Grassland Toolkit

Your essential guide to grassland and grass silage management

March 2019

GRASS SEED SELECTION ADVICE

Case studies

Why and how UK farmers are focusing on forage

Traditional and multi-cut compared

Improve forage quality to boost profitability



A Dairy Farmer publication in association with:









Nutrient

management

planning

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Introduction

Why is forage such an important part of future-proofing a dairy business? Three farmers share their thoughts and what steps they will be taking to improve grassland performance.

Improving grassland performance

Tim Sinnott, Ivy House Farm, Congerstone, Nuneaton, Warwickshire

»In the last two to three years, Tim Sinnott has had a complete change in mindset when it comes to how he grows and produces grass silage and he is set on improving management even further over the coming years.

"Forage is something we're focusing on," he explains. "We've gone to three-timesa-day milking and put in sand cubicles and stopped the cows going out. We're now growing grass as part of the arable rotation and growing it as a crop. And last year we started a multi-cut system."

The Sinnott family runs the 230-cow pedigree Holstein Chalgrove herd at Ivy House Farm, Nuneaton. In the past, silage ground was largely permanent pasture and silage quality was never as good as the Sinnotts would have liked - 25-27% drv matter. 10.5ME. 67-68 D value and protein in the low teens was typical.

When the system became more intensive, Mr Sinnott recognised silage quality needed to be brought into focus.

"The yield was going up on three-times-a-day, but milk from forage was going down," he says. "We needed to improve our milk from forage and it was financially driven. I wanted to reduce the protein we were buying-in and



Tim Sinnott has had a change in mindset when it comes to grass silage.

it made sense to improve grass quality."

All grass has since been taken into the arable rotation and put down to three-year hybrid leys to keep the grass 'new and young'. 2019 will be the first year the farm has no permanent pasture, with about 69 hectares (170 acres) due to be cut.

Monthly cuts

Having traditionally taken two and maybe three cuts of silage, starting in mid-May, last year, the team moved to cutting grass earlier, in the last week of April. Silage is now cut monthly, with four to five cuts taken a year. The impact on silage quality

has been marked, with first cut averaging 40% dry matter, 11.8ME, 73 D value and 14.3% crude protein.

As a result, cows are eating about 1.5kg more forage per head per day, while production has been maintained.

Mr Sinnott says: "We've put 1,000 litres on milk from forage over the last 12 months. That's purely from the quality silage we've got - we're doing no grazing."

The herd is now yielding 12.750 litres at 3.8% fat and 4.2% protein, while milk from forage is at 2,857 litres. Next year, Mr Sinnott has 3,500 litres from forage in his sights, together with total yields of 13,000 litres. The long-term aim is to hit 4,000 litres from forage, while maintaining fertility.

To achieve this, more grass is being reseeded in order to up the amount of grass silage fed in the diet. A silage compactor has been bought to help minimise wastage in the clamp and a new feeder wagon is on the cards.

To encourage intakes, the frequency in which the ration is pushed up for cows will be increased to about five to six times a day and epoxy resin may also be put down in the troughs. Mr Sinnott also remains firmly committed to using an additive.

"It's the icing on the cake, especially as we're making drier silage - we need to prevent secondary fermentation," he explains. He believes it is the small things that ultimately add up to make a big difference.

"The less we have to buyin, the better. It's something we can control. There's very little cost in doing it better. A small difference can make a big difference to the bottom line," he adds. "We need to do a good job whatever happens. We need to be efficient. There's no excuse, regardless of who buys our milk or Brexit."

John Owen, Gelli Aur Campus, Coleg Sir Gar, Carmarthenshire

≫Having an efficient grassland management strategy in place has always made sense to John Owen, Gelli Aur Campus at Coleg Sir Gar in Carmarthenshire.

Located in a prime grass growing area, in the heart of Wales, the 337-hectare (833-acre) farm - which is managed by Huw Davies - lends itself perfectly to a grass-centric system.

Mr Owen, who is project manager on the college farm, says: "For this part of the world, we'd have to buy-in a lot of feed from a distance. If we can keep costs down (by producing homegrown forage), it's of benefit."

The 500 cows at Gelli Aur are split equally in to spring and autumn block calving herds, with both averaging 5,500 litres a cow a year,

with 3,400 litres produced from forage. All cows are grazed as long as possible, making the most of extensive gravel and artificial grass cow tracks. In summer cows just receive grazed grass and concentrates through the parlour and move on to selffeed block silage in winter.

As a result, producing quality grazed grass and silage is a priority. Mr Owen believes regular reseeding, weed control and cutting grass at the right time is key to success.

"We find we have to control docks on a regular basis. If we don't, it effects dry matter yields. I hear a 10% drop in yield is average for a dock infestation," he says.

"We absolutely view grass as a crop. We depend on it for grazing and silage and it has to be treated in that respect. One of the most important



John Owen believes attention to grassland management is a must moving forward.

things when growing any crop is making sure the pH of the soils is right and we're strict on that. We sample regularly and apply lime when needed."

Reseeds

The team reseeds about 15% of silage ground a year using high sugar grasses. Mr Owen was using short-term leys, but has recently switched to longer term leys as he felt he was not getting round the farm quick enough to reseed everything on time, which was affecting the quality of leys. During silage-making, consolidation is high on the list

of priorities, with side sheets, plastic wrap, a top sheet and cover net used to prevent wastage. A block cutter also keeps the face clean.

Moving forward, nutrient management on grassland is an area that the farm wants to improve on. Mr Owen has just started a project using a slurry dewatering system that will help extract nutrients from the water proportion of slurry. The aim is to use the nutrients on grassland and then put the clean water back into the watercourse.

Mr Owen believes attention to grassland management is a must moving forward.

"Irrespective of Brexit, the basics of grassland management are important," he says. "You improve your efficiencies by getting the basics right. Brexit doesn't change things. If you've got an efficient grassland management programme in place, it will save you money."

Introduction



Rob Lyth, Ewe Farm, Ugthorpe, North Yorkshire

≫Yorkshire producer Rob Lyth has always recognised the value in producing as much as possible from forage, but Brexit has pushed him to set a new target of 4,000 litres of milk from forage per cow.

He explains: "I think concentrates will go up more in price. I think milk price will drop again too. So that means we'll have to feed less concentrate to make it pay. That's where forage comes in."

66 Reseeding is important so we've got younger grass, which means better quality silage

ROB LYTH

The 90-cow Holstein Friesian herd is already achieving good performance from forage, with 3,000 litres produced from forage out of total yields of 7,500 litres per cow per year. Fat rolls at 4% and protein 3.20%.

Cows are grazed for about six months of the year at Ewe Farm, Whitby, where Mr Lyth farms with wife Julie. During summer, cows usually rely purely on grazed grass and cake through the parlour, although last year they were forced to buffer feed with silage because of the drought.

The winter diet consists of grass silage, wholecrop barley and brewers' grains plus parlour cake.

Mr Lyth believes cows are healthier on a forage diet, and aims to produce both quality grazed grass and silage off the 40-hectare (100-acre) farm. Cows are strip grazed on nine-hour breaks, with three silage cuts taken a year.

A regular reseeding policy, using long-term perennial Rye-grass and white clover mixes, is viewed as crucial in achieving quality grass.

Mr Lyth says: "Reseeding is important so we've got younger grass, which means better quality silage."

Use of additive

Keeping on top of moles to prevent soil from getting in the clamp is also part of the story, together with routine dock control, and the use of an additive, which Mr Lyth 'swears by'.

"It saves us a lot of waste," he says. "We've got no waste on the sides or top. That's something you don't want, especially when you're short of silage."

A recent investment in a diet feeder has proved vital in upping milk from forage figures. Mr Lyth believes it has paid for itself fourand-a-half times, thanks to improved ration consistency and less stomach upsets.

"That's helped with milk from forage as it's made a better quality feed with everything mixed together so every mouthful is the same," he adds.

Providing enough feed space, so all cows can eat at once is also vital.

With 4,000 litres milk from forage in his sights, Mr Lyth is considering applying more fertiliser to grazing land moving forward. He is also keen to undertake regular slit aeration to alleviate compaction.

Budgeting & planning

Budgeting and planning the guality and guantity of the forages needed will not only help business profitability, but also safeguard against the effects of a poor forage growing season.

Think about quality to improve profitability

xperts agree all farmers should be thinking about how they can maximise the amount of energy produced per hectare in order to create a profitable future.

According to independent grassland consultant Dr George Fisher, thinking about the quality of forage produced on-farm will enable farmers to produce more milk from forage, which is 'the profitable way'.

He says: "If you want to improve profitability, you need to think about energy per hectare, not just bulk per hectare."

Most farmers should have a milk from forage figure of 3.000-4.000 litres in mind. To achieve this, all the basics of good grassland management apply, including regular reseeding, targeted fertiliser application, weed control and good grazing or clamp management. In Dr Fisher's experience, a

helps to hit the highest levels of energy from total acreage. For example, results from a group of 10 farmers in north west England showed moving from a three- to a five-cut system improved total season grass silage dry matter yields per acre from 9.8 tonnes dry matter/hectare (4t DM/ acre) to almost 16t DM/ha (6.5t DM/acre). Energy content also improved from 10.8 to 11.7ME (metabolisable energy), which

multi-cut system (see page 28),

Calculating forage requirements

This farm has a 30.35t deficit and will need to either grow more crops, reduce stock numbers or buy-in feed.

You can work out your forage stocks using Kingshay's Forage Stocks Calculator at kingshay.com						
Number of cows	Forage dry matter intakes	Number of days	Annual demand (t)			
in the herd	(DMI) per day (kg)					
500	12.5	365	2,281.25			
Crops grown/planned	Yield achieved/	Hectares grown	Total supply			
	expected per ha					
Maize	13	60	780			
Grass silage	12	150	1,800			
Grazing	11	15	165			
	I	Total	2,745			
		Total forage supply (t)	2,745			
		18% loss/shrink	494.1			
		Total to feed (t)	2,250.9			
		Forage balance (t)	-30.35			



equated to enough extra available energy to support a 4,300litre increase in milk potential per acre.

However, whatever the cutting system, he advises setting targets for the quality of silage you want to produce. He suggests aiming for a 15% crude protein grass silage to avoid having to buy-in extra protein and 11.5ME.

"To achieve that ME, you need to plan cutting date as early as possible, even if you're on a two-cut system," Dr Fisher says.

Think about yields

Dr Fisher believes there is room for many farmers to get better at budgeting and assessing grass yields. Although grazing-focused systems tend to be good at monitoring dry matter yields on the grazing platform, farmers tend not to be so focused on tracking performance on silage ground. He says: "Farmers may do a budget in terms of how much dry matter and fresh weight they need, but the challenge is they may not know what they're getting off a field. They need to

start to estimate what their fields are vielding."

At the very least, counting and recording the number of bales or silage trailers coming off a field is a good way to establish supplies. At the same time, it helps to identify underperforming swards so a plan can be put in place to address any issues.

"Ideally, sit down in January/ February, assess yields from fields last year, then based on your review, put together a plan for that field; whether that's weed control, reseeding or sward lifting, etc. Then get it in to the diary," Dr Fisher adds.

Mark Price, dairy specialist for Wynnstay, says budgeting exactly what forage needs to be produced on-farm and tracking supplies through the year, will put businesses in a much stronger position.

Budget forage requirements This has never been more evident than in the last six months, when many farmers have been faced with a winter shortfall due to the summer drought.

He says: "People that got through it well realised they were short from the start and did something straight away."

Farmers need to be working out the amount of forage they need in their stocks by July (see calculation box, left). Presuming 60% of growth happens by Summer Solstice, if the farm is behind by the end of June, something can then be done about it.

Mr Price says: "Those that did that were in a better position. They could buy early and their cows are in better condition."

When stocks are short, there are a number of options. Producing as much as possible is always the 'Plan A', but if this is not possible, then feed can be bought-in, or in the worst case scenario, demand can be reduced by dropping stock numbers.

To protect businesses in a poor performing forage year, Mr Price suggests considering the following five points - most of which are relevant whatever the season.

Grassland Toolkit

Forage utilisation per hectare

»Rather than milk from forage, forage utilisation per hectare (FUH) could be a more accurate parameter to use to truly understand performance from forage, according to Wynnstay's Mark Price.

He believes milk from forage can easily be skewed, which can impact on reliability. For example, if a farm increases its stocking rate on the same area and increases profitability by feeding heavier, their milk from forage per cow will fall significantly. Equally, if a lot of bought-in silage is fed, milk from forage will increase, but a more cost-effective decision may have been to buy extra concentrate and generate more milk sales.

Mr Price says: "Now more than ever, it's important farms get the most out of

their farmed land: both from an environmental and economic point of view. And we need to use a metric that captures this, without being skewed by marginal litres or business growth."

He believes FUH to be this metric. This describes how much milk is being generated from each hectare of farmed area. which is not affected by any other changes on-farm and is relevant to all system types.

FUH = (Energy required to generate milk produced one year - energy produced through feeds)/farmed area allocated to dairy cows. Note: Any purchased forage is not considered as this is a purchased feed and does not reflect farm efficiency.

1 Look at flexible cropping to extend stocks

»Can you put in an Italian rye-grass crop, oats or rye after maize? This can then provide an added bite in early spring. »Perhaps consider putting in wholecrop wheat and then grass, rather than maize. This could produce the same dry matter yield, but provide two crops in 12 months.

2 Reduce waste

»25% shrinkage in the clamp is common - aim to reduce it to 15% by getting the basics of clamp management right (sheeting, consolidation, using an additive, etc).

»Feeding youngstock or dry cows every other day can lead to a lot of waste - can you reduce this by feeding more regularly?

3 Keep on top of agronomy

≫Those that were on top of reseeding and agronomy were better able to cope with the drought as fields remained productive for longer.

4 Cull poor performing cows »Avoid holding on to stale, lame or mastitic stock as these poor performing cows will reduce your feed conversion efficiency. »Look at the cost of feed. How much does a cow need to pro-

duce to cover its feed costs, plus five litres? If it is not covering this, consider culling the cow.

5 Balance rations effectively »Make sure rations are balanced well to maximise feed use efficiency. One grass silage is not a direct swap for another, so get them tested and rebalance the diet accordingly.

Weed control

Farmers looking to maximise grassland performance should put weed control at the top of their lists.

Maximising performance

armers could benefit considerably from adopting a continuous weed control strategy, instead of a reflex reaction to make the farm look a bit better when docks get out of hand.

According to results from a Nufarm farmer survey, only half of farmers did some kind of weed control, and of those, 18% viewed the task as simply 'tidying up' (see graphic).

Brent Gibbon, of Nufarm, believes farmers are missing a trick by not recognising the benefits to grassland productivity.

Mr Gibbon adds: "Rather than looking at it cosmetically, farmers need to look at weed control for the return on investment and the extra dry matter."

Considering every 1% increase in weed cover will result in a 1% decrease in grass growth, addressing a 10% dock infestation could increase a yield from 10 tonnes to 11t dry matter/hectare

(4t to 4.5t DM/acre). This enables improved grazing availability and high stocking rates to deliver a ROI of 14:1. Mr Gibbon adds that this ROI does not include the fact grass quality will improve due to less, lower feed value weeds. Consequently, the financial benefits could be even greater.

"Weed control is one of many factors grassland farmers need to get right. If you miss it out, it can be disastrous, especially in a reseed." he adds.

To achieve the best ROI possible, there are some key areas to think about when spraying established grassland:

Treat at the right growth stage

Weeds need to be actively growing to enable the herbicide to be taken up by the plant. In very dry conditions, it is worth holding off on weed control until the plant starts to grow again.

Apply at the right time Timing is everything. Apply too late or too early and weed

Clover

control will not work effectively, if at all.

> Most farmers sprav weeds in spring, when weeds are actively growing. However, August-September is an excellent time for weed control as weeds are often at their leafiest and unlike in spring, the plant is not trying to put up a seed-head.

> Those farmers who were unable to apply herbicide in the autumn of 2018, will need to pay special attention to weeds this spring and may need to spray more than usual.

Assess swards in early March to ensure you have time to prepare, choose the right product and plan for timely application. Look at the percentage of dock cover and other weeds. Chickweed can sometimes keep growing through winter and, like docks, prefer high fertile soils. Think about how you apply herbicide

A minimum 200-litre water volume per hectare is needed to give

good coverage on the weed leaf, especially in dense swards. Air inclusion nozzles on sprayers are also recommended. This will give optimum control and achieve good coverage of the weeds. Match strategy to your

cutting system

On multi-cut systems (see page 28), where silage is being cut about every four weeks, weed control can be difficult as it takes about two weeks for the weed to get to the optimum leafy stage for spraying and three weeks to achieve the maximum effects of the herbicide. A three-week cutting withdrawal period also needs to be considered.

As a result, those farmers doing multi-cut, should consider spraying weeds in August/September. The herbicide then has the whole of autumn to translocate. Clover

Choose a clover safe spray (see page 11) and apply when clover has at least one trifoliate leaf.

Farmers' views on weed control

385 grassland farmers were surveyed on their views of weed control:

Applications



Attitudes

Cheshire farmer Chris Blythe believes clover is an essential component in his grass mixes.

Safe sprays need not affect clover

armers who do not use herbicides on their grassland because of fears over killing the clover

could be missing a trick by not embracing clover safe sprays. More than 70% of farmers who do not use herbicides on their grassland say they

do not have faith in clover safe herbicides (see graphic, left). However, Nufarm's Brent Gibbon says there are a number of sprays on the market which cannot only kill production-inhibiting weeds, but also safeguard the clover.

"Some farmers favour spraying new leys with a non-clover safe spray and then stitching in clover later. However, this can make clover establishment difficult, especially if there is a lack of rain," he says.

"If a farmer definitely wants clover in the seed mix, we have a clover safe herbicide that works well." (See how to use clover safe sprays panel).

Essential

Cheshire farmer Chris Blythe believes clover is an essential component in his grass mixes and adds white clover to a blend of intermediate and late heading perennial rye-grasses, plus Timothy. He has been using clover safe sprays for a number of years.

"I've always had clover in the sward. It adds palatability, depth to the crop and adds nitrogen to the soil," he says. "I've never had problems using sprays or with the clover dying."

Weed control is part of Mr Blythe's strategy to produce quality fresh grass and silage



How to use clover safe sprays

→A grass reseed

"The reseed stage is the Achilles' heel of perennial weeds such as docks. It is the ideal opportunity to get those perennials out of a ley and get grass established," says Mr Gibbon.

Weeds in a reseed are best controlled at the 2-3 leaf stage and before the first grazing. Docks and chickweed are the two most critical weeds to control in reseeds and must be controlled at the seedling stage.

As there will be a mix of annual weeds and seedling perennials coming through in a reseed, a mix of Clover Master (2,4-DB) and Squire Ultra (amidosulfuron) will ensure coverage of a wide spectrum of weeds (see decision tree on page 13).

→Established grassland

Use a mix of Clover Master (2.4-DB) and Souire Ultra (amidosulfuron) at an increased rate on established pasture.

In a study on a Welsh sheep farm, Mr Gibbon found an application of a mix of 3.3 litres/ha of Clover Master and 40g/ha of Squire Ultra achieved 90% control of docks in an established lev with a 20% infestation. The grass was sprayed in September and there was no detrimental effect on the clover

Weed control



for the 85-cow, predominately British Friesian herd at Green End Farm, Frodsham, which Mr Blythe farms with his son Sam. The farm runs across 61 hectares (150 acres), with just 20ha (50 acres) of that accessible by the herd. Cows

66 If a farmer definitely wants clover in the seed mix, we have a clover safe herbicide that works well

yield 6,700 litres at 4.22% fat and 3.29% protein.

Grass silage is usually the only forage component of the winter total mixed ration, although maize silage has been added to the mix this winter to extend depleted forage stocks following the summer drought. Most summers, cows receive grazed grass and zero grazed grass from off-lying ground.

In May, Mr Blythe used a mix of Squire Ultra (amidosulfuron) at 30g/ ha and Headland Triad (tribenuron methyl) at 10g/ha for the first time on a 12-month-old grass ley and was impressed by the results.

"It was very good. It never killed the clover and the thistles never came back," he says. "It was so good, I'd use it anywhere now. It is dear but it does the job."

All ground is burned off with glyphosate prior to a reseed, but although this helps, Mr Blythe believes treatment with the clover safe herbicide is vital in the new sward to really control the weeds.

Permanent pasture

He is also keen to keep on top of weeds in permanent pasture to prevent them from taking hold.

In general, all permanent pasture used for grazing will be sprayed once in May using the herbicide mix. The fact cows are run on a rotational paddock system means the sprayer can go in after them, leaving enough of a gap before they return to the field. Regrowth will be sprayed on silage ground after cutting. Mr Blythe believes it is

all about maintaining grassland productivity and grass quality.

"Weeds definitely impact on yields and quality," he says.

"The docks look bad in the sward and round each dock you get a bad patch where the dock kills the grass. It looks bad. A weed control strategy is very important.'

Weed control decision tree

The type of herbicide you use to control weeds will depend on a number of factors, including age of grassland, time of year and whether clover is present. When establishing a new reseed, creating a clean seed bed is a must. That means burning off the existing sward prior to ploughing. If weed burden is high in the existing sward, use the enhanced glyphosate, Kyleo to burn off the grass and achieve good control of existing weeds. If the existing ley has a low weed burden, use straight glyphosate to burn off the grass.

Use the following decision tree to work out your weed control strategy:



Do you need to spray autumn reseeds this spring?

If you did, but did not get the chance to apply herbicide, then Nufarm says now is the time to do so.

To protect these leys, a spring application of Squire Ultra and CloveMaster will be needed if clover is in the sward. →Be aware herbicide products must be approved for use in new sown leys (under one-year-old).

Grass seeds & mixes

The types of grass you select can have long-term implications on grassland performance, so it is well worth taking the time to match your mixes with your system requirements.

How to select grass seed mixes to suit requirements

ow many times have you just taken the grass mix your merchant has suggested without questioning whether it truly suits your needs on-farm and includes tried and tested varieties?

According to Adam Simper, grass and root seed product manager for Wynnstay, many dairy farmers could benefit from taking more time to consider the grasses they choose. This fits with the notion of 'treating grass like a crop'.

He says: "Farmers need to question their merchant and make sure they're using varieties off the Recommended Grass and Clover Lists [see glossary, right]. By using recommended varieties, the end result is higher yields, better disease resistance, better ground cover and better winter hardiness,



which comes back to improved grassland performance."

Mr Simper says before doing any reseeding, it is important to ensure all the basics are in place, which includes soil testing, correcting any nutrient imbalances, addressing compaction issues and controlling weeds. This will optimise the performance of any new grass ley.

Once confident these steps are in place, specific questions can then be asked when choosing grass seed mixes:



Glossary of grass terms

Perennial rye-grass (PRG)

→Persistent, high-quality grass

→Use in medium- to long-term mix

→Yields about 13-15

tonnes dry matter/hectare →Lower yielding than Italian

rye-grass, but lasts longer

→Can be cut or grazed

Italian rye-grass

→Higher yielding than
PRG but lower quality and
less persistent
→Yields up to 18t DM/

ha/year in the correct conditions

→Short lived grass lasting for two years

- →Open growth habit
- →Suited to cutting regimes

→Starts to grow when soil temperatures reach 3degC, so grows earliest in spring and latest in autumn compared to other grasses

Hybrid rye-grass

 →A cross between the Italian and perennial
→Balances high yielding characteristics of Italian rye-grasses with persistence and quality of perennials →Longer lasting, high yielding species
→Increased ground cover compared to a straight Italian
Festuloliums
→Italian and perennial rye-grasses crossed with a tall fescue or meadow fescue
→Combines quality from the rye-grass with winter hardiness, persistence and stress tolerance from fescue

 →More tolerant to drought and flooding
→Suitable for grazing, cutting or dual purpose

leys on light soils

Diploid or tetraploid

→The main difference between diploid and tetraploid rye-grass is the number of chromosomes per cell. Diploid plants have two sets of chromosomes per cell, while tetraploids have four

→Tetraploids: Quicker establishment and regrowth, improved first cut yields and higher water-soluble carbohydrate levels suits dry ground

→Diploids: Denser sward, better grazing yields, high DM per kg of feed and D-value, and suits wetter around

Grass seeds & mixes

Choosing dual purpose mixes – Richard Pearman, Woodlands Farm, Belbroughton, Stourbridge

≫Richard Pearman likes the flexibility of having dual purpose grazing and silage ground, although silage-making remains the priority at Woodlands Farm, Stourbridge.

Grassland on the 182-hectare (450acre) farm is grazed by youngstock and sheep on tack over winter and also cut for silage. With the 240-cow Holstein Friesian herd housed all-year-round and producing 10,700 litres at 3.95% fat and 3.28% protein, producing quality forage is a must. In fact, it is an area that has had increasing emphasis placed upon it over the last two years.

During this time, Mr Pearman has moved to a



multi-cut silage system, cutting every five weeks, rather than every six to seven weeks. He has also overhauled the grass mixes he is using with the view to producing good forage, which will boost milk from forage and reduce costs.

He says: "The key to our system is forage. It has to be top notch."

have chosen predominately short-term, Italian rye-grass leys. However, this created problems with grass going to head early. With the farm a mix of these short-term leys and perennial rye-grass leys, it meant different fields would be ready at different times for silaging, which was compromising quality when ground was cut at once.

In the past, he would

Intermediate heading Subsequently, Mr Pearman decided to change all ground to predominately intermediate heading perennial rye-grass mixtures, without clover and 24ha (60 acres) were reseeded this year.

He says: "We've moved to long-term leys, high dry matter and high leaf content

for high digestibility, hopefully."

The current grass mix, Wynnstay Sovereign with no clover, includes a mix of intermediate diploids and tetraploids with a small amount of a late diploid. This includes the intermediate tetraploid, Dunluce which produces high cutting and grazing yields and has the highest year one first cut D-value on the RGCLs. The late diploid, AberAvon also has the highest autumn ground cover score and joint highest early grazing yield on the RGCLs.

Mr Pearman adds: "The more leaf we have - which is what we get with four- to five-year, softer grass - that's where the quality is and it helps with the ME."

Tight heading dates be-Tween varieties included in a mix is a must for ease of management and to maximise the production of quality grass.

What soil types do you have?

On lighter soils, a higher proportion of tetraploid perennial rye-grasses may be better as they have a deeper rooting system and scavenge for moisture better. On heavier soils, diploids may be better as they tiller out more and provide a dense base which will help prevent poaching.

Mr Simper runs through some example grass mixes that could suit a number of different system types. (See glossary for explanation of grass types, p15)

Rotational grazing medium term, four- to five-vear mixes

»Opt for intermediate and late heading perennial rye-grasses and choose an early heading, intermediate variety to provide good early spring arowth.

»You do not want Italians as they will not give good ground cover or last long enough. Also avoid hybrids as they too will not give ground cover and are hard to manage in grazing systems.

»Select varieties with a high ground cover score on the RGCLs, which will tend to be diploids.

»Use a spread of diploid and tetraploids (50:50). The diploids will provide ground cover, while the tetraploids will provide quick regrowth and will be ready to graze again 18 to 21 days later. »Choose four- to five-year leys as a minimum. »Select medium- or large-

Silage-making

leafed white clover.

Select mixes based on how long you want the leys to last:

Short-term (two years)

»Choose Italian rye-grasses which are aggressive and quick yielding. »Four to five cuts a year should be achievable. »Spring-sown crops will yield better in their second year. »Clover is not a good option in short-term mixes.

Medium-term (three-four years)

»Go for hybrid and intermediate tetraploid perennial rye-grass.

Choosing mixes for grazing – Sansaw Estates, Shrewsbury, Shropshire

»Good ground cover and mid-season growth is important at Sansaw Estates, Shropshire, where the 1,600-cow springcalving herd grazes for 10 months of the year.

As a result, the estate's managing director James Thompson chooses mixes with intermediate and late heading perennial ryegrasses. This season he is also looking to increase the proportion of diploids in the mix to improve ground cover.

He says: "We have used more tetraploids and have had gappy pastures, so we have tried to put in more diploids. I like the diploids for ground cover. As soon as you start opening up pasture, you get broadleaf weeds that outcompete the grass," he explains.

With cows stocked at three cows/hectare (1.2 cows/acre) on the 500ha (1,235-acre) grazing platform, having a good base to the sward is essential to limit poaching. The herd calves in a 12-week block starting on February 1 and produces

»Tetraploids will provide higher cutting yields and quick regrowth, and are also naturally higher in water-soluble carbohydrates which aid fermentation in the clamp. »Use a large leafed white clover to help increase protein levels.

Long-term (five years+) »Select predominantly inter-

the ley to last? Choose the right type of perennial rye-grass to fit how long you want the ley to last. A mix with early perennial rye-grasses will only last three to four years so will not suit a

system which requires long-

term leys.

How long do you want

What seasonal Regrowth is required? Is it early spring or late autumn? Do you turnout

early and need early spring

arowth? Which fields do you want to reseed? This will impact on whether you want to cut or graze

The Recommended Grass and Clover Lists (RGCL)

≫The Recommended Grass and Clover Lists for England and Wales include varieties which have undergone vigorous testing for attributes such as yield, persistency, quality and disease resistance. As few as one in 20

varieties of rye-grasses tested will make it on to the recommended lists. By choosing grass and clover from the lists, farmers can ensure they select quality varieties. →View the RGCL at britishgrassland.com

them. Also, if a field is close to the farm and gets used a lot, you may require a mix which will provide greater ground cover. What is your end

Q_{goal}?

If you want flexibility and the ability to cut and graze ground, then choose a mix accordingly. If you are doing intensive, rotational grazing, then grasses must be able to cope with this management and provide good ground cover and regrowth. Do you want to

include clover? If so, speak to your

Agronomist about appropriate clover-safe sprays and when to use them. What are the heading dates in the mix?



5,000 litres per cow per year and 440kg of milk solids per head. Up until this year, cows have been grazed from the start of February to the end of November, before being out-wintered on fodder beet. However, out-wintering will come to an end in 2019/20 and cows will be housed instead. This will ease management and allow greater control of body condition.

Grazing period

During the grazing period, the herd is rotationally grazed on 12- or 24-hour breaks, entering paddocks at 2,800-3,200kg DM/ha and grazing down to 1,500-1,600kg DM/ha. The estate opts for longterm grazing mixes, reseeding

mediate and late tetraploid perennial rye-grass.

»Do not choose hybrids as they will not last long enough. »In long-term mixes, tetraploids can become more open in the base, which may encourage weed ingress, so include about 30% diploid varieties to aid ground cover and prevent weed ingress.

pasture about every 10 years. Going forward, the aim is to base reseeding decisions more closely off pasture dry matter production data, recorded using a grass plate meter.

This season, the estate will be using a mix of intermediate and late heading perennial ryegrasses, which includes 60% diploids and 40% tetraploids. This will be sown at 14kg/acre, including 2kg/acre of a blend of medium leafed white clover.

The mixture includes AberAvon, which has the highest autumn ground cover score on the RGCL and good grazing D value. AberGain has also been selected due to its highest grazing yield and D-value.

Mr Thompson views white clover as a crucial component in any grass seed mix.

He says: "Clover is essential. It fixes nitrogen, plus you produce more drv matter with clover in the sward and more milk solids. I would not be without it."

»Use a large leafed white clover. Note: Tetraploid grasses have larger seeds, so when using high levels of tetraploids (>70%), use a higher seed rate of about 15kg/acre.

Dual purpose cutting and grazing mixes

»If grazing is more important, include more diploids, if cut-

Grass seeds & mixes

ting is a priority, use tetraploids. »Avoid Italian rye-grasses as they will not last and will produce an open base which can lead to poaching when grazed.

» Tetraploids have an increased cell size due to this and have a higher ratio of cell contents soluble carbohydrates (sugar) to cell wall (fibre), indicating that they have a higher water content per cell.

» Diploid plants have more tillers per plant and due to the lower water content per cell, have a higher dry matter per kilogram of feed and also more energy than tetraploid plants. They are favoured in tight grazing situations.



Choosing mixes for silage – Joe Twose, Maenhir, Login Whitland, Carmarthenshire

Grass which does not go to head too quickly and also creates a thick sward that can carry machinery are the priorities on Joe Twose's silage ground.

Mr Twose runs 450 cows in a family partnership at Maenhir, Login Whitland, Carmarthenshire. Cows yield 9,500 litres at 4.2% fat and 3.5% protein and calve from July to February. About 93 hectares (230 acres) of the 222ha (550--acre) farm are

66 I don't want Italian ryegrasses that bolt up, as I need something that will cover the ground and keep the weeds out JOE TWOSE

accessible for grazing. The remaining silage block lies about three miles away and is planted with long-term mixes suitable for early cutting, that will produce good overall yields. This is essential considering about 70% of the forage proportion of the diet is grass silage, with the rest maize.

Silage mix

About 20-24ha (50-60 acres) a year are reseeded in autumn using Wynnstay Royal, a silage mix, including a blend of 10kg of late heading tetraploid perennial rye-grass and 5kg of late diploid perennial rye-grass. All of the grasses in the mix head on May 20-23. One kilo of large leaf white clover is also included to aid palatability and help silage protein levels. Mr Twose says: "We don't want grasses that head



early or go stalky, so it gives us a bigger window if the weather stops us cutting for a week. I don't want Italian rye-grasses that bolt up, as I need something that will cover the ground and keep the weeds out, withstand heavy machinery and react to fertiliser and slurry."

First cut is generally taken at the start of May, with four cuts taken a year, leaving a five- to six-week gap between harvesting. Achieved at first cut is usually 14-17 tonnes/ha (6-7t/acre), with 12t/ha (5t/acre) on subsequent cuts. Last year's first cut averaged 32% dry matter, 11.4ME, 74 D-value and 16.3% crude protein.

Soil sampling

Before any reseeding, Mr Twose always undertakes soil sampling to ensure indexes are correct. Ground destined for a reseed will also be burnt off to ensure there is a clean seedbed. When it comes to reseeding itself, he is also keen to use high seed rates.

Mr Twose says: "I always put on 1-2kg extra per acre to make sure I've got a good germination. If I go to the effort of reseeding a field, I want it to grow."

Nutrient management

Ensuring grassland is provided with exactly the right nutrients not only makes sense financially,

but will also bring big benefits to the bottom line.

Getting nutrients exactly right

rawing together a nutrient management plan based on up-to-date soil analysis results not only makes financial sense, but is also now a mandatory requirement for all farmers.

Under 'The Farming Rules for Water', which came into effect in April last year, all 'cultivated land' must be soil sampled a minimum of every five years (see soil analysis panel). This includes any land – such as permanent pasture - which has had fertiliser or manure applied within the last three years. These soil tests must be used as the basis for a nutrient management plan.



Philip Cosgrave, grassland agronomist for Yara, says there are some strong reasons for adopting such a approach.

"We need to start growing grass with the same detail as we grow a crop of wheat. This means we need a plan in place to optimise each cut of silage," he says.

Agri-Food and Biosciences Institute soil scientist Suzanne Higgins puts the cost of a standard soil test at about £5/hectare (£2/acre) when labour is costed in. If this can be used to save purchased fertiliser costs, which can be more than £200/ha (>£80/ acre), depending on the formulation, then the potential return on investment are marked.

Only by soil testing will producers truly understand the individual nutrient requirements of each field, and that is where the ultimate savings will be made. Monitoring soil indexes from year to year will highlight where soil fertility is declining, and this is due to crop off take over time being greater than what has been

Soil analysis – what and when

»The Farming Rules for Water state that soils must be tested for phosphate, potassium, magnesium and nitrogen every five years. However, SNS calculations from the RB209 Fertiliser Manual can be used to establish N levels. Taking a soil sample correctly is crucial because it will impact results.

How to take samples: →Sample between October and November →Do not sample within three months of applying organic manures or mineral P and K fertiliser \rightarrow If lime is applied, it is best to wait 12 months for a stable soil pH reading

applied. Knowing this you can then redistribute nutrients within your farm to greater effect. "We're trying to achieve or

Table 3.8: Nitrogen recommendations for grass silage							
Target annual DM		N application	Total N applied ^b				
yieldª (tonnes/ha)	First cut	Second cut	kg nitrogen/ha				
5-7	70	_	-	-	70		
7-9	80	50	-	-	130		
9-12	100	75	75°	-	250		
12-15+	120	90	70°	30°	310 ^d		

a. DM yield as harvested in the field for all cuts combined. Does not include spoilage in the clamp. Fresh yield is four times these values if silage is 25% DM.

- b. As manufactured fertiliser and crop available nitrogen from organic materials.
- c. If previous growth has been severely restricted by drought, reduce or omit application.

d. This total N could be applied to a three-cut system (yielding around 15 tonnes DM/ha) with the fourth cut recommendation of 30kg N/ha being split between the second and third cuts.

→Sample at least every five years, and preferably every three years → Take one sample per four

hectares (9.8 acres). Divide fields greater than 4ha (9.8 acres)

→Take separate samples from areas that are different in soil type and cropping history →Use a soil corer to sample to a depth of 7.5cm on long-term grassland fields → Sample the area, walking in a W pattern → Avoid headlands, gate

entrances, or where manure or lime was heaped →Take 20-25 soil cores from the sampling area →Place soil cores in the sample bag and label clearly with the farm and field name

maintain a P index of 2 and a K index of 2-. Whether it's a threeor five-cut system, the aim is to maximise the yield and quality from each forage hectare.

"During peak grass growth [>100kg/DM per day] in April and May the grass crop has a daily phosphate and potassium requirement of 0.7 and 3.6kg/ha respectively. If the soil can't release these levels of P and K daily then nitrogen cannot be used efficiently to drive high levels of daily DM production. Yield reductions of up to 30% can result if the crops P and K requirements are not met," he says.

on grassland

Soil testing is the first part of a four-part process for formulating a farm nutrient management plan. The RB209 Fertiliser Manuals form the basis for all calculations and should be referred to for the subsequent steps:

Calculating crop requirements Use RB209 Section 3 Grass and forage crops to establish the nutrient requirements of specific

Phosphate (P) and potash (K)

There are two tables in RB209 (page 10) which provide guidance on silage ground P and K requirements depending on whether you know your expected grass silage yields or not. If you are unsure, use the standard values for P and K recommendations after each silage cut. Grazing ground figures are available separately.

Nitrogen (N)

So

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ma

soil

80

crops.

Use the Soil Nitrogen Supply (SNS) calculations in the **RB209** Nutrient Management Guide to calculate nitrogen levels.

»The SNS will depend on previous management and nitrogen use. On dairy farms which are likely to be using >250kg N/ha/ year, it is likely the SNS will be 'high' or 'moderate'.

»Grass growth class (GGC) of the ground should then be established - this describes the ability of the site to respond to nitrogen, which depends on soil type and rainfall. For example, good or very good GGC sites are swards dominated by productive grass species which respond well to increased nitrogen supply as soil drainage, temperature and water supply are conducive to growth. »Table 3.8 (page 20) can then be used to establish nitrogen application rates, depending on target dry matter yields. These recommendations are applicable to grass swards with low clover content in a very good/ good GGC and moderate SNS situation »Poor GGC sites are likely to achieve DM yields towards the

Boosting fertiliser efficiencies – key considerations

→Ma
avail
→Inc
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struc
→ Inc
prod
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→ Th

Use sulphur as standard

≫Including sulphur in mineral fertilisers as standard will help boost nitrogen use efficiency, dry matter yields and grass protein levels, according to Yara's Philip Cosgrave.

Since the reduction in atmospheric sulphur dioxide emissions, the level of sulphur in the air – and hence the soil has declined substantially. This has resulted in more than 80% of UK grassland soils being deficient in sulphur.

The two essential plant amino acids, cysteine and methionine have a requirement for Sulphur. so if levels are lacking, plant proteins are not formed optimally

→ Methionine initiates the synthesis of proteins →Cysteine is critical for structure, stability and

catalytic function in proteins Mr Cosgrave says:

When you apply sulphur on

lower end of the range in most years.

»Application rates should be adjusted depending on SNS sites. For example, on low SNS sites, 10kg N/ha more should be grassland, you typically get an increase in dry matter yields, but also an increase in protein percentage.

If grass has an adequate supply of sulphur, more of the nitrogen is found as protein. Whereas, sulphur deficiency results in less of the nitrogen being found as protein and more in the form of nitrate and free amino acids.'

Soil type will effect its responsiveness to sulphur, however in general, farmers could expect to see a 10-30% increase in dry matter yields from sulphur.

First cut silage has a particularly high demand for sulphur and regardless of soil type should receive a sulphur application.

Medium and light soils, and soils with lower organic matter content show the greatest response to sulphur in subsequent cuts.

applied for first cut and 20kg N/ ha more for second cut.

Sulphur

Sulphur is considered an essential nutrient in maximising dry

slurry spreading equipment reduces gaseous nitrogen (N) losses by up to 50%. This can reduce your mineral N requirement

→The type of mineral N used plays an important

role in determining nitrogen

use efficiency. Urea is

prone to ammonia losses which is significant particularly if it does not receive 5mm of rainfall in the 24 hours following application →Nitrate-based products

have very low ammonia losses and thus more N is available for the crop

Nutrient management

Table 1: The value of different dry matter slurries

						Using AHDB			
					fertiliser				
					prices				
Example of nutrient content of slurry on a dairy farm					N @ 82p/kg	P @ 67p/kg	K @ 45p/kg		
									NPK value
									(£) of slurry
									per cu.m
DM %	N kg/	P205	K20	SO ₃		N value	P value	K value	
	cu.m	cu.m	cu.m	cu.m		£	£	£	
1.56	2.1	0.42	0.62	0.12		0.86	0.28	0.28	1.42
2	1.6	0.6	1.7	0.3	RB209	0.66	0.40	0.77	1.82
6	2.6	1.2	2.5	0.7	RB209	0.85	0.80	1.13	2.78

Table explanation:

→Average slurry analysis results from one Devon farm shows the unit's 1.56% dry matter slurry had a nutrient value of £1.42/cu.m.

→Based on the standard RB209 values of a 6% dry matter slurry, this would have a value of £2.78/cu.m. →So by using the book values this farm could be over valuing its slurry considerably and not providing the crops' requirements.

matter yield and protein percentage in both grazed and conserved grass (see Use sulphur as standard panel, page 21).

66 Split the farm up into areas with different **P** and **K** indexes and formulate mineral fertiliser recommendations based on that PHILIP COSGRAVE

Sulphur should be applied on all arass arown on: »Sandy and shallow soils. »Loamy and course silty soils in areas with >200mm rain-

fall between November and February. »Clay, fine silty or peat

soils in areas with >400mm rainfall between November and February.

On soils at risk of sulphur deficiency apply: »Silage: 40kg SO₃/ha before each cut. »Grazing: 20-30kg SO,/

ha when up to 100kg N/ha is applied and an additional 20-30kg SO,/ha for each additional 100kg N/ha applied.

Knowing the value of farm organic matter

The next step is understanding what nutrients you have on-farm in the form of slurry and farmyard manure (FYM).

The RB209 Fertiliser Manual Section 2 Organic Materials, provides guide values for the nitrogen levels of a typical dry matter slurry. However, Mr Cosgrave says it is well worth

Essential resources

»For more details on nutrient management planning, view the RB209 Fertiliser Manuals at ahdb.org.uk

You can also view practical videos on how to take a slurry and FYM samples. Read the full Farming

Rules for Water rules at www.gov.uk

testing your farm's supplies as in practice, NPK levels, can vary

considerably. He explains: "The standard

book value for cattle slurry is 6% dry matter, but on two grass trials last year in Derbyshire and Devon, where we tested each farm's slurry, one had a dry matter of 3.3%, while the other was 1.56%. That shows how you can be way off the mark by assuming a standard book value." (see Table 1).

He advises testing slurry and FYM at least two to three times a year and using this to balance mineral fertilisers.



Knowing how much mineral fertiliser needs to be applied You can subtract the nutrients that were applied in the manure from the crop requirement to work out the shortfall needs to be filled with mineral fertiliser (see Table 2, page 22).

Mr Cosgrave urges producers to select a mineral fertiliser based on what their soils require, rather than reaching for the same product year-on-year because it is what they have always used.

"Split the farm up into areas with different P and K indexes

In numbers

 \rightarrow K and S deficiency can result in yield losses of 30%. So if your total annual yield was 10t DM/ha this might reduce to 7t DM/ha/year due to K or S deficiency. You could be losing about £150-£270/ha (about £50-£90/t of good quality silage) →A sulphur-containing fertiliser might cost an extra

and formulate mineral fertiliser recommendations based on that." he advises.

Possible scenarios, where a traditional fertiliser grade would not be the right choice might be on a silage field with a P index of 0 or 1. In this case, a high P compound like a 20-8-11+S should be used instead of a traditional silage grade to build soil P reserves.

A field with a high P index (3 or more) might not need mineral P if slurry was applied, so a zero P silage grade would be best suited for this example.

£5/ha per cut. but could

to £90/ha per cut

investment

(Source: AFBI)

prevent yield losses worth up

could be losing 2t DM/ha/year.

achievable through correcting

→Soils at sub-optimal pH

The extra grass potentially

soil pH is potentially worth

a five-fold return on the lime

Example: The field is intended to have one cut of silage taken.

Table 2: How to calculate mineral fertiliser requirements

A recent soil analysis indicates that the P and K are at the optimum (Index 2 for P and 2- for K). It is a three-year-old perennial rye-grass sward with a good grass growth class and a moderate soil nitrogen supply.

First cut mineral fertiliser requirement

40cu.m of cattle slurry applied by trailing shoe in February, with an estimated dry matter of 2%.

	N kg/ha	P₂0₅ kg/ha	K ₂ 0 kg/ha	SO ₃ kg/ha
First cut requirement	120	40	80	35
40cu.m of cattle slurry				
2% DM (RB209)	32	24	68	5
Mineral fertiliser required	(120-32) 88	(40-24)16	(80-68)12	(35-5) 30

»A grazing grade fertiliser like a 27-5-5 + S0, would be required to balance the mineral fertiliser requirements of this first cut.

22

Gibberellins boost early growth

≫Applying gibberellins to grassland in early spring could boost grass growth by 20kg DM/ha/ day or more and help those farmers wanting to quickly fill a forage gap this spring.

Gibberellins are naturally occurring growth enhancers that all plants produce. They help to increase cell size and numbers, enabling greater photosynthesis, plant metabolism and, in turn, increase growth in leaves and roots.

Grazed

NuFarm's Brent Gibbons adds: "If grass has been heavily grazed, the plant produces gibberellins to try and boost grass growth."

UK research on 10 farms showed that a

spring application resulted in an average extra 500kg DM/ha over a 21-day period. This led to a 8:1 return on investment thanks to grass growth and milk yield. →Gibberellins such as SmartGrass, should be sprayed before the season warms up when conditions are at 5-10degC and grass growth is limited → Applications must be made before April →Gibberellins have a three week impact on the sward - grass should be utilised within this period

Mr Gibbons believes gibberellins have a role to play on most farms.

He says: "It's relevant to all grassland farmers and especially ones short of forage that want to get off to an early start this spring."

DIY silage

There are some golden rules for making your own quality silage. James Duggleby marketing and product manager for Krone, provides farmers with a reminder.

Tips on making the best silage possible



Scrap the calendar Don't be led by the calendar - aim to cut at the right growth stage for your farm. Walk the farm and cut when grass is leafy and green - do not wait for it to go to head.



Keep mower blades sharp Sharp blades ensure a clean cut and promote quicker regrowth. It takes minutes to change a blade and costs about £1 per blade



Cut to 50mm Aim for a cutting height of 50mm. Any lower and you risk taking soil into the clamp or damaging the mower with stones. Cutting too low will slow down regowth time.



Think about conditioning A mower with built in conditioner will speed up wilting by bruising the cuticle. Do not over-condition if the crop is very dry or the sward contains a lot of clover which can shatter



Chop length Choose a chop length to match what is being fed in the total diet and to suit the dry matter of the grass; 20-25mm is the average for conventional silage



Allow time for fertiliser uptake Follow recommended withdrawal periods for slurries and fertilisers before harvesting. As a rule for cutting, allow one day for every 2.5kg/ha of N applied. Cutting too soon will lead to greater run-off and silage losses



Speak to your contractor or team about what you are trying to achieve.



12-24 hours Aim for a rapid wilt for conventional silage to preserve sugars and nutrient valu



Timings Get grass into the clamp or baled as quickly as possible to reduce silage losses; and row up quickly immediately before harvest



Avoid soil compaction Low pressure tractor tyres are ideal to avoid soil compaction which will impact grassland performance. Full trailers should use the same route so any compaction is limited to one area. This can then be treated with a sward lifter after harvest



and put away in the autumn ready for use the following season. If not, check them in good time to avoid panic buying.



Cut in the afternoon Start mowing in the afternoon to maximise sugars in the grass and ensure the crops is free from dew



Match swath width to conditions Leave swaths as wide as possible if conditions are good. If ground is wet, put the grass in a swath to allow the top to dry and the ground to dry. Grass can then be tedded on to the dry ground.



3-5 miles per hour Travel slowly when tedding the crop to spread grass and get an even wilt



Consolidation Ensure your ability to fill and roll the clamp matches the rate the crop is brought in. To avoid waiting and to maximise consolidation, aim for two on the clamp once you have more than five trailers working. Include an additive for optimum fermentation.

Investing in their own silage-making equipment has helped service herd expansion, improve silage quality and build flexibility into the system at Merryfield Farm, Shepton Mallet.

Case study: Joe Corp, Shepton Mallet

»The Corp family brought silage-making in-house in 2013 as a means of taking greater control over when and how silage was harvested, rather than relying on busy contractors.

The Corps try to grow and utilise as much home-grown forage as possible, with the business producing grass silage, maize, fodder beet and wholecrop wheat and barley. The farm is made up of 129

hectares (320 acres) owned. 121ha (300 acres) rented and 202ha (500 acres) contract farmed. The 450-cow black and white herd yields 9,000 litres a cow a year at 4.15% fat and 3.38% protein. 2,700 litres comes from forage.

Joe Corp says: "Silage is very important. It's the base of everything. It's a lot easier to manage cows if you've got good silage as a base and it reduces what you need to buy-in."

Having initially bought a trailed harvester. frustrations with speed of harvest and reliability pushed the family to invest in a self-propelled forager,

66 Silage is very important. It's the base of everything. It's a lot easier to manage cows if you've got good silage as a base JOE CORP



which proved more efficient. Since then, machinery has grown to include Easycut B 870 CV butterfly mowers from Krone and a second-hand Swardro 1400, 4 rotor Krone rake. A new Krone BiG X 580 Forager will be arriving for the 2019 season. The farm also has a large loading shovel.

Mr Corp says the kit has been essential to boost efficiencies and cope with herd expansion.

"Herd size has grown over the last 10 years from 250-450 cows, so everything has been pushed harder. We've been able to cope with that by cutting more in a day and picking more up, while making quality silage.

"It's given us flexibility so we're not having to rely on anyone else. And it's pushed us to expand. We've taken the leap to own as much equipment as possible, which has enabled us to take on the contract farming arrangement."

Harvest

With multiple crops grown across the farm, the kit allows the team to harvest small areas of different forages, as and when they are ready. For example, Italian rye-grass leys drilled in July will be cut in September and then before the main perennial rye-grass and red clover or white clover levs in spring.

Vetches which are planted behind barley to meet greening requirements will also be silaged in the last week of April, prior to maize drilling.

This year's first cut grass silage - although sightly drier than usual at 36% dry matter - analysed fairly typically at 12.8% crude protein, 67.5 D-value and 10.8ME.

Mr Corp believes cutting grass at the right time and consolidation in the clamp are the most important factors in producing quality silage. This means cutting before grass goes to head and having an extra tractor on the clamp where possible.

"Cutting at the right time is the most important factor and making sure everybody does every part of their job properly," says Mr Corp.

Forage wagons

Forage wagons could offer a cost-effective solution for those farmers with limited labour, who are keen to take silage-making in-house.

Take more control of your silage-making

nologica advances mean forage wagons are no longer the 'clatter wagons' of the past, and could help some farmers take more control of their silage-making and build flexibility into their systems.

A forage wagon combines the task of cutting and collecting mowed grass into one pass, thus reducing machinery and labour requirements - specifically in carting silage from the field to the clamp.

James Duggleby, marketing and project manager for Krone, says the investment in

a forage wagon and subsequent silage-making kit costs roughly a fifth of the cost of a self-propelled forage harvesting set-up. Consequently it provides a cost-effective solution for DIY silagemaking.

Versatility

He says: "It also gives farmers some versatility with grass. It gives them the option of zero grazing and making silage themselves. Plus, with an in-house operation, they can decide when to do each field." Mr Duggleby believes a

DIY silage-making operation with a forage wagon provides

Case study: Brian Goodenough, Eling Farm, Newbury,

essential.

Grass utilisation

Mr Goodenough says zero

utilisation on the system, by

carted to cows from a separate

280-hectare (692-acre) silage

block, which is located on

the opposite side to the M4

motorway. The zero grazing

hour from cut to feed-out.

Mr Goodenough believes

feeding fresh grass to the 420-

process takes one man about an

allowing fresh grass to be

grazing maximises grass

has become more grazing

intensive and stocking rates

ha (1.1 cows/acre) on the

grazing platform. With the aim

litres to 4,000 litres next year at

current constituent levels, good

grassland management, regular

reseeding and cutting grass at

the optimum time is viewed as

to increase yields from 3,300

»A forage wagon has built flexibility into the system at Eling Farm, Berkshire, enabling have increased to 2.7 cows/ cows to be zero grazed when grazed grass growth dips and pockets of silage ground to be cut when desired.

For Brian Goodenough, his Krone MX 350 GL forage wagon is an essential part of his 'dry weather management plan', which is put into action most summers when the farm typically burns-off in July.

"If it looks like they'll be a trend for low grass growth and there's a chance we'll run out [of grazed grass] in five weeks, we'll zero graze," says Mr Goodenough, who tracks growth rates on the 175-hectare (432-acre) grazing platform, every week throughout summer using a grass plate meter. This strategy has

proved vital as the system

farmers with scope to harvest grass in blocks, rather than having to wait to cut the whole silage area

This is also helpful on grazing systems, enabling fields

which have got ahead of cows to be cut and clamped. By attaching a mower to the front of the tractor towing the forage wagon, zero grazing

also becomes an option.

Berkshire

cow herd in such a way is the guickest, cheapest and most efficient use of farm labour and machinery, when compared to making more silage.

He says: "I'd only put it right in the clamp, open it up and feed it....You might as well take it straight to the cow. Grazed grass is the cheapest way to feed cows and cutting and taking zero grazed grass to the cow is the next cheapest way to feed cows."

With the 2018 summer even more challenging than usual, Mr Goodenough believes the value of zero grazing has been even more apparent. By having the machinery in place, the team were able to 'dive in to different crops', when grass was running out and zero graze peas, barley, triticale and oats, which had been undersown with Italian ryegrass, after kale. Typically grass will be zero grazed for about

In addition, technological developments mean modern-day forage wagons are more reliable and more efficient than in the past. For example, Mr Duggleby says it is now possible to install a weighing system, linked to a tablet, which can be used to log the tonnage of fresh weight going into the clamp. GPS also enables individual field yields to be monitored. Most wagons also have an auto-fill system.

He says: "There's been investment in technology. They are now on a rotor system, rather than a feeder rake system, which is more suited to the UK's wetter grasses."

three weeks when conditions are drv. but in 2018 this was extended to 10 weeks using different crops.

Generally, the amount of grass which will be silaged and zero grazed will be varied, depending on the season. When zero grazing, the team will use a 200hp tractor and Krone front mower on the forage wagon. For silaging, a Krone front and back mower will be used on a 130hp tractor, alongside the forage wagon.

Mr Goodenough believes purchasing the wagon and taking silage-making in-house, has not only reduced costs, but also built in flexibility into the silage-making operation. This allows smaller blocks of 16-32 hectares (40-80 acres) to be cut when they are ready, rather than waiting for the contractor to cut everything. He says the machinery also limits soil damage. He adds: "We're creating less compaction and taking our cuts at the right time and

getting better quality grass."

Pros and cons of forage wagon versus self-propelled harvester

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Lower labour requirements

- →Low cost silage system due to lower labour and less
- machinery
- →Larger capacity (33-40cu.m) compared to individual trailers (20-25cu.m)

Pros

- → Suited to farms that want a longer chop length
- →Reduced soil compaction risk due to less machinery and lower profile tyres
- → Provides flexibility to put mower on the front of wagon and adopt zero grazing

→Slow harvesting rate

→Larger horsepower tractor required to pull forage wagon and power chopping unit (37cu.m wagon will require 220hp+) →If large distances are being travelled between field and clamp, efficiencies are reduced. Five miles is probably the maximum distance if one forage wagon is in use → Can't achieve precision chop

Cons

→Close attention to clamp consolidation required due to longer chop length



The Krone 350 GX forage wagon is an essenti part of the farm's 'dry weather management plan'.

Farm facts

→420 organic, Jersey cross Friesian cows

- →12-week spring-calving block
- →Once-a-day milking

3,300 litres a cow a year at 5.1% fat and 3.4% protein →Calve outside or on straw corals, then on to grazed

arass

→Concentrates and self-feed silage fed at shoulders of year →Some cows out-wintered on kale

→250kg concentrate to be fed this coming season - to maximise summer payments

→Herbal levs used on grazing platform, with more planned to be planted on silage ground, together with Italian ryegrass and red clover leys

Multi-cut vs traditional

Paying attention to cut and wilt timings will help farmers boost silage guality, while adopting a multi-cut system could help some to maximise performance off the same acreage.

Traditional or multi-cut silage?

raditional or multi-cut? There is a lot of talk about different silage-making strategies at present, but whatever the system used, all farmers should be challenging themselves to make better silage.

So says Volac business manager Darran Ward. He believes everyone could benefit from taking a fresh look at silage management.

"Everywhere we're making silage, we should be challenging what we do and exploiting more out of what we've got," he says.

Mr Ward says managing grass differently puts producers in a better position to improve milk from forage, which is ultimately linked to profit.

For example, Kingshay data from herds ranked by milk from forage for the year ending March 2017, shows the top 10% are producing 4,136 litres of milk from forage per cow and achieving a margin over purchased feed (MOPF)

Silage additive return on investment

MTD/1 is the strain of beneficial bacteria in Ecosyl silage additives. Compared with using no additive, treating with MTD/1 has been shown to give improvements in three ways:

0.7 MJ/kaDM

→Improve silage digestibility

Improved grass quantity Improved silage quality In addition, across trials. drv matter recover various trials, treating with with MTD/1 was boosted from 91.8% to 95.5% of the original energy by an average of

→If 1,000 tonnes of fresh weight (FW) were originally clamped at 30% DM, that would equate to an extra 37t FW back



of 18.32ppl. The bottom 25% are producing just 1,176 litres from forage, and hitting a MOPF of 15.64ppl - a difference of nearly 3ppl.

Ensuring leys are regularly reseeded will aid silage quality. However, he thinks cutting and wilt timings are where

producers could make the biggest gains. This means cutting early and wilting rapidly to produce a dry matter silage of 28-32%.

"I'd be challenging all farmers to go two weeks earlier than they usually do with first cut," says Mr Ward. "If they

usually cut in mid-May, aim for the end of April. This fits with when grass is higher quality, with a high D-value."

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Improved milk yield

 \bigcirc \rightarrow MTD/1-treated silage

improve milk vield bv an average

→Assuming 200 days of feeding

per cow per day equates to an

extra 240 litres of milk per cow

day (15 trials, various forages)

Cut early and wilt fast Cutting earlier, before the grass approaches heading, will reduce yield, but protein, digestibility and metabolisable energy (ME) all increase. This will support greater milk production, while a lighter crop will have less losses in the field.

A rapid wilt is also a must. As soon as grass is cut, sugars start to decline as they are being used by the plant, which is still living, and also by undesirable bacteria. This raises the pressure to get it in the clamp quickly. Wilting also increases the dry matter percentage and reduces clamp losses from effluent.

Mr Ward says there is a twohour window for producers to take advantage of in order to get an efficient wilt. This is the time when the stomata on the plant remain open and water loss is at its greatest; about 100 litres/tonne of grass every hour. After that, water is only lost where the leaves are broken or where the crop has been conditioned - if a conditioner has been used.

"Ideally the mower and the tedder should be in the field at the same time, or at least within two hours of each other," says Mr Ward. This will ensure a rapid wilt is achieved.

This is particularly important with an early first cut, where weather conditions may not be ideal. Water loss will be highest when air moves over the crop, so 'flicking the crop up' with the tedder will aid evaporation. Leaving a 5-6cm stubble will also help lift the crop off the ground and expose it to air movement.

Producers should also take a step back and ask themselves if they could adopt a multi-cut silage system.

Can I do a multi-cut system?

The multi-cut system reduces the time between cuts from the traditional six weeks to about four weeks. This means more than three cuts are taken in the year, with some producers taking five-six.



Silage-making strategies compared

Traditional

- →Six- to eight-week gap between cuts
- (on average depending on location)
- started to decline
- →Tends to be compromise between quality and quantity

Multi-cut

→About a four-week gap between cuts

- → First cut taken end of April
- \rightarrow Cut earlier when quality is highest and grass is young and

year will be the same or more than the traditional method

Multi-cut – key considerations

Fertiliser

Reduced cutting interval means special attention needs to be paid to crop nutrition to ensure all nitrogen is absorbed before harvesting. This will prevent →Apply slurry into the soil immediately fields are

→Apply bagged fertiliser as recommended by an growing day between cuts. Ory matter

As with traditional silage-making, the aim is to wilt rapidly to achieve aware that this can be achieved much guicker on a multi-cut system as the crop is lighter.

Some farmers. articularly Dutch producers who commonly adopt multi-cut, take the crop a lot drier to about clamps need to be narrow nough to move across the ace quickly to help reduce aerobic losses. Mr Ward practically possible Chop length

As grass is young and can cause slippage in the lamp. At 28-32% DM, Mr Vard advises a chop length of 5cm versus 2-3cm on should also be filled in thin layers of up to six inches ach to prevent slippage.

Additives As crops are younger, lower. These sugars are fermentation. To ensure the sugars which are present are used for a healthy 'feeding' bad bacteria, a

"We have found in younge leafier silages, if we don't put additives on, we don't get the correct fermentation," explains Mr Ward.

An additive also helps preserve the high protein levels in the crop and broken down in to ammoni

Treating silage with MTD/1 (the beneficial bacterial level of 'true protein'' in the silage by 31%, compared to protein is what is used most

Mr Ward also advises choosing a proven additive that can be applied at low volume (20ml/t versus 2 cut faster, with a shorter window, a lower volume helps efficiencies in the field. Ration balance OFibre levels are a lot lower on multi-cut silage, while quality is higher. This means additional fibre will need to be added to the diet to ensure the cow is able to Straw or long-chop haylage could be considered.

Multicut vs traditional

Table 1: Cost comparisons between traditional and multi-cut systems

Cost of a traditional three-cut system							
	Area	Yield/ha	Total tonnage of dry matter	Cost/cut (£)	Total cost (£)		
First cut	20.5	6.0	123	136	£2,788		
Second cut	14.5	4.5	65	104	£1,508		
Third cut	12	3.0	36	104	£1,248		
			224		£5,544		
Cost of a multi-c	ut system						
	Area	Yield/ha	Total tonnage of dry matter	Cost/cut (£)	Total cost (£)		
First cut	18.2	4.5	82	136	£2,475		
Second cut	16.1	3.0	48	104	£1,674		
Third cut	13	3.0	39	104	£1,352		
Fourth cut	13	2.1	27	104	£1,352		
Fifth cut	12	2.1	25	104	£1,248		
			221		£8,101		
Difference in con	Difference in contracting charges: £2,500 more on a multi-cut system. Source: Germinal GB						

First cut is also taken earlier than traditional methods (see Silage-making strategies compared panel, page 28). "It's traditional as it's the

way we've always done it,"

adds Mr Ward. "That alludes to the fact we haven't really challenged what what we've done. Multi-cut challenges that."

By cutting more frequently on a multi-cut system, grass

Case study: Jason Bayley – multi-cut silage

»Jason Bayley's multi-cut silage system is all about of energy per hectare to enable costly bought-in feeds to be displaced by quality, He says: "Our forage is treated almost like a

concentrate, rather than a forage. We don't want a big heap of poor quality stuff, otherwise you're filling up space in the ration with poor analysing similar to bought-in feed, it's got a lot more value." The Bayleys run 565 cows



across 290 hectares (720 acres) at Lady Leys Farm, day and yields 10,800 litres at 3.9% fat and 3.3% protein.

is younger and leafier and

of greater digestibility. This

intakes and provides the

feed.

encourages forage dry matter

potential to displace bought-in

was cut three-four times a year, although the fourth cut was viewed as a 'bonus', rather than a must. Now the farm multi-cut system. The silagemaking season also starts earlier, with first cut taken in the first week of May or end of April, weather-permitting.

younger and leafier, silage quality has improved markedly e table). Now, it is possible or more and 15-16% crude

is keen to highlight this is only possible when the weather is in your favour, and the nature

Mr Ward believes multi-cut

is one of the ways producers

figures and thus MOPF, while

growing more nutrients off the

can boost milk from forage

same acreage.

He adds: "Our first cut is the subsequent cuts that have to make all of our cuts similar to our old first cut."

Digestibility

means cows are able to eat more of it, with Mr Bayley notably surprised at how much forage cows will eat. In 2017, the herd achieved forage dry matter intakes of 15kg DM per head per day. This enabled forage replacers, like moist

Table 2: Typical silage analysis results on different cutting systems					
	Multi-cut	Traditional			
D-value	75	64			
Dry matter (%)	32	26			
ME (MJ/kg)	11.6	10.3			
Crude protein (%)	18%	14%			
NDF (g/kg)	360	450			
pН	3.8	3.9			
Lactic acid (g/kg)	90	89			
Source: Volac					
ME improvement of 1ME/kg DM on a multi-cut system 220 tonne @ 1,000kg = 220,000kg @1ME = 220,000 extra MJ of energy It takes 5.3MJ/litre to produce a litre of milk 222,000/5.3 = 41,500 extra litres of milk @26ppp = £10,800 litres worth of extra milk produced = £8,300 benefit (in extra energy alone)					

"Multi-cut is a way to exploit more from grass and to get the physical and financial benefit from it," he says. Although the individual

cuts may be lighter - perhaps 1.6-2t/hectare (4-5t/acre) at first cut versus 3.2-4t/hectare (8-10t/acre) on a traditional system - the total dry matter

Lady Leys Farm – Improveme	ents in silage quality and forage intak	(es	
	Traditional silage-making system	Multi-cut system	Improvement
	(three-four cuts a year)	(five-six cuts a year)	
Metabolisable energy (ME)			
MJ/kg DM	10.5	11.5	+1MJ/kg DM
Crude protein (%)	12-13%	15-16%	+3%
Dry matter (%)	30%	30-35%	+5%
Forage dry matter intakes	10.5-11kg	up to 15kg (in good	up to +4.5kg
		forage making year)	DM/day
intakes are back at pre-multi-	Having lighter cuts means		
cut levels due to depressed	it is important to pay attention		
forage stocks following last	to wilt times. He explains:		
year's drought. This meant	"You can get through the		
only four cuts could be taken.	acreage quickly as there is	Read of the	AND
This highlights the need to cut	less of it [yields]. But you	A THE A LAND	
good quantities of silage in	need to spread it immediately		
order to meet increased forage	after cutting so there's a rapid	CALLER AND AND A	Aller - Jul
dny matter intake demands	wilt "	A CONTRACTOR OF THE OWNER	Statement of the local division of the local

Mr Bayley believes by cutting five lighter cuts, he is system, but energy and protein is better.

He aims for a maximum will additive MTD/1 is essential to

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yield produced through the season is likely to be the same or more. Most notably, the quality of silage produced will be much higher (see Table 2).

ME increase

A 1MJ/kg DM increase in ME is generally recognised from moving from a traditional to multi-cut strategy. This will support milk production and also 'more than pay' for the extra contracting costs from cutting more frequently (see Table 1).

Mr Ward says improved silage quality equates to a 2ppl saving in feed costs, as a result of higher forage dry matter intakes and having to buy-in less energy and

protein. However, there are some key things to think about when taking a multi-cut approach (see multi-cut key considerations panel, page 29).

Mr Ward believes multi-cut is something which should be considered on many farms. However, there are some situations where it is not possible; namely if it is not possible to get contractors to cut frequently or where the farm's location means weather is challenging.

"Where geography, weather and management means you can't achieve multi-cut, then traditional silage-making is for you. But challenge yourself to see if you can go early," Mr Ward adds.

The herd is milked three times a day and yields 10,800 litres at 3.9% fat and 3.3% protein.