TEAGASC

May-June 2022 | Volume 33 | Number 3

Today's Farm

Business, production, environment and countryside issues www.teagasc.ie

Focus on Teagasc Grange research

- Beef from an all-grass forage diet
- Reducing methane emissions
- Earlier in-spec finishing
- Tackling BRD

....and much more

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IFI
Palmerstown, Kilkenny

contents

John and Micheal Casey, Causeway, Co Kerry. \Valerie Sullivan

Today's farm is a bi-monthly publication produced in a joint venture between Teagasc and the Agricultural Trust, publishers of the *Irish Farmers Journal* and *The Irish Field*.

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Cover: Walsh Scholar Sarah Burke and research technician Niamh Doyle are conducting research into multi-species swards at Teagasc Grange.

COMMENT

Mark Moore
Editor,
Today's Farm

Why open days are like buses

You wait for ages then two come along at almost the same time. Teagasc Athenry is holding an open day on June 18, where there will be a mix of technical presentations and interactive workshops dealing with all the main areas important to Irish sheep production.

On July 5, Teagasc Grange invites beef producers to come and hear about the extensive range of research projects there.

These events are not-to-be missed, given that they offer the chance to attend in person after several years of COVID-19 lockdown. See you there.

An fáth a bhfuil Laethanta Oscailte cosúil le busanna

Bíonn tú ag fanacht le fada agus ansin tagann dhá cheann ag an am céanna. Tá Teagasc i mBaile Átha an Rí le Lá Oscailte a reáchtáil ar an 18 Meitheamh, áit a mbeidh meascán de léirithe teicniúla agus ceardlanna idirghníomhacha ar na príomhréimsí ar fad a bhfuil tábhacht leo ó thaobh táirgeadh caorach in Éirinn de.

An 5 Iúil, tabharfaidh Teagasc sa Ghráinseach cuireadh do tháirgeoirí mairteola teacht le cloisteáil faoi raon leathan na dtionscadal taighde atá ar bun san ionad.

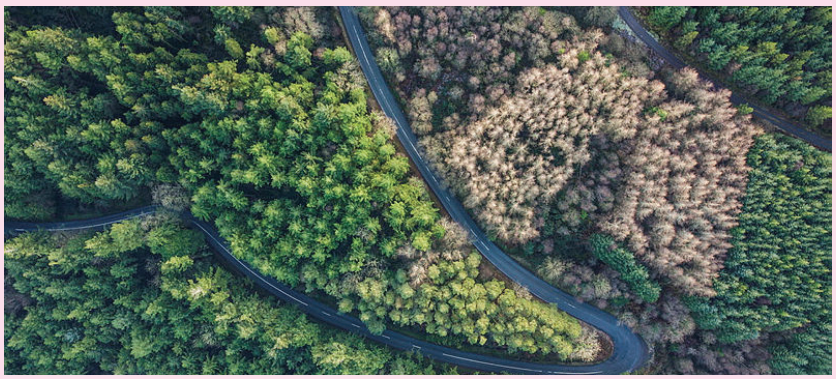
Deis iad na himeachtaí seo le bualadh le chéile den chéad uair ó tháinig COVID-19 ar an bhfód cúpla bliain ó shin – ná caill amach orthu! Feicfimid ann thú.

Forest recreational walks in 2022

Teagasc, in association with the Department of Agriculture, Food and the Marine (DAFM), is organising a nationwide series of forest walks from 9-20 May, focusing on forests that have a recreational element.

At each event, forestry experts from Teagasc and the Department will explore the many benefits of forests designed with recreation in mind. All are welcome to attend, with all events commencing at 7pm.

Registration is necessary at www.teagasc.ie/forests4recreation.



County	Nearest town	Date	Contact
Carlow	Rathvilly	12 May	Frances McHugh; 087 622 2111
Cavan	Belturbet	9 May	Kevin O'Connell; 087 121 6159
Cork	Mallow	9 May	John Case; 087 224 2283
Donegal	Manorcunningham	11 May	Steven Meyen; 087 677 5158
Kerry	Killarney	11 May	Jonathan Spazzi; 087 710 2739
Laois	Ballyroan	17 May	Liam Kelly; 087 909 0495
Mayo	Balla	12 May	Noel Kennedy; 087 909 0504
Meath	Kilmessan	17 May	Kevin O'Connell; 087 121 6159
Roscommon	Elphin	18 May	Noel Kennedy; 087 909 0504
Sligo	Tubbercurry	19 May	Kevin O'Connell; 087 121 6159
Tipperary	Killinaule	20 May	Michael Somers; 087 121 6163
Westmeath	Cloughan, Mullingar	10 May	Liam Kelly; 087 909 0495

Organic farm walk – Andrew and Leonie Workman

May 11

- Organic cereals and milling flour farm walk.
- **Venue**: Dunany Flour Organic, Drogheda, Co Louth.
- **Event time**:12pm.

See list of organic farm walks on inside back page.

Beef2022 Open Day – Supporting Sustainable Beef Farming

- **Venue**: Teagasc, Grange, Dunsany, Co Meath.

Getting to grips with the Summer Wedge on PastureBase – webinar

May 12

Join John Douglas and Joseph Dunphy, Teagasc Grass10, and Micheal O'Leary from PastureBase Ireland, along with 2021 Young Grassland Farmer of the Year Philip Tyndall, Co Wexford and 2021 Drystock Grassland Farmer of the Year Aidan Maguire as they discuss getting to grips with the Summer Wedge on PastureBase.

- **Venue:**Online.
- **Event time**:7pm.

Saturday 18 June 2022

Teagasc Sheep Open Day

An opportunity to review the latest research and technical advice from the Teagasc Sheep programme and its practical application at farm level.

- **Venue**: Teagasc Animal and Grassland Research and Innovation Centre, Athenry, Co Galway. Eircode: H65 R718.

Kildalton 50th year anniversary event

- **Venue**: Kildalton Agricultural and Horticultural College, Piltown, Co Kilkenny. Eircode: E32 YW08.

World Potato Congress 2022

30 May 2022 – 1 June 2022
- **Venue**: RDS, Dublin 4.
- **Event time**: -

The Changing World of the Potato

The Irish Potato Federation is proud to host the 11th World Potato Congress (WPC) 2022, which will take place in Ireland from 30 May–2 June 2022.

Founded in 1973, the Irish Potato Federation was originally set up to promote the interests of the wholesale potato trade in Ireland and promote potato consumption.

Today, it consists of 10 members, comprising potato growers, wholesalers, packers, importers and exporters of both seed and ware potatoes.

The Federation has been an active member of Europatat, the European Potato Trade Association, for over 40 years and is recognised by the Department of Agriculture, Food and the Marine and Bord Bia as the official negotiating body on behalf of the wholesale potato trade in Ireland.

Keep up-to-date in advance of BEEF 2022

The Beef Edge podcast is Teagasc's weekly beef podcast. Presented by Teagasc beef specialist Catherine Egan, the podcasts cover the latest news, information and advice to improve your beef farm performance. It is a free audio show that anyone with an iPhone, Android phone or computer can listen to.

You can listen anywhere and anytime. The podcast will be featuring a variety of interviews with Teagasc staff in advance of the BEEF 2022 open day, highlighting key stands and villages to visit on 5 July.

ADVERTORIAL

Don't underestimate the value of reseeding

Maeve Regan,
Head of Ruminant Nutrition, Agritech

With rising costs on farm, discussions around reducing expenditure in the short-term are ongoing. However, can we really consider putting a hold on our reseeding plans in 2022?

The straight answer here is no – research indicates that new grass, when compared to older permanent pasture, has the following benefits:

- 25% more responsive to applied nitrogen
- Results in more available grass during the shoulders of the season (typically periods of increased supplementation requirements)
- Results in faster re-growth
- Increases total annual production/ha

Economically, a low proportion of perennial ryegrass in the sward is costing the average dairy farm up to €300/ha in lost grass production during the growing season. When planning a reseed, the largest gains will be made by replacing the oldest/least productive swards. Farms should identify their poorest performing paddocks - paddocks with the least amount of grazings last year, paddocks with a low percentage of perennial ryegrass content, areas that typically have a slow regrowth following a cut/grazing, or typically have a poorer response to nitrogen application.

Clover Inclusion

Where reseeding or sward rejuvenation occurs, clover inclusions cannot be overlooked for obvious reasons. Clover is a crucial long-term investment on farm as its nitrogen fixing abilities will help mitigate against fertiliser prices.

With lots of interest currently around increasing clover content in the grazing platform, successful establishment of clover and the use of multi-species swards, an increased focus must be placed on soil fertility and good grassland management practices. Prior to reseeding, it is crucial to carry out soil tests for Phosphorus (P), Potassium (K) and pH. Ideally, fertility status of the area selected for reseeding/sward rejuvenation should be in Index 3 for P & K, with a target pH of 6.3 or above.

For further reseeding advice or to learn more about our 2022 Tipperary Grass Seed Range, contact your local Agritech Sales Advisor or visit www.agritech.ie

Teagasc Grange – beef

Beef 2022 – Supporting sustainable beef farming

Paul Crosson
Head of Beef Enterprise

Pearse Kelly
Head of Teagasc Drystock Knowledge Transfer

The theme of BEEF2022 is 'Supporting Sustainable Beef Farming'. Best practice and latest research findings in relation to grazing management, animal nutrition, beef genetics, reproductive management, animal health and farm planning are the main focus.

Key questions to be addressed include:

- What is the most suitable beef production system for you and your farm?
- What are the key performance targets for efficient beef systems?
- How do you meet these performance targets?
- How can beef farmers farm profitability in the context of extreme price volatility?

The core technologies and management practices for efficient beef farms will be covered within 'Technology Villages'. These will include:

- **Environment, including Signpost Farms:** An overview of the pathways to carbon neutrality and broader aspects of environmentally sustainable beef farm systems.
- **Sustainable grassland:** Latest research and best practice in grassland management.
- **Suckling systems:** Including participants from the 'Future Beef Programme' and updates from the Derrypatrick and Newford Herds.
- **Dairy-beef systems:** The Grange dairy-beef systems experiment, the 'DairyBeef 500 Campaign' and key elements of successful dairy calf-to-beef systems.
- **Growing and finishing cattle village:** Grass-based and indoor finishing systems, including nutrition, genetics and health.
- **Meat quality:** Including a large presence from Bord Bia highlighting the importance of grass-fed beef and Quality Assurance as unique selling points for international customers.
- **Advisory and education:** An overview of the pathways for a career in agriculture, issues around succession and inheritance and the implications of policy reform.
- **Farming lifestyle:** Beef farms are overwhelmingly family farm business and therefore health and safety and achieving a good work-life balance is critical.

There will be live displays in relation to low emissions slurry application, grazing management and health and safety throughout the day. Livestock from various suckler and dairy-beef studies at Grange will be on display.

There will also be workshops on calf rearing, anti-microbial and anthelmintic resistance, drafting cattle for slaughter and two-year-old calving.

In the afternoon, there will be a forum on the sustainability of Irish beef farming. Irish beef is known globally for its high standard of production and nutritional benefits. It is predominantly grass-fed, pasture-raised and fully traceable from farm to fork.

Irish beef has a very low carbon footprint and farms are audited every 18 months, with the aim of lowering it further. Family-run beef farms are the backbone of rural communities in Ireland. In the afternoon, a panel of experts will address these credentials.

BEEF2022 is your opportunity to see first-hand the results of Teagasc's comprehensive research and innovation programme and to meet Teagasc research, advisory and education staff. We look forward to meeting you on Tuesday 5 July.

Multi-species swards and slaughter age reduction

Edward O'Riordan, Sarah Burke, Paul Crosson, Mark McGee
AGRIC, Teagasc Grange

Sarah Burke.

Irish agriculture, including beef farming, has obligations under EU and national legislation to reduce greenhouse gas (GHG) emissions and losses of nitrogen (N) and other nutrients to the environment. The recent increase in farm input prices, especially fertiliser and feed costs, brings additional challenges. Consequently, low-cost efficient grass-based beef production is now more important than ever.

For many decades, perennial ryegrass has been the dominant, sometimes the only, constituent included in grass seed mixtures used to renew grassland. More recently, white clover is included.

Compared to 'grass'-based swards, Grange research has shown the capacity of white clover inclusion to fix atmospheric N, resulting in annual savings of chemical fertiliser, equivalent to 100-150kg N/ha, for beef cattle grazing systems.

There is now increasing interest in using 'multi-species' swards, which include grasses (perennial ryegrass and other grasses), legumes (white and red clover) and herbs/forbs (e.g chicory and plantain), to further exploit complementarity between pasture species.

For example, recent studies at Grange have found increases in annual herbage yield of up to 25% for multi-species swards compared to perennial ryegrass swards, especially so at lower fertiliser nitrogen inputs.

Multi-species swards may represent an opportunity to enhance the sustainability of beef production through more consistent pasture supply, increased nutritive value, anthelminthic properties, benefits in N-excretion, and ultimately, better animal performance.

When allied to lower fertiliser nitrogen inputs, the associated environmental footprint is potentially reduced; however, these characteristics need to be quantified for Irish production systems.

A source of inefficiency in beef cattle production systems is the failure to meet live weight targets throughout the animals' lifetime, resulting in animals being older at slaughter.

Consequently, lifetime production costs, which are mainly feed-related, and the associated environmental emissions, particularly methane and nitrogen, are increased.

Nationally, mean age at slaughter for late-maturing suckler-bred steers, the predominant breed type from the suckler herd, is 28-months, which is five months later than achieved in grass-based research systems and high-performing commercial farms.

Within beef production systems, older animals at slaughter are generally less profitable and have a substantially higher environmental footprint.

A challenge with younger slaughter ages on lower-cost grass-based systems is achieving adequate carcass fatness, which is currently a key market requirement, and attaining this fatness is especially demanding with late-maturing genotypes.

Thus, identifying late-maturing genotypes with greater genetic propensity for subcutaneous fat deposition leading to younger slaughter ages may be a strategy to circumvent this problem.

Taking these emerging demands, the objective of this research project is to assess the impact of pasture-type (grass-clover versus 'multi-species' grazing swards and silage), genetic divergence for fatness in late-maturing breeds, and slaughter age (19, 24 and 28 months), on the biological, financial and environmental performance of suckler weanling-to-beef production systems.

Teagasc Grange – beef

Production of beef from an all-grass forage diet

Edward O'Riordan, Peter Doyle, Mark McGee, Aidan Moloney and Paul Crosson
Teagasc Grange

Pasture-only production systems allow beef to be marketed as 'grass-fed', providing further high-value market opportunities for Irish beef.

In the context of the 'feed-food debate', such forage-only diets can further enhance the sustainability of beef production. This is because only feedstuffs that are not directly edible by humans are consumed by the livestock (i.e grazed pasture and grass silage) and these are converted into high-quality human food.

In Irish suckler calf-to-beef systems, where animals spend up to eight months annually at pasture, grazed pasture and grass silage accounts for around 90% of feed consumed.

Removing relatively expensive concentrates from the diet of beef cattle will require animal performance from pasture, both grazed and conserved, to be increased.

The success of such systems depends on excellent grassland management, where individual animal growth rates are maximised, and on the ability to produce high-quality silage for the winter where optimum indoor performance for both growing and finishing animals is required.

Grass forage-only beef production systems pose a number of challenges at farm level. These include achieving liveweight targets at critical points in the animal's lifetime, as well as attaining a minimum carcass fat cover (2+, 6 on a scale of 1-15) especially at younger slaughter ages, which can be more difficult to achieve without strategic concentrate supplementation.

Failing to achieve key growth targets leads to older animals at slaughter, which can be a source of inefficiency.

To address these factors, a study was carried out at Teagasc Grange to compare the performance of early-maturing (Angus/Hereford) or late-maturing (Limousin/Charolais) sired suckler weanling steers, slaughtered at one of three ages – 20, 24, 28 months.

The slaughter ages reflect, respectively, animals slaughtered at the end of their second grazing season, at the end of their second indoor winter or after a short duration at pasture during their third grazing season.

Animals were offered a grass-forage-only (GO) diet (i.e no concentrate supplementation during the grazing season or indoor winter period). The alternative was grazed grass only during the grazing season, but grass silage and concentrate supplementation during the winter, and slaughtered at 24 months (GC24) old.

Key findings from an initial study showed that early-maturing steers tended to be heavier at slaughter, but late-maturing steers had a heavier carcass (reflecting their higher kill-out proportion), with superior conformation and a lower fat score.

When slaughtered directly off pasture at 20-months of age, only the early-maturing steers had an acceptable carcass fat score, whereas all breed types had acceptable carcass fatness when slaughtered at older ages.

Figure 1: Effect of breed maturity (early (EM) or late (LM)) on live and carcass weight.

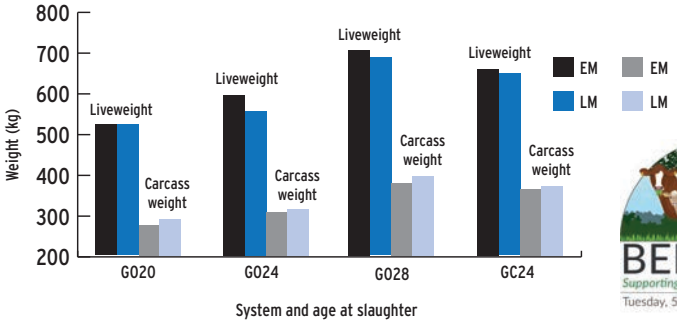


Figure 2: Effect of breed maturity on carcass conformation score.

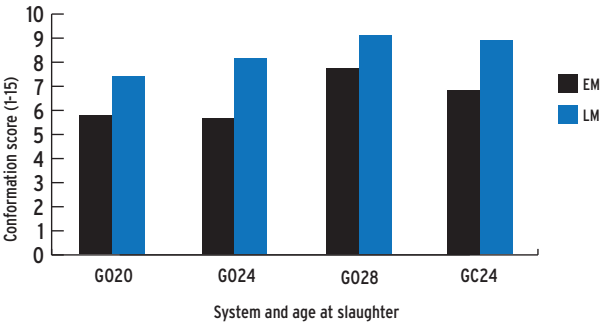
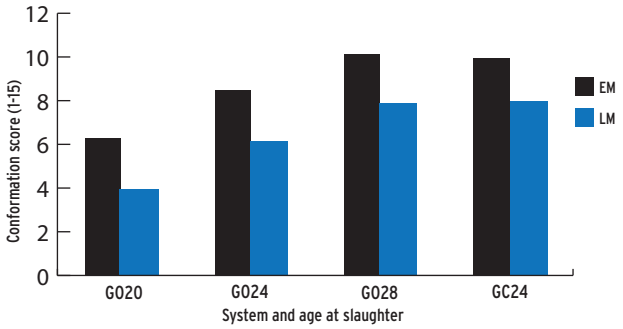


Figure 3: Effect of breed maturity on carcass fat score.



Grazing research: Effect of post-grazing sward height on beef cattle performance

In two studies carried out at Teagasc Grange, suckler-bred yearling steers were rotationally grazed to a post-grazing sward height of either 4cm or 6cm, from April to November.

At the end of the grazing season, they were housed indoors for a 4.5-month finishing period. Increasing post-grazing sward height from 4cm to 6cm resulted in:

- 29kg higher liveweight at the end of the grazing season (+0.14 kg/day).
- 15kg heavier carcass at the end of the indoor finishing period.
- 512kg DM/ha reduction in annual grass production.
- 15% reduction in grazing stocking rate.
- Similar animal weight gain/ha.

–Peter Doyle, Edward O'Riordan, Mark McGee and Aidan Moloney

Peter Doyle.

Does twinning have a role for suckler beef systems?

Twinning can increase the number of calves and weaned weight per cow thereby, increasing output for suckler systems. However, costs per cow tend to be greater and liveweight performance per individual calf is reduced.

Using data from international studies on 'twinning' herds, research at Teagasc Grange is analysing the effect of twinning on the economic performance of pasture-based suckler beef systems.

Preliminary results indicate that higher twinning rates increased carcass output by up to 27% and increased farm net margin by up to 126% for spring-calving suckler-to-beef system.

These results suggest that, when part of a defined management structure, twinning has the potential to substantially improve net margins on suckler calf-to-beef farms.

This research will also explore the impact of twinning on greenhouse gas emissions from suckler calf-to-beef systems.

–Aoife Bergin and Paul Crosson

Teagasc Grange – beef

Additives reducing methane emissions

The 'METH-ABATE' project aims to identify additives from a range of sources in order to reduce methane emissions.

Emily Roskam and Sinéad Waters
Teagasc


Emily Roskam

Under the Climate Action and Low Carbon Development Act, the Irish Government has committed to reduce emissions by 51% by 2030. This translates to a 22-30% reduction from agriculture, including a 15-20% reduction in methane emissions.

Teagasc researchers are working with NUIG, Agri-Food and Biosciences Institute; Queens University, Belfast, and a range of industry partners, on the DAFM-funded project, 'METH-ABATE'.

The project aims to develop farm ready technologies to reduce methane emissions from ruminant fermentation, and stored manure/slurry.

The main objective is to develop and validate anti-methanogenic feed additives for pasture-based systems. The research will monitor productivity, evaluate food safety and sensory properties of meat and milk products from animals that are supplemented with the anti-methanogenic feed additives.

Screening additives

Oils, plant extracts, seaweeds, seaweed extracts and halides have been assessed for their methane reducing potential in the laboratory, using a rumen simulation system (RUSITEC).

Methane reductions of two-thirds (67%) were observed when including the tropical seaweed, *Asparagopsis taxiformis,* at 1% of dry matter fed. Comparable results of 50-80% reductions were also observed from the inclusion of differing formulations of the novel halide product being developed by NUIG and industry partners.

Animal studies

Promising feed additives from the lab scale study were assessed in a sheep trial at Teagasc Athenry.

Cull ewes were fed ad-lib silage plus 0.5kg concentrates, which included one of six dietary additives; a brown seaweed – *Ascophyllum nodosum*, a brown seaweed extract, halides, soya oil, garlic extracts and a blend of essential oils.

Methane was measured using portable accumulation chambers, a closed circuit respiration chamber. A trial has also been completed feeding 3-NOP to beef animals in Teagasc Grange with very promising results.

A subsequent beef trial in Teagasc Grange in dairy beef bulls will assess a brown seaweed, *Ascophyllum nodosum*, a brown seaweed extract, linseed and rapeseed oil and halides.

Methane will be measured throughout the experiment using the GreenFeed system, which is a free standing machine. Trial work will be carried out in Teagasc Moorepark, assessing the overall most promising feed additives at pasture in 2023.

To complement this work, additives for methane reduction from manures and slurries are being developed and tested in NUIG.

Animal productivity (growth rates, feed intake, milk yield and health) are being monitored during all animal studies to ensure there are no negative implications of supplementation on performance.

Samples of meat and milk are being collected at slaughter to analyse for any residues, as well as change in taste/texture. On-farm cost effectiveness analysis will be conducted for all potential methane mitigation technologies.

Most trial work so far has been carried out in indoor systems using TMR diets. Our future goal is to assess slow release feed additives, already assessed in-vitro which, following administration to the animal, will release the active anti-methanogenic compound slowly over time.

All research is directed towards practical solutions for farmers.

Insights into the sexual development of cattle

David Kenny, Stephen Coen, Colin Byrne, Mark McGee and Kate Keogh
Teagasc.

The costs involved in producing a young bull or heifer replacement necessitate that both genders are eligible for breeding as soon as possible and are subsequently sustained within the herd.

Bio-economic studies conducted by Teagasc show that heifers that are bred at the start of their first breeding season and subsequently calve at 24 months of age are much more profitable and produce lower greenhouse gas emissions than their later-calving contemporaries.

Despite its importance, age at puberty is a trait that has received relatively little research attention and is not routinely measured at farm level.

In a series of studies led by Teagasc and funded by both Science Foundation Ireland and the Department of Agriculture, Food and the Marine, we investigated the underlying biology of sexual development in both bull and heifer calves, including the influence of diet and genetics.

We offered both male and female calves either a high or moderate feed allocation at various stages of development from shortly after birth onwards.

Age at puberty onset was measured in both genders together with other fertility-related traits.

Results

The results indicate that nutrition and rate of bodyweight gain during the first six months of a calf's life has a much greater effect on the age at which either bull or heifer calves reach puberty, and thus are eligible for breeding, than diet or performance thereafter.

The work has also provided novel insights into the underlying biological mechanisms and some of the key genes affecting sexual development in cattle, which, following further validation, could be utilised as part of future national cattle breeding programmes.

Native grains and proteins

There is growing interest in exploiting locally-produced cereal and legume protein crops, particularly to reduce reliance on imported feedstuffs.

Two recent experiments at Teagasc Grange compared intake, growth and carcass traits of steers that were offered grass silage and contrasting cereal grain types supplemented with flaked beans, flaked peas or maize by-products.

In experiment one, the feeding value of oats was equal to barley, and beans were superior to peas.

In experiment two, the feeding value of barley was equivalent to maize meal, and beans or peas were equivalent to maize dried distillers' grains or corn gluten feed.

–Mark McGee, Rian Kennedy, Edward O'Riordan, Aidan Moloney

Teagasc Grange – beef

Suckler calf health and welfare

Noeleen Brereton, Mark McGee, Colin Byrne, Peter Doyle, Bernadette Earley
Teagasc.

Noeleen Brereton.

The survival and performance of the suckler calf depends on the development of a strong cow-calf bond.

Calves are born with an undeveloped immune system and rely on antibodies and other components in colostrum (first-milk) for protection from disease, as well as nutrition.

Since the ability to absorb colostrum antibodies starts to decline after birth, suckling behaviour of newborn calves is very important for their health and welfare.

A primary identifiable risk factor associated with the failure of passive immunity in calves is delayed colostrum consumption.

At Teagasc Grange, we are studying cow-calf bond development and suckling behaviour post-partum in diverse cow genotypes, as a means to enhance management strategies for improving calf passive immunity.

We are currently working on assisted versus unassisted colostrum feeding, monitoring the suckle reflex for each calf at 10 minutes post-partum and identifying calves that require intervention.

The aim is to promote calf survival, which will enhance beef farm profitability.

Tackling bovine respiratory disease

New diagnostics for rapid detection and identification of the causative agents of bovine respiratory disease (BRD).

Kerrie Duffy, Matthew McCabe, Paul Cormican and Bernadette Earley
Teagasc.


Kerrie Duffy.

Conventional methods of bovine respiratory disease (BRD) classification involve assessing animals using a clinical respiratory score (CRS) and a scan of the animal's lungs by thoracic ultrasonography (TUS).

In addition to the methods of CRS and TUS, molecular and in-vitro culture investigations into the causative agents of BRD are quantified using qPCR.

At Teagasc Grange, two novel promising diagnostic tools to detect BRD pathogenic agents are optimised and in use, namely the Oxford Nanopore MinION M1kC and a protocol for 16S ribosomal amplicon sequencing.

The single challenge with BRD viruses in calves

Stephanie O'Donoghue, Bernadette Earley, Sinead Waters
Teagasc Grange.

Our studies use RNA sequencing to analyse the blood and lung transcriptomes of calves following a single challenge with two BRD viruses (BoHV-1 and BRSV). Differentially expressed genes and regulatory regions controlling their expression have been identified in calves post-challenge.

This data will assist in identifying variants, which will be included in genomic selection breeding programmes to generate healthier, more robust cattle with a greater potential to resist BRD.

Stephanie O'Donoghue.

Teagasc Grange – beef

Dairy-beef: producing an in-spec carcass sooner

Nicky Byrne, Donall Fahy, Jamie O'Driscoll and Mark Kearney
Teagasc Grange

Jamie O'Driscoll and Mark Kearney.

Improvements in age at slaughter, carcass traits and grassland nutrition are especially important to dairy-beef systems, as almost 60% of cattle processed in Irish meat plants originate from dairy herds.

Grass-based systems of beef production are the most financially sustainable due to their lower requirement for imported feed. However, not all beef animals are capable of producing in-spec carcasses at lower slaughter ages from a predominantly forage based diet.

Previous dairy-beef systems research at Teagasc Grange found that when managed within an optimised grass-based system, where 87% of lifetime feed requirements were produced from home-grown forage, beef x dairy steers could be slaughtered five months earlier than their national average contemporaries, at similar carcass weights.

Based on this experience, a new study was formed to explore the role of genetic selection for reduced age at slaughter and grassland nutrition in developing high carcass output beef systems that are financially and environmentally sustainable.

The male progeny of Holstein Friesian cows mated to Angus sires of divergent genetic potential for slaughter age or high-EBI Holstein Friesians sires were purchased at three weeks of age.

These three genetic groups were then assigned to concentrate management strategies, differing in concentrate supplementation during the first and second grazing seasons.

This was done to explore the role of strategic concentrate use as a means of reducing age at slaughter and to identify if there was an optimum way to manage animals of different genetic potential.

A range of standard animal measurements are undertaken including:

- Liveweight gain (fortnightly).
- Skeletal and linear measurements.
- Ultrasound muscle and fat depths.
- Carcass performance (weight, conformation and fat).
- Primal cut yield.

Invariably, cattle which can produce an in-spec carcass at a younger age have an accelerated growth ability. We want to understand how this growth is fuelled by measuring important traits such as grazing and rumination behaviour, grass dry matter intake and the substitution rate of concentrates on a grass-based diet.

Animals which excel within grass-based ruminant production systems generally have enhanced grazing behaviour and high voluntary intake of forage.

The contribution of these animal genetic groups to physical, financial and environmental farm system performance will be assessed over multiple years.

Given that there are a large number of dairy-beef systems differing in breed, gender, slaughter age and feeding practices, it is not possible to carry out animal and field experiments on each one.

For this reason, farm systems modelling is frequently used to assess the performance of alternative production systems.

In recent years, a dairy-beef systems model was developed at Teagasc Grange to quantify the physical and financial performance of alternative systems.

Current research aims to augment this model to permit the assessment of greenhouse gas (GHG) emissions performance and contribution to food security of alternative dairy-beef production systems.

In the case of assessing the contribution to food security, this entails a comparison of the quantity of 'human edible feed' fed to cattle (e.g grain in concentrate rations) and the quantity of beef produced.

Results highlight the importance of early slaughter in reducing GHG emissions.

Concrete versus rubber covered slats

Cathy McGettigan, Mark McGee, Edward O'Riordan and Bernadette Earley
Teagasc Grange


Cathy McGettigan.

Concern for the welfare of finishing cattle, particularly in relation to housing conditions (floor type and space allocation), has been expressed at national and EU level. Our key objectives are to examine the impact of housing conditions on the performance and welfare of beef cattle.

Under the conditions of our experiments, finishing steers accommodated on rubber mats had enhanced growth and feed efficiency, exhibited lying behaviour indicative of improved comfort, and body cleanliness was reduced at slaughter, compared to steers on concrete slats.

However, growth, feed efficiency, cleanliness scores and hoof health of weanling cattle was not affected by the addition of rubber matting to concrete slats.

Teagasc Grange – health and safety

Heart health – changes are needed

Farmers aged 17 to 64 are seven times more likely to die of cardiovascular disease (CVD) than salaried employees. Simple steps can reduce your risk.

John McNamara
Teagasc Health and Safety specialist

Diana van Doorn
Teagasc Walsh Scholar

A recent major study on improving farmer's cardiovascular health was led by Diana van Doorn, Teagasc PhD Walsh Scholar at the Centre for Men's Health, IT Carlow. The cardiovascular disease (CVD) study was conducted over 12 months among 868 farmers, who participated in the Farmers Have Hearts' CVD Health Programme (FHH-CHP).

A key positive finding is that over the course of the study, 81% of participating farmers made lifestyle changes and those with four or more risk factors for CVD declined by 6%.

Van Doorn stated: "Though 6% may seem like a small change, it is very significant. Farmers are a high-risk group for CVD, with three-quarters of those in the study having four or more risk factors. It is great to see reductions in blood pressure, cholesterol, waist circumference and the experience of stress for so many of the farmers who participated."

All farmers undertook a health check at the start and end of the year-long study. They chose the approach that best suited them from the following options:

- **Health coach** – contact by phone with a nurse/health coach, who supported lifestyle changes.
- **M-Health** – a series of mobile phone text messages that outlined positive health strategies.
- **Combination** – a combination of health coach and M-Health,
- **Usual care** – continued with usual health practices.

Both health coach and M-Health received an 89% positive rating, while health checks received a 98% ranking. "Making small but significant changes can greatly improve CVD health," says study co-author Noel Richardson, director of the Centre for Men's Health, IT Carlow.

"Recommendations include having a regular health check, controlling diet and weight and getting adequate, moderately vigorous exercise, along with having a lifestyle that minimises stress.

"Social/family support to maintain such lifestyle practices is vital," he added. The results of the study demonstrate that with the right support, farmers are strongly motivated to adopt and maintain healthier lifestyles.

Major study

The HSE, supported the study by funding farmer health checks, which were carried out by Irish Heart Foundation (IHF). Glanbia provided financial support and facilitated operation of the project at Agri-Branch venues, as well as making contact with farmers.

Mart managers and staff provided venues and assisted in making contact with farmers. The UCD School of Public Health, Physiotherapy and Sport Science provided assistance with data analysis and interpretation.

The Farmers Have Hearts' Cardiovascular Health Programme (FHH-CHP) study can be found on the Teagasc website. Visit the Lifestyle Village at the Teagasc Grange Open Day.

Fingal Farmers Group

This north Dublin group consists of farmers of all ages, both male and female, from all types of farms including dairying, drystock, horticulture and tillage and was set up to try to improve health and safety on farms in the area.

The group has carried out a number of different initiatives to reduce farm accidents and improve the health and wellbeing of its members. They have held farm safety training days, suicide alertness training, as well as organising health screening which was carried out at the VHI vista clinic in Swords. If issues were discovered, people were sent on for further tests.

Teagasc tillage specialist Shay Phelan, who was an advisor to this group, comments: "As this leading group has shown, a short but regular 'slot' on health and safety at group meetings is in everyone's interest and is every bit as important as production or management issues."

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Striving for superior silage

Production costs are up at least 60% per kilogram of dry matter pit silage harvested compared to 2021. Nonetheless, these Kilkenny farmers believe that quality silage is still good value for money.

Alan Dillon
Programme manager.

Séan Cummins
Programme advisor.


Peter O'Hanrahan.

Despite the painfully higher costs, particularly for fuel and fertiliser, calf-to-beef systems depend on quality silage. A dry matter digestibility (DMD) of at least 72 is essential.

This level of quality will enable growing or finishing animals to achieve the necessary levels of performance over winter.

Choose a strategy of going for more, bulkier, forage and the loss in quality will have to be compensated with hugely expensive concentrates.

One farm where the focus on producing excellent-quality silage has been mastered in recent years is that of father and son team Thomas and Peter O'Hanrahan, who operate a calf-to-beef system just outside Thomastown, Co Kilkenny.

Peter has been part of the Teagasc Green Acres calf-to-beef programme for the past number of years and will participate in the new Teagasc Dairy-Beef 500 programme, which will run for five years.

Outlining the plan for this year's silage crop, Peter said: "Prioritising silage quality has been a key focus on our farm and we are not going to move away from our targeted mid-May cutting date.

"This year's first-cut crop was fertilised with 3,000 gallons/ac of slurry and 80units/ac of artificial nitrogen.

"In recent years, we have transitioned from a system where steers were slaughtered off grass during the third grazing season to one where the majority of animals are now winter finished.

"With this change, we've had to really focus on producing excellent-quality silage to ensure our steers achieve the 1kg/head/day target during the finishing period without having to feed too much meal.

"If we fail to produce excellent quality silage, we are not only facing the prospect of having to offer finishing steers additional concentrates, we will also have to feed more meals to weanlings to ensure they achieve the daily liveweight gain target of 0.6kg/head/day during their first winter."

With higher production costs, there may be some who believe that the best option would be to delay grass harvesting in order to achieve a higher bulk.

Peter said: "If we were to lose focus on silage quality in exchange for bulk, we'd be looking at a massive increase in the volumes of meal needed to achieve the same levels of animal performance.

"If silage quality was to slip from an average of 72 DMD back to 68 DMD, we'd have to purchase an additional 36t of meal over the winter months. If, for argument's sake, concentrate was to hit €550/t next winter, this would mean an extra spend of close to €20,000 or €215/ha off our bottom line.

"With concentrate prices looking likely to be in this higher bracket this backend, we will be focusing on quality silage to counteract any price rises in the market."

Alan Dillon, Sean Cummins, Peter O'Hanrahan

Silage budgeting

Although focusing on quality is important, it only counts for one side of the equation. It's critical that a sufficient fodder is available to tide the farm through the winter months. This can only be evaluated through the completion of a fodder budget.

For the winter ahead, and including a buffer of one month, the O'Hanrahans need 295t (DM) of silage. Fortunately, 36t of this feed is already present in the yard as a carryover from last winter, so a production target of 259t has been set for the year ahead.

First-cut silage is expected to account for approximately 200t – the remainder will be harvested in the form of a second cut.

The decision on how much ground will be closed for second-cut will be evaluated once the first-cut harvest has been completed.

Commenting on budgeting, Peter said: "We are lucky in that our farm is very dry, which facilitates early turnout of younger stock and we began grazing in January this year.

"However, I like carrying a buffer of silage of at least one month. This covers us in case the spring is delayed or grass growth slows during a dry spell in the summer months.

"As we operate a spring-calf system, our demand for grass doesn't typically pick up until the second half of the year and that's why I like targeting the majority of the silage from first-cut."

Although the father and son team have transitioned to marketing the majority of animals out of the shed in the winter months, approximately 50 steers are turned back out for a third grazing season each year. With indications last December that fertiliser prices would be higher this spring, they altered their system slightly. "The only real change we've made to the farm this year is reducing the number of older animals turned back out to grass for a third grazing season. This decision was made just before Christmas 2021 and it was driven by two factors.

"Firstly, the rising fertiliser prices, but secondly, market indications were also pointing to a relatively strong beef price during the month of April and thankfully this held true.

"These steers were within 100-120 days of finish, so a lot of the heavy lifting had been done during the previous year's grazing season.

"By moving these animals off-farm earlier, we freed up nearly 13ha of grazing ground that can be re-directed to first-cut silage or to grazing for yearling stock," says Peter. "Always go for quality is the lesson we have learned."

Teagasc Athenry sheep open day

Phil Creighton
Sheep Enterprise Leader, Teagasc Animal and Grassland Research and Innovation Programme.

The open day, which takes place in Athenry on June 18 at 10am, offers you an opportunity to review the latest research and technical advice from the Teagasc sheep programme and its practical application at farm level.

There will be a mix of technical presentations and interactive workshops dealing with all the main areas important to sheep production.

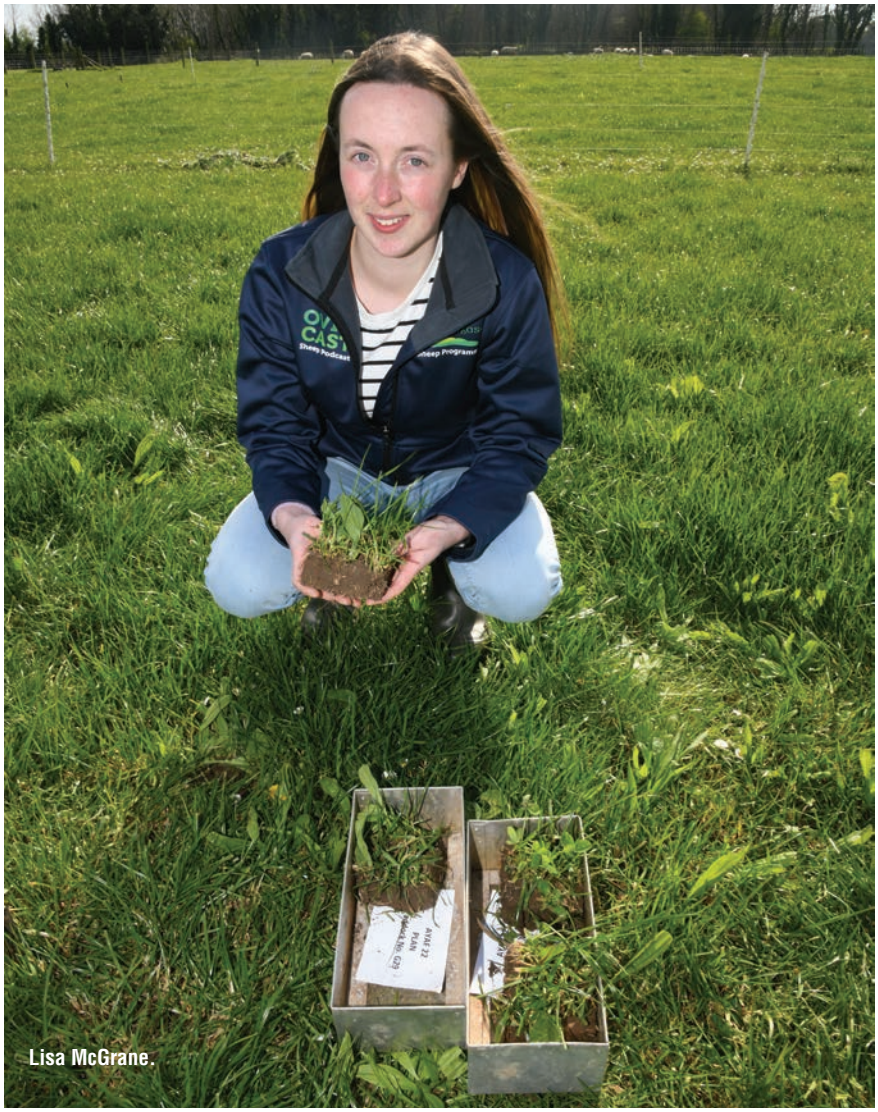
The open day is free to attend and all sheep farmers and those involved in the sector are welcome.

Areas that will be covered on the main technical stands include:

- Sustainable systems.
- Breeding.
- Health.
- Hill sheep.

There will also be an opportunity to review the wider research programme and meet with researchers, students and technical staff who will present more detail on the individual projects ongoing in Athenry.

Here, we profile a small selection of projects being undertaken by Teagasc Walsh scholars as part of their PhD studies, which will be presented on the day.



Lisa McGrane.

Lisa McGrane

Lisa's project is investigating the addition of companion forages (white clover, red clover, plantain or chicory) to perennial ryegrass swards.

Clovers have the ability to supply nitrogen to the sward through biological nitrogen fixation, while deep rooting herbs such as plantain and chicory are particularly beneficial during drought conditions.

Results over a four year period show improved animal and sward performance when ewes and lambs graze these binary sward types, compared to a perennial ryegrass monoculture.

Plot studies are also underway to investigate management factors such as establishment method, post-grazing sward height, seeding rate and perennial ryegrass ploidy on forage establishment and forage persistency over time.

The aim of this project is to investigate the suitability of these swards in intensive sheep grazing systems and determine the most appropriate management advice to maximise herbage production and plant persistency.

Sarah Woodmartin

Sarah's project aims to identify the relationship between dry matter intake and digestibility when sheep are consuming companion forages alongside perennial ryegrass. Animals graze perennial ryegrass and one companion forage, namely white clover, red clover, chicory or plantain.

The research is investigating the effect of these sward types on methane output, rumen function, carcass production and meat quality from lambs in the post-weaning period.

Results to-date suggest that consumption of perennial ryegrass plus a companion forage increased dry matter intake while reducing methane yield.

Future work will investigate the effect of these forages on meat qual-


Sarah Woodmartin.


Edel O'Connor.

ity and rumen function. The aim of this project is to identify the reasons behind the improvements that are being seen in animal performance when these forages are included in the diet and to validate their suitability as a feedstuff in sheep production systems.

Edel O'Connor

Edel's project looks at measuring methane output from sheep. We have never measured methane output from Irish sheep before, so we need to establish baseline values for Irish systems. We measure methane using Portable accumulation chambers (PAC).

The sheep are placed in the chamber for 50 minutes, with methane, oxygen and carbon dioxide measurements taken at three time points. The PACs are mounted on a trailer, which allows us to take methane measurements on commercial farms across the country, with nearly 2,500 animals measured to-date.

The PACs will allow us to identify high and low methane-emitting sheep in the flock. Ultimately, our aim is to breed sheep for reduced methane emissions, which will reduce the carbon footprint of Irish sheep production without compromising animal performance.

Mark Dolan

Approximately 50% of the national ewe flock are mountain and mountain cross type ewes. This results in approximately 300,000 male Scottish Blackface lambs being sold as stores each year to lamb finishers after weaning.

The objective of the study is to examine the performance of hill-bred lambs offered forage rape, hybrid brassica, kale, perennial ryegrass re-seed, permanent pasture and ad-lib concentrates indoors.

The impact of these finishing systems on rumen function, greenhouse gas emissions, meat quality and the economic returns of finishing hill lambs in different systems is being assessed.


Mark Dolan.

The findings from the study will lead to guidelines and targets for use by the sheep industry in future when using forage crops to finish lambs.

Workshops at the open day

A series of workshops and demonstrations will deal with topical issues relating to each of the main areas;

Grass and forage

•Clover incorporation and grassland management to maximise growth.
•Fertiliser and silage budgets and costs.

Breeding

•Value of commercial recording.
•How to use the breeding indexes.

Health

•How to reduce anthelmintic resistance development on your farm.
•Understanding the role of faecal egg counts and how to incorporate them into management plans.

Production systems.

•Lamb finishing options.
•Meet with sheep BETTER farm participants and hear how they have put research into practice on their farms.

Teagasc would like to acknowledge the support of FBD for this event.

Act now if fodder is tight

A fodder budget will help you make better and more timely decisions

Patrick Gowing
Teagasc dairy specialist.

Bryan Donnelly
Dairy advisor Teagasc, Portlaoise.

Martin Bennett and Bryan Donnelly.

While there is a lot of uncertainty this year from factors outside our control, there is one thing that is certain – having enough fodder for your own stock is critically important.

An analysis of Profit Monitor data by George Ramsbottom gives a snap shot of where farmers are from a purchased fodder point of view. From a sample of 739 farmers, an average 3% of the total forage DM required per cow was bought in.

This group is stocked on average at 2.33 LU/ha overall and utilising 10.01t of grass DM/ha. So on average, the vast majority of farmers are able to grow nearly all their fodder requirements. This assumes they continue to utilise 10t grass DM/ha, equating to 12.5t DM/ha grown.

Any reduction in the annual growth on the farm from a weather event or significant reductions in fertiliser applications may decrease the annual growth figures. This will leave some farmers having to purchase additional fodder.

Of the farmers sampled, 177 or 24% purchased up to 10% of their total forage requirement per cow. So there is a significant proportion of farmers who purchase large amounts of fodder each year.

Next steps:

1 Complete a fodder budget. At this stage, first-cut silage should be made and you can estimate how much extra fodder is required on your farm.

2 Maximise the amount of fodder you grow. Silage will be expensive to make in 2022 – probably €200+/t/DM. Reducing fertiliser will save money in the short-term but will reduce the yield, making the silage dearer as harvesting costs per tonne will increase.

3 Minimise waste. In some silage clamps, up to 20% can be lost from poor conservation and bad pit face management. You wouldn't allow 20% of purchased concentrates or fertiliser to go to waste. Silage on your farm is an expensive commodity, don't waste it.

4 If you purchase fodder every year, make sure you have it secured.

Table 1: Analysis of Profit Monitor data.

	MS (kg/cow) / no. of cows	Purch. conc. (tons/cows)	Bought in forage (kg DM/cow)	St. rate (MP St. rate)	Grass used (grown) (t DM/ha)
Average (n=739 farms)	492/166	1.05 (17% of diet DM)	138 (3% of forage DM)	2.33 (2.99)	10.1 (12.5)
Farms buying in no forage (n=321 farms)	486/160	1.01 (16% of diet DM)	0 (0% of forage DM)	2.21 (2.89)	9.84 (12.3)
Farms buying in <200kg DM/cow (n=241 farms)	492/173	1.02 (16% of diet DM)	98 (2.2% of forage DM)	2.39 (3.01)	10.43 (13.0)
Farms buying in >200kg DM/cow (n=177 farms)	501/171	1.15 (18% of diet DM)	443 (9.8% of forage DM)	2.47 (3.13)	9.75 (12.2)

Buying silage on the open market may be difficult. With the uncertainty around fertiliser supplies, farmers are likely to carry surplus silage into 2023.

5 Check your stocking rate. Are you carrying too much stock? Reducing your stock numbers can have a dramatic impact on your fodder supply, if it's short. Reducing your numbers earlier in the year will save their fodder requirement for the winter and also reduce your stocking rate mid-season. This will allow you to conserve more silage. A cow sold in April will save you 25t of fresh silage compared to a cow sold in September, which will only save 12.5t of fresh silage.

6 Target low performing animals. High SCC cows, lame or poor performers should be culled early to allow the farm to build fodder.

7 If your farm is overstocked and always having to purchase fodder annually, look at the net revenue from these cows with your advisor. Could fewer cows be as profitable? Farms that rely on purchased fodder, concentrates and fertiliser are more exposed to the increase in these costs.

8 Will there be as many alternatives like whole crop, beet etc, available to purchase? It's hard to predict availability, as higher prices than previous years are inevitable.

In summary, farmers need to complete a fodder budget early and more importantly, react to any potential fodder shortage on your farm as early as possible. Leaving it too late will reduce your options and could have a significant impact on your farm business.

How PastureBase Ireland can help

Farmers are increasingly conscious of the importance and peace of mind of having adequate levels of fodder on farm. In 2018, a cold and wet spring delayed growth, followed by a summer drought that stopped grass growth.

A winter fodder budget feature is available to all farmers on PastureBase Ireland (www.pbi.ie) under the budgets option.

The following is required to complete a winter fodder budget;

- Number of livestock that will be housed over the winter (dairy cows, 0 to one year old, one to two year old suckler cows etc).
- Estimated length of the housed period.
- Volume of silage/maize/wholecrop pits (length, width, height).
- Number of bales (silage, hay, straw).
- Yield of winter grazing crops (kale, rape, extended grazing).

On the right is a summary of the fodder report for the Bennett's farm. The total fodder requirement for all the livestock on the farm is 524.5t of dry matter (DM), while total fodder in stock equates to 571.6t of DM. This results in a surplus of 47t of DM or 9%.

Total required t/DM	524.54
Total in stock t/DM	571.65
Surplus/ deficit t/DM	47.1
% required in stock	109
Days short	0

There is sufficient feed on the Bennett's farm. With 9% extra fodder in the yard, this is a good contingency to have built up and can be very beneficial if a weather effect occurs in the near future.

On other farms, there may well be a deficit and decisions need to be undertaken – for example, purchase additional fodder or reduce the number of livestock for the winter period.

If you would like more information or help completing a farm budget, contact your local Teagasc advisor or the PBI Help Desk on support@pbi.ie or 046-920 0965.

–Micheal O'Leary

Farmer profile

Martin Bennett milks 140 spring-calving cows in partnership with his parents Michael and Aileen in Hophall, Portlaoise, Co Laois. Their land includes a 50ha milking platform plus 38ha in outblocks nearby.

"Our stocking rate is reasonably high, as we have 140 0-1s, 140 1-2s (including 30-40 replacement heifers each year) as well as the cows," says Martin.

"We run a calf-to-beef system, with cattle finishing in the second winter. Usually, 100-110 cattle finish each year, made up of 70 Friesian/Angus bullocks and 40 Aberdeen Angus heifers.

"Our focus is on grassland management. The aim is to keep grass in diet for as many days as possible," he says.

To achieve this, Martin walks the farm regularly, recording more than 20 times each year – this allows him to graze paddocks at the perfect cover.

Martin says that as he has increased his efforts in grassland management over recent years, the farm's dry matter production (currently around 15t DM/ha) has increased for roughly the same level (200kg/N/ha) of fertiliser.

"We use the spring and autumn rotation planners to budget grass," he says.

"The fodder budget feature is an important tool within the PastureBase app. We focus on cutting 70ac of top-quality first-cut silage in May and a second cut of about 50ac in July. Also, 600 round bales are made. We feed 1.1t concentrates fed per cow," Martin concludes.

–Bryan Donnelly.

Putting nutrient management plans into action in the south-west

Grazed grass remains the most competitively priced feed source despite the sky rocketing cost of fertiliser.

Ger Courtney
Business and Technology Dairy advisor, Teagasc/ KerryAgribusiness joint programme,

A group of 13 KerryAgribusiness suppliers joined the "Farming for a New Decade" joint programme in November 2020. Six of the farms also joined the Teagasc SignPost programme where targets around climate action were developed over the subsequent months. Soil fertility improvement is a key objective of the programme, and an annual soil campaign, open to all suppliers, drives that objective.

The new demonstration farms were soil sampled paddock by paddock in December 2020 and a nutrient management plan was drawn up in conjunction with the local Teagasc advisor. Colour coded maps were prepared and laminated.

During lockdown, a simple action plan was agreed between the farmer, Teagasc dairy advisor and joint programme advisor over Zoom. The key actions agreed were:

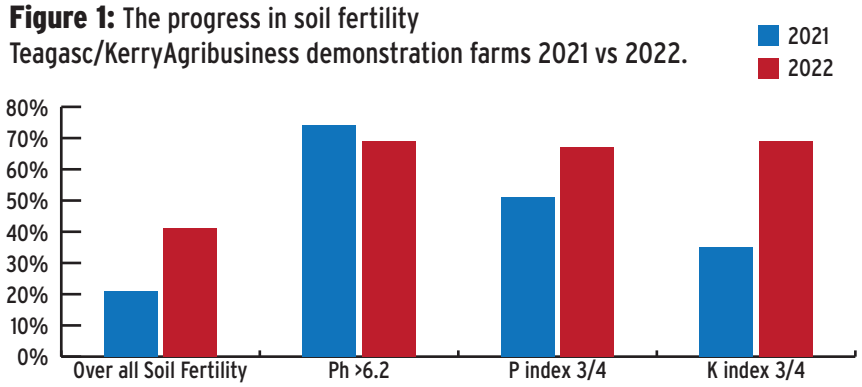
- Budgeting for an increased spend on Lime, P and K build up in 2021.
- Deciding where slurry applications should be targeted i.e low index fields.
- Deciding the fertiliser product mix, the timing of lime and each fertiliser type.
- Recording the lime/fertiliser/slurry data on Pasturebase Ireland and monitoring progress regularly.

Table 1: The progress in soil fertility Teagasc/KerryAgribusiness demonstration farms 2021 vs 2020.

	Overall soil fertility	Ph >6.2	P index 3/4	K index 3/4
2021	21%	74%	51%	35%
2022	41%	69%	67%	69%

John and Micheal Casey, Causeway, Co Kerry. \Valerie O'Sullivan

Figure 1: The progress in soil fertility Teagasc/KerryAgribusiness demonstration farms 2021 vs 2022.



The progress in soil fertility is shown in Table 1.

Conclusion

Putting nutrient management into action requires baseline soil fertility data for each paddock. More importantly, it requires a commitment to action, review and reassess.

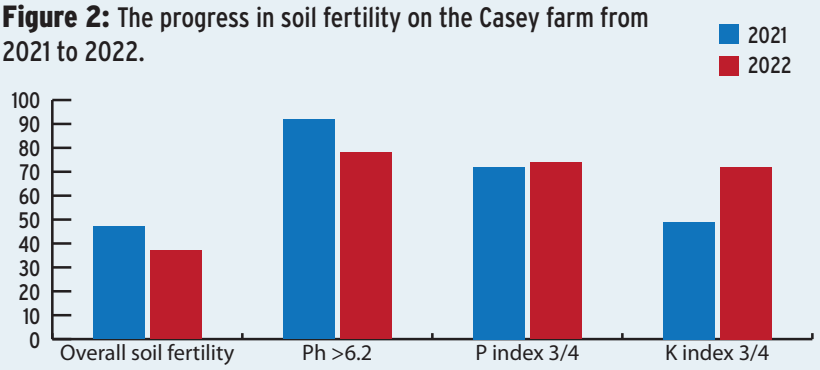
In the current environment of high input prices, it may seem like a daunting financial challenge to invest in soil fertility.

The proven impact of soil fertility improvements on farm grass growth and nutrient efficiency means that self-sufficiency in home-grown forage production must remain a key priority investment, from both an economic and environmental point of view.

Look at the overall investment planned and required, in a five year time frame, and place soil fertility improvement at the top of the list.

Case study

Figure 2: The progress in soil fertility on the Casey farm from 2021 to 2022.



John and Micheal Casey, Causeway, Co Kerry

Michael and John Casey farm in Causeway, Co Kerry, and are demonstration farmers in the Teagasc/KerryAgribusiness joint programme.

In a 115-cow spring-calving grass-based system, getting the most from home-grown feed has always been a major focus for the Caseys. Maximising the growth potential of the farm has taken on a new significance in 2022.

Keeping soil fertility right has been an ongoing challenge in this well stocked farm, but a renewed emphasis on achieving soil fertility targets has ensured that great progress has been made in the last 12 months.

Lime

"Spreading lime is a routine job on the farm, carried out two to three times each year," says Michael. "It's part of the fertiliser programme, just like spreading slurry and compound fertiliser. Where lime is needed on the milking block, it is usually spread in April when farm cover is at its lowest.Lime is always applied to the cultivated ground before reseeding.

"Fields across the farm receive lime every three years. Some areas needed specific attention and soil test recommended amounts are always followed closely." As a result, 90% of all paddocks are on target for pH. Research clearly tells us that, where soil pH is correct, there is a higher level of nutrient efficiency of applied slurry/fertilisers.

Have the Caseys seen this on their farm?

"We have noticed an added kick from applied fertilisers from mid- summer onwards," says John. "This has been put down to the mineralisation and release of added N and P from July onwards when pH is correct."

The Caseys have now embraced protected urea. In 2021, 28% of all nitrogen applied was in protected urea form. That is set to increase this year. John reckons that pH must be correct to assess the effectiveness of any fertiliser product and so far, protected urea has delivered the goods.

Phosphorus and potassium

Soil test results have driven the approach to P and K build up applications. At present, 90% of paddocks are at or above target P index 3. Phosphorus was quite good on the milking block, but needed more attention in the out blocks.

The potassium status on the farm was the weak link, with just under half (49%) of paddocks at target index 3 for K in 2020. Particular attention was paid to silage ground, or any ground that had bales taken off during the year.

Last year, Muriate of Potash was applied in the mid to late summer on these blocks and it was very effective in increasing the K soil test readings. In the latest soil test reports, 79% of paddocks were correct for K.

"We are planning to apply required K with protected urea fertilisers this year on the basis of 'a little and often' from mid-July onwards," says John.

Higher rainfall in Co Kerry compared to other areas means there is a greater loss of K by leaching and this must be factored in when considering annual applications. John's overall philosophy is: "If you have lime, P and K right, once growth comes, you have the reserve in the soil to drive things on."

Growth has been between 11t-12t DM/ha, and with reseeding, the target is to move towards 13.5t-14t DM/Ha by 2024. The foundations have been laid when fertiliser prices were, with hindsight, very competitively priced, and building up soil fertility as an investment, has really paid off.

Sean and Diarmuid Fitzgerald, Cratloe, Co Clare

Sean and Diarmuid are demonstration and SignPost farmers on the Teagasc/KerryAgribusiness joint programme.

The Fitzgerald development plan has as its key objective the growing and utilisation of more grass and the incorporation of clover across the farm to reduce the use of chemical nitrogen.

The graph shows the progress in soil fertility recorded between 2020 and 2021.

Lime

"We first addressed the soil pH issue," says Diarmuid. Since 2020, a total of 257t of lime has been applied to this 67ha farm. Nearly four-fifths of all paddocks are now above the target pH of 6.3. Over 17ha was reseeded in 2021 and lime was incorporated at 2t/ac before sowing.

"I was keen that pH was correct, as we included 2kg coated clover/acre at reseed. We achieved good clover levels (10-15%) as a result."

"Having established clover on 24ha, we have been able to reduce the dependence on chemical nitrogen to less than 200kg/ha this year, compared

to 240kg/ha N last year. This will reduce GHG production by approximately 3%, with a significant reduction in chemical fertiliser to grow our targeted 14t/ha."

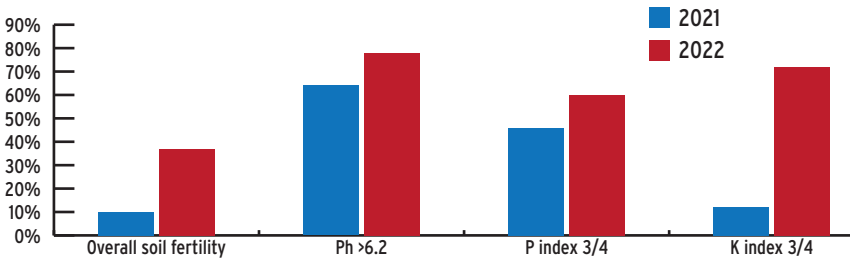
The Fitzgeralds decided that in 2021, as well as the ordinary applications of slurry and 18-6-12, they would improve K status. Over 5t (54kg K/ha) of Muriate of K were applied from mid summer on.

Many of the index 2 paddocks moved to index 3, which was the main reason that the overall fertility status improved, from 10% of paddocks to close to 40% correct when sampled in late 2021

The Fitzgeralds have also availed of the P build up facility in the nutrient management plan, drawn up by their Teagasc dairy advisor, Aidan Bugler.

"While overall fertiliser cost was considered high at 4.4c/l in 2021, by today's standards, it was a low cost, high return investment," concludes Diarmuid.

Figure 3: The progress in soil fertility on the Fitzgerald farm from 2021 to 2022.



Education powers careers in the dairy farming sector

Due to the growth in herd size, more dairy farms require non-family labour. The ability to attract and retain labour is fundamental to the success of many dairy farm businesses.

Emma-Louise Coffey
Teagasc Education Coordinator, Moorepark.

Martina Gormley
Teagasc Dairy Specialist, Athenry.

John and Carmel Butler farm near Templetuohy, Co Tipperary. They grew their dairy herd the hard way, building their skills, consolidating the grazing platform and purchasing quota. They went from 54 cows in 2005 to 200 in 2016.

Today, they milk 210 cows and rear youngstock on a separate grazing block (60 0-1 and 1-2 year olds). Both agree that work/life balance is increasingly important.

Farm labour

Until 2015, John and Carmel completed the majority of the farm work themselves. Relief labour helped at weekends. During the summer, family members were involved; an agriculture student was available for 12 weeks during the spring.

"We recognised the need for full-time labour to help manage the additional workload associated with the growing herd," says John.

"We began hosting 12-month students from the Teagasc Level 7 Professional Diploma in Dairy Farm Management (PDDFM) course in September 2015 and have been fortunate to have worked with excellent students since then."

Currently, the farm team includes year two PDDFM student Jack Ryan and PDDFM graduate Michael Boland, who was placed on the Butler farm and is now employed as assistant manager.

Teagasc' Professional Diploma in Dairy Farm Management course

- Gold standard in dairy farm management training.
- Two-year paid placement on approved host farms.
- Pay: at least minimum wage, per hour worked.
- Typical roster: 11/3 or 5/2 - 40-48 hour working week.
- 20 course days, delivered in Teagasc Moorepark and Kildalton College.
- 20 days paid annual leave.
- Optional six-month placement abroad.
- Eligibility: Level 6 Advanced Certificate in Agriculture or equivalent.
- Course validated and certified by UCD.

Emma Louise Coffey, Carmel Butler, Front, from left, Michael Boland, John Butler, Jack Ryan.

Dairy farming as an attractive career

Ruth Nettle from the University of Melbourne outlined what employees want based on an employment survey completed in Australia at the Teagasc labour conference in 2018.

"While wages play a role in attracting staff, the conditions of employment and how staff are treated are key in retaining and motivating staff," says Ruth.

The most common practices appreciated by employees included:

- Flexible working hours.
- Rostered time off.
- Autonomy and responsibility.
- Opportunities for training and development.
- Recognition for a job well done.

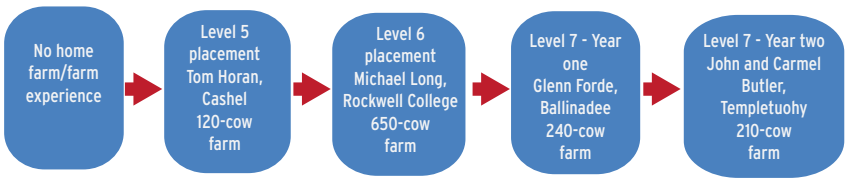
Michael Boland

Prior to agricultural college, Michael's only farming experience was a brief amount of time spent on relatives' farms during family visits.

"This left an impression on me," says Michael. "When it came to deciding what to do after school, I chose to go to Teagasc Kildalton College to complete the Level 5 Certificate in Agriculture and the Level 6 Advanced Certificate in Agriculture (Dairy), rather than my other preferences of an ag science degree or a trade in carpentry."

Michael says he viewed dairy farming as a career where he could work outside and in time become his own boss.

Figure 1: Michael Boland's dairy experience



Introduction to dairy farming

"I was very lucky to be placed with excellent host farmers throughout my education," says Michael.

"They were all patient and willing to answer my many questions (Figure 1). I was extremely 'green' starting out. The placements, with the lectures, practicals and experience in Kildalton, gave me a great base to start my dairy career."

PDDFM course

Following Kildalton College, Michael applied for the Level 7 PDDFM course.

"Not coming from a farm, this was the next best thing to expand my knowledge base and get experience on farms over a 12-month period," he says. "Being away from home on the placements boosts your self confidence and independence."

Michael completed the PDDFM course in August 2021 and chose to take up the role of assistant manager on the Butler's farm. Michael explains: "I am totally invested in what is going on here and when you get the opportunity to work alongside someone like John, you learn a lot.

"Everyone works best where they are appreciated and treated well, given responsibility in different aspects of the business and the farm facilities are good – this farm ticks all those boxes."

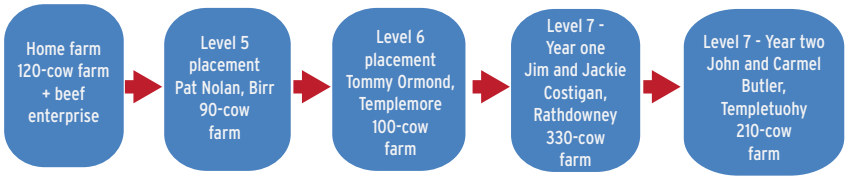
Jack Ryan

Jack, from Toomevara, Co Tipperary, gained a keen interest in agriculture from farming with his parents on their dairy and beef farm. After school, Jack enrolled in Teagasc Kildalton College to complete the Level 5 and 6 course "to take a practical approach to my education in agriculture," he says.

Learning how to measure and allocate grass and breeding management to ensure compact calving were highlights, he says.

Jack also completed the DIY AI course through the college.

Figure 2: Jack Ryan's dairy experience



PDDFM course

Following this, Jack took up a place on the PDDFM course. "Since joining the course, my knowledge and capabilities have doubled," he says.

"I now understand how management decisions can impact financial performance and how work organisation can achieve high productivity while allowing all farm staff a good work-life balance."

"I have defined start and finish times and while things were busy in springtime, this doesn't mean the length of the working day dragged on. We had a plan, worked hard and finished timely everyday."

Jack appreciates the experience he has gained from his placements with Jim in Year one and John in Year two (Figure 2). He recalls situations where he asked John a question in the yard during the working day and how they often have a follow up discussion around the table at lunch to work out the answer.

Completing the PDDFM course is about the learning opportunity for Jack: "I'm not coming here to work every day for a pay cheque, I'm coming for the experience."

Learnings from students in the PDDFM course

John and Carmel highlight the addition that the PDDFM students have made to the farm: "Their course days at Teagasc mean they are well informed of the latest research and best practice and they bring that to us and challenge us to be the best we can."

The farm has impressive figures, including a six-week calving rate of 84% and milk solids at 515kg in 2021, steadily increasing from 470kg in 2015.

How we have changed?

"In 2015, taking on and managing a full-time staff member for the first time was a steep learning curve," says John Butler.

"We needed to manage our expectations because employees have a life outside of the farm. We structure the work, especially evening milking time, so there is a consistent start and end to the working day."

John and Carmel encourage constructive feedback from students on how they can improve the farm business. As a result, they have investment to improve facilities, which includes extending the milking parlour to 24-units as well as automation, cluster removers, auto-drafting and automatic calf feeders.

Silage walls: consider safety and capacity

Silage pits on some farms are dangerously high.

Tom Fallon
Teagasc Farm Buildings and Infrastructure Specialist.

Herd size has increased, but in many cases there hasn't been a corresponding investment in silage storage. Grass is being piled ever higher. This is a serious safety concern when personnel are filling and sealing the grass, but also when emptying the pit.

Silage loaders and tractors can easily turn over on high pits. The sides of silage clamps should have a slope of less than 45 degrees. In a walled pit, the silage above wall height should also slope in at less than 45 degrees.

The moisture content of the grass, the width of the silage pit and the competence of loader operators will all influence how high the grass can be safely placed. The risk of a pit splitting is greater with wet grass and this is an added safety risk for the loader operator.

Contractors need a reasonable working width to roll the pit effectively. Walled pits are usually a safer option than a simple silage base or clamp.

More capacity and less waste

A walled pit will hold approximately 20% more silage than the corresponding silage slab. Consolidating the grass, covering the pit and keeping the pit reasonably air tight after opening are all easier with a walled pit. The result is less waste in a walled pit when it is filled and sealed correctly.

Specifications

The Department of Agriculture, Food and the Marine (DAFM) has two specifications covering silage facilities; S128 for silage slabs and S120 for walled silos.

Farmers or builders may be tempted to use less steel or substitute mesh steel for the horizontal steel. This can be a costly mistake.

Silage walls have to withstand a lot of pressure. The vertical steel is important, as it is holds up the wall. The horizontal steel also plays a key role.

The chemical reaction between cement and water in the fresh concrete generates heat. As the newly formed concrete cools, the concrete mass shrinks and the horizontal steel is there to take the strain and prevent vertical cracking.

In very long walls, joints should be formed at no more than 12m intervals. Waterbars should be placed in the joints and joints should also be sealed with a gun-applied sealant.

The minimum concrete grade for silage facilities (including purpose-built silage effluent tanks) is S.100 Mix A (think of 'A' for 'SilAge').

This not only covers the 45N strength but it also includes a minimum cement content, slump class etc. The minimum concrete grade for all other grant related facilities is S.100 Mix B.

The required batter of 1:12 on silage walls gives extra width and therefore strength at the base of the wall where the forces are greatest.

Guide rails

Guide rails on walls are required to comply with DAFM specification S120. It is an option to put them on the outside of the wall so that it is feasible to walk on the wall.

The farmer with this silage wall has installed a platform for safety because there is a big drop away from the silage wall. A half metre of galvanised serrated antislip walkway has been used here. This is sold in 6m x 1m sections.

Other farmers are looking at doing something similar to give extra comfort in sealing the pit. Having the guide rails out from the silage wall will make it less likely that the loader will collide with them.

Other tips

•Beware of wires becoming detached from tyres used to secure silage pit covers. A Donegal farmer lost more than one animal because wires from the inside of tyres fell down onto the face of the open pit. They ended up in the cows' diet causing peritonitis. Exposed tyre wires are also a hazard to handlers and can damage plastic.

•Check the adequacy of effluent collection, channels and storage. Channels should be clean and free from waste material or fresh grass.

• Place a drainage pipe in the channels to keep a space for effluent to flow and ensure that the outlet to the tank is clear.

• If necessary, please contact your local Teagasc advisor for further advice.

Teagasc/UCD Michael Smurfit Business School course in Business Strategy

As challenges multiply due to climate change and market volatility it has never been more important to have a robust and well-thought-out business strategy.

Mark Moore
Teagasc and
Michael Smurfit Business School

John Sampson, who farms 140 dairy cows at Ballychristy, north of Mallow in Cork, recently completed the Teagasc/UCD Michael Smurfit Business School course in Strategy for farmers.

"The course certainly took me out of my comfort zone," says John, who is married to Fiona and father to two teenagers. The course acknowledges that management success is all about people. "We gained a lot of insights about ourselves, but also how best to interact with other people, be they staff, neighbours or other stakeholders," says John.

The course is described as 'executive education' and includes subjects such as negotiation, people management, self-management, as well as business strategy, finance etc. The course is structured around business cases from a range of industries, which yield insights relevant to any small business, including farm businesses.

To graduate from the accredited course, participants must complete a strategy for their own business based on learnings from the course.

There are no academic requirements (Leaving Certificate, for example) to join the course, providing you have been running a farm business for a minimum of five years. The class size is limited to 20 and well over 100 farmers (women and men) have now completed the course.

"I wondered was it too long since I had studied," says John. "I was also concerned about finding the time to get away from the business. Both were not a problem."

The course is residential, with participants staying at a hotel for two modules: one for three days and the other two days. Day six is where participants present their individual strategies.

John Sampson.

Smurfit Executive Development
UCD Michael Smurfit Graduate Business School

"I thought it was great, as it helped me address a range of strategic issues such as work/life balance, long-term succession, and the sustainability of the business. It gave me the push to create a written plan for the medium term."

John's wife Fiona says she would recommend the networking aspect of the course. "Farming is a fairly solitary life and I can see a huge advantage in taking the chance to go and meet up with 15 or so other farmers to tease out strategic issues, on a top level course delivered by the Smurfit Business School and Teagasc."

"The timing of the course (autumn) and the content was really well tailored to the group and I really enjoyed learning business insights from other industries. We also enhanced our skills in areas such as negotiation. The whole experience was enjoyable and everyone on the course learned a huge amount by interacting with other participants, as well as the top-class lecturers," says John.

The course content is business focused and is relevant to any farmer regardless of their enterprise mix. Married couples have completed the course together. The course has run since 2014 and its successful completion earns the participant a Level 8 Certificate from the UCD Michael Smurfit Business School.

The course will run again in autumn 2022. If you would like to learn more, please email mark.moore@teagasc.ie with your contact details.

Control what you can

International developments are beyond your control, but there is still a lot you can do to manage your farm and family finances.

Kevin Connolly
Financial management specialist, Teagasc Rural Economy Development Programme.

Despite global events and consequent runaway input prices, you still control a large part of what happens within your farm gate. Track your finances closely, possibly using banking apps or other cash flow recording tools. And there's nothing wrong with pen and paper for this vital task.

It is better to know before, rather than after, when a difficult financial picture is developing. But remember to always look after your physical and mental health and don't neglect family life.

If at all possible, take time some away from the farm, for a short while at least, to clear your head.

Maintain commercial relations as well as family ones. Both you and your suppliers/contractors depend on each other to keep your businesses going in good times and bad. Don't jeopardise good working relationships by being unreasonable during these uncertain times.

Maximise your income

Operate to the principle of "secure the income first". Target the maximum price for all sales and any bonuses available. Apply in good time for EU or Government schemes and meet the terms and conditions to ensure that you do not suffer financial penalties.

Survivors of previous cash flow troubles have learned the importance of a 'rainy day' fund. If you are fortunate to have reserves, question every withdrawal. You do not know how long the cashflow squeeze will last.

Promise yourself that, once the cashflow situation eases, you will replenish this fund to at least its original level. Treat it like another monthly bill to be paid until you have built it up again.

Time to sharpen your pencil

Price rises in feed, fertiliser and fuel have grabbed the headlines, but there have been increases in other costs too, not least household living expenses.

Examine how your family uses cash. Online banking can assist you to keep tabs on your current account movements. Banking apps on your phone or computer make it easy to log in at the same time every week and review what funds came in, and more importantly, what left your account over the previous week.

Can you match every payment to what it was for? Many direct debits and standing orders are flowing out of accounts and the reason for these can be forgotten as time passes.

Look ahead

Build up a picture for the next six months of when the largest payments are due. Contractor charges, fertiliser, vet bills/annual testing, loan and machinery lease repayments, annual tax payments to Revenue and accountancy fees will be among the biggest.

In these tough times, many suppliers are tightening credit terms and some may require payment sooner than normal. Keep that in mind and ensure that you have a cash reserve or bank credit facility to call on to meet these payments.

Your aim is to keep the business functioning and your focus should be on running the farm as best you can, without having to worry about how the next bill is going to be paid.

Prioritise your spending

When expenses are rising, you can either continue to spend regardless or you can make savings. Prioritise spending on areas which keep your farming system running efficiently.

Money to secure your on-farm winter feed supply for stock or to protect animal or plant health is essential. Be particularly careful with savings on anything that could cut farm income.

All other spending should be questioned. If the spend is not necessary for this year, postpone it. This principle also applies to household spending.

The core household expenses of food, heat, light and daily commuting are hard to cut back on.

There are, however, usually some areas that can be looked at for potential savings. Involve all the family in coming up with a list of things that they can do to keep costs down.

Using credit for purchases

Merchants are feeling the pinch, as they need to pay for their stock sooner and as a result they need to get money in from their customers.

Some purchases are now on a cash-on-delivery (COD) basis, but many merchants still offer credit, perhaps on restricted terms (reducing credit periods or increased credit rates to "encourage" buyers to pay back early). If you avail of credit, make

sure you understand the terms – when the payments are required and what interest will be charged. It may be cheaper and easier to arrange a short-term loan from your bank or Credit Union to cover your farm input purchases.

Regard your bank or credit union as another supplier which can help you run your business. Stay in contact with them and be upfront on what you need and stick rigorously to any agreements made.

Short-term borrowing options

Most farms operate with a line of credit from their bank to help to manage cash flow during the year. This may take the form of a bank overdraft, a working capital facility or short-term stocking loan. These facilities help to manage cashflow and should be availed of when needed. But use them wisely.

Bank overdrafts are only suitable for short-term needs – where 'own funds' in the current account drop below zero and there is a need for a facility to meet cash requirements.

Keep in mind the rules around not exceeding overdraft limits, and the requirement to clear the overdraft balance for a number of days in the year. Be aware of the interest rate on your overdraft. These are usually at the higher end of loan rates and there are penalties for not abiding by the terms and conditions.

An alternative to an overdraft is a fixed amount credit line facility. This is a prearranged, set limit of funds that is available to transfer into your current account as you need it and which has a defined payback term. This facility is often called a stocking loan or credit line loan.

The interest rates are generally lower than for bank overdrafts. In contrast with an overdraft facility, a stocking loan or credit line is usually targeted to be repaid when receiving cash from a significant sale, usually stock, crop or other product, or a direct payment lodgement to the farm current account.

There have been significant changes in the financial sector recently, with some banks exiting the market. On the plus side, the Credit Union network is now providing loan facilities to farms under the 'Cultivate' programme (cultivate-cu.ie).

Many of the financial institutions can also facilitate applications for loan facilities in addition to their own loan products.

The Strategic Bank Corporation of Ireland (sbci.gov.ie) provides products in association with most of the main financial institutions, with its own specific terms and conditions.

Microfinance Ireland (microfinanceireland.ie) is also a provider of small business finance and they work in association with the Local Enterprise Office network who can assist in the application process.

Additional information on how to manage your cashflow is available online from Teagasc on our website, or by scanning the QR code below.

Tillage farmers feeling the cost squeeze

Steps to control outlay can yield an environmental as well as cost benefit.

Shay Phelan
Crops specialist Teagasc
Crops, Environment and
Land Use Programme.


Tom Tierney.

Now that we are well into the season, farmers are thinking of fertiliser costs and whether savings can still be made. This is not straightforward. Where organic manures were used, these help reduce the requirement for chemical fertilisers, as they are a good source of N, P and K.

Another area to consider is the total amount of nitrogen required on crops. This will vary based on the BER ratio of the price of a kilo of grain versus a kilo of nitrogen. Teagasc published tables at the beginning of the year based on the prices that were available then, but these have changed, so farmers need to look at the revised tables.

From Table 1, we can see that where nitrogen was purchased at the lower prices, e.g €650/t, that the economic optimum total amount of nitrogen required is similar to other years at the high grain prices, e.g. €350/t, so the adjustment to the total nitrogen is small – 5kg/ha.

However, where expensive nitrogen was purchased, e.g €1,000/t, and is being used to top dress winter wheat crops, and where grain was forward sold at relatively low prices e.g €250, then the economic optimum maximum nitrogen rate is much lower and rates should be lowered by up to 53kg/ha.

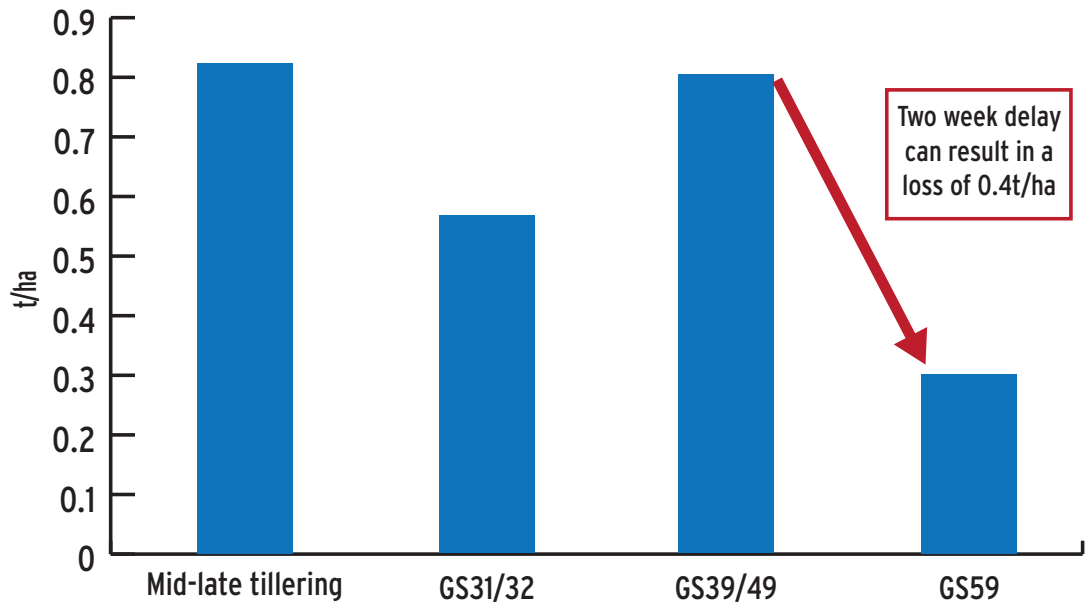
Every situation is different, so famers should use the table to estimate how much total nitrogen is economic to apply to their crops based on their average nitrogen cost and grain price.

Catch crops in 2021 grew very well and trapped quite a lot of nitrogen in many cases. From a survey carried out on some of the Tillage Signpost farms, up to 50kg/ha of nitrogen had been recovered from the soil from some of these crops, many of which

Table 1: Adjustment to economic optimum N rates (kg/ha) for wheat based on CAN (27% N) as N source.

Grain / Fertiliser N (CAN)	€650	€700	€750	€800	€900	€1,000	€1,100
€200	36	-42	-47	-53	-64	-75	-86
€250	-22	-26	-31	-35	-44	-53	-62
€300	-12	-16	-20	-23	-31	-38	-45
€350	-5	-8	-12	-15	-21	-27	-34

Figure 1: Response to fungicide timings in barley.



were brassica-based mixes.

How much of this nitrogen is available in the short-term depends on the species and whether the material is mostly leafy or stemmy material.

Where the crops contained mostly leaf, then this is considered to be readily available, but the amount of available nitrogen could vary significantly, so target a reduction of up to 10kg/ha of nitrogen on spring crops in 2022.

When the material was stemmy, the nitrogen was considered to be relatively unavailable to the following crop. In which case, don't make any significant adjustment to your rates.

Looking forward to the 2023 season, it seems that fertiliser prices will remain at the current levels.

While grain prices will somewhat offset the high fertiliser prices, farmers should start planning now to reduce their requirement for mineral fertilisers.

This may include growing catch crops, using organic manures, planting beans or peas, or adjusting the total amount of nitrogen based on the BER. Don't wait until the crops are in the ground in the autumn to begin planning.

Farmers should also look at the grain markets and perhaps forward sell a portion of their crops. This will reduce the risk of prices falling in 2023 and leaving growers suffering both high input prices and low grain prices.

Likewise, when it comes to crop protection, there are areas where the risks are lower and savings can be made. Teagasc trials have shown, over a number of years, that the response to a leaf 4 (T0) is very limited and does not justify the cost of a fungicide unless you are dealing with yellow rust.

In fact, if an Azole is used at this timing, then it will reduce the efficacy of the Azole used later in the programme, so for most winter wheat crops, a three-spray strategy will be sufficient. In barley, research has shown that 50% rates of fungicides will give adequate control of diseases when timed properly.

Timing the final fungicide on barley at the awns peeping stage (GS 39/49) will be more effective than applying it two weeks later when the heads are fully emerged.

The earlier timing has been shown to increase yields by up to 0.4t/ha, compared to waiting until the heads are fully emerged.

In recent years, we have seen more tillage farmers opt to use reduced cultivation systems as a way to reduce diesel and labour costs and to help growers establish crops faster.

While this is not a short-term solution for 2022, it may well be worth considering in the longer-term depending on your farm circumstances.

One leading farmer in this area is Tom Tierney from Prosperous, Co Kildare. Tom is a Teagasc Tillage Signpost farmer and is also a member of BASE Ireland.

Tom implements conservation ag principles on his own farm and also farms in partnership with his neighbour, Gordon Lucas, totalling 165ha of owned and long-term leased land.

Tom's farm practices cover cropping, diverse crop rotations and using organic manures where possible. Other practices include eliminating insecticides, reducing pesticides and synthetic fertilisers.

Crops grown on the farm include winter and spring cereals, winter oilseed rape, spring beans and forestry. Ivan Whitten is Tom's Teagasc advisor.

"We have been direct drilling for six years. A diverse crop rotation and cover cropping is used to improve soil health habitat and counter-act the challenges of the weather, grass weeds and the diversity of soils ranging from heavy clay to peat," says Tom.

"Multi-species cover crop six-way mixes of vetch, berseem clover, buckwheat and phacelia are grown to trap nutrients, improve soil structure and biome which makes direct drilling process work easier."

Clovers are routinely used in cover crops mixes and this year, they were introduced to an OSR crop as a combination crop to help supply some of the nitrogen requirement for cash crops. Tom also uses compost to improve soil health and offset fertiliser requirements. He chops straw on the headlands and participated in the Straw Incorporation Scheme in 2021, where all the oaten straw was chopped.

This will help to reduce P and K requirements in the years ahead.

"For the last six years, our aim with no-till and conservation agriculture has been to keep expensive inputs to a minimum, without compromising yields," concludes Tom.

"It's good for the environment, but in times like these, it's also very good for the bottom line."

Butterflies and moths bring beauty to our world

No hedge cutting or scrub clearance from March to September allows birds to nest safely and is good for butterflies and moths too.

Catherine Keena
Teagasc Countryside Management Specialist.

Jesmond Harding
Butterfly Conservation Ireland.

Small Copper butterfly on gorse. All pictures by Jesmond Harding

Butterfly life cycle

Female butterflies lay eggs in or near a food plant. This means larvae have something to eat when they emerge. Their colour either allows them to avoid detection by blending in with their foodplants, or they are a completely different colour to warn predators that they are inedible, possibly poisonous. Most Irish butterflies overwinter in their larval stage.

Larvae moult and shed their skin several times, before becoming a pupa. The adult butterfly develops inside the pupa.

Pupae usually hide deep in vegetation and blend in with their surroundings. Adult butterflies push their way out of the pupal skin from April to September and fly away after drying their wings.

Importance of hedges

There are 35 species of butterflies in Ireland and 23 of these breed on hedges. Over-management of hedges removes butterfly eggs, larvae and nectar sources for adult butterflies.

Leaving around one-third of a hedgerow uncut each year helps butterflies, moths and many other wildlife groups.

However, three-year growth in some hedges is too strong for a flail to cut without causing damage, so where hedges are trimmed annually, it is essential to leave some 'escaped' hedges on the farm.

Escaped or untopped hedges, or treelines which have never been topped, provide great habitat for butterflies and moths, as do the occasional individual trees allowed to mature within topped hedges. Fenced field margins alongside hedges containing native grasses and flowers increase their biodiversity value significantly, which is of critical importance in intensive agriculture.

Results from a study of the abundance of moth species showed that really good hedgerows, containing trees with fenced field margins, mitigated the impact of intensive arable farming.

Left to right: Peacock butterfly and its caterpillars feeding on nettles growing along a hedge bank that enjoys full sun. Nettles are very important for butterflies and moths. Twenty-six of our larger moths breed on stinging nettles.

Hedge species

Whitethorn is of high value, as it supports 62 species of larger Irish moths and additional wildflowers at the base, which moths on feed at night.

Left to right: Emperor moth egg cluster on Alder Buckthorn and the adult female moth.

Willow is really good for biodiversity, flowering early in spring. Brimstone butterflies, Peacocks, Comma and Small Tortoiseshells waking up from a long winter hibernation parched for nectar head straight to willow.

An amazing 115 of our larger moth species breed on willow, making it the single most important plant for moth species and that just counts the larger moths – there are hundreds of micro moths which are much smaller and a lot of those breed on willow too.

Birch supports 102 moth species. Oak supports 72 species of larger moths and more micro moths, as well as the purple hair streak butterfly. Oak trees within hedges provide the same support as an Oak woodland, even in exposed locations.

Beech isn't native and supports less insects because it hasn't developed alongside the native fauna of Ireland. There are only 22 species of moth that breed on beech.

The herb layer at the base of hedges containing plants such as Cow Parsley and Greater Stitchwort are brilliant areas when sunny in spring for butterfly and moth species. Insects are cold-blooded, so they need external heat from the sun to warm themselves up, so those sunny spots are really brilliant for butterfly and moth species.

Hedge banks are great because they are lower in nutrients, which allow different plants that can't tolerate high nutrient levels to grow, such as Lady's Bedstraw – a yellow frothy flower with a beautiful scent that was used to fragrance ladies' beds.

Patches of scrub are incredibly important for butterflies, especially in unshaded areas with native flora and grasses.

Other farmland habitats

Field margins, road verges and other unfarmed areas provide excellent habitat for butterflies, provided they are allowed to grow freely from now allowing them to flower – unsprayed and uncut.

These areas do need to be cut after September 1 to retain their value, but leaving some uncut (in rotation) each year allows insects go to ground in the winter and hibernate at the base of the vegetation.

Avoid severe cutting – do not cut below 4 inches/100mm. Overly-zealous tidying of nature in the countryside is not good for wildlife.

For more information on butterflies, visit: https://butterflyconservation.ie/wp/

Join Butterfly Conservation Ireland at https://butterflyconservation.ie/wp/join-us/

See Jesmond Harding's new book – The Irish Butterfly Book at https://butterflyconservation.ie/wp/2021/12/06/the-irish-butterfly-book/

Left to right: The Beautiful Carpet moth feeds on bramble, raspberry and hazel and the Barred Yellow moth feeds on Common Dog-rose.

Multiple challenges, long-term reward

John Casey
Forestry Development Officer.

In 2019, Ash Dieback disease was discovered in Brendan Keane's 7ha crop of 14 year old ash. At the same time, the Waterford farmer from Dunhill was preparing to put in a forest road and thin his adjacent 8ha Sitka spruce plantation. Brendan sought advice, before mapping a path through these tricky challenges.

Firstly, Brendan had a 430m forest road built under the Forest Roads Scheme. Partly thanks to the presence of a stone supply on his own farm, the net cost to Brendan was just €600 for the completed internal road in March 2021.

The Department of Agriculture, Food and the Marine (DAFM) Forest Road Scheme provides funding for the construction of forest roads and associated infrastructure.

A rate of €40 per linear metre to a maximum of 25m per hectare is available where 50% or more of the area is due for harvesting in the next three years.

This can be extended to five years in the case of joint applications. Extra funding is available if significant additional stone is required to build a bellmouth, where it is at least two metres below the surface of the existing public road. Go to the Teagasc website for further details.

Brendan employed a registered forester when applying, as the total road length was less than 500m.

A qualified civil engineer or engineering surveyor must prepare specifications and carry out appropriate works supervision where the road application contains grant aided special construction works, lengths in excess of 500m, or sections of roads due to site conditions or difficult construction designs.

A standard management plan was drawn up at the time of application, and was incorporated into the November 2018 felling licence application for the thinning of the 8ha of mainly Sitka spruce. Felling approval from DAFM was received in July, 2019.

These conifer trees were harvested in the summer of 2021, and overall, Brendan says he was satisfied with the thinning operation.

Brendan Keane.

"The contractor carried out a 1-in-7 line and selection thinning of the Sitka spruce and 20% Japanese larch, removing a total of 500t of timber, or approximately 60-65 m^3/ha. The breakdown in terms of product categories was 70% pulp and 30% pallet," he says.

Felling the ash crop

The new road was beneficial when it came to clearfelling the ash under the Ash Dieback Reconstitution and Underplanting Scheme (RUSS). This DAFM scheme provides financial support for the site clearance or partial clearance of ash and the reconstitution or replacement of ash trees with alternative species.

Retaining some of the more resistant ash trees and under-planting is also an option in some cases. Following consultation with his Teagasc forestry advisor, Brendan decided to clearfell, with €6,000 assistance from RUSS.

Almost 260t of ash was clearfelled – 2ha by harvesting machine and 5ha by chainsaw. Having looked at his options, Brendan decided to replace the ash with a crop of Sitka spruce and alder, planted in inverted mounds in March 2022.

Life stages of the large pine weevil.

"There were a couple of learnings from the whole experience," says Brendan.

"Apply for the road scheme and the felling licence in plenty of time. I first contacted the road contractor in 2019.

"Secondly, the Knowledge Transfer Group (KTG) I participated in during 2019 was a real help and enabled me to get my head around timber pricing."

The ash-focused RUSS was applied for in 2020 and approved in April 2021, which allowed the ash to be efficiently felled at the same time as the conifer thinning.

Brendan reckons that the total operation resulted in "about €20,000" in his pocket.

He also retained some of the ash as firewood for his own use.

Replacing the ash

"Thanks to the group, I'm aware that felling an adjacent coniferous crop, even in a thinning, can leave breeding material for the large pine weevil (*Hylobius abietis*)," says Brendan. "The young replacement Sitka trees can be attacked by adult pine weevils feeding on the stem from the root collar upwards."

While many forest owners are unaware of the threat posed by large pine weevils, on average 50% of the seedlings on untreated reforestation sites in Ireland and the UK are killed by pine weevils during the first few years.

Heavy damage can completely girdle stems and cause plant death.

"Young tree losses could lead to substantially increased re-establishment expenditure through the cost of insecticide application, replacing plants and additional weeding," concludes Brendan.

No control of the pest in the stumps is available and young plants must be protected through dipping and/or spraying with the insecticide Cypermethrin.

The use of such pesticides is governed by the European Communities Regulation 2012, Sustainable Use of Pesticides.

Alternative insecticides are emerging in the marketplace, as well as lower impact Integrated Pest Management (IPM) strategies.

The adult Hylobius (the large pine weevil) can live for up to four years and may attack at any time of year when it is warm enough for insect activity. There are typically two peaks when damage occurs; one in spring before egg-laying and the other in late summer before the adults hibernate underground.

Note that knapsack application of Cypermethrin is only effective for approximately six weeks, so predicting the optimum time is critical.

Protecting the young spruce trees

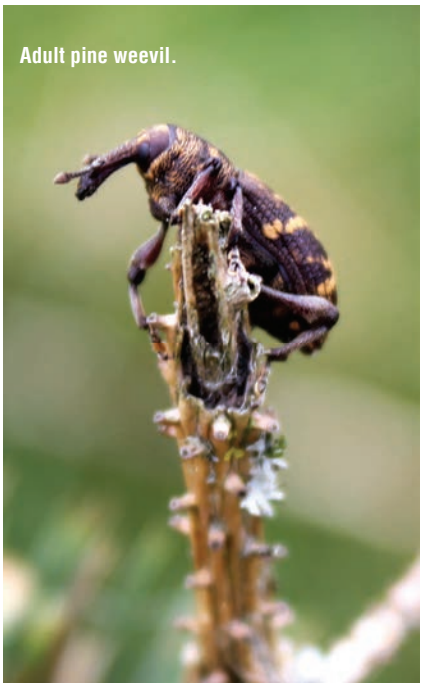
For the forest owner, stump hacking can help predict a weevil outbreak. Clear the soil away from one-quarter of a stump, at least 40cm out and 30cm down from soil level (include at least one major root and two root-stump junctions).

The bark is then removed from the cleared area using a wood chisel or spade. Count the number of weevil larvae and pupae. Weevil larvae are not segmented or ridged and tend to form a C shape.

Sample at least five stumps. If the average stump count on a site felled more than a year ago is five or more per stump, then spraying will be necessary. If the count is one or less, then spraying may not be needed.

If average count is between one and five, then check the site again during weevil feeding periods (April and August). This method should be viewed as an indicator and is not 100% accurate. The young trees will remain vulnerable for the first couple of years.

"Forestry throws up multiple challenges, but the rewards make it worthwhile," concludes Brendan Keane.


Adult pine weevil.

Treat yourself to a wildlife pond

Ponds have been garden features for millennia.

Chris Heavey
Lecturer, Teagasc College at the National Botanic Gardens.

I have fond childhood memories of a pond in the beautiful garden of a family friend. These memories, and Alan Titchmarch, inspired me to create my own pond. I find it a most rewarding garden feature.

The process begins by finding a site. Somewhere not too shaded, where the sun can shine on at least part of the pond's surface.

Then, dig a hole. In my case that hole was 11m long, three and a half metres wide and 90cm deep at its longest, widest and deepest points, serpentine in shape.

Safety is paramount. Always be aware that ponds can pose a danger to children in particular. Take precautions to ensure safe or restricted access.

It is a good idea to leave shelves for plants that don't want to be too deep and for wildlife survival at different levels. My pond goes from a maximum depth of 90cm, gently over its full length, to a comfortable slope for water wildlife to crawl out of the pond when necessary.

Planting beds were created within the shelves, which were edged by rounded stones and filled with soil for planting edge-of-water plants such as Candelabra primula, Hosta, marsh marigold and Iris. I lined the pond with old carpet. Traditionally, sand is used to ensure there is no possibility of puncturing the Butyl rubber liner with sharp stones.

Marsh marigold.

The rubber liner is the most expensive part – everything else is just hard work. There are other liners available in rigid format and even a puddling clay which can be compressed into the pond wall, where synthetic liners are unacceptable.

At this point, you should have a waterproof hole. Fill this with water. I used saved rainwater and benefitted from a torrential downpour to cap it off, but you may find yourself using treated tap water, which should be let settle before putting in plants or fish.

The choice of plants varies from deep water lilies to marginal plants such as flowering rush. The edge of the pond, where the overflow happens, can accommodate beauties like Rheum, Astilbe and Hosta, while atmosphere can be created using architectural plants such as tree ferns, or in a dry spot, the hanging flowers of the beautiful angel's fishing rod (Dierama).

Oxygenators like water hawthorn may be needed, but avoid using Canadian pond weed and other invasive species. Only buy from reputable sources, as unwanted plants such as duck weed, once introduced to a pond, can never be successfully removed.

Alan Titchmarsh once said: "Build it and they (wildlife) will come." And he was proven correct. While the pond was filling, I saw my first diving beetle. This was followed by damsel flies the next day and within a week, we had a frog in residence, along with numerous other pond life. I am still hoping for a newt or two!

Any garden can benefit from a pond and it is only limited by your imagination. It's like going to the cinema – there's something new and exciting to see every time you look.

Teagasc
Agriculture and Food Development Authority

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Organic Farm Walks 2022

Teagasc, Department of Agriculture, Food & the Marine and organic organisations invite all farmers and members of the public to see organic farming in practice and to meet and speak with the producers and sector's experts.

Wednesday, 11th May | 12pm
Andrew & Leonie Workman, Dunany Flour Organic, Drogheda, Co Louth
Cereals, Milling Flour

Wednesday, 1st June | 2pm
John Hurley, Castle Hill House, Knockalaughta, Ballintubber, Castlerea, Co Roscommon
Suckler to Weanling, Sheep

Wednesday, 8th June | 2pm
Fergal Byrne, Calverstown Little, Dunlavin, Co Kildare
Sheep, Cereals, Beef Finishing

Wednesday, 15th June | 2pm
Donal & Frederique Keane, Camelton Stud, Summerhill, Co Meath
Suckler to Beef, Cereals

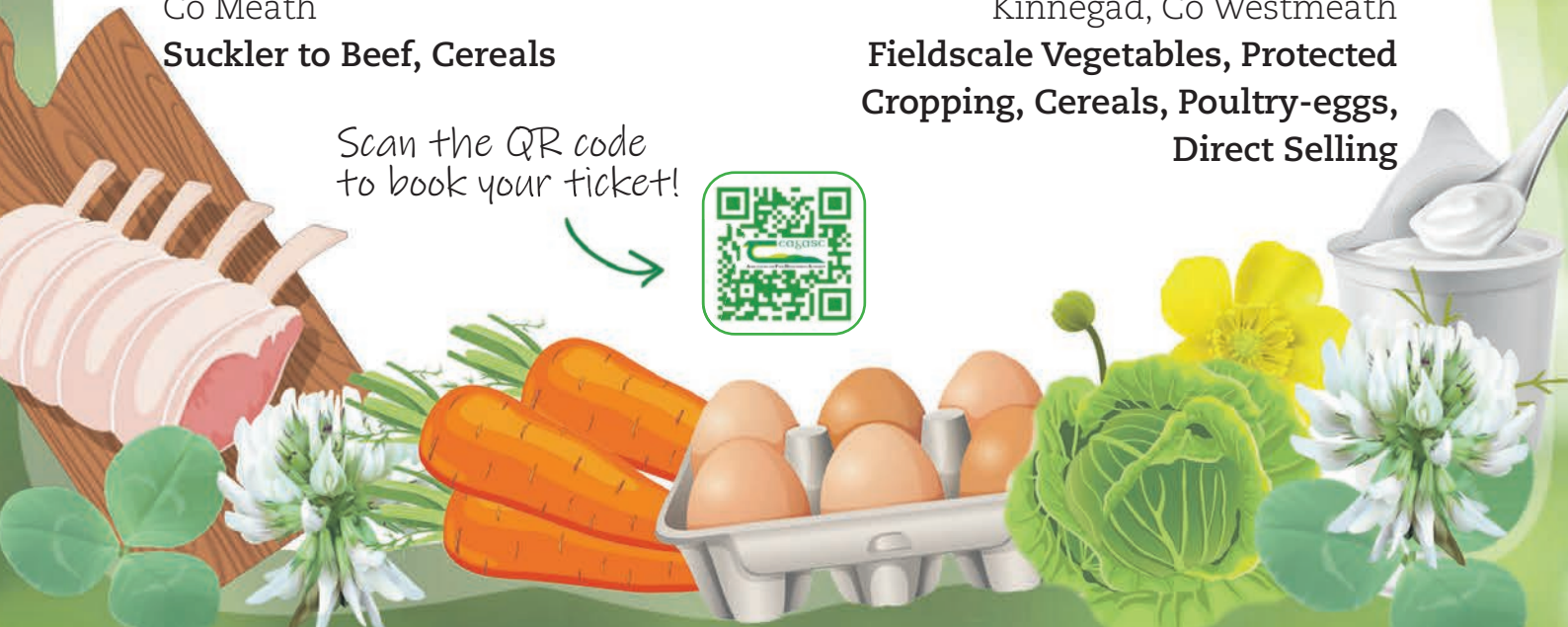
Wednesday, 22nd June | 2pm
Clive Bright, Ardsallagh, Ballymote, Co. Sligo
Beef, Direct Selling

Wednesday, 6th July | 2pm
Gavin Tully, Clonhenritte, Camolin, Enniscorthy, Co Wexford
Cereals

Wednesday, 13th July | 2pm
Declan Houlihan, Corrigeen Organic Farm, Rathcabin, Birr, Co Offaly
Cereals, Poultry-eggs

Tuesday, 19th July | 2pm
Rose O Sullivan & Martin Fox, Spring Cottage Organic Farm, Parke, Kinnegad, Co Westmeath
Fieldscale Vegetables, Protected Cropping, Cereals, Poultry-eggs, Direct Selling

Scan the QR code to book your ticket!



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