



Crops
Environment
& Land Use
Programme

National Agri-Environment Conference 2019

Tullamore Court Hotel, Tullamore, Co. Offaly.



Thursday, 17th October, 2019

National Agri-Environment Conference 2019



Tullamore Court Hotel, Tullamore, Co. Offaly
Thursday 17th October 2019
10.00am to 4.00pm

Tel 053 9171200
Web: www.teagasc.ie/environment/

Agri-Environment Conference 2019- Foreword

This year the Agri-Environment Conference returns to its spiritual home in Tullamore following last year's trip to the Burren. The conference will focus on the challenges facing the agri-food industry; to deliver on the environmental outcomes that are being asked of the industry. The climate action plan requires a re-design of the CAP and its Rural Development Programme, the review of the provisions of the nitrates directive, the derogation, and the implementation of measures to achieve emissions reductions; There will be a requirement for an unprecedented level of dialogue between a very broad number of partners to deliver on emission targets, biodiversity and water quality. The industry collectively must use all the tools available to it in order to deliver the improvements required. It is also essential that there be clarity for farmers and as much simplification of what they are being asked to do as possible.

During the day we will consider a number of the key challenges with a view to improving our understanding of the complexity of the task ahead and we will have the possibility for frank and open dialogue. Thank you once again for supporting the conference and I hope that we will meet your expectations for the day with some excellent presentations, panel discussion and networking.

Go raibh maith agat.

Pat Murphy



National Agri-Environment Conference 2019

- 10.00** **Opening**
Director Gerry Boyle, Teagasc
- Session I.** **Policy development & sustainability challenge**
Chair: Helen Sheridan, UCD
- 10.15 Challenges in water quality
Bernard Harris, DAFM
- 10.45 Challenges in biodiversity
Sean Kelly, NPWS
- 11.15 Meeting the challenge of reducing greenhouse gas and ammonia emissions
Dr Karl Richards, Teagasc
- 11.45 Communicating with the farmer community to improve water quality
Mary Barrett, LAWPRO
- 12.15 Panel discussion
Mark Gibson, Teagasc
- 12.45-1.45** **Lunch**
- Session II.** **Policy impact at farm level**
Chair: Dr Mary Ryan, Teagasc
- 2.00 Farmers perspective
Gillian O’Sullivan
- 2.30 Biodiversity management practices on intensive farmland
Catherine Keena, Teagasc
- 3.00 Local authority and their findings update
Carol McCarthy, LAWPRO
- 3.15 ASSAP update
Noel Meehan, Teagasc
- 3.30 NMP online as a tool to assist environmental policy change and impact at farm level
Tim Hyde, Teagasc
- 3.45 Role of knowledge transfer in reducing greenhouse gas emissions
Andy Boland, Teagasc
- 4.00** **Conference Close**
Con Feighery, Teagasc

Session I

Policy development & sustainability challenge

Challenges in water quality

Bernard Harris
DAFM

Current Water Challenge

Water quality in Ireland had improved since the introduction of Good Agricultural Practice for Protection of Waters Regulations (also known as the Nitrates Regulations) in 2006, however over recent years the situation has stabilised and there are indications that quality may be deteriorating. The EPA's recent national assessment of water quality report, covering the years 2010- 2015, stated that while the quality of water sources has remained relatively stable, there has been a failure to meet the planned national target of 13% improvement in water status for the six year period. In meeting Ireland's goals of the Water Framework Directive (WFD) farming practices will play a key role in improving the water quality of our rivers, lakes and groundwater.

The Impact of Agriculture

Farming plays an important role in the Irish economy and landscape and approximately two-thirds of the Irish land area is in agricultural use. The challenge of sustainable agriculture is to continue to protect and improve our environment whilst facilitating the growth of the agricultural sector. There are interrelated economic, environmental and social dimensions. Food Wise 2025 is a ten year development strategy for the sector and has ambitious targets including an 85% increase in exports to €19bn and a 65% increase in primary production value to €10bn. There are 416 actions in the Food wise strategy, 79 of these relate to ensuring the environmental sustainability of Irish agriculture. Additionally, a number of regulations and initiatives are in place to support sustainable growth of agriculture and specifically the improvement of water quality.

Progress, Tools and Measures

- **Agricultural Sustainability Support and Advisory Programme (ASSAP)**

This is a collaborative initiative supported by the Department of Housing Planning and Local Government, the Department of Agriculture Food and the Marine and industry to achieve farmer behavioural change for the protection of water. Thirty sustainability advisors have been assigned to this programme – 10 provided by DAFM, 10 by DHPLG and 10 by the dairy co-ops. The 30 Advisors will work within a unified partnership structure which encompasses Teagasc, the Co-ops and LAWCO (Local Authorities Water and Communities Office).

- **Agricultural Catchment Programme (ACP)**

The Agricultural Catchment Programme is a programme operated by Teagasc and funded by DAFM which promotes better water quality and supports the production of high-quality food. It has been in operation for nearly ten years with ACP staff working with 300 farmers across six catchments in Ireland. Phase 3 of the programme runs to the end of 2019 and builds on the gains and experiences from earlier phases. Overall, evidence from the ACP indicates that supporting farmers, through technical advice, to make better decisions regarding how they manage nutrient applications is likely to be the single area with the greatest potential to improve outcomes for water quality on Irish farms.

- **The River Basin Management Plan (RBMP)**

Under the Water Framework Directive the second cycle of the RBMP has a much-improved evidence base to underpin decision making at national and local level, a more integrated approach to public consultation and engagement and strong suite of measures that will be implemented nationally (e.g. Nitrates Action Plan, Irish Water Capital Investment Plan), supported by local measures to be implemented in 190 prioritised areas for action.

- **Nitrates Action Programme and Nitrates Derogation**

The Nitrates Directive, implemented by means of the Nitrates Action Programme (NAP), is the key legal measure in Ireland's River Basin Management Plan dealing with Agriculture. Its objective is preventing and reducing water pollution from surplus nutrients coming from agriculture. 7,000 intensively stocked farmers availed of the nitrates derogation in 2018, with an increase in national land area being farmed under derogation. It is recognised that compliance of a higher standard is required from these farmers to ensure a greater level of environment efficiency is achieved. Interim measures will be in place under the Nitrates Derogation Review 2019 which introduces additional measures focussed on further reducing agricultural emissions to water and air.

- **The Future of CAP**

Under the new CAP, each Member State will have to develop its own CAP Strategic Plan, which will include the measures that will deliver the required socioeconomic and environmental outcomes. The plan will have to include eco-schemes under Pillar 1 in addition to the traditional environmental payments under Pillar 2. A set of impact indicators will be used by the Commission to monitor progress in relation to environment, climate change mitigation and biodiversity in Member States to ensure that effective measures are adopted.

Meeting the challenge of reducing greenhouse gas and ammonia emissions

Karl Richards¹, Dominika Krol¹, Trevor Donnellan² and Gary Lanigan¹

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²Teagasc, Rural Economy Research Centre, Athenry, Co. Galway H65 R718

Background

Agriculture is currently facing a number of environmental challenges relating to biodiversity, water quality and reducing both greenhouse gas and ammonia emissions. Emissions of greenhouse gases and ammonia continue to increase nationally in response to dairy expansion. The recently published [Climate Action Plan 2019](#)¹ sets out the challenging targets for agriculture:

- Reduce emissions by 10 to 15% by 2030
- Deliver carbon sequestration
- Support diversification including bio based products and bioenergy

In addition the National Clean Air Strategy has set out the pathway for Ireland to comply with the [National Emissions Ceiling regulations 2018](#)² which has set a target to reduce ammonia emissions by 5% by 2030. The department of Agriculture Food and the Marine will be launching a code of good agricultural practice for reducing ammonia emissions to So what are the options and actions that we can undertake to achieve these very challenging 2030 targets? A marginal abatement cost analysis (MACC) was used in order to assess the abatement potential of a range of mitigation measures, as well as their associated costs/benefits on both greenhouse gas (GHG) and ammonia emissions for the period 2020-2030.

Reducing Greenhouse Gases

The [Teagasc MACC](#)³ identified a large range of measures to reduce or offset greenhouse gas emissions. These were sub-divided into four different categories: a) Measures with reduced agricultural greenhouse gases (i.e. directly reduce methane and nitrous oxide); b) Measures which enhance CO₂ removals from the atmosphere in terms of land management or Land-Use, Land-Use Change in Forestry (LULUCF), and c) reductions from displacement of fossil fuels via enhanced cultivation of biomass and/or adoption of anaerobic digestion.

A total of 14 cost-beneficial, cost-neutral and cost-effective mitigation measures were identified for reducing agricultural emissions (methane and nitrous oxide). These measures were estimated to reduce emissions by 1.85 Mt of carbon dioxide equivalents per year (CO₂-e yr⁻¹) between 2021 and 2030. The largest contributors to the abatement are using protected urea, improving dairy EBI and using low emission slurry spreading. In addition, the MACC identified carbon sequestration from afforestation and management of high organic soils could potentially remove another 2.97 Mt CO₂-e yr⁻¹ from 2021-2030 reaching a maximum of 3.25 Mt CO₂-e yr⁻¹ by 2030. The cultivation of biofuel / bioenergy crops and AD has potential to account for a further reported reduction of 1.37 Mt CO₂-e yr⁻¹ by 2030, mainly associated with the displacement of fossil fuel usage.

Reducing Ammonia Emissions

Currently the Teagasc [MACC for reducing ammonia emissions](#)⁴ published in 2015 is being revised to include new measures based on recent research. The top measures for reducing ammonia emissions are switching from urea to protected urea, using low emission slurry spreading, covering external slurry stores and reducing the crude protein in feed. Currently the MACC estimates the abatement potential was of up to 22 kT NH₃ by 2030. This may not be sufficient to achieve the 5% reduction target and thus new measures are under evaluation to increase options for farmers to reduce emissions.

Action Needed

The MACC reports exist on paper only and what is needed to achieve the greenhouse gas and ammonia targets is practice change and adoption. While regulations are being considered by DAFM as part of the Derogation review, knowledge transfer is essential. Many of the measures described in the MACC reports lead to efficiency improvements on farms and reductions in costs. Teagasc is currently planning a greenhouse gas demonstration farm and KT campaign to provide support to farmers at this time of change. Practice change is difficult and will require significant communication and action. Early adoption of measures increases the abatement potential over up to 2030. There are opportunities for both farmers and the wider agricultural industry for Ireland to be a leader in the move to low carbon farming.

References

¹<https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/Climate-Action-Plan.aspx>

² <http://www.irishstatutebook.ie/eli/2018/si/232/made/en/print>

³<https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf>

⁴<https://www.teagasc.ie/media/website/publications/2015/An-Analysis-of-the-Cost-of-the-Abatement-of-Ammonia-Emissions-in-Irish-Agriculture-to-2030.pdf>

Communicating with the farming community to improve water quality

Mary Barrett
Local Authority Waters Programme

Introduction

Agriculture is the most common land use in Ireland, covering approximately two thirds of the country. Agriculture has been identified as the most prevalent significant pressure on water quality, impacting just over half (780) of all water bodies (1,452) that are *At Risk* of not achieving their water quality objectives under the Water Framework Directive (WFD). Where agriculture is a significant pressure, collaboration, communication and clear, concise understanding between industry partners and the farming community is fundamental to bringing about behavioural change. The focus is convincing these stakeholders of the value of water resources and persuading them to adapt long-term behaviours appropriate to protecting water quality while maintaining a financially sustainable farming system. In this talk I will outline the principles of effective communication that are key to reaching stakeholders such as those in the agricultural sector.

Communicate more effectively with the farming community

Communication is an exchange that occurs between two or more people. It can be verbal and/or non-verbal and quite often proves to be a complex process. However, there are certain assumptions we can make with a high degree of confidence when it comes to communication that can help us develop our understanding of the process. Communication is inevitable, transactional, irreversible, skilful and a learning process. One of the most positive attributes to take from this in terms of knowledge exchange is that as communication is a learning process, good communication skills can always be honed, developed and enhanced.

Communication can be modelled in a simplistic format which starts with the source, a sender who transmits a message out, through different channels to a receiver. The receiver may or may not then have an opportunity to make a response, offer feedback. However, the effectiveness or success of the exchange is challenging and dependant on multiple factors. One of the key elements to this success is perception. Perception is the processing, interpreting, selecting and organizing of information. Perception can often inhibit the communication process because the same message can be perceived differently by different people and cause misinterpretation or blockages to the intended meaning of the message being delivered. Developing good empathy skills can reduce misunderstandings as it enables the sender to have a better awareness of the thoughts and feelings of the receiver. Displaying empathy and a clear understanding of the farming community's perspective and position will help us in establishing the type of relationship needed with them, which is a precursor to successful engagement and effective communication. We need everyone involved in the solution, to facilitate connection, responsibility and ownership of the issues.

Conclusion

Our overall goal is to improve water quality, and as an industry we need to be cognizant always of our audience, working collaboratively to achieve good water quality. We have legislative requirements to meet under the Water Framework Directive but more over we have a moral obligation to ensure the sustainability of one of most precious resources for future generations.

Session II

Policy impact at farm level

Farmer's perspective regulations & dairy farming

Gillian O'Sullivan

Farms carry a significant administrative workload:

- Calf registration & BVD sampling
- Feed purchases
- Fertiliser purchases & usage
- Nutrient management plans
- Herd register & movements
- TB testing & milk certification
- Facilities & slurry storage capacity
- Herbicide purchases and spray cert
- Soil Sampling
- Bord Bia audit
- Drug register
- Safety Statements
- SFP
- Nitrates

Time spent on administration is increasing

Recent changes in policy direction towards greater regulation framed by Climate Action Plan are positive from an environmental perspective but will have a huge impact at farm level. Difficult for primary producers to continually bear the brunt of regulation as it is adding to costs at farm level in terms of time, expenditure, paperwork & stress. Farmers taking a battering from media, consumers, vegan/animal welfare/environmental groups & need to be supported rather than pressured further. Simpler solutions can be found by working with industry to share the regulatory load.

Towards measuring biodiversity management practice on intensive dairy farms¹

Catherine Keena, Teagasc Countryside Management Specialist

Professor Jim Kinsella, School of Agriculture and Food Science, UCD

The increasing importance and concern for biodiversity can be seen from the evolution of global policy since the 1990's. There is ample room for exploiting the potential for agriculture to contribute to the recommended mainstreaming of biodiversity conservation across sectors and indicators that take account of the diverse values of nature are required (IPBES, 2018). According to the EU Biodiversity Strategy to 2020 (2011), biodiversity policies will need to be integrated to sectoral policies with an emphasis on the contribution of agriculture to protecting biodiversity and integrating biodiversity into the Common Agricultural Policy (CAP). A strategic objective of Ireland's National Biodiversity Action Plan 2017- 2021 (NPWS, 2017) was to strengthen the mainstreaming process so relevant sectors take biodiversity into account. This plan for Ireland recognised that most biodiversity is in the wider countryside and facing multiple pressures with agricultural intensification identified as a main pressure (NPWS, 2017). Food Wise 2025, a ten year vision for the agri-food industry in Ireland, identified significant growth opportunities, but concluded that future food production systems must be as focused on managing and maintaining natural resources as they are on increasing production (DAFM, 2015).

In Ireland, one action to mainstream biodiversity into decision-making across all sectors in the National Biodiversity Action Plan 2017-2021 was to ensure Origin Green (Ireland's food and drink sustainability programme) produces tangible benefits for biodiversity (NPWS, 2017). Performance indicators for this action included the development of a scientifically-based methodology to assess farmland habitats and the development and trialling of a biodiversity indicator in the Teagasc National Farm Survey. Food Wise 2025, a ten year vision for the agri-food industry, identified significant growth opportunities across all sub-sectors of the Irish agri-food industry with export growth driven chiefly by expansion in dairy, beef, seafood and consumer food (DAFM, 2015), and the opportunity for the dairy sector described as 'immense' provided the product is safe, of high quality and sustainably produced with the ability to verify these criteria. The recognition that a significant increase in food production cannot be considered in isolation from its environmental impact led to recommendations in Food Wise 2025 including the development of a wider spectrum of sustainability indicators and consideration if tools similar to the Carbon Navigator could be used for biodiversity (DAFM, 2015). This emphasis on biodiversity and expansion in farming in Ireland rationalises the study undertaken in 2013 by Catherine Keena entitled: *An examination of biodiversity management practices on Irish farms and how this can be measured: the case of dairy farmers in County Waterford*.

¹ Based on extract of PhD Study entitled: *An examination of biodiversity management practices on Irish farms and how this can be measured: the case of dairy farmers in County Waterford*. of Catherine Keena (Degree awarded pending revisions, July 2019)

The study draws on the literature to propose an index which can be readily applied at farm level to establish biodiversity management practice on intensively farmed dairy farms. This methodology draws on existing evidence and literature to inform the development of an innovative, easily repeatable and rapid assessment tool that measures biodiversity management practice on dairy farms. The index proposed combines four broad biodiversity characteristics of intensively managed dairy farms of most relevance, namely: farmed landscape structure; hedgerows, field margins and watercourses.

Informed by the literature, a Biodiversity Management Practice Index (BMPI) is proposed for application on dairy farms to inform biodiversity management practice which enables the positioning of intensively-managed farms by their biodiversity management practice status. There are four broad characteristics of farms which provide readily accessible indicators, namely: the farmed landscape structure; hedgerows; field margins; and watercourses. The proposed index combines these characteristics (Figure 1).

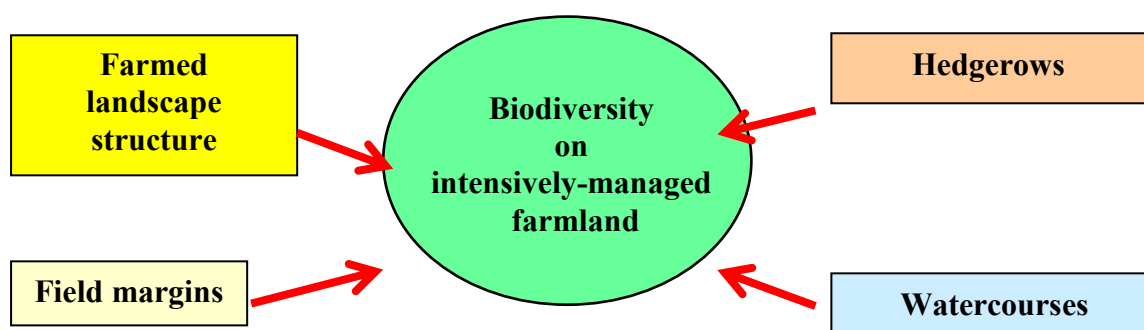


Figure 1. Diagrammatic representation of the characteristics of farms that combine to reflect biodiversity on intensively-managed farmland

This index acknowledges the importance of focusing on the assessment of biodiversity management practices, specifically on intensive farms, epitomised in the case of Ireland by dairy farms, due to the high contribution of this sector to agricultural produce and plans for the sector to increase. The constituents of the BMPI are explained and referenced in Table 1.

Table 1. Constituents of the Biodiversity Management Practice Index with Partition Points

	Constituents of BMPI	Partition Point
1	Average field size	5 ha or less than 5 ha
2	Hedgerow height	1.5 m or less and 1.5m
3	New sapling trees in hedgerows	Presence or Absence
4	Uncultivated field margin	1.5 m or more
5	Unsprayed field margin	Yes or No
6	Fenced watercourses (with / without drinking access)	Yes or No
7	Watercourse margin of 1.5 m or more	Yes or No
8	Absence of drinking access to watercourses	Yes or No

Application of the BMPI

The Biodiversity Management Practice Index (BMPI) was created with scores ranging from a low of 0, indicating poor biodiversity management practices to a high of 4, indicating excellent biodiversity management practices. The study collected data from 149 dairy farms in 2013, which was used in the testing and application of the BMPI. A typical farm with a low BMPI score has an average field size over 5 hectares, treeless hedgerows less than 1.5 metres in height, no field margins, and watercourses unfenced with unrestricted animal access (Figure 15). In contrast, a typical farm with a high BMPI score has an average field size less than 5 hectares, hedgerows over 1.5 metres including tree saplings, unsprayed field margins over 1.5 metres, and watercourses fenced 1.5 metres from the bank with no animal access (Figure 16).



Figure 15. Image of a low BMPI scored farm



Figure 16. Image of a high BMPI scored farm

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Local Authority and their findings update

Carol McCarthy
LAWPRO

Local Authority Waters Programme

Water quality in Ireland is under pressure. The number of monitored river water bodies and lakes at high or good status declined during the first river basin management planning cycle (2009 – 2015), despite increased regulation designed to protect water quality and significant investment in infrastructure and environmental schemes. The second cycle's River Basin Management Plan for Ireland 2018 – 2021 (RBMP) sets out a new approach for the protection and management of our waters that involves close collaboration between local authorities and state agencies. To achieve this, greater responsibilities have been placed on local authorities to coordinate WFD activities and drive public participation in the development and implementation of the RBMP. In response to these responsibilities, the Local Authority Waters Programme (LAWPRO) was established as a shared service between the 31 Local Authorities. The shared service has two elements; the Waters & Communities Office (in place since 2016), and the Catchment Assessment Teams (set up in the second half of 2018). The Catchment Assessment Teams are systematically assessing the 190 priority Areas for Action (PAAs) detailed in the RBMP, noting basic measures (such as those contained in the Good Agricultural Practice for the Protection of Water Regulations) that are not being implemented, recommending supplemental measures to bring the PAAs into compliance with their WFD objectives and supporting the relevant public bodies and land managers to get those measures implemented. Where agricultural land management measures are identified, the Teams work with the Agricultural Sustainability Support and Advisory Programme (ASSAP) which focuses on knowledge transfer and collaboration aimed at driving practice change towards more sustainable farming that protects water quality. A RBMP governance structure is in place for discussion on policy issues that need further development or which currently conflict with the aims of the Plan.

Findings To-Date

Due to the close collaboration with ASSAP, LAWPRO's initial focus has been on PAAs where agriculture is a pressure, but it is looking at all pressures in those catchments; domestic waste water treatment systems, forestry, hydromorphology, industry etc. The assessment process is now well-established commencing with a desk study which gathers all the available information about the PAA, followed by a public information meeting which allows input from local communities. Before fieldwork commences, ASSAP organises a farmer engagement event to inform local farmers directly about the process and seek their input. The programme has the support of the main farming organisations.

The significant issues that have been identified for agricultural lands are loss of nutrients, sediment and hazardous substances (pesticides, sheep dip, farm chemicals etc.) to waters. Land drainage and land reclamation appear to be more of a significant issue than previously thought. There is widespread evidence of over-maintenance of water channels, leaving banks bare of vegetation and prone to collapse. In some areas greater attention to detail is required in the implementation of basic measures. For example, there is a good understanding of the benefit of buffer strips when slurry spreading near water courses, but

this is not always practised for drains that may be dry for parts of the year yet provide a pollution pathway from the farmyard or land to waters. There have been a significant number of silage effluent discharges to waters this summer, leading to a fish kill in at least one case. Fieldwork is also identifying some toxic impacts on water courses where hazardous substances such as sheep dip have been disposed, or pesticides have been sprayed. Pathogens are also being noted as an issue for some protected areas such as bathing and shellfish waters.

Once identified during the catchment assessment process, these issues are then referred to the ASSAP advisors detailing the scientific evidence, the specific measures required and a map of areas to focus on for implementation of measures. Tracking of progress is done through the EPA's WFD web application to facilitate reporting.

ASSAP update

Noel Meehan
Teagasc

The Agricultural Sustainability Support and Advisory Programme (ASSAP) is a free, voluntary and confidential advisory service providing advice to farmers on reducing nutrient and sediment loss from farms to waters.

ASSAP is an industry wide collaboration with support from the DAFM, DPHLG, EPA, LAWPRO, the Dairy Industry and Farming Organisations. It is available to farmers located in 190 Priority Areas for Action (PAA's) – these are catchments identified throughout the country where water quality is under pressure. Advisors will visit farms, assess existing practices and offer advice on preventing nutrient and sediment loss to waters with a view to improving overall PAA water quality.

Initial LAWPRO stream assessments in the PAA's indicate that diffuse P and sediment losses account for approximately 60% of the pressures on streams with point sources, diffuse nitrogen, pesticides and ammonium losses making up the remainder.

Based on this information the advisors assess farms under three areas; nutrient management, land management and farmyards. The majority of issues identified on farms reflect the diffuse P and sediment pressures on streams. Identification and management of critical source areas (CSA's) on farms and the protection of waters from overland flow and livestock access will be play a large role in improving water quality.

The advisors role in informing and educating farmers on best practice and management of their farms will also be fundamental to ensuring that the 'right measure' is put in the 'right place' and maintained over time.

NMP online as a tool to assist Environmental Policy change and impact at farm level

Tim Hyde, Pat Murphy
Teagasc

The use of NMP Online as a decision support system with farmers in Ireland is focused on achieving three main objectives which are central to the development of a sustainable agri-food sector in Ireland. The objectives are

- Improving soil fertility and crop nutrition to support improved crop/grass production
- Reducing nutrient losses to water
- Reducing Gaseous emissions

In the past the main impetus for preparing nutrient management plans has been to meet statutory requirements arising from the Water Framework Directive, the Nitrates Directive and Agri-environmental schemes. However, the focus is shifting rapidly. Soil fertility has declined since the introduction of regulation. Improved understanding of the mobilisation and pathways of nutrients require a focus which is wider than just product and place; to one which incorporates timing, soil type, awareness of critical source areas/water quality and an increased focus on farmyard and other point source losses. The requirement to reduce GHGs and Ammonia emissions require that nitrogen use efficiency be improved and that particular emphasis is placed on technologies which can reduce emissions.

The best nutrient management system in the world is completely useless unless it can overcome two other challenges. These are to develop a system where the Agri-Professional supporting farmers can develop a plan for the farmer in the relatively limited time available and secondly to develop a system which can produce a plan for the farmer which can be easily understood and implemented subsequently.

NMP online was first used to prepare plans in 2016 and since then plans have been prepared for over 60,000 Irish farms. Phased development over the next few years will focus on building on the ability to meet statutory requirements to an efficient system which can support the challenging range of sustainability goals which farmers face.

Any Nutrient Management Planning system must highlight to the user the factors that can mobilise nutrients such as soil type/slopes and the proximity of water bodies so that users can factor these into application of nutrients. Encouraging sustainable fertiliser plans for farmers, contractors and suppliers that will help reduce GHG's and ammonia emissions though emerging technologies will help us deliver on Environmental policy change in the future.

Role of knowledge transfer in reducing GHG emissions

Andy Boland
Teagasc

The Government Action plan on Climate Change was published on the 17th of June 2019. It details the massive change that is required in all sectors of the economy to achieve Ireland's EU targets by 2030. The plan sets out over 180 actions to achieve these targets and has an ultimate goal of an approach to Carbon Neutrality by 2050. 34 of these actions apply to Agriculture, Forestry and Land Use. The Agriculture sector accounts for about one third of National GHG emissions. Knowledge transfer between advisors and farmers is critical in helping farmers with the transition to a low carbon agriculture. Without this farmer understanding and buy-in will not occur. As both the 2020 and 2030 GHG reduction targets are multi-annual targets which effectively means that targets are cumulative emissions reduction over time, the total amount of abatement achieved will be highly dependent on rates of uptake. Ultimately, the quicker adoption of measures should lead to a larger cumulative emission reduction. This means that understanding barriers to uptake and the role of knowledge transfer in overcoming obstacles for adoption will both be more important than ever.

Research in of itself will not lead to emissions reductions without strong linkage to KT. There are twin roles of research and KT. Research into new GHG mitigation options aims to further reduce the carbon-intensity of farms that are already carbon-efficient and KT efforts focus on narrowing the spread in carbon-intensities between the most efficient producers and the main body of producers (see Figure 1). This highlights the urgent requirement for a strong link between research and knowledge transfer to encourage practice change and the adoption of mitigation measures by Irish farmers.

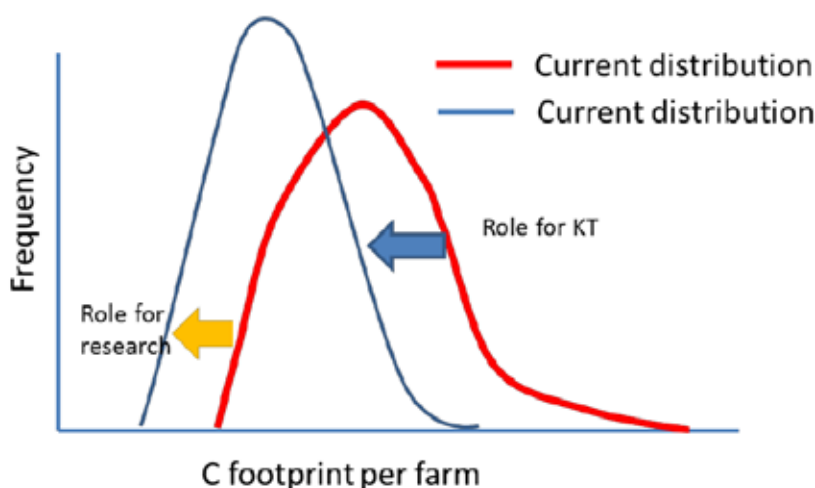


Fig 1: Conceptual illustration of the roles of research and KT in reducing the carbon intensity of produce: while new research outcomes can further reduce the minimum carbon footprint of produce, the role of KT programmes is to narrow the frequency distribution and lower the average GHG intensity, by bringing the carbon intensity of the majority of producer closer to that of the top 10% most efficient producers.

Therefore, emissions reductions can only be realised if the desired mitigation actions are supported by a comprehensive KT programme. In response to this KT challenge, Teagasc have a number of initiatives to aid in the uptake of new abatement measures. These measures include the Carbon Navigator, EBI, Pasture Base Ireland, NMP and the Heavy Soils Programme. Each of these measures as stand alone would do little to reduce GHG emissions. However, taken as part of a linked strategy between research, KT and policy, they are key tools for achieving climate targets.

Within the Climate action Plan 2019 Action 101 aims to bring forward proposals for the introduction of measures to implement the full suite of options set out in the June 2018 Teagasc Report, 'An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030'. Action 111 aims to introduce an enhanced knowledge transfer programme through the Teagasc advisory service to explore the establishment of "signpost" networks or communities within the agricultural sector to be leaders in adopting mitigation measures. This network of farms would implement key measures of the MACC and signpost the way to low carbon farming for all farmers with the objective of reducing agricultural emissions in the national inventory. The programme would increase awareness among farmers and the solutions they can adopt.

Monitoring the progress of adoption of abatement measures and assessing the success of tools such as the C Navigator and NMP online will also be a key requirement over the next commitment period. The Teagasc National Farm Survey (NFS) has been incorporating features in to the survey that will allow for the monitoring of measures such as timing and application technique of slurry spreading, grazing season length, fertiliser type and use, EBI and herd makeup, finishing times and health.

There is relatively poor uptake of GHG mitigation actions worldwide and without mitigation emissions are likely to increase. Significant mitigation potential exists but these solutions exist or remain on paper at the moment. Significant initiatives are needed now!

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