Working to **secure your future**

Issue 09 2022

# GRASSROOTS

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# SOIL FERTILITY AND HEALTH CAN IMPROVE RESILIENCE TO PRICE VOLATILITY

**Fertiliser prices have tripled for nitrogen and doubled for phosphorus and potassium. So, what can we do to improve soil fertility and health to reduce inputs and cover some of the rising costs? Independent grassland consultant, Dr George Fisher, gives some pointers.**

Having noted the increase in fertiliser nitrogen price at the farm gate, the Radio 4 interviewer of the 'Today' programme on May 24, asked the CEO of Yara if fertiliser prices would go even higher. His answer was; "I don't know". We seem to be living in a time that's redefining the parameters of 'volatility' and the best we can do is to better manage what is within our control. At the farm level, part of that involves improving nutrient use efficiency, by focusing on soil health and fertility.

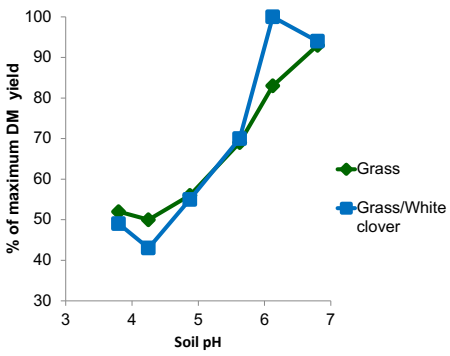
## Basic soil fertility improves efficiency.

A basic nitrogen fertiliser use efficiency on a grassland farm will be round 60%. So, that means for 200kg N/ha from the bag across the season, only 120kg is getting into the grass. By tackling the basics of soil fertility we can raise that efficiency to 80%, or by 40kg N, or £80/ha at current prices. So we need to ensure we have an up-to-date soil analyses done across the farm and target pH 6.5, K (potassium, potash) index 2- and P (phosphate) index 2. We also need to apply 80 to 100kg sulphate per ha on all land, which in itself can raise nitrogen use efficiency by 10%.

## The impact of pH can be massive

The graph below is from UK research back in the 1980's, but we need reminding of what we already think we know. This work shows that letting soil pH drop from 6.5 to 5.5, reduces grass growth potential by around 35%. Even at pH 6.0 we can get a 20 to 25% reduction in dry matter production. Lime sales have soared since the rise in nitrogen costs, but the data proves that trying to save on liming is a false economy.

### Soil pH and grass growth



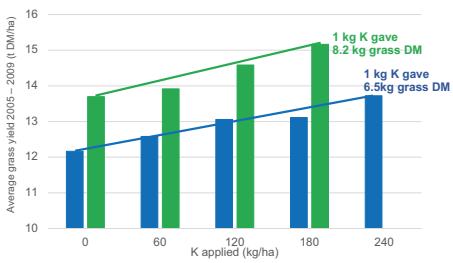

From Hopkins *et al.* (1990) Grass and Forage Science

## Potash is involved in nitrogen uptake, so it has to be right.

Grass takes up nitrogen from soil solution, therefore potassium (potash) is critical to that process. Even when we are at the target soil fertility of K index 2-, we need to make sure that maintenance applications are going on. This was shown through work in Ireland by Teagasc (see graph below), where applying up to 240kg potash/ha gave a 6.5 to 1 return in grass dry matter in perennial ryegrass and 8.2 to 1 on Italian/perennial ryegrass mixes.

### Teagasc (Ireland) research

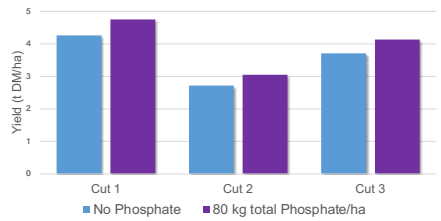
- 5 years of on-farm replicated trials
- Soil index 2-
- Effect of maintenance Potash applications




## Phosphate response

Similar effects to the potash Teagasc studies were seen in work at Reaseheath College (graph below). On an index 2 sandy clay loam soil, making sure a three cut silage system got the maintenance phosphate it needed raised yield from 10.7 to 11.9 t DM/ha, a 15 kg grass dry matter return for every 1kg phosphate added. Not surprising when we consider that phosphate is crucial for root health and energy transformation in photosynthesis.

### Maintenance phosphate (replicated trials, Reaseheath College, 2014)




## Don't forget sulphur.

As nitrogen prices have gone up, many farmers try to keep costs down by buying straight N fertilisers without sulphur in them. This is another false economy. Even at the prices we are dealing with, the cheapest feed on farm is still grazed or cut grass and on most soils we can't get enough sulphur (S) from soil reserves and manure inputs, to support nitrogen uptake (efficiency) and grass growth. The table below shows this in stark reality for a two cut system trial run by SRUC in Aberdeen in 2018.

### Yield (t DM/ha) by N and S input

| Nitrogen applied over 2 cuts | Sulphate applied over 2 cuts | |
|---|---|---|
| | 0 kg SO3/ ha | 90 kg SO3/ ha |
| 90 kg N/ha | 6.5 | 9.1 |
| 210 kg N/ha | 11.7 | 13.0 |

Yield on the same sward doubled when the recommended rates of N and S were applied. At the 210 kg N/ha rate (derived from the Fertiliser Manual, RB209), the return on S input was 14 kg grass dry matter for every kg sulphate applied.

## Manure - from brown to gold

We need to appreciate that most of the nutrients in our slurry and FYM come from the manufactured fertiliser and feeds that we buy-in, so we have already paid for them. Manures are not a waste to be disposed of, they are a recycling asset to be managed.

The starting point for managing this asset is to know what nutrients it contains. There is no logic in complaining about fertiliser and feed prices by not knowing the nutrient content of our manures. Sampling to get an analysis is a messy and unattractive job, but is definitely worthwhile.

A study by ADAS, who analysed over 500


It doesn't look like this (surface grazing compaction)

Or like this (wheeling compaction):

slurries, revealed just how variable the nitrogen content of slurries can be. The Fertiliser Manual uses a value of 2.6 kg N/m3 of slurry for a 6% dry matter material as an average and the ADAS work showed this to be correct, as an average. But the range went from 1.2 to 4.5 kg N/m3. By definition, only about 25% of farms will have an 'average' slurry; it depends on the system you operate and how you store the material. So, getting an analysis done and using it to make sure you are only putting on what you need from bagged nitrogen can pay handsomely. For example, if your slurry is 3.6 kg N/m3, rather than the book value of 2.6, this represents an extra 40 kg available N/ha from your slurry rather than the bag for a stocking rate of 2.5 cows/ha.

We also need to look at when, how and where we are applying slurry nutrients. Switching as many applications as we can from autumn and winter to in-season and also moving from splash-plate application to dribble-bar, or even injection, can help. It's about the accumulation of small gains, and adding these two changes together could remove 20 to 40kg N/ha of brought-in fertiliser applications.

For most cattle systems, the maintenance phosphate and potash we need will come from slurries and manures, as long as we are spreading them across the farm. So, when it comes to where we are applying manures, we need to check our soil analyses and make sure that fields with lower fertility (generally those away from the steading) are getting their input from manures. It is a pain to haul slurries and manures further from the core of the farm, but is cheaper than buying those nutrients in a bag to get the benefits of a properly balanced soil fertility and fertiliser plan.

## Dig for victory (soil health)

Soil fertility is really 'soil chemistry'. But we also need to consider soil health in the ground, which includes soil structure (physics) and bugs (biology). All three are inextricably linked but the only way to assess the structure and biological health of your soil is to get out with a spade and dig inspection pits.

Healthy soils have a profile that has minimal compaction. This allows air in to service the bugs and water to flow through, rather than run off or sit on the surface. Sounds simple, but it's really important. Well-structured soils dry out more quickly in spring and wet up more slowly in the autumn, allowing more grazing on the shoulders of the season. Extending grazing through good soil structure can be worth £2.50 to £3.50 per cow per day, according to SRUC and AHDB Dairy, in reduced feed and labour costs – that's £3,500 to £4,900 per week for a 200 cow herd.

Getting soil structure right is the basis of the whole job. By reducing compaction, or restoring compacted soils, the biology and organic matter of the soil will work better and it's those worms and bugs that turn over the organic nutrients in manures, making them available for grass growth and replacing bought-in fertilisers. More grass gives us the opportunity to reduce bought-in feeds.

The useful thing about focusing on soil fertility and health is that everything is connected. You improve one aspect, such as soil structure, and other things like nutrient availability from slurries, will follow.

So, our response to not knowing what the future price of fertilisers will be? Well, partly it's to control the health of our assets so that we don't have to buy so much. And doing this means we grow more energy and protein at home, reducing feed costs, which is another unknown factor going forward.

# Where are the gains to be made when production costs need to be cut?

**Pasture to Profit consultant Sean Chubb talks through what the plans are for Walford College.**

Like all farms out there, Walford has been looking for ways to reduce the cost of production to offset the increase in fertiliser and feed, as well as take advantage of the removal of BPS payments. Being an autumn block farm, the need for concentrate through the winter months is something they cannot avoid, but other decisions can be made to reduce the impact on profitability during these uncertain times.

At the beginning of the financial year the cost of fertiliser was already on the rise. Luckily the farm had already purchased its needs for the 2021/22 season, so there was already a degree of mitigation in the system. While having this fertiliser on hand was going to save the farm costs during the season, there was no guarantee that the cost of fertiliser would reduce to 'normal' levels before the farm needed to purchase fertiliser for the 2022/23 season, so a plan was put in place to save as much of this fertiliser as possible.

To reduce the level of nitrogen we looked to utilise the natural growth of the plant. As grass grows there's more leaf area to capture sunlight and through doing so the growth rate increases. The plan was to increase the pre-grazing height of the sward from 2800KgDM to around 3200KgDM.

We didn't want to graze covers any higher than this as we'd be risking canopy closure, which would stimulate stem elongation and lower the feed value of the sward and make it harder to achieve residuals of 1500KgDM.

We were still aiming to grow the same amount of grass for the year, but with less nitrogen. The exact level of nitrogen reduction is unknown and will be largely dictated by the weather, but we are hoping for a reduction of 50 to 70 kgs of nitrogen per ha. The confidence in this approach was taken from Lincoln University dairy farm in New Zealand, where in 2014 with nitrogen regulations coming into effect, the university dairy had to make changes.

They reduced their nitrogen applications from 325kg per ha down to a four-year average of 167kg per ha, this level of reduction in nitrogen was forecasted to reduce growth by 3 tonnes of dry matter per hectare but through increasing their entry covers they managed to reduce the loss of growth to 1.5 tonnes of dry matter per hectare.

## Spring rotation

The spring rotation was managed as normal, but instead of finishing on a 21-day rotation we finished on a 23- day rotation. Leading into the heading date the entry covers were to be lowered slightly to ensure quality and to keep the required rotation speed as cows would be starting to be dried off through this time as well.

Through the summer months with the transitioning cows on standing hay, high growth rates are not needed so entry covers would be back to 2800KgDM. This would ensure top quality grass for when the cows calve.

In autumn the covers will stay at 2800KgDM to ensure all of the farms can be grazed out well leading into housing. The fully housed date is going to be the end of October so the cows will stay on a 21-day rotation through this time period, giving a flat wedge for turning out.

Since the beginning of the monitor farm process, Walford has had the goal of getting to 6000L from forage.

This year the farm is set to exceed 5000L from forage which is helping to keep the concentrate usage low.

This level of milk from forage is being driven from two places, forage quality and days at grass. Forage quality needs to be maintained not only for grazed grass, but also grass and maize silage. While there's still room for improvement in the quality of the silages, the area where gains can be made easier is through days at grass.

The farm benefits from two thirds of the farm being sand and loam soil which enables early turn outs. This year the cows were turned out during the day from January 14 and the farm achieved 100% of the farm grazed by March 25.

## Helping earlier turnouts

While this winter and early spring did have above average growth, the farm is going to continue to target turning out mid to early January to drive days at grass and milk from forage. Through having a fast final round in the autumn and achieving a flat wedge, this will enable the farm to turn cows out early and keep a higher level of grazed grass in the diet even in low growth years.

To help facilitate the earlier turn outs and to reduce the risk of low growth through the early period of spring, the milking platform is going to have the grass species changed over time. Currently the farm has perennial ryegrass and clover lays on the milking platform with some hybrid ryegrass (Italian and perennial) on the silage blocks.

The plan is to reseed the milking platform with these hybrids along with clover. As these hybrids have greater growth in colder weather the farm will be better situated to handle early turn outs through cold springs when growth is supressed. The downside to changing to this grass species is that the natural lifetime of the plant is 4 to 5 years, this lifespan means that 20% of the farm would need to be reseeded each year.

This level of reseeding would put pressure on the grass growth/ demand no matter what time of year it would be undertaken. To overcome this, the plan is to under sow or direct drill seed into the lays at year 5 and have the paddocks fully reseeded at year 10. This will hopefully see the paddocks stay productive through to the end of the 10-year period without having to take out large areas for reseeding.

A topic that has had much discussion around the future of the farm, is the growth of maize on the farm. As the farm sits in a NVZ area they are limited in the number of cows that can be milked through the growing of maize, if the maize was not grown on the farm it would allow for an additional 50 cows to be milked. As there is currently no prospect of taking on more land nearby, this would mean that the farm would need to buy in additional feed to meet cow requirements, opening them up to price fluctuations.

Under the current environment the farm is going to continue growing maize but this will be revisited as new norms are established post BPS removal, along with fertiliser and feed prices stabilising.

**If you are interested in how the farm has performed on these topics, please feel free to join us at our next open day. The details are provided on the side of the page.**

## Walford Open day to come in 2022

### Join us at our monitor farm open day in October this year.


**Our second open day will be on October 26 where we'll be covering the following topics:**

- Reviewing financial performance of the last financial year
- Looking at the breeding plan for the year
- Milking cows on hybrid ryegrass- what is needed

If you're wanting to attend this open day please email Sean Chubb on **schubb@liceurope.com** to register your place. This will help us with our catering arrangements as lunch is included.

Please aim to arrive for 10:30 and we will plan to finish by 2pm

# Inbreeding... why it's important to understand and what you can do to minimise it

**Here LIC's Sally Pocock talks us through the steps we need to take.**

"Why is inbreeding important and why should I worry about it?" It's a question I'm often asked.

Inbreeding is the term given to a mating between close relatives and is generally avoided amongst cattle breeders. That's because it comes with risks including lowered performance across all traits, increased incidence of recessive genetic diseases, and loss of genetic diversity in the population.

Inbred individuals will have a greater percentage of their genes from their dam and sire from a common ancestor (identical by descent). The more inbred they are, the more identical, or homozygous, gene pairs they will have. Populations with higher levels of inbreeding have an increased frequency of homozygous gene pairs than less inbred populations.

Two different genes at a site are known as a heterozygous pair. Heterozygosity can confer a performance boost for some traits. So, the loss of heterozygotes in the DNA may result in depressed performance, especially for survival traits. This drop is called inbreeding depression, the first risk.

The second risk of increased homozygosity is the increased prevalence of unwanted recessive genetic conditions that occurs when animals carry two copies of the deleterious recessive gene. BLAD is one such disease. In the heterozygous animal, the dominant non-deleterious variant protects it against expression of the disease.

The third disadvantage of inbreeding is the loss of genetic diversity in the population. Diversity brings choice - it provides a larger gene pool to select from. Genetically diverse populations would be more likely to be able to adapt to changing selection goals and have more opportunity for genetic gain than populations with low genetic diversity.

## Inbreeding depression effects

Although it affects survival traits more strongly, inbreeding depression can negatively impact all traits including health, production, reproduction, adaptability, longevity and conformation. The effects can vary with how long ago the inbreeding happened in the population. Ancient inbreeding tends to be less problematic than recent inbreeding due to the purging effect on the most deleterious genes, which have essentially been 'weeded out' over multiple generations.

Estimates on the impact of inbreeding depression vary between populations. Some studies found production effects of losses of 31 to 41 kg 305-day ECM yield, 1.4 to 1.7 kg protein and 1.1 to 1.3 kg fat per year per percent increase in inbreeding in Holstein Friesians. Lower solids concentration was noted in another study which found losses of 0.01% protein and 0.05% fat concentrations per 1% increase in inbreeding. Yet others reported increased somatic cell scores of 0.03 to 0.86, 2.5 d increased age at first calving, 8.8 d longer calving interval, 1% more stillbirths, 2% more dystocia and one even reported 0.7% more male calves![1]

A New Zealand estimate in 2020 reported an overall cost to BW of -7.16 $NZ per one percent increase in inbreeding per year, across all breeds.

There can be instances where individual inbred animals perform well. These animals are likely to be carrying a more favourable mix of genes from their ancestors, missing out on the unfavourable ones, thus having high genetic merit and exhibiting little to no inbreeding depression. Perhaps this gave rise to the old adage that if the cow born from an inbred mating performs well, then it is 'line bred' but if it disappoints, then it is 'inbred'. Two perspectives on the same reality! Unfortunately, research consistently suggests that accelerated inbreeding will more often result in disappointment than joy.

An important contributing factor to inbreeding in artificial breeding programmes can be the extensive use of elite bulls, which increases the overall level relatedness within a population. Bulls that are selected in the future, and made available for widespread use, will have an increased chance of being related to the cows in a herd. The conundrum is that elite bulls and cows tend to produce the elite animals in the next generation, while lower genetic merit animals, which may be less related to the herd, may also be less desirable to farmers.

Cow selection and targeted semen use within dairy herds to produce females may also reduce genetic diversity, and genomic selection is shortening generation intervals, opening the potential for relatedness to increase at a faster rate. All of this means that managing inbreeding is becoming very important for breeding programmes.

The primary focus of a breeding programme should be firmly on increasing genetic merit, while concurrently managing inbreeding. Strategies to counter inbreeding aim to increase heterozygosity in the population and include cross breeding and out-crossing.

## How can we manage inbreeding risks on farm?

The first thing to do on farm is ensure accurate recording of dam mating information, sire information and calving date for replacement progeny. The degree of inbreeding, represented by the 'inbreeding coefficient', is traditionally calculated by analysing the relatedness, based on pedigree information, of the animal's parents. It is expressed as the expected percentage of genome that is homozygous due to its parents being related. E.g., The offspring of a father-daughter mating is 25% inbred. For a half-sibling mating (son over father's daughter) it is 12.5% inbred.

If you want complete parentage accuracy, we can look at DNA sampling calves to confirm the genetics match back to dam and recorded bull. This is a relatively simple process requiring a tissue sample from the ear of the animal and it takes around 6 weeks to get the results back.

Running detailed inbreeding reports with your cows to prospective sires can maximise the benefits of the genetics that are performing well in your herd and allow multiple years of breeding to a bloodline.

Take care when selecting sires, you're going to use in your herd and remember that different genetics companies can own closely related bulls, so bloodlines may be the same across multiple companies.

1. Gutiérrez-Reinoso MA, Aponte PM and García-Herreros M (2022). A review of inbreeding depression in dairy cattle: current status, emerging control strategies, and future prospects. Journal of Dairy Research 89, 3-12. https://doi.org/10.1017/ S0022029922000188

# Latest bulls in the UK

**Take a look at the bulls below for an early opportunity to see the fantastic sires we will have on offer this autumn. It's never too early to get your order in...**

**118071 Glenmead SB Trapeze:** Efficiency is the key word when it comes to Trapeze. An A2A2 Spring Tralee Bass son, low liveweight at 507kg, making him a safe option for use on well grown heifers. Trapeze's dam is still a contract cow at 7 years old, a great innings and sign of a really strong cow family. Bred by Kevin and Felicity Clark from the Glenmead herd in the Bay of Plenty. Some of Trapeze's highlights are a gBW of 294, a fertility gBV of 3.6 and 0.55 in the udder with 62 daughters analysed so far.

- Breed Split: Holstein Friesian – F15 J1
- Proven
- Fat 5.1%
- Protein 4.1%
- Easy calving
- A2/A2

**318009 Tironui Superman ET:** Sired by Superstition out of the well proven Tironui Integ Meg, this sire from the Tironui Stud of Murray and Janet Gibb boasts an incredible combined milk solid BV of 73kg. Superman has certainly become a favourite proven bull, having daughters with great capacity and very good udders. Worthy of a special mention is the recent sale of a rising three-year-old sired by 318009 Tironui Superman for NZ$55 000, creating a New Zealand record!

- Breed Split: Jersey – J16
- Proven
- High solids
- No. 2 Jersey bull on the RAS List
- A2/A2

**317034 Heuven Super Wiseguy:** Wiseguy is Waikato-bred by Frank and Ida Van Heuven. He is a son of the top bull Superstition, and it's no surprise that Wiseguy is also breeding daughters with good size and liveweight. Positive attributes include his high fat and protein, good fertility (3.8%), and likeable management traits. Notable too is the longevity and high production down the maternal line, with 10 and more lactations for three most direct descendants in the pedigree.

- Breed Split: Jersey – J16
- Proven
- Short gestation length: - 6.3 days
- Good fertility
- A2/A2

**318021 Glanton Desi Banff:** This exciting bull from the Glanton stud of Rob and Alison Thwaites. Sired by Arrieta Terrific Desi ET, he is out of the well-proven B cow family, a half-brother of Baltic and is also related to Bastille. Noticeable is the super production of this cow family, with his dam Glanton Tana Blysse ET having a PW of 561 and multiple LWs exceeding 600. His grand dam, the matriarch Glanton Mans Blanche, was a super production cow with a highest LW of 717. No surprise then that Banff is a production specialist as well, with a combined milk solids gBV of 54kg mark, good size, and excellent somatic cell count at -0.51. He rates well with farmers on opinion overall and comes with excellent dairy conformation.

- Breed Split: Jersey – J16
- Proven
- Top 10 RAS list
- Great fertility
- Fat 6.5%
- Protein 4.7%
- A2/A2

**517055 Taramont Springtide:** An exciting bull selected for the premium product in NZ called Forward Pack, Springtide offers bucket loads of solids and phenomenal udders (1.07) to carry his impressive production. Bred by Jim and Sue Webster of Waitara, Taranaki.

- Breed Split: KiwiCross® – F10 J6
- Proven
- High Litres
- Excellent in the udder
- A2/A2

**518038 Werders Premonition:** Topping the RAS List, and bred by Thomas & Courtney Werder of Patea, this bull has come good on his predicted potential! Now with 149 herd tested daughters and 28 TOP (traits other than production) daughter inspections done. Premonition has a SCS of -0.47, an udder overall gBV of 0.66 and capacity gBV of 0.63. Sitting at 460gBW, Premonition, a Priests Sierra son, looks set for a considerable stint on the RAS list, with rock-solid cows in his back pedigree

- Breed Split: KiwiCross® – F8 J8
- Proven
- Easy calving
- High solids
- No. 1 KiwiCross® bull on the RAS List
- A2/A2

**518072 Deans Professional:** The perfect bull for heifers. An easy calving outcross. Professional is a son of the Jersey bull Besiege who never made it onto these shores. It's hard to find fault in Professional, with a fertility of 4.1 & BCS of 0.28, Professional will truly breed long lasting cows. Also, the unique thing about Professional is that he has a positive liveweight of 512kg even though he is a J9, so you won't drop much size. Breed Split: KiwiCross® – F7 J9

- Proven
- Fat 5.4%
- Protein 4.1%
- Easy calving
- A2/A2

**520033 Dowson Honenui ET:** If it's percentages you're looking for, Honenui is the bull for you, coming in with a massive 6% fat and 4.6% protein. Along with his excellent udder support and a capacity of 0.52 these will be stylish type cows that last forever with a fertility of 3.2. Breed Split: KiwiCross® – F7 J9

- Genomic
- Fat 6.0%
- Protein 4.6%
- Easy calving
- Excellent in the udder
- A2/A2



# Ten in Seven milking in the UK

**A review and a look at the opportunities with Pasture to Profit Consultant Piers Badnell.**

Brent Boyce, LIC FarmWise consultant in the Upper South Island of New Zealand, has been working with clients in New Zealand on variable milking times for many years. A number of UK producers saw his first YouTube presentation on 10 in 7 in late 2020. They tried it, and their results were good. It looked as though there was potential for 10 in 7 in the UK, so LIC UK asked Brent if he would present his findings which he did in November 2021. See the webinar on the LIC Europe YouTube channel - Alternative Milking Regimes: What are the options.

Since his presentation, 10 in 7 has started to grow in popularity, so I wanted to share the experiences of some people who've tried it.

Mark Hoskins, spring calving 420 cows in Wiltshire – Mark changed from twice a day to three times in two days before Brent's presentation and was part of the panel on our November 21 webinar.

He said it had gone so well that he was intending to go 10 in 7 in 2022. Mark started on once-a-day post calving for five weeks and then went 10 in 7. When I asked him how it had gone, he said "Brilliant, I have not looked back". That's a great start, so let's explore in more detail.

The cows adapted well and quickly, but at first Mark said they did not come to the gate. More to do with allocations than anything else, he believed 24-hour allocations would sort this. Body condition has been excellent which Mark puts down to 10 in 7. SCC has been good, submission in the first three weeks was 90%.

In terms of production, his herd peaked at 25 litres on twice a day and has peaked this year on 10 in 7 at 22.5 litres. But in terms of milk solids they peaked previously on twice a day at 2 Kg and 10 in 7 also at 2 Kg.

Mark will wait till the end of the season to see if there are any litres lost or if they are going to have a flatter lactation curve. He says there have been cost savings in terms of electricity, dairy chemicals, and labour. It's been a big win for himself and his team, allowing for later starts, more time for all the other essential jobs and time to think.

Mark commented he and his staff would not want to go back to twice a day and said how the system will help with staff retention. Overall the switch has been a success, and Mark looks forward to the end of season to see if there are any effects on yield and income.

Mark Read, spring calving 260 cows in Dorset – Mark is in the 'Moovin on up' discussion group with Mark Hoskins and like others has started 10 in 7 this spring. Mark started in the last week of April as he likes to milk twice a day at the start of calving to aid the management of colostrum cows. This also allows time, pre-breeding for the cows to settle.

Mark said the cows got used to it within three days which was faster than the staff did. Part of the move was due to Mark's weekend relief milker not being able to milk weekends anymore, so 10 in 7 simplifies the weekend and makes it manageable for one person. As an example, weekend milking's do take longer, this means there is more time during breeding to apply scratch cards and draft cows.

Mark says he can't see any downsides. For the first three to four pickups, the milk was down 18% but then came back and is now running on the same production as it did this time last year. It's better for people, including Mark and will help him retain his team.

Cow fertility is good with three-week submission rate at 87%, which is the highest it's been compared to recent years which were running at 83-85%. Body condition has been the best it has ever been at this time of year.

When asked about the negatives, the break sizes are a little complicated but practice will sort this out. Cost savings have not been seen yet and he will need new time clocks for water heating that will save on relief work, one day a week.

The lie ins are very good, and the cows adapted to it very quickly. Mark plans to milk 10 in 7 all year and may review his twice a day milking of colostrum's at the start of the season.

James Rowntree, spring calving 200 cows in North Yorkshire – James started 10 in 7 towards the end of the season last year and milked 10 in 7 from the start of this season and is loving it.

Milk is down by 4% but fertility is up and has made a significant difference to body condition. The season has been good, so it's a mixture of weather and 10 in 7. Three-week submission is 95% where in previous years it was 90-92% and he has not seen many returns. James has increased both cows and land and will eventually go once a day in the future, so 10 in 7 is a good halfway point.

The cows have adapted very easily, and it's made weekends and life a lot easier as James does not have many staff. In terms of allocation, the days where the cows are milked twice a day, they get a 12-hour allocation and on the days where they are milked once, they get 24-hour allocation.

The cows have adapted very well with no issues. Cost savings total £900 a quarter on electricity, lameness has improved, the cows are a lot more relaxed along with better body condition. SCC did rise to 250 but a milk recording found the culprit and now SCC is back to a normal 150.

James has been incredibly surprised at the lack of drop in production, with fat and

| Day | 7in10 |
|---|---|
| Monday | 5am-3pm |
| Tuesday | **10am** |
| Wednesday | 5am-3pm |
| Thursday | **10am** |
| Friday | 5am-3pm |
| Saturday | **10am** |
| Sunday | **8am** |
| **Milkings Week** | **10** |

protein up. At the back end of last year, they hit 6% fat and 4.2% protein. Normally in the spring, fat would drop to 4% but the lowest this spring was 4.25% and they're now running at 4.45% with 3.65% protein at the time of writing. Finally, due to 10 in 7 James has been able to graze paddocks he has never been able to before, which are a 1.5-2 kms walk and has seen no milk drop.

Guy Ford, spring calving 300 cows in Cheshire – Guy started 10 in 7 at the back end of last year and will go 10 in 7 again in September this year. Cow condition was good, no loss of production, solids up and no increase in SCC. A good lifestyle choice.

He kept the same morning milking times all the way through. Body condition is better, and the cows were content, the benefits were more positive than he anticipated. Cost savings have not been analysed yet but he's soon to do CFP, so that will show any. Once settled on 10 in 7 he was able to graze the cows until drying off in mid-December and it made grass allocation easier.

Other members of his discussion group have tried it and had good results. He was nervous of making the change but once he'd done it, he was very happy he had.

There are many similar positive themes running through all four businesses, with no negative points, but as yet it's still early days. As lactations and full financial implications are yet to be completed, it seems positive at the moment, so maybe 10 in 7 is something more spring calvers ought to consider for the reasons mentioned so far.

Here are my thoughts for autumn calvers based on the experience of spring calvers. The positives found by the spring calvers with 10 in 7 is certainly realisable by autumn calvers in late lactation. I would suggest from the time the cows are outside 24 hours in the spring, the positives listed are there for autumn calvers to take advantage of as well.

The biggest area is around attracting staff and retaining them, plus it's easier on cows without a reduction in yield. I'm not aware of any autumn calvers using 10 in 7 late lactation, maybe there's a greater risk around a drop in production. However if milking times as suggested are applied, udder memory should take care of production.

Perhaps upping the ante a little more, we should look at freshly calved autumn cows. Most grass based autumn calvers yield between 6000 and 7500 litres and so peak at between 25 to low 30's litres, depending on when planned start of calving is, and peak at or just before housing at night. Before housing at night, these cows grazing on 10 in 7 would drop their walking by 28% (energy use for walking - flat 2MJ ME / kilometre, rolling 3MJ ME/Km and steep 6MJ ME / Km).

Other benefits are fresh calved heifers would have less walking and, if allocated 24-hour paddocks, arguably could attain a greater dry matter intake or maximise their intake of quality as opposed to being last to a 12-hour break and then competing with older cows for what's left. On the people side of it, it would ease the start of calving before winter routine and breeding.

Just a thought! I think once cows are housed, the pressure around teat hygiene would make 10 in 7 risky, however my comment is there to be proven wrong by someone!

10 in 7 is potentially kinder on the cow and person(s), how can more cows and people benefit from it?

Thanks to those I've talked to: Mark Hoskins, Mark Read, James Rowntree & Guy Ford for their time and inspiration, and to Brent Boyce for his experience and starting the ball rolling...


Mark Hoskins


Guy Ford


James Rowntree

# Short Gestation Length (SGL) straws – a vital tool

**LIC sales manager Sally Pocock points out that at this time of year we look at mating results and assess the efforts that have been put in during the first 6 weeks of mating.**

Non-Return rates (NRR) can provide an indication of the conception rate and how successful our AI mating program has been in generating replacement heifers for the following season.

- Targets: 2-24 Day NRR target >64%
  18-24 day NRR target >70%
  (excluding sexed semen)
  Conception rate target >52%

| Non-Return Rate Calculation % | |
|---|---|
| (Eligible Matings - Eligible Returns) | x 100 |
| Eligible Matings | |

With these numbers the NRR makes an assumption of how many cows are in calf.

If we aren't completing aged pregnancy diagnosis, then we often have to wait until calving to see the results. Of course, by then it's too late to counter the impact of late mating and late calving cows.

So, what can we do?

Late calving cows have a significantly poorer survival in the herd; along with lost days in milk, more man hours spent with cows yet to calve, rearing and holding calves for longer on farm and the pressure on natural mating bulls with larger numbers of cows to service.

As block calvers we are in the race against time every year.

There are 12 weeks between the start of calving and start of mating. Meaning cows need to calve, resume cycling, be mated and conceive within 12 weeks to retain a 365 day calving interval.

This effectively limits the mating period to less than 12 weeks.

A NZ-genetics dairy cow comes on heat on average every 18-24 days and has a 50-60% chance of getting in calf per insemination. With many farms having a mating period length of around 11 weeks, there are a limited number of opportunities to get in calf.

In a block calving herd:

- Cows mated in the first two weeks of mating will get up to four chances to conceive.
- Those not mated by the end of week two only have three chances at best.
- If heats are missed or cows are late cycling, some will get only one or two opportunities to conceive.

Our early calving cows have an advantage.

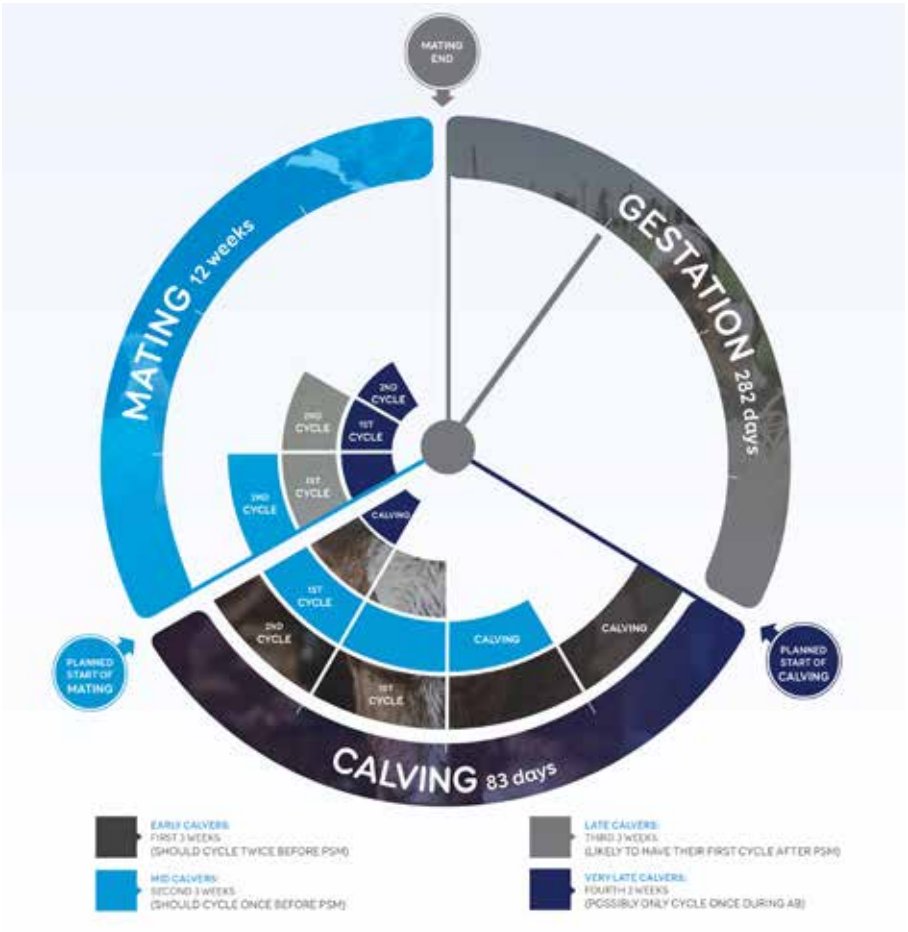
- An early calving cow has more time to recover postpartum.
- They have the opportunity for a 'practice cycle' or 'pre mating heat'.
- Second and subsequent heats generally are more fertile than a first heat.
- Cows calved in the first six weeks should perform better at the subsequent mating for both 6-week in calf rate and empty rates – winning the 'race against time'.

With this in mind we have several SGL options to help reduce the impact of late calving cows in our herd.

The first is to use a short gestation length beef bull from day 1 on cows that we've selected not to produce replacement animals from. Beef breeds are often longer in gestation length than dairy breeds.

Our short gestation Aberdeen Angus from the NZ Rissington herd, are examples. These bulls have been selectively bred for their gestation length, are 7.2 days shorter (on average) and will calve about the same time as your dairy replacement cows.

The Angus progeny are great beef calves and are suitable to continue growing for beef finishing.



A solid assessment of the previous season's mating and calving is required to implement a plan for the coming season to ensure our cows remain in the block year upon year.

A good program of selecting our best cows based on performance, health, early calving and strong heat for our replacement semen including sexed semen is a must.

Use beef on cows that you do not want to get a replacement animal from including those at risk of Johnes, or those poorer performing cows.

Using our bulls in reducing gestation length order to ensure our calving pattern remains tight and cows aren't calving too early for our feed budgeting.

Talk to your Farm Solutions Manager to find out more about creating a comprehensive breeding plan; to get the most out of using short gestation length bulls and to help keep your block tight to reduce the number of animals that are leaving your herd every year."

(Note: half of the gestation length is passed onto progeny - -20 days will result in cows calving 10 days shorter)

Our short gestation Hereford is an excellent option as the Hereford are very easy to identify when born and can create a 'marker' between replacement progeny and beef, and on average are 9 days shorter.

Short gestation bulls with high breeding worth produce both good genetic merit progeny for replacements and have a shorter gestation length. Using these in week 2 of mating will eliminate the number of cows that calve before planned start of mating.

Short gestation dairy bulls (SGL Dairy) are -20 days in gestation length and are bred specifically for their gestation length; other traits and genetic merit are not part of the selection criteria. As a result, these offspring should not be kept as herd replacements.

Dairy SGL calves are fully formed viable calves typical of their breed type. SGL is a naturally occurring trait, these calves have completed their full gestation length and have initiated their own birth just like any other calf.

Identifying these SGL animals is important. Utilising a 'marker' beef animal like a Hereford, calving before the SGL dairy calves, will allow for easy identification. Alternatively DNA progeny testing will provide certainty of parentage after calving.

Many farmers have had success utilising SGL dairy genetics at the tail end of the block.

Following analysis of AI mating and observation of natural mating bulls in the field, if there are too many cows still cycling, consider coming back in for 11 days of SGL dairy AI mating.

By SGL dairy AI mating the tail end cows, we can reduce the number of empty cows at the end of our mating period. As a result, they'll be calving in the block with the remainder of the herd and can remain active in the herd for longer.

SGL mating can provide a quick fix where sexed semen may have had a negative impact at the start of the block (due to poorer conception rates), we can use SGL to recover these cows and bring them forward if they have not successfully held to sexed.

| TARGETS | |
|---|---|
| 2-24 Day NRR target | >64% |
| 18-24 Day NRR target (excluding sexed semen) | >70% |
| Conception rate target | >52% |

| Non-Return Rate Calculation % | |
|---|---|
| (Eligible Matings - Eligible Returns) / Eligible Matings | x100 |

# Maximising production efficiency for the future

**Liveweight is back in the spotlight, as recent enhancements to the New Zealand BW model emphasise its relationship to farm profit. Feed conversion efficiency reflects the efficiency of feed utilisation by animals for production, including meat or milk. Here LIC's Joyce Voogt explains why this is so vital.**

As feed costs rise, highly efficient cows can help farmers maintain profitability, whatever the feed type. It reminds us again of a popular metric for efficiency amongst UK and Irish dairy farmers - 'kilograms of milk solids per kilogram of liveweight', with the rider 'and she'd better get back in calf', as Malcolm Ellis stated in the last issue of GrassRoots.

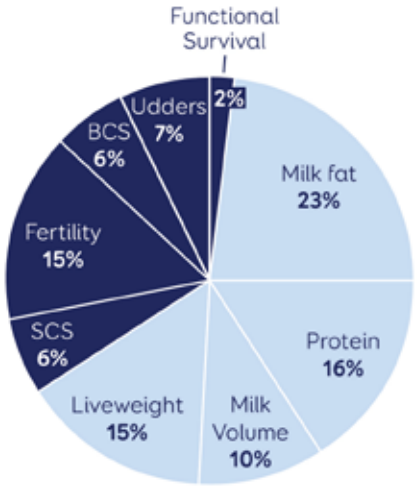
Within a herd there can be quite a range of production efficiency and it's useful to know who the most efficient cows are when determining your breeding programme.

The contribution of liveweight to the efficient conversion of feed to profit is clear in the BW (Breeding Worth) trait emphasis graph, Figure 1. Liveweight is a key factor in the production efficiency across all livestock sectors, as significant feed costs are associated with both growing and maintaining animals. In the context of dairy, it takes more feed to grow the larger cow to maturity, and more energy daily to maintain her.

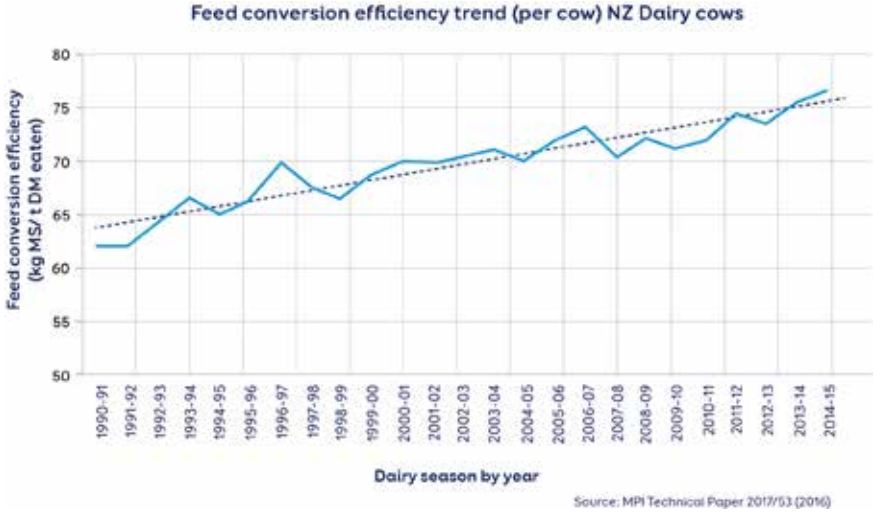
It takes 4.5MJ/ME/day to maintain an additional 50kgs of liveweight in mature dairy cows. That equates to just over 0.4kg of dry matter/day of 11/MJ/ME pasture, or about 150kgs/DM per year, in annual running costs for the cow.

The more expensive the feed, the more costly that difference will be, which is why farmers are encouraged to maximise annual intake of energy from high quality pasture, usually the cheapest form of feed in temperate climates. This requires maximising both pasture grown and eaten, and pasture quality. That might sound simple, but it takes great skill given climatic challenges on farm.

Farmers also need a cow that can harvest the grass efficiently, convert it to optimal milk production for profit, and get back in calf quickly while doing so. New Zealand genetics are tried and tested in the pasture dominant, seasonal calving systems. Latest figures report that 82% of feed consumed per cow in NZ is grazed pasture, with crops and harvested supplement comprising 10%, (mostly fodder beet and maize silage), and imported supplement less than 8%. (MPI Technical Paper No 2021/04).




Effective emphasis on individual traits within BW




Source: MPI Technical Paper 2017/53 (2016)

| Methane HoofPrint® Rating | Average Liveweight (est. mature) | MS/kg Lwt |
|---|---|---|
| 1 | 564 | 0.68 |
| 2 | 570 | 0.72 |
| 3 | 548 | 0.76 |
| 4 | 528 | 0.8 |
| 5 | 523 | 0.83 |
| 6 | 504 | 0.87 |
| 7 | 487 | 0.9 |
| 8 | 472 | 0.93 |
| 9 | 466 | 0.95 |
| 10 | 457 | 0.98 |

Table 1. Relationship between genetic estimates for HoofPrint®methane efficiency rating, liveweight and milk production efficiency in NZ dairy AI bulls. LIC (2020)

Production efficiency relates to how the animal partitions its feed. Each tonne of dry matter eaten is partitioned into grazing, walking, growth, condition gain, lactation, pregnancy, and body maintenance. Figure 2 shows the increasing efficiency of milk solids production in New Zealand per cow, per tonne of dry matter eaten. Management plays a part, but the gains are underpinned by genetics, with genetic trends showing increasing production BVs (breeding values), while liveweight BVs remain relatively static.

Liveweight also relates to environmental efficiency, as seen in LIC's HoofPrint® efficiency rating for methane, (Table 1). The performance of heavier liveweight BV animals is poorer on both methane and production efficiency in the model. Heavier animals need to consume more energy each day to be equally efficient on a kgMS/kgLwt basis.

They have more liveweight to maintain and must produce proportionately more outputs to compete kilo for kilo. Ideally, that intake should be from pasture if that is the cheapest high-quality feed available. Feed intakes do reach a limit in pasture-fed systems however, with 400kgs Jerseys on average, being able to eat about 4% of their liveweight (16kgs) as good quality grass and 550kgs Friesians about 3.3% (18kgs).

Larger cows find it harder to keep increasing pasture intakes to support increased production without receiving additional concentrate feed. Concentrates don't come cheap. Heavier animals may generate more revenue from carcass and calf revenue, but farmers may be surprised at just how much feed it takes to maintain that extra liveweight. See GrassRoots Issue 5 for more on lifetime energy partitioning.

Within each group in a herd there will be a range of cow efficiencies. Some larger cows can be highly efficient, but this may come at a higher feed cost. The trick is to discover the type of cow who is most efficient and profitable in the individual farm system, and to breed and keep more animals like her.

## Changes to BW improve liveweight estimations

The recent BW model enhancements have increased the accuracy of mature liveweight estimations. The changes have seen Friesian and Jersey average gBV differentials move closer together. Friesians saw a 4kgs drop in average liveweight BV, Crossbreds a lift of 2kgs, while Jerseys and Ayrshires saw a lift of 6kg and 15kgs respectively. (Figure 3).

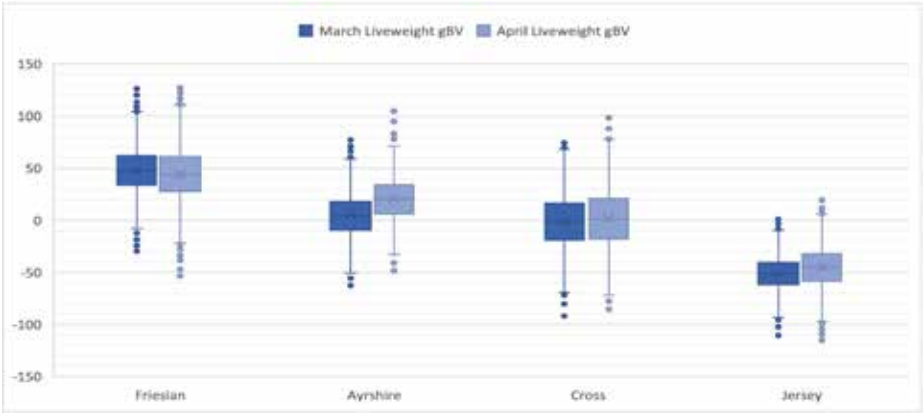
Overall, the BV averages remain similar, with some individual bull re-ranking.

The variation within breed increased with a 3-4kgs increase in standard deviation for AE enrolled bulls in Friesian, Jersey and FxJ Cross. The model changes had the effect of increasing the effective emphasis of liveweight in BW, an estimate of the profitability of an animal's offspring per 5t/DM consumed, compared to the genetic base. These enhancements support farmers breeding decisions with improved accuracy.

At times when fuel prices are high, it makes sense to run the highest performing, most fuel-efficient fleet of vehicles. As mentioned above the same principle applies on farm, using 'kilograms of milk solids per kilogram of liveweight' as a useful metric to compare cows within your herd for efficiency.

Cow bodyweight and milk recording data can give valuable insights on the most efficient type of cow in your system. The LIC UK sales team have been providing some excellent insights for customers in this regard in recent years, supporting farmers to identify their most efficient cows which in turn, helps inform breeding choices.

The Pasture to Profit consultant team have been helping farmers to increase production and harvest of high-quality feed. With the optimally efficient cow on farm and efficient production and harvest of pasture, farmers are better positioned to weather any storms current international uncertainty may bring to milk price.




# Diverse swards – are they fabulous or just a fad?

**Pasture to Profit consultant Bess Jowsey puts her thoughts forward**

Diverse swards, mixed species swards, herbal leys... they all refer to the practise of introducing greater plant diversity to our typical Perennial ryegrass (PRG) and clover grassland.

While true definitions are hard to pin down, the overriding definition involves combining three or more different plant families into the same sward – usually grasses, legumes and herbs. This may also include different varieties from within each plant family.

## So why have diverse swards become so trendy?

We care a great deal about the land and environment in which we farm. We work within biological systems that are intrinsically linked to nature. Therefore, observing how the natural world thrives without human interference seems a good place to start.

Nature's default setting is diversity. With everything we know about evolution there must be a good reason for this. Introducing greater diversity to mimic nature seems logical to farmers and is ultimately the reason I believe diverse swards are not just a passing fad.

Our general understanding of how soil really works is in its infancy. With a growing awareness that soil is a living biological organism, farmers are realising some long held well-researched practises need to be questioned, revisited and adapted to support the soil microbiome rather than disrupt it.

I'm not disputing that as pasture-based farmers it is a significant departure from what we know and trust, so there is plenty of scepticism about their suitability. But with environmental and social pressures mounting, and income opportunities rewarding these philosophies becoming more common, it seems that the adoption of plant diversity into swards is growing quickly.

## Drought tolerance

One of the useful benefits of diverse swards that is now fairly well acknowledged is that they are more dry and drought tolerant than PRG swards. The deeper root structures allow this. This rooting feature has also been linked to alleviating compaction and improving drainage in tight soils, as well as improving the carrying capacity of soils in wetter conditions.

Research in the UK and Ireland has demonstrated that after their first season, diverse swards can grow similar quantities of dry matter per hectare as PRG, and can do so with lower N inputs. Nutritional analysis of these swards has revealed them to be of comparable quality to PRG as well. (Google **Field Options sward diversity** or contact **germinal.com** for an update on their trials)

With carbon capture also a hot topic, it seems logical that the varied leaf and root architecture would draw additional carbon further down into the soil profile than PRG swards. Plant diversity increases the number of insects above and below the ground, provides additional food sources for pollinator species and encourages greater soil microbiology. These are some of the reasons why integrating diverse swards are considered a regenerative agriculture strategy.

There are also some challenges to consider. Before going through these it is worth mentioning that there is currently no research proven consistent results in grazing systems for the UK. Early adopters have reported a wide range of experiences and results, which is unsurprising given you are unable to manage each species optimally. Every species performs differently given the season, weather and how they are managed.

Establishment is deemed to be one of these challenges, however any type of sowing event contains risk. As always, diligent planning based on recommendations from your seed merchant in relation to your location, micro-climate and soil type should help reduce this.

## Just surviving or thriving?

Establishment risk also relates to the investment into different seed varieties, and how some species may not establish equivalent to the rates at which they are sown or may not appear at all. While this may seem like failure it is unfortunately part of 'letting nature do its thing'... some won't survive whilst some (hopefully most) will thrive.

The top tips for establishment as a reseed are to look to sow into warm soils when you will have adequate moisture and are least likely to encounter a weed burden. Ensure a very shallow sowing depth or broadcast, and then roll; seed to soil contact seems to be critical. Follow with a very light graze 6-8 weeks after emergence - avoid over grazing and limit poaching.

Species persistency is also seen as a challenge. Investment into sward renovation with grazing type PRG combined with

sound grassland management, we would expect to get at least ten years. Many report that some species, particularly the herbs, are likely to dwindle and sometimes disappear after 4-5 years. So maintaining a wider diversity may mean more frequent reseeding or developing an overseeding policy that works within your system.

Grazing management plays a huge role in how a diverse sward evolves over time. A typical 21 – 24 day rotation will favour grasses and will likely contribute to the decline in other species. Grazing down to the typical 1500 kgDM/ha residual can also favour grasses, therefore many early adopters extended round lengths on their diverse swards, entering at higher covers and leaving higher residuals.

## Get allocation right

They also used a mixture of these at different times of the year depending on the needs of the stock, and/or the needs of the sward. Plate meters are more inaccurate in predicting feed availability with diverse swards, however they are still a good tool for overall decision making. Allocation of diverse swards needs to be a balance between the pre-grazing measurement, the residuals, and the stock grazing behaviour, adjusting the offering when necessary. Surpluses can be harvested as silage or bales.

Probably the most important factor to consider if you are looking to use diverse swards are your goals. Be clear about what you are trying to achieve by using them, as this will influence many decisions in relation to mix selection, establishment techniques and subsequent management. It will also dictate what you deem to be success or failure. If a sward ends up being dominated by PRG and clover after 5 years is this going to disappoint you? Below are some farmer experiences to demonstrate this point.

Organic conversion – diverse swards being used to aid the conversion process, reactivate and improve soil microbiology. Based on pasture measuring data the diverse swards once established had less of a drop in productivity going through the conversion process than swards dominated by PRG.

Light dry soils that are prone to poor growth in dry spells – diverse swards have been used with great success to increase growth across the summer months by introducing species that thrive under these conditions, even in the more extreme conditions seen in summer 2018.

Improving water infiltration – diverse swards established as an experiment had the unintended impact of helping with drainage. A dipped field that frequently lay with water for long periods through winter no longer does so.

## Soil structure improvement

Improving soil structure – diverse swards established again as an experiment, has altered the carrying capacity of the soil. The ground feels firm under foot throughout the year regardless of the amount of sward cover. This includes during wet winters and is in stark contrast to neighbouring fields which in wet conditions or in winter, feel squishy and tacky.

Income opportunity – diverse swards established as part of an environmental scheme that are required to maintain diversity for extended periods of time. This was achieved by ensuring at some point during the growing season the sward was allowed to flower in an effort to improve species persistence. The flowering sward was then either grazed by dry stock or harvested as bales.

As mentioned earlier, the theory behind diverse swards seems to resonate with many farmers. A great deal of early adopters have done so in an experimental way, seeing it as an opportunity to learn to farm in greater partnership with nature, use less fertiliser, and try something a bit different.

The vast majority continue to use diverse swards within their systems, demonstrating that they believe there is value to be gained. Having said this, many have adapted the species they use, their establishment methods, and how they are managed by observing performance over seasons and years and how their management impacts on them. I would go as far as to say, some of these farmers would describe their diverse swards as fabulous as they have truly revolutionised the way they are able to graze across the year.

Historically we have looked to research to provide us with proof before implementing change. Diverse swards are an area of farm management that is being led predominantly by farmers. I believe the very nature of adding more diversity into a multifactorial biological system means traditional research methods are unlikely to provide farmers with a blueprint for guaranteed success on their farm, under their specific management.

If you are interested in adopting diverse swards into your farm system, we advise using them in the spirit of exploration and discovery. Look to local farmers or industry personnel who have experience at a practical level for your initial guidance. Given the various benefits they can offer, consider where on your farm to 'put them to the test'. Observe (and perhaps document) how they and the stock respond across the seasons and adapt management if you feel it's needed. Then use this experience to guide future selection, establishment and management policies. For more information google The Jena Experiment.

Diverse sward 'mixed salad' ready for grazing. Contains ryegrass, red and white clover, chicory and plantain

Mixed sward

Dry cows grazing a diverse sward

Diverse sward with high plantain content - plantain is one of the herd species that can persist well under grazing

# LIC conference visit in Ireland

The LIC teams got together for a three-day visit across Ireland in June and were treated to some excellent farm visits, plus half a day hearing about the latest research to come out of Moorepark.

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