer being proactive and doing a better job at managing the land.

"By having a stake in the land, they are (as share milkers) more likely to farm better and more likely to improve performance due to better land productivity which will improve performance overall."

The Grayling's agreement is now in its fourth year, with Will and Kim investing most their income into buying more cows. This means they now own 1,000 cows in the herd, compared to 500 cows at the start.

The Graylings chose to raise total cow numbers and keep the 70:30 ownership split to keep the van der Poels in a strong position so they did not feel they were giving away more than necessary.

Farm Facts

- 3,300 cows calving over nine weeks from August to September.
- 830ha (2,050 acres) located near Ashburton, Canterbury, South Island.
- Average 480kg milk solids (MS)/cow or 1,900kgMS/ha.
- Rotationally grazed and fully irrigated.
- No cake in parlour.
- Feed 1,000kg of supplement/cow/year (mostly palm kernel and silage).
- Cows out-wintered on fodder beet.

Share milking set up:

- The 50:50 share milking company is called Ashpouri Ltd - the Graylings have a 30% share and the van der Poels have a 70% share.
- Ashpouri owns the machinery and cows in a 70:30 split.
- Any income is split 50:50 between parties.
- A separate company - Singletree Dairies 2013 Ltd is the land-owning company. Ashpouri has a 30% share in this and the van der Poels have a 70% share. This means the Graylings own 9% of the land.

Positive Farmers Conference - Sound bites

"Every additional 1% of the farm grazed in early spring increases grass production by about 14kgDM/ha."
- John Maher, Teagasc.

"Too many farmers do other things in the six week breeding period - you need to focus on heat detection, heat detection, heat detection."
- John McNamara.

"Be pushy, sell yourself, show you want to work for it and you're really keen."
Matthew Jackson's (pictured left) advice for new entrants.

"Stocking rates and calving pattern are two main strategic decisions to get most of intensive grazing system."
Brendan Horan.

"Everyone's dealt the same amount of luck, it's what you do with it."
- Kiwi farmer, Will Grayling.

"A shock to the system every now and then brings us all back down to earth."
- Irish farmer, Seamus Quigley on volatility.



Matthew Jackson



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SATELLITE GUIDANCE TAKES GUESSWORK OUT OF TOP-DRESSING

Luke James meets a dairy farmer who's seeing the advantages of using precision farming technology for applying fertiliser to grassland.

The ability to apply fertiliser accurately across 24 metre bout widths is proving advantageous for Cheshire dairy farmer Peter Gleave as he seeks to maximise production from grass.

Milking 160 cows and rearing all replacements at all-grass Dock Bank Farm, Holmes Chapel, his aim is to squeeze as much as possible from long-term perennial ryegrass leys. Fertilising the grass effectively is central to his success.

He is carrying out soil analysis annually, covering every field on average on a four-yearly cycle to ensure he matches applications to requirements. He is separating his slurry, thereby making full use of this resource, and applies artificial fertiliser with GPS-guidance to achieve a high level of accuracy and efficiency.

The Gleave family owns 61ha (150 acres) at Dock Bank Farm, and rent a further 55ha (135 acres). The herd calves all-year-round, although the main blocks are in February/March and August/September. The Holstein Friesian herd averages 6,300 litres/cow/year from a system that seeks to graze grass for as long a

season as possible, with self-feed silage fed during the winter months and cows fed to yield in the parlour. With total concentrates fed at just 0.85t/cow, the contribution achieved from forage is significant.

"We aim to have the cows out by late March, but earlier if conditions allow, and in a good year like 2016 we can have them still out grazing up to the end of November," explains Peter.

"We're using a rotational grazing system across the fields that are accessible to the cows and have 40-50 acres of rented ground further away that we use for silage."

Leys are reseeded roughly every 10 years - according to their productivity - with all grassland planted with long term perennial ryegrasses. White clover is included in the seed mixtures, apart from fields with persistent dock problems. In this case the need to control docks makes it impossible to sustain the white clover.

Nutrient planning

Routine soil nutrient testing gives Peter a good overall understanding of what's required to maintain

sward productivity, so the use of manures, artificial fertiliser and liming is all done to a clear plan. The farm has a weeping wall slurry separation system, which allows more effective storage and use of manures. A trailing shoe system is used to apply liquids and a dual-purpose spreader for solids.

The first top-dressing of artificial fertiliser will usually be applied in mid-late March, either of straight nitrogen or - if required - a NPK compound such as 27:5:5.

Optimum fertiliser use

Peter adds: "Fields closer to the farm that are grazed more often will typically not have the same phosphate and potash requirements as those further away. We apply as much fertiliser as we need to in order to get the best from the land, but no more."

This sentiment reflects the cost burden that bagged fertiliser places on the business, and extends not only to how much is used, but also how accurately it is applied.

Investment in a Kuhn Axis 30.2Q spreader with an entry-level



Routine soil sampling helps Peter to match fertiliser inputs to requirements.

GPS guidance system was all part of Peter's overall strategy to improve his farming efficiency and make best use of bought-in fertiliser.

"We've upgraded from a land-drive machine capable of spreading to 12 metres, to a system that will spread accurately to 24 metres," says Peter. "We're travelling half the distance and applying the fertiliser more accurately. There's no way we could spread to 24 metres on grassland without the GPS guidance, especially when spreading on silage aftermaths, so it's an essential piece of technology."

The Axis is a twin disc spreader, using a system that allows application rates to be varied in relation to the forward speed of the tractor. Spreading can also be adjusted at field margins and in the narrower irregular-sized bouts that are inevitable in most fields.

Ease of application

"It's simply a case of setting up the machine ourselves online and then following the display monitor in the cab," says Peter. "We are spreading the full application right up to the field edges, without any going into the hedgerows or the neighbour's fields and there is automatic shutting off and on at the headlands. It's a system that allows you to maximise every square metre of your field, without wasting any fertiliser."

The Axis in use at Dock Bank has a fully extended hopper to allow it to carry four 600kg bags and is mounted on a 113 horsepower Ford 5070 tractor.

"We have a front linkage on the tractor and this allows us to carry ballast on the front when we are spreading," adds Peter.

"We are typically spreading either nitrogen or a compound every three or four weeks during the grass growing season, so the ability to do this quickly - as we can with 24 metre spreading - is important. We can also spread granulated lime with the Axis, so can address soil pH in a timely fashion, little and often, without having to rely on a contractor."

Reliance on sophisticated technology may be a

worry for some, but Peter has no such concerns as the back-up provided through Malpas Tractors, where he bought the Axis, is excellent.

"We had one situation where the GPS wasn't working, which effectively stopped operations completely," he recalls. "However, I was able to call the dealer and they put me in touch with someone that was able to reboot the system and sort the problem - all from my mobile phone whilst sitting in the tractor in the middle of a field. You need reliable back-up if you are going to use technology of this kind, and we have no concerns on that front."

Making the best use of nutrients at Dock Bank Farm

- Routine soil sampling.
- Weeping wall separation system.
- Trailing shoe slurry application.
- GPS guidance for fertiliser spreader.
- Precision application technology on spreader.

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Using GPS guidance, Peter Gleave can spread fertiliser accurately to 24 metres.

BREEDING TO BEAT GRASSLAND DISEASE

Plant breeder Sarah Palmer from IBERS Aberystwyth University explains how new methods have a role in producing more disease-resistant grasses.

Incorporating genomic selection techniques into the already highly successful ryegrass and clover breeding programmes at IBERS Aberystwyth University should provide great encouragement for livestock farmers focused on producing more milk or meat from forage.

The opportunity to accelerate animal breeding progress through genomic selection will be familiar to many livestock farmers, with Genomic Estimated Breeding Values (GEBVs) now widely available and used to assist young bull choices.

Use of comparable technology in grass and clover breeding may not yet be as far advanced as it is in cattle genetics, but for the scientists involved in its emergence, the long-term potential is no less significant.

Genomics is already being applied to accelerate breeding progress at IBERS, and increasingly it will have a key role to play in selecting for traits that are more difficult and expensive to measure. In particular, there is real potential in unlocking disease resistance in future ryegrass and clover varieties.

We have seen more incidences of diseases like crown rust and drechslera in ryegrass in recent years – possibly in response to climate change.

Disease pressure can restrict a swards' ability to grow, as well as affecting its digestibility. During

the peak of the season, even a one unit decrease in D-value lost to disease can mean a reduction of feed value of 600 MJ/ha. Research at IBERS shows that a severely affected sward could be affected by six times this amount, and this will be reflected in lost potential profit.

The most effective way of controlling plant disease on farm is by growing resistant varieties.

Breeders strive to bring new and improved varieties to the market all the time. This means combining biomass production, alongside quality and the ability to overcome stresses from pests, pathogens and the environment.

The genetic variation within known populations of ryegrasses and clovers is sizeable and genomics is now just beginning to play its part in unlocking the most advantageous traits. (see box)

The use of genomic selection methods is set to have particular benefits in disease resistance breeding, which can be a particularly challenging area given the complexity of fungal challenge and the difficulties with processes such as inoculation when working with large plant populations.

Genomics will not only aid us in breeding for a wider panel of diseases than we can manage using traditional methods, it will also help us respond faster to any future changes, thus ensuring the future competitiveness of the

Aber High Sugar varieties.

This is an exciting time to be involved in grass breeding, not least because of the emergence of genomics. The opportunity to speed up breeding progress will be of real benefit to a farming industry that is increasingly reliant on quality forage.

Grass Genomics

- Speed: GEBVs can be obtained at a seedling stage, thereby enhancing the opportunities for selection much quicker than by phenotyping alone.
- Improved accuracy: There are many traits difficult or expensive to measure, GEBVs will offer higher levels of accuracy than conventional selection.
- Accelerated cycling: One generation takes four years, GEBVs will reduce this by half or more.
- Enhanced breeding gain: Digestible yield improves at ~4% per generation or 10% per decade. With GEBVs this rate of gain could double or even quadruple.
- Added value traits: GEBVs for added value traits (such as new disease resistance genes or quality traits) will allow breeders to select for more traits without compromising progress in yield and quality.

GEBV development for drechslera resistance is funded through a collaborative Germinal/IBERS Innovate UK project (102078).

Plant breeders at IBERS Aberystwyth University are now integrating genomic selection techniques into both ryegrass and legume breeding programmes and expect this to accelerate the development of new varieties.

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BALE-A-MINUTE SERVICE MEANS TIMELY WRAPPING

Wrapping silage bales quickly and efficiently can be key to feed-out quality. Paul Jennings reports on a contractor that understands his customer's priorities.

For livestock farmer and agricultural contractor, Richard Woodsworth, the ability to negotiate the tight lanes and gateways of the Yorkshire Dales is key to providing a fast and reliable bale wrapping service during the busy grass harvesting season.

Based at Brown Hill Farm, near Skipton, Richard runs his own flock of 800 breeding ewes and 100 beef sucklers, in addition to his agricultural contracting and groundwork business trading as Bolton Abbey Bobcats.

Bale wrapping is one of the main farm services, with his primary operator, Lee Greenwood, wrapping over 10,000 bales per season.

Richard explains: "We wrap bales for farmers throughout Nidderdale, Wharfedale and the Yorkshire Dales National Park,

with our success coming down to our ability to balance the summer's heavy grass harvesting workload with the need to negotiate a network of narrow lanes, tight gateways and hard to access fields."

Lee believes most modern equipment is too big for the hillside meadows and moorland fringes that the business operates on.

"Fortunately, there are still a few manufacturers who appreciate that not all farms are located on wide, open land and that farmers and contractors like ourselves need kit which can travel between small fields with ease," he adds.

Five years ago, Richard purchased a Kuhn SW 4004 trailed bale wrapper, using it successfully for four seasons before replacing it with the upgraded SW 4014 last year. In common with its predecessor, the

SW 4014 is capable of wrapping square and round bales and shares the outgoing machine's rapid throughput rate and easy manoeuvrability.

"Depending on the size of bales and how many layers of film and overlap are required, we're wrapping between 50 and 75 bales per hour," Lee says. "The way the Kuhn machine's rollers pinch and pick up the bales makes it a fluid and continuous process, with one bale being wrapped while travelling towards the next. On average, I can wrap a bale every 60 seconds."

The SW 4014 also ensures a rapid work rate by being easy to manoeuvre between fields. "With some machines, it's impossible to take the most direct route from one field to the next, simply because the local lanes are too narrow. Finding an alternative route can take 30-40 minutes and can add up to several lost hours over an entire day," adds Lee.

"With the SW 4014, I know that

if the baler can fit through a tight gap, the wrapper will easily follow thanks to its ability to transform from a working width of four metres, down to just 2.5m in transport mode."

The SW 4014 can also pick bales from the tightest spots. This means that for difficult bales, such as those dropped against dry stone walls or in tight corners, Lee can simply reverse the wrapper over them. The wrapper's rotors then only need to be able to pinch the last 12 inches of the bale to pull it into a more accessible location.

The SW 4014 also suits the Yorkshire Dales landscape thanks to its lightweight design. "With favourable weather windows seemingly getting shorter and shorter, we often need to work on wet or soft ground," Lee continues. "For the SW 4014 that's not a problem. The machine is very light (2,820 kg) and can operate without leaving a mark. Our customers tell us that's one thing they really appreciate, especially as many of them are operating within the constraints of various HLS stewardship schemes which dictate that

meadows have to be cut and baled within specific dates."

Another feature Lee's customers place great value on, is the ability to determine which way up bales are deposited.

For example, he says when applying four or eight revolutions of film, the wrapper automatically drops bales with the film knots facing upwards. But with six layers, the bales will land with the knots facing down. However, by using the ISOBUS control panel to programme the wrapper, the machine can be instructed to rotate the bales through an additional 180 degrees to make sure the bales always land with the knots uppermost. Lee says this makes it easier to unwrap the bales when feeding out and is something recognised by customers who appreciate the extra attention to detail.

The SW 4014 is also equipped with Kuhn's new laser-guided Autoload facility, although Lee rarely uses this feature.

"In an ideal scenario, bales would be lined up in straight lines across a uniformly flat field. Under those circumstances, the Autoload system would let me

use the machine with very little operator input. Unfortunately, that's rarely, if ever, the case in the Dales. It is, however, good to know that the automatic facility is there for times when someone else is operating the wrapper."

Richard says the Autoload feature also helped last year when the business drafted in a new driver with no prior wrapping experience.

"The Autoload feature made the machine simple and easy for him to use and allowed us to keep ahead of the summer's busy workload," he explains.



A narrow transport width and great manoeuvrability offers unexpected advantages.



A machine that wraps square and round bales offers important flexibility for Richard Woodsworth's contracting business.



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PASTURE IMPROVEMENT CUTTING FEED COSTS

An overhaul of in-bye acres on one Highland sheep farm is paying early dividends, as Luke James reports.

After just one year of a three-year grassland improvement programme, Scottish sheep farmer Donald MacDonald is already seeing benefits in terms of reduced bought-in feed costs.

Donald produces breeding stock and store lambs across 160ha (395 acres) at Taldale, Thurso, on the exposed northern coast of Scotland and has 49ha (120 acres) in-bye. Since 2016 he has been improving the in-bye land by overseeding 16ha (40 acres) every year.

Whilst selecting the best new varieties for the job is important, success is also being attributed to pan-busting, soil testing and use of specialist overseeding machinery that does far more than simply broadcast seed.

As a contractor, as well as a sheep farmer, Donald knows his machinery. He's also someone who does his research and is

willing to take advice, so the approach he's adopting is well thought through.

He says: "Our in-bye acreage is heavy clay land, which we run alongside 280 acres of hill. It's been heavily stocked over the years, so there is a high risk of compaction. After attending a grassland event, I bought a soil compaction tester and started using it on our ground."

Addressing compaction

Donald discovered that compaction was an issue in many areas, down to a depth of 13-18cm (5-7 inches). As a result, he invested in a four-legged grass sub-soiler and now uses this regularly, typically in September.

"This machine operates down to a depth of 18 inches and is making a real difference to

our ground," he comments.

Donald has also picked up on the fact that grassland reseeding rates across the UK are stubbornly low, despite the obvious advantages that growing modern leys fit for purpose offer to livestock farmers. Having begun to see the benefits of sub-soiling, he started planning an approach to improve the performance of his in-bye land further.

One of the tools Donald uses successfully off the farm in his contracting work is a Guttler Greenmaster seeding and soil conditioning implement, supplied by Wox Agri Services. This single-pass unit will level, scarify, overseed and roll, with the potential to engage or disengage different elements depending upon the job to be done. In addition to grassland overseeding, Donald uses the machine within his landscaping

business and points out that it has the versatility to work on ploughed ground as well, sowing everything from cereals to clover seed.

He explains: "We are on our second machine now, this being a 3-metre model that we upgraded to last year. We have a front linkage on the tractor from which we mount shatter boards and tines, and then have another shatter board and two rows of adjustable tines behind. There is then the broadcast seeding unit, plus the Guttler roller that effectively creates the seedbed."

Reseeding

It is the Greenmaster that lies at the heart of Donald's stage-by-stage reseeding plan, which involves improving one-third of his in-bye acreage each year over a three-year period.

"We need minimum time out of production, given our limited acreage and the ambition of achieving total renewal in three years. Having sorted the compaction issues with the deep sub-soiler and addressing any soil nutrient issues with liming and application of compound fertilisers with trace elements, the Greenmaster effectively does the rest. It will rectify poached pastures and scarify old swards, with varying degrees of intensity, and then dimple in the grass seed to the optimum depth (not too deep)."

Donald will overseed when there is sufficient soil moisture and warmth, first grazing down

the old sward as tightly as possible. He chooses long-term grazing mixtures supplied by William Shearer - predominantly containing Aber High Sugar perennial ryegrasses and white clover - overseeded at 10kg/acre. If over-seeding later in the season, he may withhold the white clover and stitch that in with the Greenmaster the following year.

The need for quality pasture

In total, Taldale has a flock of hill-type North Country Cheviots made up of around 500 ewes and 200 ewe lambs. Half of the ewes are bred to Blue Faced Leicester rams, to produce Cheviot Mules for breeding, with the other half being bred pure. Everything lambs from the first week of April.

Quality pasture is the key for ewes and lambs through the summer and autumn months. Donald keeps a close eye on trace element and mineral levels and uses enhanced fertilisers to boost selenium and cobalt in particular, without which lambs will not do as well. He's also providing free access sodium as Himalayan rock salt.

Improving the grassland through overseeding is so far paying dividends at the back-end of the season, allowing Donald to delay the introduction of concentrates to weaned lambs by a full month.

"We are already seeing the benefits of the pasture renewal, with concentrate feeding not

In-bye improvement

- Sub-soiling to rectify soil compaction.
- Liming and customised fertiliser applications.
- Overseeding with modular seeding and conditioning implement.
- Top ranking Aber High Sugar Grass perennial ryegrasses.
- White clover included or stitched in later.

'Golden hooves' effect of Guttler roller

- 305 prism points per square metre.
- Stimulates grass tillering.
- Controls broad-leaf weeds.
- Incorporates grass seeds directly into turf.
- Creates the required soil-to-seed contact.

starting until December last year, instead of November. This means lambs are growing off grass costing 7p/kg instead of bought-in feed at 35p/kg," he reveals.

"At this stage, we see this opportunity to cut bought-in feed costs as the main benefit, rather than increasing stocking rates. Whilst we cannot control the cost of what we buy in, we can – through pasture improvement – control how much we need."



Donald MacDonald (pictured left) is cutting bought-in feed costs in his North Country Cheviot flock by improving in-bye pastures.



The versatile Greenmaster serves as a soil conditioner and overseeding drill.

MAKING BEEF STACK UP

Guest writer Laura Mushrush, formerly of the USA's Drover magazine, recently visited a Somerset beef producer who is using rotational grazing and out-wintering to make his forage-based business sustainable.

Looking out across the rolling countryside of Somerset, there is a break in the landscape. Fields filled with evenly spaced round bales sit in narrow rows on a turnip cover crop. The set-up looks at odds with the more traditional farming landscape all around, but it's all part of a long-term plan to make farming pay.

Enter Matt House, farm manager of Bowden Farms, one of a new generation of progressive thinkers, chomping at the bit to use modern practices and creative management to make a sustainable living in an old game. For him, it's all about the bottom line of running an efficient operation that can support itself.

"How can I make it stack up?" he asks. "This is the question I need to answer with everything I do."

Matt, a tenant farmer's son, came to Bowden Farms in late 2014, and immediately saw the potential in the operation which had just made a transition from dairy to an unprofitable mixed arable and beef operation. The de Pelet family - owners of the farm - gave Matt free rein to manage, prompting a major overhaul. The focus is now primarily on producing beef from forage, with a 300-head herd of spring calving suckler cows the target by 2019 as part of a plan to be operating 100

percent sustainably, without relying on subsidy payments by 2020.

This includes the explanation for the round bales sitting in the turnip fields.

"They are part of our grazing system," Matt says, "which includes rotationally grazing cows and calves on quality grass for most of the year and strip grazing dry cows on forage crops in preference to housing over the winter."

This coming spring Matt will calve 122 crossbred cows, all bred to Angus to produce calves that will be sold at around 10 months of age as 350kg stores into finishing units, producing quality grass-reared beef. With over 90 bulling heifers that will be served to calve in spring 2018, and more bought-in heifer calves arriving concurrently, he is on track to have the required headage within two years.

Rotational grazing

As stock numbers grow, he is improving the productivity of the pastures which will provide the basis of a rotational grazing platform. Long-term leys are primarily comprised of intermediate and late heading Aber HSG perennial ryegrasses, plus timothy and white clover.

The adoption of rotational grazing and out-wintering is

linked to an AHDB Beef from Grass initiative that began in October 2015. Matt is now just over halfway through the two-year programme and the farm has seen massive benefits, not least through an increase in dry matter production from 9.8tDM/ha to a current level from the new leys of 12-13tDM/ha.

"Before we started, we were at 50 percent utilisation of our forage. Now we are at 75 and even 80 percent in some fields, and we're growing more grass," he explains.

The set-up is simple: Electric fencing is strung around each field, with temporary fence sectioning off a single two-hectare paddock. Recently weaned calves are grazed on reseeded paddocks, being introduced at a sward height of around 10cm and moving onto a fresh paddock every 24 hours. They are supplemented with baled silage to provide additional fibre. From this grazing system, average growth rates of 1.28kg/day and 1.2kg/day have been achieved from steers and heifers respectively.

According to Matt, the hardest part is to find the optimum stocking rate, so that utilisation is maximised without limiting regrowth potential. To help determine the amount of dry matter available in fields and to manage stocking rates, he uses a plate meter and the AgriNet

computer programme to measure and monitor grass covers throughout the season.

"If they eat it too short, growth will be stunted since the leaves won't be able to feed roots through photosynthesis," he explains. "We don't want to graze the re-growth, but don't want to under utilise it either."

Turnips

The dry cows are out-wintered on turnips, supplemented with round bales of straw or hay arranged in-situ. A single portable fence is moved once a day to give cows access to a new section of turnips.

By the end of February the cows were approaching calving with just 10 days left on the turnips, and all was looking favourable.

Improving beef from grass

- Soil sampling for tailored fertiliser plan
- Grassland reseeding
- Rotational grazing with grass measurement and monitoring
- Selecting bulls from EBVs
- Out-wintering dry cows

Matt adds: "We've been through the winter with no housing costs and we've no muck to spread. The cows have stayed healthy and are in good condition to calve down and we've fresh paddocks to turn onto."

Along with the benefits of higher forage use, Matt points to the reduced labour requirement

as a major factor in his system's future sustainability. Currently he is the only full time employee with part-time help coming in three days a week.

"We've been doing this for a little over a year now and it is the best thing we've ever done. Grass is the best asset we've got, so we have to utilise it," he concludes.

Breeding policy

When it comes to the cow herd, Matt House takes a no-fuss approach to the way things are run. In 2014, 26 cows, 40 heifers and 40 steers were managed on Bowden Farms. Currently, the beef suckler herd is at 122 cows, with plans to expand it to 300. He is buying-in heifers bred from Kiwi-cross (Friesian x Jersey), back-crossed to either Angus or Hereford, so hardy and moderate framed animals with a maximum weight of 550kg. The spring calving herd is weaned in October using the low-stress practice of fence-line weaning. Angus bulls are used for natural service, selected on their EBVs for a high growth rate, long frame and relatively shallow fat depth.



Straw bales provide additional fibre for dry cows grazed over winter on turnips.



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MAKING THE MOST OF MAIZE

Luke James visits a high-yielding dairy herd in Cheshire where the use of technology and attention to detail is ensuring the best use of conserved forage, and particularly maize.

A precision feeding approach with the potential to fine-tune the milking cow ration daily, if necessary, has taken herd performance for Richard and Ruth Pilkington's 250-cow pedigree Aintree Holsteins to new levels in recent years.

Rumination collars that transmit real-time information on cow health and nutrition lie at the heart of this progress, but success is only possible if this technology is combined with growing and ensiling forage of consistent quality.

Maize typically makes up 65% of the forage ration, with the farm growing around 60ha (150 acres) each year, so attention to every aspect, from variety selection through to meticulous clamp management, is a priority.

Aintree Holsteins, based at Shordley Hall Farm between Wrexham and Chester, currently average 10,692 litres/cow of milk sold from a three times daily milking regime. This is from a herd currently including 45% first calvers due to a decision to keep progeny normally destined for sale rather than sell into a recently depressed market.

Calving all year round, most of the herd is fed a standard TMR twice a day, with only the fresh

calvers (up to six weeks into lactation) receiving the variation of a transition diet.

Data recording

All cows wear collars to detect heat and monitor rumination, with information transmitted to the farm computer. Rumen activity is a true indication of many aspects of cow health and nutrition, so - as well as being an early warning of anything from mastitis to metabolic disorders - can alert Richard and his nutritionist to any inconsistencies or inadequacies in the ration.

Richards explains: "Information relayed to the farm computer can be accessed remotely, so we are keeping a close eye on performance at all times."

With any changes to the ration being made on the farm computer, this information is then relayed to the diet feeder via a data transfer stick. With the feeder's weigh cells being linked to the control box, accurate loading of all ingredients is made possible, and the actual diet loaded and fed is then recorded and relayed back to the farm computer.

Typically, the standard TMR at Shordley Hall Farm comprises forage maize (65% of the forage ration) and grass silage (35% of forage), with soya, rape, caustic wheat,



Richard Pilkington chose Pirro for the first time in 2015.

nutritionally improved straw (NIS), molasses and other minerals and supplements making up the ration.

Forage maize is complemented by quality grass silage, which is always made from grass cut before it becomes too mature and ensiled at 30-35% dry matter.

Maize selection

The farm has been growing maize for 30 years, having around 40ha (100 acres) of lighter land suitable for early crops.

"We select varieties from the Recommended List and always try a newer variety on about 10% of our acreage, to ensure we are taking advantage of the latest breeding advances.

We grew Pirro successfully as a new variety for the first time in 2015 and more in 2016. It's yielding around 20 tonnes/acre, out-performing the older varieties, so we'll expect to grow this variety on all of our favourable land this year," adds Richard.

Maize can be drilled as early as mid-April at Shordley Hall Farm, but in 2016 it went in as late as the first week of May. Di-ammonium phosphate (DAP) is placed in the seedbed at 75kg/acre (up from 50kg/acre). Going forward the intention is to cut costs by reducing the need for any additional nitrogen top dressing and instead rely on slurry and digestate. This has been effective in 2016 on all but the hungriest ground. Cambridge rolling after drilling ensures pre-emergence herbicides are as effective as possible.

Harvest

Maize was harvested in 2016 in mid-to-late October, with a bacterial inoculant, as always, applied by the chopper. The farm has two large maize clamps, but nevertheless ensuring quality forage maize is always available requires some necessary forward planning.

Richard explains: "To ensure we have access to older maize to feed alongside fresher maize, we spend a good four hours spreading what remains in the clamp as a base for the new crop. It's time well spent to ensure the ration remains as consistent as possible throughout.

"We double up on the rolling, with the contractor buck raking down the middle of the clamp whilst I concentrate on compacting the edges with the Manitou."

The aim is to avoid any waste or secondary fermentation, so after the attention to detail in clamp filling, the maize is covered with a plastic sheet as well as weighted mats.

An immaculate clamp face results, with no waste on the top or at the sides and shoulders, and this is maintained at feed-out by using a silage defacer that mills silage from the clamp face, leaving the cleanest of surfaces.

"You can lose as much as 15% through pit waste, so we are making every effort to avoid secondary fermentation," concludes Richard.

Forage Maize Analysis: Shordley Hall Farm

Dry Matter (%)	40.7
Crude Protein (%)	7.5
D-value (%)	75.4
ME (MJ/kg)	12.0
pH	4.0
Starch (%)	30.0
Starch degradability (%)	75.0
NDF (%)	46.8
Intake (g/kg) ML	119.5

Source: Wynnstay, January 2017

Harvested in mid-October, the Pirro out-yielded other varieties, producing 20 tonnes/acre, and will now make up the bulk of the 2017 cropping.

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STRIKING THE BALANCE BETWEEN BUFFER FEED AND GRASS

Buffer feeding is usually a necessity at spring turnout so cows achieve adequate intakes when grass dry matter is low and grass growth is slow, but how do you get that all-important balance between grazed grass and buffer? Aly Balsom finds out.

Gradually introducing grazed grass into the diet and allocating the right amount of a suitably balanced buffer feed is key to ensuring a smooth transition at spring turnout.

Independent nutritionist, Rob Minter believes opening the gates in the spring should have little effect on milk in the tank if ration balance requirements are met.

“You’re trying to create the same type of overall ration as the winter diet. So, you shouldn’t see any change in yield at turnout,” he says.

To ensure a smooth transition, it’s worth thinking about the following:

1. Introduce grazed grass slowly

Slowly introducing grazed grass into the diet and avoiding any rapid changes is fundamental to success and is a common hiccup Rob sees on farm.

“In the winter, you’d never change from one silage clamp to another straight away. You need to give the rumen bugs time to adjust to the protein in grass, the change in dry matter and feed in general,” he explains.

For high production cows or cows used to a TMR, he suggests starting by grazing cows for 2-3 hours a day to begin with, gradually increasing time at grass over 1 week to 10 days. For block

calvers going onto a full grass diet, providing dry haylage, wholecrop or maize is advisable (see point 2).

2. Think about energy

To make efficient use of higher crude protein levels in grazed grass (up to 30%), it’s important to provide enough energy in the diet.

“Where rations are short of energy, milk proteins will drop which can take 2-3 months to recover,” says Rob.

To get around this, maize silage, wholecrop and/or straw can be added to the diet. Wholecrop and straw bring the added benefit of adding fibre to the diet which complements the

low fibre levels in spring grass. This will help maintain milk constituents.

3. Provide the right protein

Grass is high in crude protein, but low in rumen bypass protein so it’s important to bridge this gap using a suitable protein source such as soya or protected rape. If this is not addressed, cows will produce milk, but can waste energy getting rid of extra protein. This is where body condition and milk proteins can be compromised.

4. Select the right parlour cake

Choose the right type of high energy, high fibre parlour cake at turnout to complement the high crude protein, lower dry matter and lower digestible fibre levels in grass, says Rob. This will again help to maintain milk constituents.

Nutritionist, Diana Allen of Quality Nutrition Management, says the crude protein level in the cake can also be reduced to match higher levels in grass.

“Dairy cake to complement spring grass rarely needs to be more than 16% crude protein. Many spring calving herds feed 14% grazing cakes,” she explains.

5. Think about oil levels

With high input herds trying to make better use of grass, whilst still feeding partial mixed rations, take care to balance the oil level of the ration, says Diana.

“Spring grass can have quite high oil levels which, when combined with a slightly acidic rumen, can lead to significantly depressed milk fat levels if biohydrogenation of oil occurs,” she explains.

6. Measure and allocate grass accordingly

Piers Badnell from LIC emphasises the importance of regularly monitoring grass covers to enable appropriate allocation of both grazed grass and buffer. Monitoring is particularly important so intakes from grazed grass are not over or underestimated.

“Many farmers could be bolder in terms of how much buffer they feed - in terms of more grass, less buffer,” he says.

Piers says typical grass growth in early spring should be able to provide 5-6kg of dry matter intake, which can replace the same amount of grass silage in the ration. This amount can quickly increase as growth rates increase.

Diana adds: “Monitoring grass growth weekly and tracking the results on a spreadsheet or grass management programme makes rationing much easier. It is possible to do a grass budget, which takes cow numbers and kg DM required (i.e. grass demand and grass supply) into account. This makes it easier to predict when buffer feeding will be required and how much is likely.”

7. Put cows out with an edge on appetite

To maximise grazing intakes, turn cattle out with an edge on appetite. Ensure feed troughs are empty prior to milking and turn cows out onto fresh grass.

Can you lower feed costs by grazing lower yielders?

All farmers have the potential to lower feed costs and make more of grazed grass by splitting the herd and turning staler cows out to grass early, says nutritionist Rob Minter.

“To increase profitability, you need to split out lower yielders producing under 20 litres and get them out to grass straight away,” he says.

As long as a high fibre cake is being fed through the parlour, Rob says lower yielders could be fed half of the winter ration, with remaining intakes provided from grazed grass in the day. When cows are settled on grass, grazing is then capable of providing maintenance plus 20 litres.

“The 20 litre cow requires about 17kg DM and you should be able to get that all from grass if grass is optimum quality, there’s good grazing conditions and access,” he comments.

Rob also says grazing in such a way helps set up the grazing platform for the rest of the season, so when the high yielders go out, grass quality is improved. This can also help extend the grazing season, saving on silage and providing better quality grazing for fresh cows.



“You’re trying to create the same type of overall ration as the winter diet. So, you shouldn’t see any change in yield at turnout,” says Rob Minter.

Any buffer needs to be balanced with the right amount of energy and protein to complement spring grass.

KIWI TECHNOGRAZING SYSTEM BOOSTS FARM PRODUCTION

The New Zealand concept of TechnoGrazing- which has been found to double production per hectare on some beef and sheep farms - has made it across to the UK. Aly Balsom finds out more.

The Kiwis don't do anything unless they can see a favourable financial return, so the fact over 20,000ha of New Zealand grassland has been converted to TechnoGrazing says it all.

Designed by Manawatu farmer and inventor Harry Wier over 30 years ago, TechnoGrazing systems provide farmers with a template to adopt an intensive, cell grazing system using specially designed fencing and portable water troughs.

Cornish consultant James Daniel from Precision Grazing explains: "TechnoGrazing provides the model to operate a cell grazing system with high production, but with minimal hassle and labour. In New Zealand it is often the farm's bank manager who suggests adopting TechnoGrazing due to the boost in profitability per hectare it can bring - and it's a sustained boost."

James has brought the concept to the UK in partnership with Kiwitech International, and in 2016 undertook a project with

AHDB Beef and Lamb as part of their Farm Innovation Grant Scheme to look at what benefits TechnoGrazing can bring to UK farmers.

System aims

As part of the TechnoGrazing system, fields are split into long 'lanes' with semi-permanent fencing. These are then divided into cells using temporary polywire fences. Precision Grazing then provides management as required (see box).

The aim is to boost livestock production per hectare by grazing efficiently so grass growth and quality is maximised. The principles of TechnoGrazing stem from the three rules of grazing:

1. Grass Grows Grass - cover height needs to be correct for the grass to photosynthesise and grow.
2. Grass needs adequate rest time between grazing events to recover.
3. Grazing time or "on time" should not exceed three days.

TechnoGrazing can be used on specific fields or across the whole farm, but is normally focused on the best ground and grazed by stock that have the highest feed conversion rates. This may include weaned lambs or growing cattle for example.

James adds: "When considering the impacts of increasing production, we need to look at the whole picture; is it better for the whole farm to be understocked, under utilised and for animals to graze everything all of the time, or is it better to target high output from the most suitable land and leave the most marginal areas for public goods such as carbon sequestering? This way, total farm production is still increased, but whilst enhancing the soil and the environment."

He also believes that rather than looking at individual animal performance, farmers should instead look at whole farm production as a true indicator of success.



As part of the TechnoGrazing system, fields are split into long 'lanes' with semi-permanent fencing. These are then divided into cells and rotationally grazed.

"Per hectare performance is key as business output is normally limited by the land it has access to. Individual animal performance is almost vanity...Instead it should be "we produce 600kg deadweight per hectare at a gross margin of 12p/kgDM". As the dairy industry has demonstrated, focusing the use of grazed grass reduces costs and increases gross margin. For beef and sheep farmers it will do the same."

Production potential

AHDB Stocktake 2016 figures for 16-24 month beef finishing show that the average farm is producing 480kgDW/ha per year, of which an estimated 175kg (36%) is from grazing. The remaining production is coming from concentrate (24%) and silage (40%) at a cost of about £780/ha.

James comments: "These businesses could maintain their current output per ha and substantially reduce their costs through grazing alone. The next

improvement in production will then come from genetic selection to increase pasture conversion rates and deliver even greater profitability."

The extra grass produced from efficient grazing also creates the opportunity to raise stocking rates, which may allow farmers to increase numbers or give up costly rented ground. Growing better quality grass also enables concentrate use to be stopped.

"It's about ensuring personal productivity by removing non-value added activity," adds James, who also lists improved organic matter distribution, reduced surface water run-off and increased pasture longevity as additional benefits of TechnoGrazing.

System design

When designing a farm specific TechnoGrazing system, James calculates how many kilos of dry matter is needed to achieve target daily liveweight gain (DLWG) for the chosen stock. The aim is then

to match supply and demand, maximising DLWG when grass growth is high and planning ahead to ensure adequate supply in periods of deficit. The specifics of cell size and rotation length will vary depending on grass growth, stock type and area.

"We are also not so concerned about entry and exit residuals, providing we are maintaining quality. The system is managed to control average cover height (across all lanes in a system). We set targets against the growth rate we need to achieve to meet stock DLWG," explains James.

Topping is seen as a failure due to the associated costs, as is making silage (unless required by the farm), so the target is to either manage the surplus growth with more stock or control cover heights to avoid surplus occurring.

James says most clients could expect to double stocking rates compared to a traditional set stocked system with the skills and attitude of the people within the business being the key to success.

TechnoGrazing - how it works

- One large field or several adjacent smaller fields are split into equal size "lanes" using temporary electric fencing made up of specially designed fibreglass posts and high tensile, steel wire.
- Special HyperSprings are installed in the wire which allows the fences to flex and be "pegged down" to allow stock or modified vehicles to cross, almost eliminating the need for gates.
- A race is often installed along the end of the lanes to provide access.
- Posts within a lane are placed at a predetermined distance and provide consistent markers to allow lanes to be split into cells using polywire.
- The high accuracy of the sub divisions allows precise feed budgeting.
- Stock are back-fenced within each cell and also have a safety fence in front of the current break.
- Systems may be grazed by a single group of stock rotating through all the lanes or by multiple groups allocated 1-2 lanes each.
- Portable water troughs are connected to water laterals via hydrants within the lane system.
- The electric fencing and water equipment used in TechnoGrazing systems are produced in New Zealand by Kiwitech International and imported by their UK company; Kiwitech UK.

- Set-up is provided by Precision Grazing who survey, model, design and install the system and provide training and ongoing management.
- Under a management agreement the farmer is required to measure pasture cover weekly using a plate meter and take fresh grass samples monthly - this is used to calculate daily allocation and rotation length.
- Cost - about £220-400/ha (depending on layout) including design, installation and materials (a solar panel powered installation would add about £30/ha).





Beef farmer, Steve Thorne (right) witnessed a substantial boost in production per hectare by adopting a TechnoGrazing system under the guidance of James Daniel (left).

TechnoGrazing has helped Steve Thorne to manage high stocking rates due to TB restrictions and led to a boost in production per hectare on his Devon beef farm.

In fact, having trialed the system in 2016 with 12-13 month old Black Limousin cattle, he has now set up an additional TechnoGrazing block for this coming grazing season and will use this to grow six month old Dairy X Angus calves reared on farm.

Steve runs 47 spring calving black Limousin suckler cows and either sells cattle as stores or finishers. He is already a convert to rotational grazing and has done a lot of work to split fields, whilst measuring grass with a plate meter. This has helped reduce

concentrate use and improve grass quality compared to a set stocked system. As a result, he has been able to reduce the acreage put down to cereals and also rent out 109ha (270 acres) of the 325ha (580 acre) farm due to increased grassland productivity. However, TechnoGrazing - as part of an AHDB trial with Precision Grazing - has shown there is potential to make even bigger improvements.

Last year, 45, 12-13 month old cattle weighing 280kg on average were TechnoGrazed on a 6.47ha (16 acres) system with a four year old temporary ley from March until November. Over a 152 day period (26th May to 25th October) the performance of the TechnoGrazing cattle was

compared to a similar group of cattle being rotationally grazed.

Techno cattle achieved an average 0.8kg daily live weight gain (DLWG), compared to 0.5kg DLWG on the existing rotational grazing set-up and overall production was higher (see table).

The fact the TechnoGrazing system is designed with accurate sub-division also meant any of the farm team could manage it, which Steve says was an added advantage.

“It makes it a lot easier. The advice from James would be ‘put the polywire fence every fourth post to achieve a 32 day rotation’ and I’d set up the fence or I could ask dad or one of the workman to do it. It was almost fool proof,” he says.

On the 6.47ha field, each post in a lane represented 0.10ha. Last year, in spring/summer, stock grazed four cells (0.404ha) moving every 1.5-2 days to achieve a 24-32 day rotation. This was necessary to maintain quality, whilst providing the +60kgDM/ha required for animal demand.

Over the 240 day period the system was stocked at an average of 5.84head/ha, equivalent to 2,220kg liveweight/ha. During the early spring and autumn rotations, cattle grazed two cells (0.202ha) every two days meaning the effective stocking density was 222head/ha.



Nick Jasper (right) takes advice from Germinal's Daniel Loe to ensure he's growing the best quality leys to maximise the value of the TechnoGrazing system.

For Cornish sheep and arable farmer Nick Jasper, TechnoGrazing has become an integral part of the forage-based system that is helping him to make a success of a share-farming arrangement at Bradstone Farm, near Launceston.

Around half of the 200ha (500 acre) unit is down to grassland, with the remaining ground run as arable or taken up by an equestrian enterprise. Nick lambs 1,250 New Zealand Romneys outdoors from mid-March, finishing 1.5 lambs/ewe entirely off grazing.

His high stocking rate and the ability to finish all his lambs without concentrates is down to growing the best quality forage, utilising it effectively through the cell grazing system, and aspects of

management that owe much to Nick's own experiences in New Zealand.

“We shear the ewes pre-lambing and again at the end of September, so we're selling two clips a year but also believe this is better for the sheep,” explains Nick. “We also clip lambs that are still here at the end of August; they'll yield about 1kg of wool, but it's more about the fact that they grow on better after shearing.”

Nick was introduced to TechnoGrazing by James Daniel, and runs a solar-powered system with four lanes, each split into three cells. Sheep are moved onto a fresh cell every other day, with Nick using his adapted quad bike to quickly and easily access paddocks and

move fences as required in about five minutes. The system requires a focus on grassland management, but with regular plate metering and monitoring through the associated pasture management computer programme, Nick is seeing very tangible benefits.

“I estimate that we are approximately doubling our stocking rate compared with a set-stocked approach, and this is worth around £75/acre in profitability,” he says. “Another benefit is that you see all your sheep very quickly and easily, which from a stockmanship point of view is very advantageous.

“Grass is a relatively easy crop to grow, but one of the hardest to manage. If you can get it right, grass is a very high energy resource that needs no supplementation. The TechnoGrazing system ensures you are getting the best out of your cheapest resource.”

This resource is maximised at Bradstone Farm, with a reseeded policy that includes Aber High Sugar Grass perennial ryegrass varieties grown in mixtures with Aber white clovers and Tonic plantain.

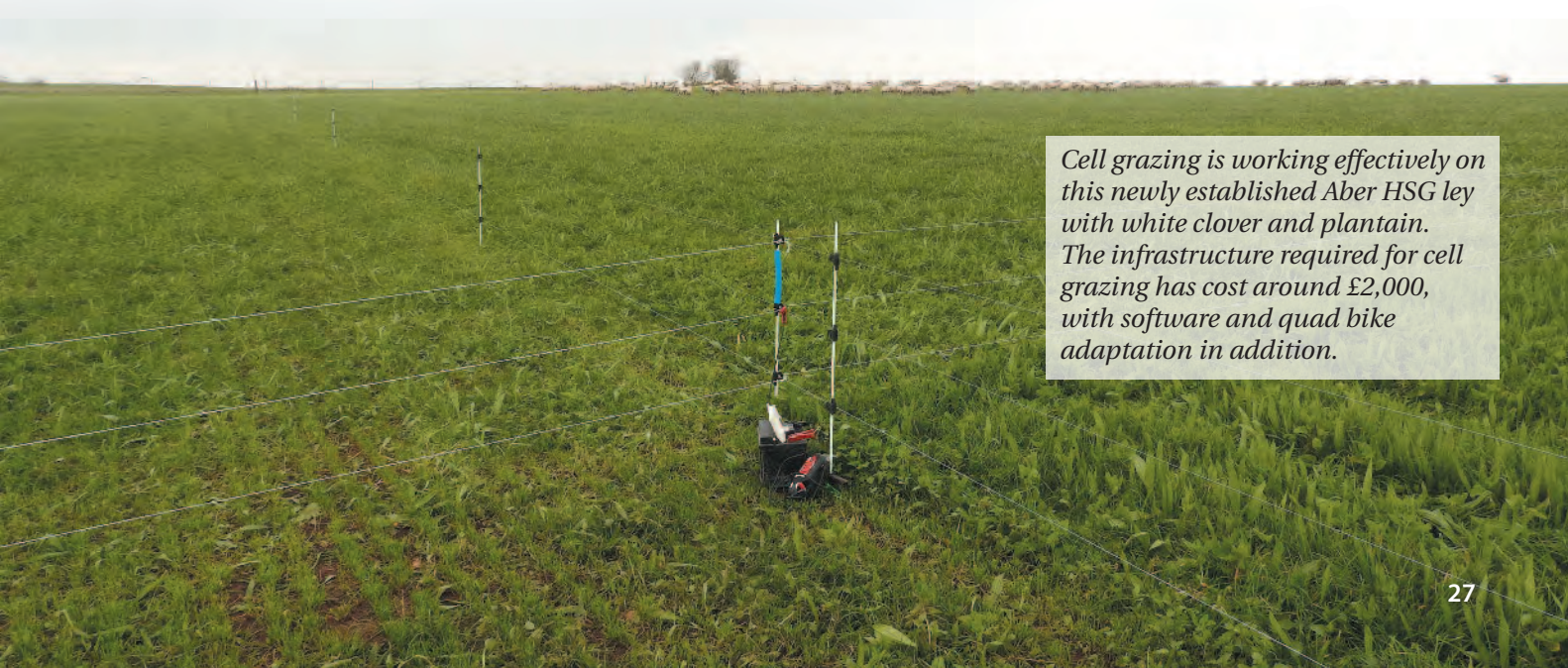
“It's about maximising our output per acre and hence we need the best quality grazing in front of the sheep,” adds Nick. “We are selecting the best ryegrass varieties available and including additional species like plantain for extra performance.”

Performance comparison on rotational grazing and TechnoGrazing systems Lower West Panson Farm (over 152 days)

System	Number of cattle	26/05/2016 Average weight (kg)	15/08/2016 Average weight (kg)	25/10/2016 Average weight (kg)	Total weight gained (kg)	Average DLWG (kg)	Average stocking rate (LU/ha)	Average output for period (kgLW/ha)
Rotational	26	380	448	454	74	0.49	2.57	274.17
Techno	40	340	411	462	122	0.80	3.57	650.89

- Stocking rate was also 38% higher in the TechnoGrazing system, so production was greater.
- The greatest difference in performance came in the last 60 days where cattle on the TechnoGrazing system still had adequate feed for growth, whereas the rotationally grazed cattle's intakes had been reduced.

- Over the full grazing period the Techno produced 957kgLW/ha (estimated 507kgDW/ha) from pasture alone.
- Both groups were grazing similar age leys which received the same amount of nitrogen (94kgN/ha)



Cell grazing is working effectively on this newly established Aber HSG ley with white clover and plantain. The infrastructure required for cell grazing has cost around £2,000, with software and quad bike adaptation in addition.

How to assess soils AFTER OUT-WINTERING

Now's the time to assess ground used for out-wintering and put in measures to ensure you have the right seedbed for the following crop, reports Aly Balsom.

Carrying out a soil assessment after out-wintering on brassicas is a must to ensure you get the best performance from the following crop by drilling it into a well prepared seed-bed.

In an ideal world, out-wintering would have been planned well in advance so brassicas were drilled into well prepared fields of the correct soil type, so ground is left with an even distribution of surface foot holes when stock finish grazing. However, it's still essential to go out and check that soil condition and structure is right.

Helen Mathieu from Germinal says taking steps to address any problems prior to drilling the subsequent crop is essential considering compaction can lead

to a 10-20% reduction in grass growth. AHDB Beef and Lamb figures also suggest compaction can cost £250/ha, due to various factors including reduced grass growth and poor rooting.

"If you have a compacted layer and you don't address it, it could inhibit air flow and the flow of microbes through the soil so you won't get the breakdown of nutrients and organic matter. And when new seeds establish, it can also cause roots to turn horizontal," she says.

Specific actions will depend on soil type and subsequent cropping. Helen says often many issues can be put right with limited cultivation.

In some cases, more work may be required. This could involve

subsoiling specific areas. In extreme situations - where management hasn't gone to plan or field choice has not been right - a whole field strategy may be needed.

Helen suggests looking at the following areas before drilling:

1. Dig down to 46cm (18") in 3-4 places across the whole field to assess for compaction. Be sure to look at areas where there may have been pockets of problems.
2. Soil test, if you haven't done so already.
3. Check drainage.
4. Do a fertiliser plan for the next crop based on soil results and bear in mind muck deposition from out-wintering.

Example soil assessments and actions after out-wintering

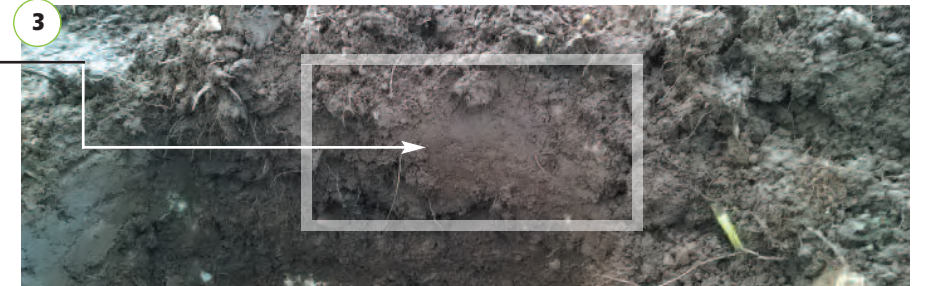
Field example 1:

Dry cows out-wintered on Maris Kestrel kale

Soil Type: A 'medium', silty clay loam, shallow soil over shale/sandstone.

Assessment: Good even distribution of foot holes will hold up moisture and prevent run off (pictures 1 and 2). There's evidence of a compressed layer of around 4 to 6" just below the surface (picture 3).

Action: The unevenness of soil depth would make ploughing difficult so shallow cultivation should be carried out with a rotivator or set of discs. This field had been a grass ley for many years, but the soil type also has naturally high levels of organic matter.



Field example 2:

Dairy heifers out-wintered on Redstart Hybrid Brassica

Soil type: A sandy clay loam, 'medium soil' with parent rock (glacial till) (see pictures 4 and 5). The field had been in maize for two years and then wholecrop cereal, so there is less organic matter.

Action: This may be shallow ploughed or run over with a set of discs prior to reseeding a grass ley.



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Chewing the cud

with Karen Brewer

Karen ruminates with Michael Murphy, who lives on the Irish coast at Clonakilty, south-west of Cork, and has dairy farming interests on four continents, with cows milking on grass-based systems in New Zealand, USA and Chile.

KGB: Good morning Michael and welcome to Forager. I'm pleased to find you at home as you seem to be quite the traveller, with farming interests all around the globe. Have you always had an international outlook and has that influenced your farming philosophy?

MM: I was born in Cork County, son of a cattle exporter, but on leaving school I went to New York and then spent a few years in the Norwegian merchant navy before returning to Warrenstown Agricultural College in Ireland. I did a three-year farm apprenticeship, which involved spending a year each on three different farms. I was top apprentice in the first two years, but took unapproved leave in my final year to join a farm tour to New Zealand. That trip in 1972 convinced me of the resilience and merits of grass-based systems and I have never diverted from that since.

KGB: You are now involved in the management of dairy farms across the world, with a wide variety of climates, soil types, commercial and political conditions that have surely forced a multitude of compromises to your favoured 'milk from grazed grass' system over the years?

MM: There are challenges, but cows are more adaptable than people and in my experience there are two factors that have a high correlation to profit in every situation. 1; the amount of grass eaten per hectare and 2; low costs. The key thing is to grow a high weight of grass and allow the cow to utilise most of it directly, which



Michael Murphy believes profit potential is far greater when grazing cattle.

also means you don't have to tie-up capital in machinery and housing costs. In NZ, we are grazing 8,000 Jersey cross cows on 2,711ha (6,700 acres), growing 16-18tDM/ha of grass with 85% utilisation, feeding just 20kg of meal for a milk solids yield of 400kg per cow.

KGB: Most farmers are aware of what can be achieved on the lush, irrigated pastures of Canterbury Plain on the other side of the world, but often facing high rainfall and heavy soils at home, question the suitability of their farms for such a grazing based system.

MM: About 95% of Europe's bogs are in Ireland and Scotland and we have heavier soils in the west of Ireland than anything in the UK. I wouldn't be aware of any farm in the British Isles not

suitable for grazing systems, except maybe the east of England, where low rainfall limits grass growth, and perhaps the north of Scotland, which I don't know. The amount you can grow and utilise will vary from farm to farm, but under an Irish and British sky, aim to get 75% of the cow's total diet from grazed grass. I accept there can be occasions when conditions mean cows can't go out, but they are very rare and there are farming techniques we can fall back on. Cows will eat 95% of their grass intake in the first three hours after milking and work at Moorepark has shown they take more bites per minute when grazing time is limited. Watch the cows and after about three hours, when the first ones start to walk around, shift them off the pasture and you'll get far less damage. Profit potential on very heavy

west of Ireland and west of Scotland soils, where one may only get a grazing season of 230-260 days, will always be lower versus the 280-300 days we expect on free draining soils. But profit potential even with a 250 day grazing system is far better than with confinement systems.

KGB: You operate a classic spring calving, grass grazing, crossbred herd in NZ. How much have you had to compromise that system to meet the very different challenges of the USA?

MM: It is a bit different for us in Missouri. We are running 13 herds across 4,249ha (10,500 acres), but the land is not all in one block and not all in dairying yet. Broadly we are taking the same approach, changing the herds to crossbreds, using NZ semen, and trying to get as much from grazing as we can. We have been there 10 years but we still have a lot to learn. The US has extremely good research on confinement dairy, but not much on grazing systems, so we are pioneers on the introduction of perennial ryegrass. On the best farms, we are only buying in 15% of the feed with the rest coming from grazing or silage and, although we are dealing with a continental climate, there is no

housing. We do get cold snaps, but the cows are happy outside if they are well fed. The biggest single problem is summer heat.

KGB: It was back in 1999 when you paid a deposit on your first farm in NZ - the source of your original inspiration - but what is it that attracts you to invest in Missouri?

MM: Land is cheaper in the USA, no quotas, political stability and a good rule of law. Milk prices are higher than Europe and imported feed prices are lower so there can be good margins. A system based on grazed grass is the best for generating free cash with a 15% return typical. Although with the better trading conditions in Missouri we can get up to a 30% return. Then, so long as you are reinvesting in land and cows, not machinery and buildings, you can do well.

KGB: Are there any measures or benchmarks you find particularly useful in assessing a grass based operation and setting targets for progress?

MM: Top farms are achieving 14.5tDM/ha of grass eaten, an annual yield of 17t at 85% utilisation, so with the ME of grazed grass averaging 12.2MJ/kgDM, that's heading

towards an annual UME (utilised metabolisable energy) production of 180MJ/ha. A current campaign in Ireland is to get average grass dry matter utilisation up from eight to 10t/ha. Each extra tonne of grass DM eaten adds €181/ha (£154.79) to total profit, so a move from eight to 10 is worth an extra €362/ha (£309.58). Of course, this is an average figure as it depends on your milk price and your contract, but if you can get to 10 and then to 12t, you can see the potential for increasing profit.

KGB: So, is it all about the money?

MM: Profit is important, but so is lifestyle. Grazing based systems let the cow to do most of the work, with time input varying from 10-20 hours per cow per year. Instead of sitting on a tractor you are walking the fields with your partner and making decisions. It is a very family oriented way of farming and a hell of an enjoyable job. Plus, the cows are happier and last longer. Our target is 5.5 lactations per cow. In confinement systems a lot of time is spent operating that depreciating machinery, feeding, slurry-spreading and clearing out buildings, working two or three times more hours for less money.



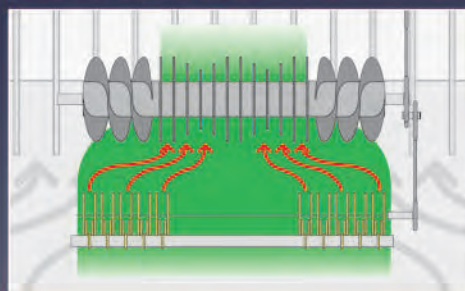
Michael is unaware of any farm in the British Isles not suitable for grazing systems.

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