Irish Grassland Association

Members' Information Booklet

Issue No. 47 Summer 2021

"To advance the knowledge of good grassland management in Irish farming"

Irish Grassland Association

CORPORATE MEMBERS 2021

Aurivo
abp
Acorn
AgriLand
AIB
BASF We create chemistry
Bank of Ireland
Barryroe
Bord Bia Irish Food Board
Bonanza calf nutrition
Dairymaster
Dawn Meats
DeLaval
An Roinn Talmhaíochta, Bia agus Mara Department of Agriculture, Food and the Marine
Devenish Nutrition the agri-technology company
FDC Group
Germinal Sowing future seeds
glanbia
Irish Farmers Journal
FM
FBD Insurance
Grasshopper™ www.moregrass.ie
Grassland Agro
Hygeia
ICBF.com
John Deere
Keenan an Alltech company
Kuhn
Kepak
Kerry Agribusiness
Mullinahone Co-op Est. 1893
MSD Animal Health
munster cattle breeding group
NitroFert
Teagasc Agriculture and Food Development Authority
Progressive Genetics
provimi shaping tomorrow's nutrition
volac
Supermac's
Target Fertilisers

Want to have your company logo on this page?
Contact the Irish Grassland Association office today...

Irish Grassland Association

CORPORATE MEMBERS 2021

AGRITECH www.agritech.ie
Allennutrition
Alltech ...naturally
ANIMAX veterinary technology
ANULAND
Corby Rock Mill Heart of Farming
Cork Grassland Services
CormacTagging Animal Identification Tags
Corteva agriscience Agriculture Division of DowDuPont
dairygold Golden Valleys, Growing Naturally AGRI BUSINESS
Dovea Genetics
DLF Seeds & Science
Drummonds Seeds Green Acres The Seed Specialists
Durapak for Animal Comfort and Crop Packaging
FARMEYE
Irish Independent farming
Goldcrop
Goulding
Grasstec Group
Greenvale Animal Feeds
ifac
The Irish Farmers' Association
IFA
IHFA Irish Holstein Friesian Association
interchem
JFC
Lakeland Dairies
Lallemand Lallemand Animal Nutrition
Lely –innovators in agriculture–
LIC
McHale
Nufarm
O'Donovan Engineering
Ornua The Home of Irish Dairy
Premier Molasses Delivering Solutions
Monsanto
TERRA NutriTECH Intelligent Herd Nutrition
Ulster Bank
Whelehan Crop Protection
YARA
zoetis

Kells, Co. Meath, Ireland. Tel: (087) 96 26 483
General Information: office@irishgrassland.ie www.irishgrassland.ie

Corporate membership commences on the 1st January annually.
Standard membership is deducted from all IGA members via direct debit on an annual basis.

Contents

DATES FOR YOUR DIARY

IGA Sheep event: June 22nd at 8pm, June 23rd at 8pm, June 24th at 8pm
IGA Beef event: July 13th at 8pm
IGA Dairy Summer Tour Live: July 21st at 11am

Follow us on

Irish Grassland Association IGA **@IrishGrassland**

Editorial

Matt O'Keeffe
Editor and
IGA Council Member

Grass is still the IGA's constitutional imperative.

The Irish Grassland Association was founded in 1946. As the constitution of the IGA affirms, the main objective for which the Association was established is to advance and spread the knowledge of the best grassland production and management practices available for the economic and sustainable development of Irish grass-based dairy, beef and sheep producers. That continues to be the raison d'etre of the Association.

In this Newsletter we outline the calendar of events the IGA will organise over the Summer months. Because of continuing Covid-induced travel restrictions and attendance limits on outdoor events, we have again adopted electronic technologies to provide virtual visits to many of the best livestock farms in Ireland and beyond. All the farms have a singular focus on manging grass to provide the core nutrition for their animals. Our virtual sheep events will highlight the significant efficiencies to be gained through excellent grassland management.

Our virtual beef event organisers will gain access to the largest suckler farm in the country. The management practices on the farm are applicable to every suckler, cattle and beef farm and should be considered a 'must view' event. Applying one of the benefits of hosting a virtual event, our Dairy Team has organised two host farms, 300 kms apart, one in Galway and the other in West Cork, both highlighting the ongoing benefits of clover inclusion in their grazing swards. The dates and details of our Virtual Dairy, Beef and Sheep Summer Tours are included in this Newsletter with further information available nearer the event dates on the IGA website. We are very grateful to our host farmers for sharing their experiences with the Irish Grassland Association membership.

We also thank the many contributors to this Newsletter, providing articles ranging from Soil Health to Future Economic and Environmental Sustainability. In our Archive section we remember Brian Hussey, a former IGA President, who died earlier this year. Brian made a hugely significant contribution to Irish agriculture in his long and varied career.

Finally, we look forward with hope and confidence that the essential collegial and social aspects of IGA membership can again be experienced in a few months time.

Matt O' Keeffe
IGA Editor

SUGGESTIONS & FEEDBACK PLEASE!

If you have any suggestions for the members information booklet or any particular topics or features you would like us to include in our forthcoming issues, please send them via email to office@irishgrassland.ie. We would love to hear from you!

The presidential Team L-R Paul Hyland Immediate Past President IGA, Stan Lalor President IGA and Christy Watson Vice President IGA

The Irish Grassland Association AGM

Maura Callery
IGA Office Manager

The Irish Grassland Association AGM is scheduled to take place in early September. As this is a good time away and lots of changes are still occurring with Covid19 restrictions, we are hoping that it will be possible for this meeting to be held in person in a hotel premises. Due to the logistical challenges in hosting events at present, it is paramount to register your interest if you wish to attend by emailing the office office@irishgrassland.ie no later than 1st July 2021.

A roundup of the year's activities will be presented by the outgoing President Stan Lalor and we will also welcome the new incoming President Christy Watson into office. Each year a small number of seats on our council can become available to be filled through election on foot of existing council members terms expiring. Last September we welcomed three new faces to our council namely, Alan Bohan, Finbar Kiernan and Tomás O'Leary. We saw the retirement of Eddie Gavin, Pat Donnellan and Ronan Delany.

IGA Annual Membership will be deducted from September. All fully paid-up members of the Irish Grassland Association for the previous term are eligible to be nominated for election. If you wish to put your name forward this year for election to our council, then please contact us to express your interest by emailing office@irishgrassland.ie no later than 9am Thursday 1st July 2021 with your supporting nominations. (Constitutionally we also need to receive two supporting nominations for you in writing from two current Irish Grassland Association members).

We have a very large volume of farming families involved in bringing our summer event showcases to you. We would like to take this opportunity on behalf of our President and Council to thank everyone involved in running these virtual events. We would also like to thank you, our loyal farming and corporate members for your continued support. We hope that you are all safe and well and we are really looking forward to meeting you all very soon again.

A virtual view of Irish dairy

Matt O' Keeffe
Irish Grassland Association
Council Member and Editor

The Irish Grassland Association Dairy Conference entitled 'Future proofing Irish dairying' took a remote format this year. It consisted of three punchy presentations, each followed by a questions and answer session chaired by IGA Council member and dairy farmer Laurence Sexton. Sponsored by Yara, the conference gave Irish dairy farmers a great insight into the future.

Jim Woulfe: 'Can we sell our milk?'
Dairygold's Chief Executive Jim Woulfe gave a comprehensive presentation on the outlook for dairy to attendees at the Irish Grassland Association's virtual Annual Dairy Conference last January. While being generally positive, Jim clearly outlined the challenges facing the sector and gave strong advice on what milk producers need to do to reassure consumers and purchasers of our dairy produce on international markets.

Lawrence Sexton Irish Grassland Association Council Member and Dairy Farmer

Jim Woulfe Dairygold Chief Executive

Listing Covid as an immediate issue, Jim's comments were reassuring, saying that with vaccinations and restrictions in the coming months, the biggest Covid-related challenges should be behind us by the turn of the year. Brexit poses more permanent challenges, the Dairygold chief confirmed, adding that while the Irish agri sector had prepared for the UK departure as well as possible there will be long term added costs to the supply chain, inevitably impacting on price. No conversation on dairy here or globally could be complete without reference to climate change and Jim Woulfe advised farmers to embrace the issue positively and deal with the relevant aspects including carbon emissions, ammonia, water quality and biodiversity.

Global outlook

The 'big picture' global forces impacting on food production were also outlined. These include, in Jim's estimation, ongoing political uncertainty, the need for economic stability, tariff wars, anti-microbial resistance and the rise of dairy alternatives. Underpinning the continued success of our dairy export industry will be the long-term dairy supply/demand equation, he added. While noting ongoing market volatility, Jim took some reassurance from historical developments in dairy consumption as well as confirming that current trends suggest a reasonable alignment between supply and demand on global markets.

The Dairygold CEO believes that continuing population growth, increased urbanisation especially in Asian dairy deficit regions, a growing middle class adopting increasingly dairy and meat-based diets and improving income trends should all have positive implications for dairy demand in the years ahead. Jim Woulfe also referenced the greater numbers of older people globally, all requiring the essential nutrients present in dairy products to maintain good health into old age.

Jim made his audience fully aware of the need to acknowledge the changing eating trends of global consumers and their expectations around food. He highlighted the need to build the dairy story around those expectations, especially in the sphere of health and wellness.

Grass-fed production model

Addressing milk producers directly, the Dairygold Chief Executive urged the adoption of grass-fed production standards that the Irish dairy industry can capitalise on to secure increased market share and added value. He insisted that accreditation will be necessary to provide proof to dairy buyers and consumers that our grass-fed dairy production system is valid. Kerrygold Butter's success in the USA is underpinned by an awareness of the unique grass-fed status that Irish butter enjoys, he added. An effective 'licence to produce' in future will include significant reductions in carbon footprint, water quality improvements, identifiable biodiversity planning as well as corrective measures being undertaken in relation to anti-microbial resistance. All of these, he warned, on top of operating sustainable farming business practices, applying excellence in animal welfare and the previously mentioned certifiable grass-fed production model.

Dr. Deirdre Hennessy: Rebalancing nitrogen input and milk output.

Teagasc researcher, Dr. Deirdre Hennessy discussed the challenge of maintaining herbage production with a lower N input. She put forward potential actions to mitigate the drive in European agricultural policy towards lowering inputs and less intensive agricultural production methodologies. Dr. Hennessy pointed out that filling potential chemical N deficiencies will necessitate more focus on maximising the value and use of available nitrogen from slurry and clover swards as well as optimising the benefits of allowable applications of chemical nitrogen.

Dr. Deirdre Hennessy
Teagasc

The Moorepark-based researcher outlined successful research results from Moorepark in reducing N surpluses and losses, increasing nitrogen efficiency, while achieving higher herbage production and milk solids. Deirdre advised greater management of fertiliser and grazing practices to more closely match inputs with outputs from the farm. She noted significant increases in herbage production from the inclusion of white clover in swards, allied to improved milk solids production. Doing nothing, Dr Hennessy warned, will result in in increased feed input costs and/or lower stocking rates. Optimum soil fertility, she concluded, will be an absolute necessity in future grass production strategies.

Tom O' Connell: The SPRING dairy farming strategy

The farmer experience at this year's IGA Dairy Conference was provided by Tom O' Connell from Cork. Tom highlighted his own experiences in promoting work/life balance on his farm while also being realistic in terms of expectations. He pointed to the value of planning ahead in order to achieve goals and explained the simple routine of using a whiteboard to establish priorities and necessary and immediate tasks to be undertaken on a weekly basis. "Get your ideas out of your head and onto a whiteboard" is Tom's mantra. His Spring routines, including calving and early grazing, were both practical and immediately adoptable on most dairy farms. The use of a diary to quickly enter calving details is again easily adopted and hugely beneficial for all farms. Tom's tactics are well worth viewing on the IGA website, where the conference is available for re-viewing.

Tom O'Connell
Dairy Farmer, Cork

Practical choices

With high numbers of cows calving in a short period, Tom O' Connell adopts a once-a-day milking routine until sixty percent of the herd is calved (achieved in three weeks). This has the obvious benefit of reducing labour requirements at a time of maximum labour demand. Calf management, especially in the crucial first few days of life was well described in the Cork dairy farmer's presentation. The emphasis, he insists, is on ease of management, high welfare standards and efficient use of labour. Good facilities, efficient labour utilisation, clear and simple communication all lead to a relatively stress-free environment, Tom concluded. His mantra is explained in an easily understood SPRING acronym: S=Simple Systems, P=Purchase time (labour, contractors), R=Rest, I=inventory (have all necessary inputs, purchases to hand), N=Necessary work and G=Good communication.

2021 IGA Sheep Event Preview

Alan Bohan
IGA Sheep Chairperson, Council Member and Sheep Ireland

The 2021 Irish Grassland Association Sheep event will be held online over three evenings on June 22nd, 23rd and 24th at 8 PM. These events are sponsored by Mullinahone Co Op. Due to Covid-19 restrictions the option of a farm tour was not possible, but in place of that we are holding an online event with a strong farmer focus. The theme for the event is 'The use of innovative practices to enhance flock management and performance'. The event will see three sheep farmers discuss their systems of production and will focus in on where each farmer has used innovative practices or technology to improve the management of their flock and increase overall flock performance. Each host farmer will discuss their farm and system of production, while video clips allow you to have a virtual stroll around the farm.

Host Farms

McGuinness Farm

The first speaker will be Peter McGuinness. Peter farms in partnership with his father Tom in Trim, Co. Meath. Over 800 ewes are lambed outdoors on the farm starting in mid-March. All single and twin bearing ewes are outwintered with triplets being housed. Grassland needs to be extremely well managed to allow for the out wintering of ewes and outdoor lambing from mid-March. Peter's excellent grassland management was acknowledged in 2020 when he received the award of Grassland Farmer of the Year in the sheep category. Once ewes are lambed the grassland focus turns to fattening lambs with ewes and lambs rotationally grazed in batches of 250 ewes and their lambs pre weaning and then lambs are grazed ahead of the ewes in a leader follower system post weaning. The high lamb performance achieved by the flock is demonstrated by 96% of lambs being drafted for slaughter in 2020 by October 1st with the remainder being sold as stores to allow the ewes to take grazing preference once again for the breeding season. The farm has 20 permanent paddocks that can be subdivided to manage grass at different times of the year and this along with 10% of the farm being reseeded annually allowed Peter to grow an impressive 13.7 tonnes of grass per hectare in 2020. Peter spent some time in New Zealand on work placement and it was there that he discovered the value and benefits of grass measurement. Peter embraced this technology and has implemented it on his own farm to great effect. Peter joined the Teagasc Grass10 program in 2019 and started measuring grass using a plate meter. Peter walks the farm on a weekly basis throughout the grazing season with up to 33 measurements taken throughout the year. All grass measurements are uploaded to PastureBase which helps Peter to manage the grass on the farm and to ensure there is always a good supply of good quality grass in front of the ewes and lambs right through the grazing season. The use of the PastureBase system also helps Peter to make decisions on what paddocks to skip in the rotation which ensures high quality grass for grazing but also high-quality silage from the skipped paddocks. The high level of grassland management means that the 13.7 tonnes of grass produced on farm supports a stocking rate of 10.5 ewes per hectare, produces silage for a beef finishing unit on farm and also supplies enough surplus grass to feed by 100 dairy heifers that are grazed on the farm on a daily rate during the summer months.

Cole Farm

The second speaker will be Alan Cole from Athy, Co. Kildare. Alan farms a flock of 200 mid-season lambing ewes and all lambs are finished on farm. There are multiple enterprises on the farm with spring barley, winter wheat and contract rearing of 60 dairy heifers meaning that the farm needs to be managed efficiently to ensure all enterprises run smoothly concurrently. Alan puts a big focus on grassland management for his sheep flock and dairy heifers. The high level of grassland management is helped by the excellent grassland infrastructure with the farm split into 20 main paddocks that can easily be subdivided when required. Alan's aim is to finish as many lambs as possible off grass and to achieve this he has a two-pronged approach.

Firstly, he ensures that lambs have an ample supply of fresh leafy grass in front of them at all times and secondly, he ensures the lambs are not under any parasitic burden that would hinder their performance. Alan is very aware of the effects a high worm burden can have on lambs' performance and the worm burden of his flock is measured frequently over the grazing season using faecal egg sampling. Faecal egg sampling serves two purposes for Alan, firstly it allows him to monitor the level of worm burden in the lambs and to treat the lambs with anthelmintics when required and secondly it allows him to manage the level of anthelmintic use on his farm to avoid the development of anthelmintic resistance. Frequent faecal egg counts allow Alan to only administer anthelmintics when the lambs are under a high worm burden which avoids the overuse of anthelmintics which can lead to anthelmintic resistance.

McGowan Farm

Our third speaker will be Neil McGowan of Incheoch Farms in Perthshire, Scotland where he farms alongside his wife Debbie. The McGowan's are farming 1,200 breeding ewes and 220 suckler cows on 485 hectares of upland ranging from 400 to 750 feet above sea level. The focus of the farm is to produce lamb and beef from grass and forage crops grown on farm. All ewes lamb outdoors from late April with minimal intervention. Of the 1,200 ewes on the farm there are 800 performance recorded Lleyn ewes and 100 performance recorded Texel ewes. Neil and Debbie use EID technology to record a large amount of data on each animal and from this estimated breeding values are produced allowing for the selection of the top performing animals to breed the next generation. Focusing on traits such as lambing ease, maternal ability and ewe efficiency allows the McGowan's to select for the most commercially viable ewes that need minimal shepherding. All sheep are involved in Faecal egg counting breeding programmes with the Lleyn and Texel breed societies to breed for better worm resistance. The careful selection for desirable traits has seen the twinning rate increase from 65% to 75% over the past 10 years and lamb liveweight at 150 days increase by 3.8kg in the same period. Grassland management is an area that is constantly being assessed to improve animal performance. All lambs are finished off grass or forage crops with no concentrate supplementation while ewes are outwintered on swedes. The aim of the farm is to produce functional, efficient, and robust sheep which are then sold onto other farmers for breeding at their annual on farm "Working genes" sale where they sell 80 to 90 rams. The achievements at Incheoch Farm have not gone unnoticed with Neil and Debbie being awarded the 2018 AgriScot Sheep Farmer of the year award and the 2020 Farmers Weekly Sheep Farmer of the year award.

IGA Beef Event 2021

Niall Claffey,
IGA Council Member
and Tradeforus

With Covid-19 restrictions preventing an on-farm tour again this year, the 2021 Irish Grassland Association Beef Event will take an online format - hitting mobile phone, tablet and laptop screens on Tuesday, July 6th – kicking off at 8:00pm. This event is kindly sponsored by Mullinahone Co Op.

This year's event will have something for everyone – for both Irish suckler and beef-finishing farmers. The online event will carry two different segments: 'Inside the gates of Ireland's largest suckler farm' and 'Back to basics; the benefits of grass inside and outside the farm gate'.

Progressive Irish farmers will lead the visual video production showcasing and outlining the management practises and tools – and the strategies implemented – to make their systems tick. Our last segment will examine the development of the grass-fed standard for Irish beef.

Inside the gates of Ireland's largest suckler farm

Our first farmer is **John Kingham**, the manager of Ireland's largest suckler enterprise - namely the Tateetra and Rathmore Farms - based in Co. Louth and Co. Meath. John and his team took the reins of the operation in September 2017 and have grown the herd size to 500 cows – consisting of Simmental, Limousin and Belgian Blue genetics.

The suckler herd spans across 1,000ac, with calving split between spring and autumn. All cattle are housed over the winter period. Looking around the paddocks on the farm, not one breed dominates in the herd, with a wide range of breeds visible and progeny are produced for several different markets.

While some heifers are kept and used as replacements on the farm, the backbone of the enterprise is the sale of these replacement heifers for breeding – with two very successful sales completed to-date. Most of the bull weanlings are sold direct off-farm for the export market, with a proportion of these destined for southern Europe.

During the breeding season, a large team of sires are introduced by way of AI and using stock bulls. The main breeds used are: Charolais; Limousin; Simmental; Red Angus; and Shorthorn. In addition to this - to produce as many heifers as possible - synchronisation is introduced on several cows and heifers each spring and sexed semen is used on these females.

The autumn-calving herd (200) normally commences calving during the last week of September or the first week of October, while the spring-calving herd (300) starts calving in January. Splitting the calving across spring and autumn eases the workload, but also provides buyers with more choice when choosing stock.

Prior to John taking over the farm and growing the herd, existing stock could graze in large fields for long periods. This system has since changed and a paddock system was introduced. In the height of the grazing season, large groups graze paddocks for three days before being moved onto the next paddock, with a rotation length of 18-20 days.

Regular weighing complements the system of production and a state-of-the-art cattle handling facility was recently constructed on the farm, along with improved wintering facilities for the large numbers present on the holding. Strict animal health protocols are adhered which maintain a high herd health status.

Back to basics; the benefits of grass inside and outside the farm gate

Next, we will find out more about the grass-fed standard for Irish beef. Firstly, we will hear from beef farmer, **Allen Callagy,** who will talk about the management of his beef-finishing enterprise and how his slaughtered animals qualify for the standard.

Allen farms in Co. Kildare in close proximity to the Meath border. The farm - which is fragmented and laid out in three blocks up to 4km from the farmyard - is all laid out in permanent pasture. The beef system is based on the purchase of 100 continental weanlings each autumn, with all stock brought through to beef.

Despite the difficulties of managing grass on a fragmented farm, Allen is determined to maximise live weight gain from grass and grass silage, and minimise the amount of purchased concentrate in the diet of the cattle.

Since joining a grass management course in Kildare, Allen has renewed his focus on grassland management. The Kildare-based farmer has substantially improved the grazing infrastructure on the farm and installed a new water system - with large water troughs and up to thirty additional paddocks.

He is already reaping the rewards of good grassland management, with not only more grass grown, but it is of a higher quality resulting in more cattle finished off grass without the need for concentrate input. In addition, grass silage regularly analyses over 73% DMD which is a great achievement from old permanent pasture.

The installation of additional paddocks and the new water system has revolutionised grazing practices on the farm. Allen gets great satisfaction from the fact that he is producing top-quality beef from predominantly home-grown resources - grass and grass silage.

According to Bord Bia, the rationale to create a grass-fed standard to market Irish beef is based upon evidence from research conducted with approximately 13,000 customers and consumers across Europe and in key international markets.

The research highlighted a significant market demand for grass-fed products. Grass-fed is a term that consumers are familiar with - that holds a positive association as premium.

Ireland is already strongly associated with grass-fed production. This evidence points to a real opportunity to use existing grass-fed strengths to create an ISO accredited national standard and deliver upon a clearly identified consumer desire for ethical, premium, natural and healthy beef.

Bord Bia has adapted the scope of the standard to accommodate young bull beef. This means young bull beef will now be eligible to be assessed in the grass-fed standard, along with steers, heifers and cows.

This standard will be implemented at processor level and utilises information provided by farmers in their Sustainable Beef and Lamb Assurance Scheme (SBLAS) audits to determine the grass-fed status of animals. The audit of standard will ensure processors are engaging with the Bord Bia database and performing checks correctly and - in turn - ensuring correct traceability, segregation and labelling of grass-fed product.

Young bulls will be treated the same as other animal categories, with their qualification as grass fed being dependent on meeting the criteria of the standard in relation to the proportion of grass in the diet and grazing days.

Our final speaker from Bord Bia, **Rory Mannion,** will dive a little bit closer into the inner workings of the standard – detailing the required criteria to be eligible for the standard. An update of progress to-date will also be provided with the benefits to the primary producer detailed.

IGA Dairy Summer Tour 2021

Stuart Childs
IGA Dairy Summer Tour
Chairperson and Council
Member & Teagasc

Focus on the management and potential of clover

While the country is are is gradually beginning to open up as the vaccination programme rolls out, unfortunately COVID-19 restrictions will again prevent us from being physically on-farm for our 2021 Irish Grassland Association Dairy Summer Tour supported by AIB.

But the show must go on, so we welcome farmers across the country to join the Irish Grassland team and sponsors AIB for a live online farm walk via our website www.irishgrassland.ie to explore the role of clover.

Throughout the hour and a half event at 11am on July 21st, we will take you from the start of the journey on the road to clover incorporation on your farm to what the future will hold for you following this journey. Being online allows us to bring you to see two farms that are nearly 300km apart. We will take you from the start of the journey on the road to clover incorporation on your farm to what the future will hold for you following this journey.

Commenting at the launch of this year's Summer Tour, Donal Whelton, Head of Agriculture, AIB said:

"Despite being the most sustainable producer of milk globally, Irish dairy farmers, wrongly, have all too often been portrayed in a very negative light within broader climate change discourse. While generally accepted that change is inevitable and required in certain instances, there is no other group in society as committed to truly being a fundamental part of the climate change solution as are Irish farmers. And it is Irish farmers who hold the innate carbon sequestration potential to offset the externalities of production.

AIB is delighted to once again partner with the Irish Grassland Association to provide, through experience and knowledge gleaned from these two progressive and forward thinking 'host' farmers, practical insights and strategies that can boost further not only the environmental sustainability of the Irish dairy sector, but also its economic sustainability'.

Kevin Moran

Kevin Moran farms near Caherlistrane, Co. Galway, and in the last few years has really focussed on reducing his nitrogen fertiliser inputs and incorporating clover on his farm. He is some of the way along his journey, and we will discuss with him how he is finding the transition, what challenges he has encountered along the way and what he is doing to overcome those challenges.

Photo courtesy of Aurivo Co Op

John Joe and Andrew O'Sullivan

Then we will attempt to take you 'back to the future' by visiting the farm of John Joe and Andrew O'Sullivan near Rosscarbery, Co. Cork. John Joe began using clover as part of his farming system in the mid to late nineties and still does so to this day. We will discuss what clover has done for John Joe in that time and what it continues to do for him and son Andrew, who is now working the farm with John Joe. How clover has been incorporated and more importantly maintained on their farm will be the focus with the O'Sullivans.

As there is much weight on the shoulders of clover to carry the livestock industry as a whole, but specifically help the dairy industry to reduce its reliance on chemical nitrogen, this online event will be of great interest to all. We look forward to welcoming you to Cork and Galway live at 11am on July 21st. Updates will be shared on our website (www.irishgrassland.ie) and our social media platforms closer to the date.

Multi-species swards for silage production

Thomas Moloney
DLF Seeds

Perennial ryegrass has been the species of choice for Irish grassland farmers for the last 50 years. The popularity of perennial ryegrass is not unfounded as it excels in a range of agronomic traits including ease of establishment, high yield potential, persistence and is well suited to both grazing and conservation systems. However, to achieve optimal performance, a high level of inorganic nitrogen input is required. Such requirement for high levels of fertiliser represents a significant challenge for grassland farmers at a time when sustainability, both financially and environmentally, is a growing concern.

The role of legumes.
Including legumes such as white and red clover in mixtures with ryegrass can increase herbage yields under grazing and cutting systems, respectively. These increases in herbage production reflect the complementary interactions that occur when species with different growth habits are grown together. In a grass-clover sward the best-known example of such complementarity is biological nitrogen fixation by rhizobia associated with the clover. As well as increasing herbage production, this biologically fixed nitrogen can reduce the amount of fertiliser nitrogen required, therefore reducing the cost of producing feed for livestock. There are also animal performance benefits associated with grass-clover swards as clover tends to increase the palatability, digestibility and protein content of the sward.

Complementary species.
Developing a grassland sward mixture beyond grass and clover species provides an opportunity for further complementary interactions that can enhance forage yields and quality throughout the growing season. For example, herbs like ribwort plantain and chicory are highly digestible, mineral-rich forage species but perhaps equally important is their strong summer production and drought tolerance thanks to deep tap roots. These traits can complement grasses in the sward as their production begins to decline in mid-summer.

There is increasing interest in how these multi-species swards can improve the productivity and sustainability of grass-based agricultural systems with a growing body of Irish research lead by institutions like UCD and Teagasc showing the potential positive effects associated with multi-species swards compared to grass swards. These benefits extend beyond increased DM yields and animal performance, there are numerous benefits for the environment including reduced requirement for nitrogen fertiliser and biodiversity.

The ensiling issue
However, one of the big gaps in our understanding of multi-species swards and a question repeatedly asked by farmers is 'can multi-species swards be ensiled?' Silage is the principal source of winter feed being produced on 82% of farms and after grazed grass is the second most important crop produced in Ireland. As well as producing a vital feedstuff, silage making is an important grass management tool which allows maximum utilisation of grass by storing spring and summer surpluses for use when demand exceeds supply. For multi-species swards to offer a viable alternative to perennial ryegrass swards, they must be at least suitable to a grazing regime where there is occasional silage harvesting.

Smartgrass project.
The Smartgrass project, a collaboration between UCD, AFBI and Teagasc and funded by DAFM, was one of the first research projects to examine the use of multi-species swards in Ireland. The project's general aim was to explore these swards' potential as a strategy to improve the sustainability of ruminant-based livestock production on Irish farms. The project focused on three main topics: sheep production, silage making and above- and below-ground biodiversity. My PhD addressed silage making and was carried out at Teagasc Grange with Drs Edward O'Riordan, Padraig O'Kiely and Helen Sheridan (UCD). The study at Grange assessed a range of grass monocultures, grass-red clover binary mixtures and more complex multi-species mixtures under a 4-cut annual silage harvesting regime. Additional treatments examined the effects of incremental rates of inorganic N application and date of first harvest. For the purpose of this article I will compare two multi-species mixtures (Mix 1: perennial ryegrass, timothy, red and white clover and Mix 2: perennial ryegrass, timothy, red clover, ribwort plantain and chicory) to a perennial ryegrass monoculture. The full report including results for the remaining sward treatments can be viewed in the links below.

Compare and contrast
The first set of objectives were to determine the herbage yield and quality response of the two multi-species mixtures when managed in an intensive four-cut annual silage regime. Comparisons were also made of the response of these mixtures and a perennial ryegrass monoculture to increasing rates of inorganic N fertiliser (0, 120, 240 or 360kg N/ha per year). Both multi-species mixtures produced greater annual yields than a perennial ryegrass sward, with the magnitude of this advantage greater at lower rates of inorganic N application (Figure 1).

Furthermore, Mix 2 had greater annual yields than Mix 1. This is likely due to the presence of ribwort plantain and chicory increasing the functional diversity of Mix 2 resulting in enhanced synergistic effects on production compared to Mix 1. Overall, herbage harvested from Mix 1 and Mix 2 was of lower digestibility and higher crude protein content than perennial ryegrass. The greater crude protein content can be explained by the presence of clover in the mixtures while the digestibility findings must be interpreted with caution. The actual animal performance by ruminants fed grass-clover swards is generally greater than those fed grass-only due to higher intakes and rate of digestion, however, *in vitro* DMD tests carried out in the laboratory do not account for such plant-animal interactions and can underestimate the true digestibility of grass-clover swards.

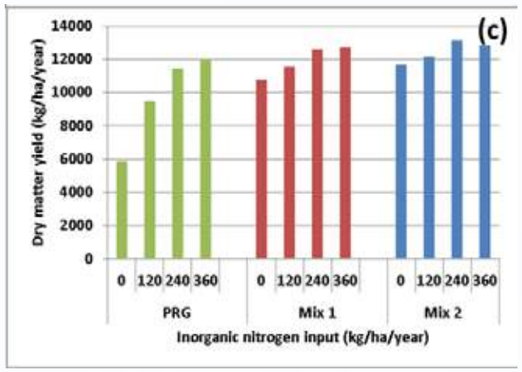

Figure 1: Annual DM yield of perennial ryegrass (PRG), Mix 1 and Mix 2 at inorganic nitrogen rates of 0, 120, 240 and 360 kg/ha per year.

Ensilability
The second set of objectives of the study were to assess the ensilability of herbage and the nutritive value of silages produced from Mix 1 and Mix 2 compared to perennial ryegrass. Despite herbage from the multi-species mixtures having apparently poor metrics of ensilability (low water-soluble carbohydrate content and high buffering capacity), under favourable ensiling conditions, the multi-species mixtures preserved comparatively well relative to perennial ryegrass. However, when crop conditions were poor i.e. excessive crop moisture, the multi-species mixtures preserved more poorly than perennial ryegrass. This finding suggests there is a greater requirement for an adequate period of rapid wilting and/or use of preservative when ensiling multi-species mixtures than perennial ryegrass swards. Silage digestibility was primarily influenced by the digestibility of herbage pre-ensiling for all sward types however where conservation losses were high silage digestibility was negatively affected.

Conclusions
The implications of these findings are significant for Irish farmers. On farms where rates of N application are low multi-species swards represent an opportunity to increase DM production, and thus animal output, without the extra N that would be required to achieve comparable gains with a perennial ryegrass sward. It is important to note that optimum soil fertility is required to achieve such gains. Conversely, on more highly stocked farms the use of multi-species swards may allow for a reduction in N fertiliser input while maintaining sward productivity.

In regard to silage production it has been shown that multi-species swards can be preserved successfully under optimal conditions. However, future research should aim to establish guidelines for successfully and efficiently ensiling multi-species swards. These guidelines will likely have much in common with those for perennial ryegrass but with some slight alterations. The animal performance response of feeding such silages also needs to be examined.

IGA Student Photo Competition runner-up

Cian Corcoran
UCD Ag Science student

My name is Cian Corcoran. I am 18 years old, and I am currently in my 1st of studying Agricultural Science in University College Dublin. I live on a farm near the village of Monasteraden in Co. Sligo. We keep a suckler herd, as well as sheep, and not forgetting 3 donkeys. The farm is spread across different areas, but most of the land located along the shores of Lough Gara. I have always had an interest in farming as long as I can remember. As a child I enjoyed doing the different jobs with my father and my older brother, feeding cattle, going to marts and getting spins in the tractor.

Farm agenda

The farm was 40 hectares but last year a neighbouring farm was purchased, this has allowed me to see what it is like to start out. I spent most of last summer fencing the new fields and making our own silage. This summer will be much the same. Currently there is approximately 65 hectares spread across 3 locations. We also replaced our Hereford bull with an Angus bull last year and in recent weeks we have been seeing his first calves. We have 30 suckler cows of various breeds, as well as a few purebred Herefords which we AI to keep for breeding and growing the herd. Cows due to calf are usually brough home to the calving shed and keep an eye on them. We sell on stock as store cattle. We keep a Texel ram with around 40 crossbred ewes, and all are lambed by Easter. We try let them lamb outside but bring them at night. My interest and view of farming as a future really took off in the last year. We all have had to spend more time than ever at home with lockdowns, but I count myself lucky because I could keep myself busy and get outdoors with the farming. I have become more invested, have a better appreciation and understanding of the farm now. In a normal year I would not be at home during the day but now I can run up to shed to check on the ewes lambing or cows calving between lecturers. It can be tiring to spend hours at a computer screen taking notes, checking on stock and be outside is a welcomed break from the computer.

Grass theme

On the farm it's easy to see how important grass is to the Irish farm. In Ireland we are lucky to have the advantage of a grass-based systems. Irish farms efficiently turn grass to beef, milk, or lamb, while keeping costs low and little to no environmental impact. I think organic, grass-based farming is the way forward, especially with the focus on minimising environmental impacts and emissions in all sectors but also because it is the traditional way to farm. It's this traditional way of farming that gives Ireland its green image that's famous across the world, making our products sought after by modern consumers. I believe grassland management is very important and is becoming more talked about. Any farmer can do a form of it as it often low-cost solution. We use strip grazing, paddocks as well as topping ground when stock comes off it as it really helps encourage new growth.

Ag Science

I chose to study in UCD because of the job opportunities for graduates and the ability to do professional work experience in 3rd year. As I am in the Agricultural Science Omnibus course, I get to pick a specialised degree to study for the next 3 years. This is a great route to go for anyone interested in agricultural science but not yet certain which area to specialise in. I hope to continue my studies in the Animal and Crop Production degree programme. I like this degree as it will give me a broad knowledge of both animal science, crop production as well as some of the business associated with it. With this degree I hope I will be able in the future to run my own farm part time as well work a professional career in the agricultural sector in the future.

The Photo

I wouldn't call myself a photographer by any means, but when out farming I sometimes take pictures of the natural scenes around me. The timing of this photo was very lucky to get the sun as it was setting. It's also one of the few pictures that I have taken that is not of the lake, I actually had my back to the lake in this one. I entered this photo into the competition last year and called it "Green Gold" as it literally shines a light on one of our most important resources, the Irish grassland.

Farming in Partnership

Eddie Connell,
IGA Council Member and
Sheep & Beef Farmer

Alan Bohan,
IGA Council Member
and Sheep Ireland

Farming 90 hectares in Clonbullogue Tullamore Co. Offaly, Aidan and Eddie Connell farm in a partnership where they run mixed farm with beef, tillage and sheep enterprises managed concurrently. The beef enterprise consists of 150 to 170 bull weanlings that are purchased each autumn at approximately 350 to 400 kg. The strongest of these bulls are finished out of the shed in the springtime of the year while the lesser animals are castrated and finished off grass by the end of the following year. Traditionally all the bull weanlings would have been left entire regardless of whether they were being finished indoors or off grass but due to discontinued markets for bulls and increased feed costs, Aidan and Eddie decided to castrate the majority of the bulls and finish them off grass which has improved the grass utilisation on the farm. The tillage enterprise on the farm consists of 15 hectares of winter barley which is mainly used as a source of feed and straw for the beef and sheep enterprises.

The sheep enterprise on the farm consists of a 400-ewe mid-season lambing flock with lambing commencing on March 1st. The ram effect is used at mating time to compact the lambing season and ewes are pregnancy scanned and housed in mid-December. The flock is prolific, consistently scanning 1.9 lambs per ewe joined and Eddie noted that at this scanning rate there was approximately 20% singles and 12% triplets which allows ample opportunity to cross foster triplet lambs. Cross fostering surplus lambs is the preferred option with artificially reared lambs being avoided, if possible, as the Connell's feel there is very little margin for profit when all inputs and labour are considered. This high scanning rate requires a good pre-lambing nutrition plan for the ewes to allow them to produce health lambs and to ensure the ewes have adequate colostrum post lambing. As the Connell's have their own barley on farm, they mix their own pre-lambing ration consisting of 50% barley, 25% beet pulp and 25% soya increasing to 30% two weeks pre lambing. A mineral package is also included ration to avoid any deficiencies in the ewes or lambs.

Once ewes and lambs are put out to grass the focus shifts to ensuring good quality grass is available at all times. A rotational grazing system is in place with paddocks being subdivided as needed to ensure fresh leafy grass is available to ensure good lamb performance. All lambs are finished off grass and are sold through the Offaly Lamb Producers Group with 1.65 to 1.70 lambs sold per ewe put to the ram. Although the aim is to finish all lambs off grass Aidan and Eddie admit that things do not always go to plan and they have had to supplement lambs when drought conditions effect grass growth or when wet conditions reduce dry matter intake, as happened in August of 2020. Eddie mentioned that if concentrate is introduced before the lambs were affected of the drop in grass quality, a relatively small amount of concentrates was sufficient to maintain lamb performance.

The main silage crop is saved in late May/early June and this means that there is a plentiful supply of after grass for lambs post weaning in late June. At weaning Aidan and Eddie would hope to have approximately 35% of their lambs drafted and very few lambs remaining on the farm by the 1st of October in any year. The lambs are managed in groups of 200 to 250 lambs to allow for easy handling and to also allow for mixed grazing along with the cattle. Mixed grazing improves the sward quality, reduces the worm burden on the lambs and in turn increases lamb performance. The lambs are regularly tested for worm burden using faecal egg counts and apart from a dose for nematodirus in April/May the lambs only receive one worm dose in mid-July.

By mid-July Aidan and Eddie are thinking of next year and are beginning to prepare the ewe flock for breeding in October. Ewes will be marked for culling for reasons such as mastitis, poor performance, lameness, and age with no 6-year-old ewes being retained in the flock. Aidan and Eddie have found that when these older ewes are retained, they can be troublesome with many having poor body condition, difficulty lambing or poor milk yield. The strict culling in the flock results in an annual replacement rate of 25% with all replacements purchased as hoggets in early August. Purchasing replacement hoggets from reliable sources rather than retaining their own replacements simplifies the systems and is an approach that is working well for the Connells. Purchasing replacements comes with risks with regards to biosecurity but Aidan and Eddie are well aware of these risks and have measures in place to counteract them. On arrival to the farm the new replacements are foot bathed, dosed for fluke and dosed for worms with two types of wormer and are kept inside for at least 24 hours. At this stage, the hoggets are vaccinated for enzootic abortion, toxoplasmosis and are also vaccinated with Heptavac P. Even with all the precautions mentioned above Aidan and Eddie still treat the new arrivals as a separate flock until post lambing, this acts as an extended quarantine period and also allows the hoggets to receive preferential treatment as they are still growing. New stock rams are sourced from the premier sales with Aidan and Eddie always choosing a 5 Star ram. The new rams are also treated as a biosecurity risk and are given similar treatment to the replacement females with regard to foot bathing, dosing, and a quarantine period upon arrival.

Aidan has previously worked in engineering and fabrication so in 2018 he drew up plans and set about constructing a new purpose built shed for the 400-ewe flock. The shed is 700 square meters, straw bedded and adaptable to housing cattle if required. Aidan was able to put his fabrication skills to good use by fitting out the shed interior to make it as user friendly as possible. Ewes can be fed from inside and outside the shed by one person without the need for walk through feeders. As Aidan qualified as a young farmer under the TAMS grant the Connell's were able to avail of the 60% grant on the first €80,000 of the shed cost and a further 40% on the remaining cost which made the project financially viable. The next stage of construction will see a handling unit added beside the shed this year to improve the handling facilities on the farm.

Aidan and Eddie are a great example of the benefits of a farm partnership where both parties can combine their skillsets and knowledge and work together to achieve the common goal of having a productive, sustainable, and profitable farm.

Development of a high-output grass-based spring milk production system

Nicholas Ryan[1], Zoe McKay[2], Finbarr Mulligan[1], Karina Pierce[2], Bridget Lynch[2], Ciaran McDonnell[2], Niall Walsh[2], Alan Fahey[2], Michael Wallace[2]

[1]School of Veterinary Medicine, University College Dublin, Ireland.
[2]School of Agriculture and Food Science, University College Dublin, Ireland.

Background

Researchers at UCD Lyons are trying to develop a high-output grass-based milk production system. In regions where it is possible to grow and graze large quantities of highly digestible perennial ryegrass, it is favourable to produce as much milk as possible from this low-cost feed source. However, dairy production systems that have been developed to utilise large quantities of grazed grass have mostly been based on low-output per cow. With these low-output systems, high levels of profitability are possible through avid cost control and comparatively high stocking rates. Reasons to consider the development of grazing systems that are based on high-output per cow include concerns about increasing dairy cow numbers and environmental emissions, facilitating farm expansion post EU-milk quota removal for land limited and fragmented farms, increased requirement for dairy product for export, lack of available skilled labour and infrastructure at farm level to deal with expanding animal numbers and concerns over the continued allowance of high-stocking rate systems within the EU nitrates directive derogation.

In this ongoing study, the animal and grassland performance for a grazing system based on high-output per cow and the resultant dairy production system profitability will be reported. The project began in 2016 and data has been collected for five full production years. To date, the system has been profitable, achievable and sustainable.

Project objectives:

- To develop a profitable high output grass-based spring milk production system.
- To incorporate the most recent advances in grassland management for dairy farms into a high output system.
- Use a type of dairy cow that has good genetic indices for both milk production and fertility.
- Employ the best practices from nutrition research and dairy cow husbandry.
- Incorporate nutritional studies into a high output system.
- To incorporate management technologies and system attributes that enhance the environmental sustainability of dairy production.

Targets of the system and milk production results to date

Maximising the use of grazed grass/home grown forage in the system by incorporating the most recent advances in grassland management and the strategic use of supplementation thereafter is one of the key aspects of the project. The performance target is 625 kg of milk solids per cow per lactation. This target is approximately 50% higher than the national average figure of approximately 417 kg of milk solids per cow. Milk yield and solids produced by the herd has steadily improved since the study began (Table 1). In 2016, 7407 kg and 588 kg MS/cow were produced. In 2020, the highest annual milk yield (7503 kg) and milk solids yield (606 kg) since the project began were recorded.

The current herd of 57 cows are in the top 1% of herds nationally with an EBI of €204, a milk sub-index of €69 and a fertility sub-index of €81 (January 2021 evaluation).

Table 1. Milk production and grassland performance of UCD high output grazing herd.

Parameter	Target	2016	2017	2018	2019	2020
Cow numbers	60	58	60	59	58	57
Milking area (ha)	17.64	17.58	17.65	17.65	17.52	17.43
Grass grown (t DM/ha on MP)	15.0	13.06	14.0	11.7	14.5	13.6
Herbage utilized (t DM/ha on MP)		11.4	12.2	10.0	13.5	12.1
Grazed grass utilized (t DM/ha on MP)		9.7	10.2	8.6	11.6	10.7
SR on MP	3.4*	3.3	3.4	3.34	3.3	3.27
SR whole farm	2.4	2.18	2.4	2.4	2.34	2.33
% heifers in herd	22	22.4	23.3	28	21	23
Average lactation days	305	301	305	305	305	305
Yield kg/cow (305d)	7,750	7,441	7,548	6,680	7,541	7,771
Milk solids kg/cow (305d)	625	592	602	558	597	621
Yield kg/cow (actual)	7,750	7,407	7,466	6,790	7,381	7,503
Milk solids kg/cow (actual)	625	588	595	544	586	606
Milk solids kg/ha MP	2,125	1,953	2,023	1,850	1,940	1,980
Milk solids kg/ha whole farm	1,521	1,291	1,428	1,306	1,386	1,413

**From 2021, the Target stocking rate on the milking platform will be 3.25 LU/ha.*

Fertility

High fertility targets are required for efficient seasonal grass-based milk production systems and the targets chosen are similar to those used to benchmark for lower output high fertility herds (75% 6-week in calf rate for the milking herd). Similar to milk production, fertility has improved since the project began (Table 2). In 2020, the 21-day Submission rate was 91% with a 1st service conception rate of 74%. Six week in calf rate was a very respectable 87%. The overall empty rate, including cows not selected for breeding, was 9%. High levels of fertility are currently being achieved with a group of cows that are within the top 5% of herds for fertility sub-index.

Table 2. Fertility performance of UCD high output grazing herd.

	2016	2017	2018	2019	2020
Number of cows bred	58 (of 58)	59 (of 60)	55 (of 60)	56 (of 58)	54 (of 57)
Length of breeding season (weeks)	12	13	12	10	10
Submission rate (%)	91	90	96	95	91
First service conception rate (%)	43	49	69	64	74
6-week in-calf rate (%)	59	54	83	79	87
Empty rate of total cows (%)	9	15*	13*	12*	9*

**Figure includes cows not selected for breeding.*

Feed Budget 2020

From a feeding perspective, the focus is to maximise grass intake with approximately 75% of the diet coming from grazed grass and grass silage (DM basis). On an as fed basis, the annual feed budget consists of approximately 94% grazed grass and grass silage. However, achieving over 600kgs milk solids will not happen with grass only and therefore cows are fed 1500kgs concentrates over the lactation to meet energy requirements. Cows are fed a flat rate as seen in Table 3 with high feeding rates for the first 4 months post-calving and high overall intakes are achieved.

Table 3. Feed budget of 2020

Days in milk	0 -20	21-60	61-90	91-120	121-180	181-240	241-270	271-305	306-343	344-365	Total annual (Est)	2020 Total annual (actual)
Silage kg DM/ cow/day	5	0	0	0	0	0	5	15	10.7	9.5	1.3t DM	1.7t DM
Grass kg DM/ cow/day	10	15	15	15	15	14	7.5	7.5	0	0	3.5t DM	3.3t DM
Concentrate kg/ cow/day	8	8	7.5	6	3.5	3	3	3	0	0	1.5t As fed	1.4t As fed

Grassland

The system has a very strong focus on growing and utilising as much grass as possible. Grass supply is measured weekly using a combination of cut and weigh, platemeter and visual assessment. Measurements are recorded on PastureBase Ireland. In 2019 the milking platform grew 14.5 t DM/ha, with 9.6 grazing's achieved on average per paddock with cows at grass for 263 days. Should paddocks grow a high cover, they are baled for silage. Grazed grass utilized equated to 11.6 tonnes of DM/ha in 2019, and overall utilisation was 93% (13.5 t DM/ha). In 2020, the milking platform grew 13.6 t DM/ha, despite a drought period in May and June. There were 8.5 grazings achieved on average per paddock with cows at grass for 246 days. Grazed grass utilized equated to 10.7 tonnes of DM/ha and overall utilisation was 89% (13.6 t DM/ha grass grown). In 2020, we incorporated protected urea and low emission slurry spreading into fertilising strategies. Two paddocks (1.82ha) were re-seeded with a mix of Abermagic (6.45kg/a), Aberclyde (4.3kg/a) and a white clover blend (1.25kg/a). The closing cover on 1st December 2020 was 711 kg DM/ha. In 2021, the opening cover was 791kg DM/ha (17th January 2021). Full time turnout was 16th February and cows were kept indoors for two days in March due to poor weather conditions. As of 1st April 2021, 966 kg DM/ha has been grown and the second grazing rotation has begun. As grass is the corner stone of this system, we continue to aim to maximise grazed grass intake throughout the year.

Findings to date

High levels of milk and milk solids output per cow and per ha are achievable from moderate concentrate feed input in a grazing system. These high levels of output are possible from cows that score highly on a selection index that has had a significant fertility component for some time. High levels of grass utilisation can also be achieved in higher output grazing systems. The system has also been found to deliver good levels of profitability and has a favourable life cycle analysis for carbon footprint.

Acknowledgements

The authors would like to acknowledge funding from the European Regional Development Fund through Enterprise Ireland (2016 to 2018) and from Dairy Research Ireland (2019 to 2021).

Future systems: Growing sustainably

Brendan Horan, Donal O'Brien & David Wall
Teagasc researchers

Introduction

The stellar performance of the Irish dairy sector over the last number of years has been unparalleled, both in terms of other indigenous sectors of the Irish economy or other international dairy industries. At the core of this success story are 18,000 family-owned dairy farms, producing over 7.6 billion litres of milk and supporting 60,000 jobs across the rural economy. This success has been achieved against a backdrop of increased global pressures to realign increasing food demand with more environmentally efficient production systems to meet climate change targets. The concept of sustainable intensification has recently been developed to increase productivity, while reducing environmental impacts. This means increasing yields per unit of inputs (including nutrients, water, energy, capital and land) as well as per unit of undesirable outputs (such as gaseous emissions, water pollution or biodiversity loss). Globally, grassland is the most important agroecosystem; it is capable of efficiently feeding ruminants with human inedible feeds, increasing soil carbon (C) storage and maintaining high quality biodiversity. Increasing public awareness of the impacts of agriculture on land use and climate change highlight the need for greater efficiency and sustainability in all aspects of agricultural production across the globe. On-farm production systems are at the centre of many of the challenges we face and need to adapt to these changing circumstances. This paper sets out both the challenges faced by the Irish dairy industry, and thereafter, describes the targets for future Irish dairy production systems including new research technologies that will assist farmers to realise these targets.

Why should Irish dairy farmers be concerned with sustainability?

In the context of an expanding, export-dependent agri-food sector, the sustainability of Ireland's dairy industry is now very much in focus. Customers, both at home and abroad, have become more engaged in the provenance, nutritive value and sustainability credentials of the food they consume. The business case for improving the environmental performance of dairy farms is compelling, as efficiencies gained also enhance the economic performance of a farm. At farm level, environmental sustainability comes down to minimising the amounts of resources used (e.g., nutrients, electricity, feed, water, etc.) to produce each kg of output. Indicators of sustainable intensification are essential to verify the comparative advantage of Irish pasture-based food production systems. Even under current regulations, Irish agriculture faces significant environmental constraints in terms of water quality, ammonia (NH_3) and greenhouse gas (GHG) emissions and biodiversity loss which may result in EU fines (NH_3) and the necessity for Ireland to purchase credits (GHG's) for exceeding target levels in the future. As Ireland has recently declared a national climate emergency, the Irish government is currently formulating targets for each sector to achieve a low carbon, climate-resilient and environmentally sustainable economy by 2050. As part of this national plan, agriculture (and land-use including forestry) will be required to reduce total emissions without compromising our capacity for sustainable food production. Irish dairy farmers need to be aware of, and proactive in, adapting dairy production systems to these new requirements.

What are the important sustainability metrics?

The environmental metrics that are of most concern in Ireland include air quality, water quality, energy use and biodiversity. Air quality measures of foremost importance include both GHG and NH_3 emissions, both per hectare and per kg of fat and protein corrected milk (FPCM). At the farm scale, N and P surplus (defined as the excess of N and P inputs in feeds and fertilisers less N and P exports in milk) and N and P use efficiency (defined as the amount of milk N and P produced relative to total N and P inputs) are commonly used as overall measures of the efficiency of nutrient use to minimise nutrient loss to water. Energy efficiency is measured as kiloWatt hours per 1,000 litres of milk sold (kWh/1,000 L). Biodiversity is measured in terms of the proportion of farming area with hedgerows and high value ecosystems. Although Irish pasture-based dairy systems have been widely heralded for our lower intensity of food production, the rapid expansion in the sector has increased total agricultural contributions across each of the metrics. The increase in Irish dairy production over the past number of years has been possible due to a 26% increase in the size of the national dairy herd. Using data compiled through its national farm survey, the recently published Teagasc National Farm Survey Sustainability Report tracked the performance of Irish farms in terms of environmental sustainability and sets out the challenge for a growing dairy industry. The report highlighted that farm level GHG and NH_3 emissions efficiency (per unit of product produced) has been improving, and Ireland is among the lowest in terms of emissions intensity when compared against international dairy industries. The recent expansion in animal numbers and area per farm, however, has resulted in increasing total emissions and stable nutrient surpluses on Irish farms.

Beginning with the end in mind

Sustainability is not just confined to environmental considerations, but also encompasses the economic well-being of those involved in farming, the quality of food produced and the welfare of animals. There is a growing understanding of the role of pasture-based food production in efficiently converting human inedible grazed forage to high quality human edible nutrients with a low environmental footprint. In contrast, confinement dairy systems use a large proportion of maize silage as the forage, which must be balanced by imported protein-rich feedstuffs. In effect, this outsources a considerable proportion of the environmental impacts to South America, where the expansion in soybean cultivation has been a major environmental concern. Permanent pastures also provide an important biological filter to reduce nutrient and chemical losses, conserve soils and store carbon, while also supporting high levels of biodiversity.

Core principles of efficient pasture-based grazing systems

Future pasture-based dairy systems will continue to be dependent on highly productive pastures combined with efficient ruminants (Table 1). Substantial additional gains in farm profitability can be achieved on most farms through refinement of Irish grazing systems. The greatest gains will come from increasing pasture production and utilisation followed by conversion to milk fat plus protein (milk solids; MS), and this will provide the primary avenue to improved environmental efficiency over the next two decades. Research modelling results indicate that for each 1 t DM/ha increase in pasture utilisation on dairy farms, GHG emission intensity is reduced by 4% and net farm profit is increased by €173/ha. Further improvements in pasture productivity can be realised by improving grazing management, reseeding unproductive swards and improving soil fertility to optimum levels. Optimising the soil pH to ≥ 6.3 through application of lime on acidic mineral grassland soils is vital to ensure efficient use of applied nutrients. Teagasc data indicates that a 10 day increase in grazing season length increased annual farm profitability by €30 per cow, and reduced GHG emissions by 2% per annum. In addition, where soils are maintained within the optimum soil pH range, productive grass and clover persist for longer, resulting in reduced cultivation and increased C sequestration.

The selection of more efficient dairy cows is also of paramount importance. From an animal breeding standpoint, there are two key improvement goals: firstly, extend the lifespan of each animal and reduce the requirement for replacements; and secondly, to further increase individual animal performance for grazed pasture. Increasing herd Economic Breeding Index (EBI) by Đ10 per year increases annual farm profitability (by Đ20/cow/yr) and reduces GHG emissions by 2% per annum. In addition, selection of dairy cows that are capable of achieving large intakes of forage relative to their size and genetic potential for milk production increases feed efficiency and also reduces nutrient losses. Efficient grazing animals should produce in excess of 90% of bodyweight in annual milk solids production to increase N use efficiency. On that basis, dairy farmers should aggressively select on EBI and use milk recording to eliminate inefficient animals to further advance both the economic and environmental efficiency of Irish dairy herds.

Table 1. Performance indicators for current average, top performing and future dairy systems.

	NFS[1]	Top 10%	Future Target
Net profit (€/ha incl. full labour)	473	1,032	2,500
Dairy Economic Breeding Index (€)[2]	86	122	200
Herd maturity (No. calvings/cow)[2]	3.4	4.1	4.5+
Calving rate (% calved in 42 days)[2]	64	85	90
Optimum soil fertility (% farm area)	10	75	100
Fertiliser N (kg chemical N/ha)	180	250	*150 - 250**
Grazing season length (No. days/cow)	235	265	280
Stocking rate (LU/ha)	2.1	2.3	2.8
Pasture utilised (t DM/ha)	7.3	9.6	13.0
Supplement (kg DM/cow)	1,050	910	500
Fat plus protein (kg sold/ ha)	825	1,021	1,350
Total GHG emissions (t CO_2 eq./ha)	9.2	13.9	12.6
GHG intensity (kg CO_2 eq./kg FPC milk)	1.14	1.00	0.71
Total Ammonia emissions (kg NH_3 eq./ha)	46.9	65.1	46.2
Ammonia intensity (kg NH_3 eq./'000 kg FPC milk)	6.2	4.8	2.6
Nitrogen/ Phosphorus surplus (kg N or P/ha)	164/10	225/9	160/10
Nitrogen / Phosphorus use efficiency (%)	25/62	26/70	35/85
Energy use (kWh/1,000L milk sold)	59	42	30
Biodiversity cover (% habitat area)	7	5-10	10+

[1]NFS: National Farm Survey (2015 to 2017), [2]ICBF (2018).

**Where an overall sward white clover content of 25% is achieved, chemical N can be reduced to 150 kg/ha*

Identifying the appropriate stocking rate (SR) is the key strategic decision for pasture-based dairy farms. This is generally defined as the number of animals allocated to an area of land (i.e., cows/ha). Although the beneficial impacts of SR on grazing system productivity have been widely reported, the impact of SR on environmental efficiency must also be considered. Previous studies have indicated that increased SR was associated with increased chemical fertiliser and supplementary feed importation, greater nutrient surpluses and reduced nutrient-use efficiency, resulting in increased losses to ground water and the general environment. Currently, the average Irish dairy farm has an average SR of 2.1 livestock units (LU) per hectare. Hence, any increase in farm SR needs to occur without greater usage of chemical fertiliser, and without an increase in concentrate supplementation per cow. Based on improved grazing management and soil fertility, increasing overall farm SR will result in increased pasture utilisation and improved farm profitability and environmental efficiency in the future. As a component of the sustainable intensification of dairy production, improved management practices are required to maintain low levels of nutrient loss within more intensive pasture-based systems, including greater use of organic manures to replace chemical fertiliser, more strategic use of chemical N, reduced cultivation reseeding, improved nutrient budgeting, and, importantly, the preferential management of higher risk farm areas. Previous studies have also reported that the C footprint of milk production will be reduced by maximising the use of grazed pasture at an appropriate overall SR. The optimum SR for farms that produce different amounts of pasture and feed different amounts of supplement is defined in Table 2 below.

Table 2. Stocking rate (cows/ha) that optimises profit on farms growing different amounts of grass and feeding different amounts of supplement/cow

	Grass grown, t DM/ha			
Kg supplement DM/cow	10	12	14	16
500	1.8	2.2	2.5	3.0
1,000	2.0	2.4	2.9	3.2

Farming for the future – new practices for intensive dairy farms

Irish dairy farmers have been to the forefront in terms of innovation over the last decade, which has contributed greatly to improvements in productivity within the sector. The adoption of the following research practices on intensive dairy farms could further reduce both emissions and nutrient losses and facilitate the achievement of the future industry targets set out in Table 1 above.

Grass clover swards

Traditionally, white clover was included in perennial ryegrass mixtures to improve sward nutritive value and reduce N fertiliser use. The availability of cheap N fertiliser, however, reduced the variability in pasture production during spring and increased overall pasture production. This led to a reduction in the use of white clover, with declining levels reported in temperate grazing regions such as Western Europe and New Zealand. Managing grassland with less mineral N fertiliser inputs and with greater reliance on biological N fixation from clover can reduce costs (less mineral N fertiliser), reduce GHG emissions (industrial synthesis of mineral N fertiliser is energy intensive) and increase the digestibility of herbage. Data was compiled from multiple studies to quantify the milk production response associated with introduction of clover into perennial ryegrass swards. At a mean sward clover content of 32%, mean daily milk and milk solids yield per cow were increased by 1.4 and 0.12 kg/day, respectively, compared with grass only swards. The same studies indicated that there is potential to replace up to 100 kg fertiliser N/ha, while maintaining output and profitability on intensive dairy farms where white clover content exceeds 25% of the sward biomass. Ongoing analysis of trial results indicate that the combined animal performance gains and cost saving from reduced N fertiliser use in ryegrass plus white clover pastures could increase annual farm profitability by €450/ha, while also educing GHG emissions by up to 10%.

There are, however, challenges with the adoption of white clover on dairy farms. The use of white clover is not widespread and may be problematic on wetland soils. The yield stability of white clover in intensively managed pastures remains problematic and the limited range of clover friendly grassland herbicides and risk of bloat in grazing livestock have discouraged some farmers. While research has shown the possibilities for overcoming these obstacles through improved grazing management, over-sowing swards and the use of bloat prevention technologies, further work is required to increase the stability and persistency of white clover and more generally encourage greater adoption.

Low Emissions Slurry Spreading (LESS)

Slurry is an important source of nutrients (N, P & K) and application to grassland must be properly timed to maximise the efficiency of nutrient capture and replenish soil fertility levels. The targeted application of slurry in spring, based on soil test results, will ensure the most efficient use of slurry nutrients for grass production and minimise potential NH_3 losses. Slurry N losses in the form of NH_3 emissions are potentially the largest loss of reactive N on Irish farms, with manure spreading responsible for a quarter of all NH_3 losses in Ireland. Using LESS methods, such as trailing shoe or band spreaders, has a large effect on N losses and increases slurry N value by 10%, thereby increasing pasture productivity and further reducing chemical N requirements.

Protected Urea Fertiliser

There is a strong yield response from ryegrass swards to supplemental N addition, including from mineral fertilisers. Loss of N, via NH_3 and nitrous oxide (N_2O) emissions and N leaching, however, must be reduced. Recent studies have shown that protecting urea with a urease inhibitor reduces loss of NH_3 to the environment by 80%. Furthermore, protected urea reduces N_2O losses by 71% compared with ammonium nitrate, without compromising productivity. Results from several studies indicate that protecting 50 kg/ha of urea-N will save 6 kg N/ha, which can increase the value of grass growth by

up to €40/ha per yr. Protected urea can help reduce N losses to water by holding N in ammonium form, which is more stable in soil particularly during wet conditions.

Reducing Concentrate Crude Protein Content

On average, Irish dairy cows have a requirement for a diet with a Crude Protein (CP) content of 15 to 17%. In general, high quality grazed pasture has a CP content in excess of 18% during the grazing season. Therefore, grazed grass more than adequately meets animal requirements for crude protein. Several studies have been completed during the last 10 years that showed no benefit from feeding rations with high CP content at pasture. Indeed, feeding high CP content concentrates during the grazing season provide excess CP to the dairy cow, who must then expend energy to excrete the excess N. From an environmental perspective, reducing concentrate CP content will reduce N surplus and loss to the environment. A 1% reduction in CP of dairy concentrates reduces N excretion by 1% and also results in a 5% reduction in GHG and NH_3 emissions. On that basis, using concentrates with a CP content of 12 to 14% is recommended when animals are at pasture.

Protecting Biodiversity

Biodiversity is an important primary environmental indicator of sustainable agricultural systems. Although extensively managed farmland will always provide the highest quality ecosystems, improving biodiversity on intensively-managed farms can also play an important role in halting the decline of farmland biodiversity and maintaining soil C. Pasture-based farming systems are uniquely well positioned to support wildlife within the landscape; it is estimated that natural habitats constitute 12-14% of the area of grassland farms in Ireland. Greater efforts are required to improve both the area and quality of high biodiversity habitats. Examples include maintaining and managing existing habitats such as hedgerows and field margins, and the inclusion of watercourse buffer strips.

Energy & Water Efficiency

Although average electricity costs on Irish dairy farms are €5 per 1,000 litres of milk produced, large variation exists between farms (from €2.60 to €8.70). The main energy uses are for milk cooling (31%), milking (20%) and water heating (23%). Teagasc research suggests that it is possible to reduce on farm electricity consumption, and related CO_2 emissions, by up to 60% and save over €2,500 (100 cow herd) by installing an effective milk pre-cooler (e.g. plate cooler), variable speed drives on the vacuum and milk pumps and solar photovoltaic systems.

Future opportunities - Methane reducing feed additives

Methane from the cow's digestive system is the main source of GHG/C emission from milk production. Numerous additives have been fed to cows to reduce methane emissions, but most are not effective, or their effect weakens after a short period i.e. 8 weeks. Moreover, some additives have a negative effect on animal production or the environment (e.g., the ozone layer). New research in the USA and Europe, however, indicates that mixing the inhibitor 3-NOP (3-nitrooxypropanol) into the feed ration or feeding plant extracts (e.g., Mootral™) can persistently reduce cow methane by up to 30% without any significant adverse effects, and may improve cow productivity. These additives are likely to be required to meet long term (2050) emission and food targets, but testing is required to determine if these additives reduce emissions in grazing dairy cows.

Conclusions

Improved efficiency in dairy systems is a significant challenge for the future. The world demand for food will increase further in the coming decades, but intensive milk production systems must become more sustainable with lower nutrient surpluses and increased emissions efficiency. Irish dairy farm systems can grow sustainably based on highly productive swards and genetically elite dairy cattle consuming a predominantly pasture diet. Considerable gains in both farm profitability and environmental efficiency can be achieved through incorporation of white clover into grassland swards coupled with the use of protected urea fertilisers and low emissions slurry application methods.

Understanding the basics of soil health

Andy Doyle
Irish Farmers Journal

Soil health might best be described as a well-balanced working biological system that processes and recycles nutrients, restructures damaged soil, facilitates root growth and water percolation and enables plants to grow to an optimum level. In some ways it me be equivalent to a healthy rumen.

This description will mean different things for different soils but health is not heavily correlated with soil fertility. Indeed, soil health can be more negatively than positively impacted by high soil fertility. That said, fertility is an element of one of the three pillars or legs of soil health which is important for the functioning of any soil.

For many years soil health has been completely ignored in modern farming systems and it is almost inevitable that low input soil systems have better soil health. But this does not have to be the case. Good soil health helps make better use of all resources that use the soil, including the plants. High grass growth rates are essential for the competitiveness of our livestock systems, but this must be done in a sustainable way to help ensure the long-term health of the soil, the pastures and the animals.

What is a healthy soil?

Soil health does not lend itself to precise definitions because soils are so fundamentally different. But a healthy soil must optimise the three main pillars of any functioning soil system and these relate to the physical, chemical and biological components of a soil. We have a moderate understanding of matters relating to the chemical nature of soils which relates to fertility and nutrient availability. We can recognise and see poor physical or structural characteristics of a soil and how it negatively impacts growth. But the biological leg is perhaps most important overall and least well understood or appreciated. In reality, biology is the key that unlocks the potential of the other two.

A healthy soil needs a balance between the three pillars or legs of the three-legged stool. Think of it this way -- fertility matters little in a soil that is highly compacted. If roots cannot grow through soil to access nutrients and water, above ground growth will be limited by nutrient availability rather than the presence of nutrients.

A healthy soil is only possible where all three pillars work in unison. The biology frees up nutrients from organic matter, it also helps repair damaged soil structure to provide an environment that enables good soil porosity and root growth. High root growth can access more water and nutrients to drive higher plant growth. But if any of these processes is damaged, all of them will be adversely affected.

Soil health is the relationship between the biology which cycles nutrients to enhance root and plant growth, the physical structure which helps air circulation, water percolation and root growth, and then fertility which is important to enhance growth capability. When any one of these functions becomes damaged the others work less well. Soils that suffer surface compaction are not conducive to root growth or nutrient uptake and do not respond well to fertiliser. Hence the need to protect and encourage the three legs to work in harmony.

The biology in soil

Soil biology may well be the most important of the three pillars of soil health. It is also the most ignored because it is least well understood. It is suggested that we only know about 1% of soil living organisms. It is difficult to envisage just how much life is present in a healthy soil. It involves the combination of the earthworms, insects and trillions of microorganisms. Together these provide very many agricultural and environmental services.

The challenge we face as farmers and custodians of the land is to ensure that this biological system remains active in our soils. And the only way that can be done is to feed them – if it is not fed, the organisms cannot survive or thrive.

The presence of earthworms is taken as a key indicator of soil healthy. They aerate the soil and their burrows act as channels for root growth and water percolation. Air is critical in soil to fuel microorganism activity to release nutrients. Soils should also perform other ecosystem services, but surface compaction makes it is very difficult for organisms to do that. If root growth is impeded by surface compaction, access to water and nutrients is impeded and plant growth is reduced.

Earthworms are also critical for the repair of damaged soil and structure is constantly damaged by nature, animals and machinery. Where earthworm burrows are present, the fine clay and silt get washed into the burrows with rain. This is then consumed by the earthworms, as well as organic materials, as they clean out their burrows. The mixture is later cast in the earthworms' excrement and other organisms then feed on it to produce a new crumb of soil.

This constant restructuring of damaged soil is essential to provide the environment for root growth.

Why are you reseeding?

Reseeding to potentially more productive grass species is an important pillar of good grassland management. But grass is a perennial crop and reseeding is expensive so one of the important things to ask is why is it necessary to reseed? This is an important question as grass needs to be resilient as well as functional.

As stated previously, good soil structure is important to maximise the physical growth of any plant species. But grazing when soil conditions are sub optimum also means that physical damage is inevitable. Increasing physical damage results in decreasing sward performance over time and this often leads to the decision to reseed. But the very practice of reseeding tears up the old shallow root structure which makes the next sod less resilient over time and the cycle continues.

So why did the current sward fail. Was it poaching, consistent structure damage, poor fertility etc? Whatever the cause you will only get value from a reseed over time if you address the main cause of the deterioration and do all you can to enhance the resilience of your soil.

What is resilience?

This is about making your sward durable and better able to withstand hardship. That means building a biological army in your soil and the simple basics of doing that is to feed them. But this means more than slurry. The main and most visible soil organism is the earthworm and we all know accept their importance. It is also accepted that big applications of slurry can, indirectly, result in earthworm deaths. All living things benefit from variety in their diet and why would earthworms be any different? The work they do in repairing damaged soil is critical to its productivity, arguably more important than fertility.
While soil structure is very important, a good deep root mass is also extremely important for resilience. A big root mass that locks the soil particles together helps to reduce soil damage and compaction. And that combination of existing roots, high biological activity and good soil structure is critical to help soil to recover where damage has occurred.

It is also worth noting that all the things that help health and resilience are very important to help get water off the surface quickly. And getting water down into the soil helps to reduce the risk of further soil damage. This percolating water is strained and cleaned in a healthy soil to minimise the loss of nutrients to water systems.

Why is soil structure important?

It is reasonable to ask why soil structure is so important to plant growth. Consider this starting point. For a plant to grow above ground it needs to have access to nutrients and water below ground. The amount of growth that can be produced is to some degree correlated to the amount of root growth that is possible below ground. The ease with which roots can grow is influenced by soil characteristics, its bulk density and structure and the presence of pores and channels created by roots or soil organisms.

While root systems can be very extensive, it is important to realise that nutrient and water to fuel plant growth can only be taken up by the root hairs which exist at the growing tip of a root only. As that tip grows through a fragment of soil that part of the root loses its hairs and no more nutrients can be extracted from that bit of soil until another new root grows in. In each bit of soil the hairs at the root tip have a relatively short life span which can be as little as a few hours in rapid growth conditions. So, it essential that a root can continue its growth and produce lots of branches, all of which have active growing points to take up more nutrient to fuel growth.

Are soil health and high grass growth compatible?

In most situations it should be possible to secure improved grass growth and have soil in a healthy and resilient state. But it seems inevitable that there will be some trade off where very high levels of performance are targeted. I have no idea where the optimum lies but it will always require care for the soil because damaged soil is not a high-yield environment.

Where soil is badly damaged physically, the solution is not just a matter of loosening it up and starting again with a new sward. Damaged soil takes time to repair and ongoing physical damage will just continue to shorten the life of a reseed.

Resilience for grazing in marginal soil conditions will be greatly helped by the presence of a dense and deep root system which acts like reinforcing in the soil. An old sod does many different things for a soil so we need better ways to establish improved varieties in existing swards, rather than just destroying the previous root system. Direct drilling establishment systems may force some level of trade-off as to the maximum amount of grass that can be grown in any year, but it may still provide a better seven-year average.

Additional sources of organic matter could also help this cause, with occasional topping being the most obvious. Building earthworm numbers is best done by having a big supply of organic matter on the soil surface where they can react to this food supply by increasing in number. Where toppings will not be available, any other organic matter source, preferably dry and coarse, would be useful to help build earthworm numbers. And when earthworm numbers build, they provide the food for the rest of the soil organisms to help restore soil health. But the bottom line is that soil will not be healthy if it is not being fed.

Grass10

John Maher,
Teagasc

Introduction
In pasture-based systems it has been shown that there is a strong relationship between the amount of grazed pasture in the diet and the costs of milk and meat production, with operating costs of production declining with increased reliance on grazed pasture. Ireland's comparative advantage in milk and meat production can be explained by the relative cost of grass, silage and concentrate feeds.

Recent industry reports (Food Harvest 2020 and Food Wise 2025) have highlighted the important role grass can play in future systems of livestock production. Additionally, grass-based systems of milk and meat production promote a sustainable, green, and high-quality image of animal production across the world. Recent Teagasc analysis has indicated that net profit per hectare is increased by €173/ha for each additional tonne of grass DM utilised on Irish dairy farms, with the corresponding figure for drystock farms being in the region of €105/ha.

Given this background, Teagasc launched a multi-year Grass10 initiative to promote sustainable grassland excellence on Irish livestock farms (dairy, beef and sheep). The primary objective of Grass10 was to utilise 10 tonnes of grass DM/ha/year using 10 grazings per paddock on grassland farms in Ireland.

Grassland Farmer of the Year initiative
Grass10 launched a grassland intiative to recognise those farmers who are achieving high levels of grass utilisation in a sustainable manner. The Grassland Farmer of the Year was launched in 2017 to coincide with the Year of Sustainable Grassland.

Farm practice change priorities.

- Grazing infrastructure — improve paddock layout, water system and farm roadways.
- Soil fertility — improve soil pH, P and K.
- Reseeding — reseed poor performing paddocks.
- increase both the number of farms and numbers of measurements/farm.
- Grassland management skills — improve the grassland skills of farmers

Grass measurements
The number of farmers recording 20 or more grass measurements to manage grass on their farms has increased by over 100% since Grass10 began. Increasing the level of grass measurement has been one of the key objectives of Grass10. The level of regular pasture measurement needs to increase to gain greater improvements in grassland management. To this end there has been a strong focus on training farmers to engage in regular grass measurement and data collection.

Table 1. Number of farms (Dairy & Drystock) who have completed 20 or more grass measurements annually over the last four years

Year	Dairy farms	Drystock farms	Total
2020	1623	116	1739
2019	1014	106	1120
2018	731	93	824
2017	739	70	809
2016	659	49	708

From Teagasc National Farm Survey data, grass utilisation per ha increased by 0.3 tonnes (7.7-8.0 tonnes of DM/ha) on dairy farms, while it remained static at 5.9 tonnes on drystock farms over the last few years. This corresponds to a grass production of 7.9 and 10.7 tonnes of DM/ha on drystock and dairy farms in 2019. The estimated 10.7 tonnes grass grown on dairy farms is much lower than the 13.6 tonnes of DM/ha recorded by dairy farms actively participating in Grass 10, indicating that there is still significant potential to grow more grass on the average dairy farm. There was a significant improvement in soil fertility over the period with about 20% of soils now at optimal soil fertility compared to 10% at the beginning of Grass10.

A farmer experience.
Here is one farmer's feedback on being involved in Grass10:

"I always like to have cows out grazing and get a lot of satisfaction from it. However, I felt I could do it better. The first thing I noticed from being part of Grass 10 was I didn't have to top paddocks anymore after grazing. I gained confidence in measuring and compiling grass growth figures and the grass wedge and this enabled me to take out paddocks that are too strong for grazing but at same time graze the right covers of grass. This improved milk solids because I was entering the paddock at the right time. Walking the farm and doing the measurements has allowed me to have better grass for my cows but I also grew more grass on the farm."

John Fox, Dairy farmer in Glenroe, Co. Limerick who milks 80 cows.

Grass10 communication
Under Grass10 there is regular and ongoing communication with participants. The grass measurements taken by grassland farmers are shared and the predicted grass growth for the upcoming week is included. Farmers daily grass management decisions are of huge importance to ensure good quality feed availability for the animals during the grazing season. Being able to predict grass growth for the following week at farm level would help farmers to better anticipate variations in grass growth. The Moorepark St Gilles Grass Growth (MoSt GG) model is a dynamic model working at the paddock and farm level. The model takes into account soil type, weather and the grazing management practice to predict farm grass growth.

Social media is also used effectively to communicate with Grass 10 advocates.

BRIAN HUSSEY

President of the Irish Grassland Association 1976/77

By Sean Flanagan, Former Teagasc researcher

Brian Hussey B.E. was elected President at the Irish Grassland Association's AGM held in the RDS, Ballsbridge during the Spring Show in May 1976. He farmed at Donard, Co. Wicklow, followed later in the 1980s by developing his interests in forestry new technologies for tree growing, culminating on his retirement in the 1990s as Restorer of Gregan Castle in Co. Clare.

Brian's tenure as IGA President was characterised by the organisational duties and arrangements for the 3-day International Conference on Grasslands held in Dublin in June 1977. The backdrop to this iconic event is worthy of recall. Arising from the build-up of R & D information in Ireland in the early 70s, the IGA Council submitted an application to the International Grassland Congress to host the 1977 Congress in Ireland. This application was supported by many research authorities operating in temperate climates around the world. However, when the vote was held at the 1973 Congress in Moscow, the decision was manipulated by holding the vote with the massed Soviet delegates participating. Leipzig in East Germany was chosen as the venue for 1977. The IGA Council seized the opportunity to organise its own conference as a follow-on to the Leipzig Congress. The subject theme was centred on the grass growing conditions operating in temperate climates overseas, namely, 'Animal Production from Temperate Grassland'. Twenty-one leading researchers were selected to present plenary papers and 53 offered papers were received in support. 365 delegates from all temperate zones including those in South America participated. The Social highlight for participants was the Wine Reception held in the National Gallery of Ireland, Merrion Square. As IGA President, it was Brian Hussey who secured the booking of this select venue where the Gallery's splendid array of exhibits was exposed to the scrutiny of delegates drawn from across the globe.

A Forester

Brian Hussey's diversification into forestry in the 80s was driven, firstly, by the ongoing downward pressures on farm commodity prices and, secondly, by his recognition of the huge natural advantages for growing wood in the Irish climate, two and a half times faster than overseas competitors. In the longer term the potential for higher profit per acre from growing trees was evident. He instigated the Woodland Investment Group Ltd. to attract investment funds to help the tree growing industry and became its Managing Director. New technologies in tree transplanting were imported from Sweden and a nursery for containerised seedling production was set up at the Irish Sugar Company in Tuam; it had a capacity for one million seedlings with four sowings per year. In the era of the REPS Scheme, however, a bias against forestry in favour of grassland farming prevailed, a continuing challenge. Forestry industry representatives sought new incentives. Speaking at an Irish Forestry Industry AGM, Brian Hussey as Deputy Chairman said that incentives to new entrants must be sufficient to balance those for other land uses. He called for similar concessions allowed to REPS farmers to be extended to forestry. "The returns to farmers from REPS is a problem for the forestry industry. We are looking to the Government for an improved strategy."

Restorer

Brian Hussey's range of capabilities were epitomised again following his move west to Co. Clare in the 90's. He had acquired land in the Burren. The property included a tract of woodland and scrub in which a thick clump of trees was subsequently found to contain the complete shell of a tower house castle. It was the historic Irish Family seat of the O'Lochlainn Princes of the Burren, Gregan Castle. It had been abandoned in the 18th. Century and lay forgotten. Driven by his ambitions for the concealed tower, Brian embarked on a four-year project of reconstruction of the ruin. Restoration of this historic Irish Family seat from its bare shell existence to a live-in residence was completed in 1997.

Brian Hussey died on February 2nd. 2021.

Design & Print Modern Printers 056 7721739