Irish Beef Sector Sustainability

Progress to Date & Roadmap to 2030

Meat Industry Ireland

Ibec

Contents

Foreword

With growing emphasis on climate change and the need to meet new and challenging greenhouse gas emission reduction targets, Meat Industry Ireland's primary beef processing industry members have been focussed on building on our sustainability efforts, which have been further driven in line with Food Vision 2030.

Over the next decade and beyond, even higher standards of agri-food sustainability will be demanded in the marketplace. The onus will be on member businesses to demonstrate our sector's credentials as an international leader on sustainability in all its forms - economic, environmental, and social.

Our journey to achieving sustainability goals is one of continuing progress.

The acceleration of that progress is also driven by legal targets set by Government requiring greenhouse gas emission reductions of 25% by 2030 across the agri-food sector.

Early finishing of cattle was the principal measure identified in the recently published Final Report on the Food Vision Beef and Sheep Group. Our members have made significant progress to achieve a current average of 26 months. This has been achieved as part of a suite of connected market specifications, driven by bonuses that rewarded farmers for the additional efforts undertaken to supply our international customers with beef products that met the demands of consumers. The new target of 22-23 months will add to a cumulative reduction in emissions of approximately 0.75MT CO2e, by 2030.

During the past seven years, processors have contributed some €150 million to sustainability initiatives, resulting in the benefits of reducing farm level input costs, rewarding farmers financially and contributing in a significant manner to emissions reduction. That journey continues as we work towards meeting Government Climate Action Plan targets across a range of measures.

MII members have a clear objective of driving genetic improvement in the beef herd which has already delivered strong results, with 76% of replacement heifers now four/five Star compared to 52% in 2015.

Genetics have the potential to mitigate up to 400,000 tonnes of GHG emissions annually by 2030.

Successfully delivering on this requires genotyping of the national herd. We are committed to working with the Department of Agriculture, Food and the Marine, the dairy industry, and other relevant stakeholders to deliver a national genotyping programme and we are confident of substantial progress in the short term. MII has been to the forefront in its collaboration with stakeholders to further strengthen integration between beef and dairy, and a number of beef processors have partnership programmes in place with the dairy sector.

Through our industry investment with Enterprise Ireland in Meat Technology Ireland (MTI), hosted by Teagasc in Ashtown, we will launch the first genomic evaluations for methane traits globally in 2023. Members will work closely with MTI and the Irish Cattle Breeding Federation (ICBF) to build a commercial dataset for methane traits to inform breeding decisions. Our members will also deliver an extended rollout of a pilot Beef Benchmark Report programme with ICBF from mid-2023.

We will launch the first genomic evaluations for methane traits globally in 2023

Working with farmer suppliers and the wider industry, animal health and welfare remains a key priority for MII members. MII is committed to financially supporting the work programme of Animal Health Ireland (AHI). Animal health is a key part of the Teagasc Marginal Abatement Cost Curve as healthier animals perform better from a carbon perspective.

The successful delivery of the Signpost Farms and Advisory Campaigns to help ensure the scaled delivery of mitigation measures is a priority for MII, which is why the industry has committed to a five-year funding contribution to the programme.

We strongly believe that new and emerging scientific and technological measures offer significant mitigation potential of the scale required to meet overall sectoral emissions targets.

At processing level, the focus for the coming decade is centred around decarbonisation. By 2030, processors will aim to reduce Scope 1 & 2 emissions intensity by more than 50% and reduce Scope 3 emissions intensity by 30%.

MII members are committed to delivering individual sustainability programmes to incentivise their suppliers. The direction of such programmes will be guided by the Beef Sustainability Charter. Members will also expand the role of their agriculture teams to incorporate the hands-on sharing of best practice information to suppliers with a particular focus on suckler farms.

Suckler farms remain the lynchpin of Ireland's beef sector, producing the highest quality beef for the international marketplace. Addressing data gaps in tracking their sustainability performance will be key to delivering the rate of progress required between now and 2030, particularly in terms of calving intervals and age at first calving. These issues were discussed extensively as part of the Food Vision Beef and Sheep group.

Further investment is required to measure the level of carbon sequestration on cattle farms and provide a more in-depth picture of the net emissions from each enterprise. Research by Teagasc suggests that sequestration rates of up to 2 tonnes CO2e per hectare are evident on Irish cattle farms, which is significantly higher than the 0.5 tonnes used in the national inventory. This would suggest that many farms are close to being carbon neutral, but the absence of data prevents this from being verified at scale.

In conclusion, MII and its members will continue to do all within our remit to assist the transition to a low carbon economy in the decades ahead. Being ambitious for change, the beef processing industry will continue to play a meaningful role in emissions reductions through enhancing our already strong reputation as one of the most sustainable producers of beef internationally.

Philip Carroll,
Chairman, MII

Executive summary

The decision by the Irish Government in July 2022 to target a 25% reduction in agriculture emissions by 2030 represented an unprecedented challenge for the sector.

The beef sector is committed to delivering further, significant progress up to 2030. However, the scale of the target requires strong Government policy support and investment to move at the pace required while safeguarding the future viability of the sector, which supports 90,000 farm families, around 25,000 jobs and delivers over €2.5bn in exports annually.

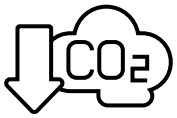
Since 2015, Meat Industry Ireland members have invested more than €150 million in a range of sustainability initiatives and have achieved important results on behalf of the sector.

Results to date

Beef processors working with Origin Green

Since 2015, beef processor members of Bord Bia's Origin Green sustainability programme have:

- reduced emissions intensity by almost 20% per tonne of output.
- cut energy intensity by more than 30%.
- minimised waste, with more than 50% of waste being recycled and achieving zero waste to landfill.
- delivered an 8% reduction in absolute water usage and a 22% drop in water intensity.



Farm level emissions

The Bord Bia Sustainable Beef and Lamb Assurance Scheme (SBLAS) 2021 carbon footprint assessments showed a decline of 9% or 1kg CO2e per kg liveweight since 2015. Bord Bia has recently updated its beef carbon footprint model to reflect refinements in recommended methodologies, and preliminary results suggest that the average carbon footprint across SBLAS farms reduces by 12% when the updated model is applied.

Processing level

The beef sector now sources 92% of animals from SBLAS farms and processors have enhanced their engagement with farmers in relation to their sustainability performance, which includes an initiative with the Irish Cattle Breeding Federation (ICBF) to report carcass and greenhouse gas data on an individual animal basis.

Reduction in finishing age

Younger finishing ages have mitigated up to 400,000 tonnes CO2e annually since 2010.

Biodiversity

The beef sector supports the All-Ireland Pollinator Plan by committing to several biodiversity targets on their sites as part of their Origin Green plans, while individual members support a range of specific biodiversity projects around Ireland.

Driving progress to 2030

We are committed to building on our progress between now and 2030, in line with the Government's Climate Action Plan. In addition to our policy commitments, the marketplace is also accelerating its ambitions to secure net zero supply chains.

It is clear that customers will increasingly prioritise sourcing from suppliers that contribute to and support their own sustainability agendas, providing a crucial opportunity for the Irish beef sector to grow its proposition as a sustainable solutions provider and protect the viability and market share of the sector.

Relative emissions performance of the Irish beef sector

Ireland's position within the global market when it comes to emissions performance is highly relevant to understanding the overall impact of shifts in production output. Data from the Joint Research Centre (JRC) of the EU Commission highlighted that Ireland had the lowest absolute emissions and second lowest footprint per kg of beef among the top six European beef producing countries. If 100,000 tonnes of beef production currently taking place in Ireland moved to Mercosur, it would result in up to 5.5 million tonnes CO2e in additional greenhouse emissions annually – almost the equivalent of the Irish Government's 2030 target for the agriculture sector as a whole.

This is one of a number of issues which MII believes needs to be considered and addressed, alongside the delivery of further priorities for the beef sector. This report sets this out in detail while identifying 11 action areas between now and 2030.

Meat Industry Ireland priorities

Building on progress to date, MII policy is to further enhance a world class low-carbon Irish livestock sector by proactively supporting national scientific programmes which are focused on reducing GHG emissions, while adding additional export value from current production levels, fully in line with Government objectives as set out in Food Vision 2030. The key priorities for MII for the period ahead are as follows:

Reducing age at finish

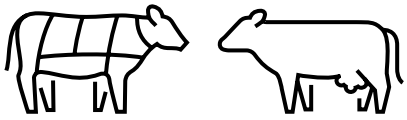
The last decade has seen a significant reduction in finishing ages with the average age for all prime animals in 2021 standing at 26 months compared to 28 months in 2010. The Climate Action Plan outlines the ambition to deliver an average finishing age of 22/23 months for prime cattle by 2030. This requires a further 3/4-month reduction relative to 2021. In line with this ambition, MII is committed to working with Government and suppliers with a view to delivering on this target in a way that recognises the efforts made at farm level.

Driving genetic improvement

Investments such as the Beef Data Genomics Programme (BDGP) to boost the genetics of the national breeding herd have delivered strong results with 76% of replacement heifers now 4/5 Star compared to 52% in 2015. ICBF research points to the potential for genetics to mitigate up to 400,000 tonnes of GHG emissions annually by 2030. Successfully delivering on this requires genotyping of the national herd as a matter of urgency.

Meat Industry Ireland is committed to working with the Department of Agriculture, Food and the Marine (DAFM), the dairy industry and other relevant stakeholders to deliver a national genotyping programme as a matter of urgency.

Ireland will launch the first genomic evaluations for methane traits globally in 2023. MII members will work closely with Meat Technology Ireland (MTI) and ICBF to build a commercial dataset for methane traits to inform breeding decisions. Meat Industry Ireland members will also deliver an extended rollout of the pilot Beef Benchmark Report programme with ICBF from mid-2023.



Further strengthening of integration between beef and dairy

With around 60% of finished cattle now originating in the dairy herd, it highlights the importance of strong integration between the beef and dairy sectors. A number of beef processors have partnership programmes in place with the dairy sector. MII members are fully committed to building further on these with a focus on delivering better integration, implementing dairy-breeding strategies, minimising nutrient loss and promoting enhanced biodiversity.

Supporting animal health

MII is committed to continuing to financially support the work programme of Animal Health Ireland (AHI). The Teagasc Marginal Abatement Cost Curve (MACC) suggests that animal health can contribute 147,000 tonnes CO2e of mitigation annually, which equates to more than 7% of the anticipated total savings.

Priorities for MII include the 100% adoption of Beef Health Check data collection by the end of 2023 and proactively supporting the implementation of Ireland's second One Health National Action Plan on Antimicrobial Resistance.

MACC measures

MII members will play their part in the successful delivery of both the Signpost Farms and Advisory Campaigns to help ensure the scaled delivery of mitigation measures. Technical measures utilising existing technologies offer mitigation potential of 2MT CO2e annually by 2030 with cattle farms potentially delivering around a quarter of this. Achieving this is highly dependent on the implementation of these measures at the scale required.

Regenerative agriculture

Biodiversity is a vitally important element of a regenerative agriculture system in Ireland. The All-Ireland Pollinator Plan provides clear actions that can deliver progress at farm level. MII has incorporated these actions into its Beef Sustainability Charter, which will shape the direction and focus of individual members' sustainability programmes.

Beef processing

The focus for the coming decade is centred around decarbonisation. To date, three processors have committed to the Science-Based Targets Initiative (an internationally recognised pathway to reduce Greenhouse Gas emissions in line with the COP Paris Agreement goals).

Examples of the targets set by beef processors to date include:

- Reduce Scope 1 & 2 emissions by more than 50% by 2030
- Scope 3 emissions targets aiming to reduce emissions intensity by around 30%.

Supplier engagement

MII members are committed to delivering individual programmes to incentivise their suppliers. The direction of such programmes will be guided by MII's Beef Sustainability Charter. Members will also expand the role of their agriculture teams to incorporate the hands-on sharing of best practice information to suppliers with a particular focus on suckler farms.

Issues to be addressed

There are a number of issues to be addressed in order to deliver and accurately track progress by the sector between now and 2030. These include:

Measurement approach

The delivery of a robust national agricultural Greenhouse Gas (GHG) inventory measurement approach is critical to accurately monitor progress by the sector. This requires enhanced co-ordination to ensure all available datasets are combined to provide the depth of information needed. There is also a need to embrace an 'all farm' approach to measuring and recognising the overall contribution of the sector in the transition towards a carbon neutral economy.

Data gaps on suckler farms

Suckler farms remain the lynchpin of Ireland's beef sector, accounting for around 40% of all calves for beef production. Data gaps exist in tracking the sustainability performance of this cohort of farms with less than half being members of Bord Bia's Beef & Lamb Sustainable Assurance Scheme. Addressing this gap will be key to delivering the rate of progress required between now and 2030, particularly in terms of calving intervals and age at first calving.

Adoption levels

A key factor in delivering the 25% emissions reduction target by 2030 will be the extent to which the abatement technologies identified in the MACC are adopted at farm level. MII Members will support government policy aimed at achieving adoption rates required across the sector.

Sequestration potential of cattle farms

Further investment is required to measure the level of carbon sequestration on cattle farms to provide a more in-depth picture of the net emissions from each enterprise. Previous Teagasc research suggests that sequestration rates of up to 2 tonnes CO2e per hectare are evident on Irish cattle farms, which is significantly higher than the 0.5 tonnes used in the national inventory approach. This would suggest that many livestock farms are close to being carbon neutral, but the absence of data prevents this from being verified at scale.

Biogenic methane

The measurement and reporting of biogenic methane requires further significant research to ensure that beef sector emissions are accurately reported and inform policy decisions that impact the strategic direction of the sector.

Enabling the decarbonisation of beef processing

There are a number of structural enablers required to incentivise the delivery of a decarbonised processing sector. These include a clearer framework to encourage the adoption of anaerobic digestion, stronger financial supports for the adoption of solar photovoltaic technology (PV) and a streamlined planning process for wind, solar and anaerobic digestion.

Importance of the beef sector

The beef sector continues to act as the mainstay of many rural communities across the country, with over 90,000 farm families and around 25,000 jobs supported by the sector.

Through its network of more than fifty processing sites, the sector reaches every part of the country with the average site contributing €100m of economic activity to its local area and sustaining 320 direct jobs.

The multiplier effect associated with the sector was highlighted by Hennessy et al in 2018 when they concluded that every €1m increase in beef sector output generates a further €2.1m in the wider economy and creates an additional 16 jobs.

The sector remains a key driver of the Irish economy, accounting for one third of gross agricultural output and over €2.5bn in exports annually. To put the beef sector in a global context, Ireland remains the 2nd largest net exporter of beef in the northern hemisphere and the 6th largest globally. The Irish beef sector has a internationally renowned reputation as a supplier of high quality, grass-fed beef to more than 60 markets globally.

The sector has always focused on optimising the value of output, while investing in the future to help ensure the rural economy continues to survive and thrive. This mindset has never been more important. A continued emphasis on doing more with less is critical in ensuring that the sector collectively progresses towards the ambitions set out in the National Climate Action Plan, while continuing to remain internationally competitive and meeting the nutritional and health needs of consumers.

Irish beef sector in a global context

When it comes to examining the performance of the Irish beef sector in relation to sustainability, it is worth noting the performance of the sector across a wide range of metrics relative to other producing nations globally.

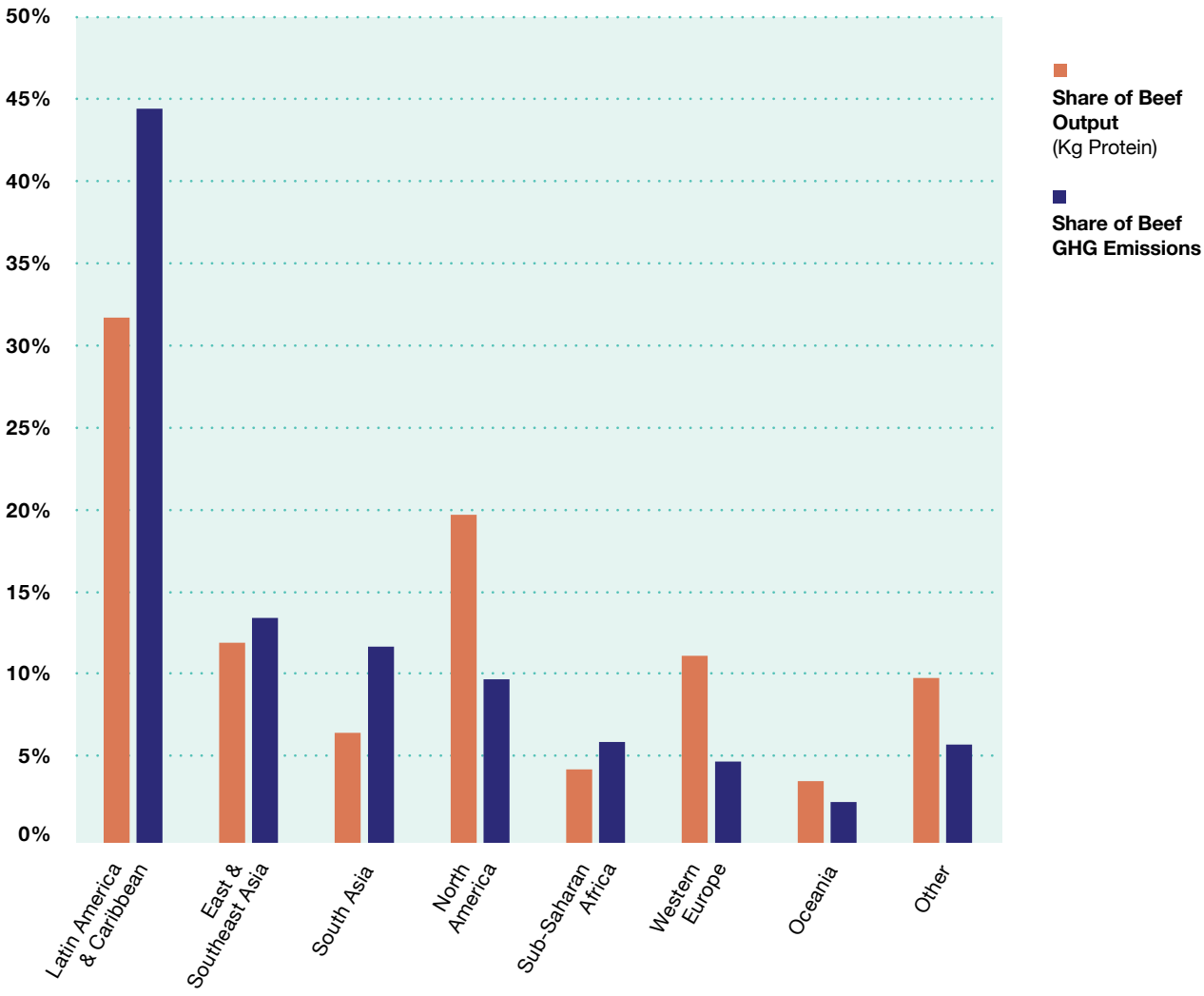
Greenhouse gas emissions

International comparisons of emissions intensity can be challenging given the many varied methodologies adopted to measure the carbon footprint of beef across different regions. Data from the UN's Food and Agriculture Organisation (FAO) – Global Livestock Environmental Assessment Model (GLEAM) offers a more consistent approach to undertaking global comparisons.

Results from their 2017 analysis show a wide variation across regions, with Western Europe production systems performing strongly. The region accounted for 11% of global beef output on a kg of protein basis but only 5% of GHG emissions. On the other hand, Latin America and the Caribbean region made up around 30% of output but more than 45% of GHG emissions, highlighting the emissions intensity gap between the two regions.

Regional Breakdown: Share of Beef Output in Protein terms vs share of GHG emissions

Source: FAO/GLEAM



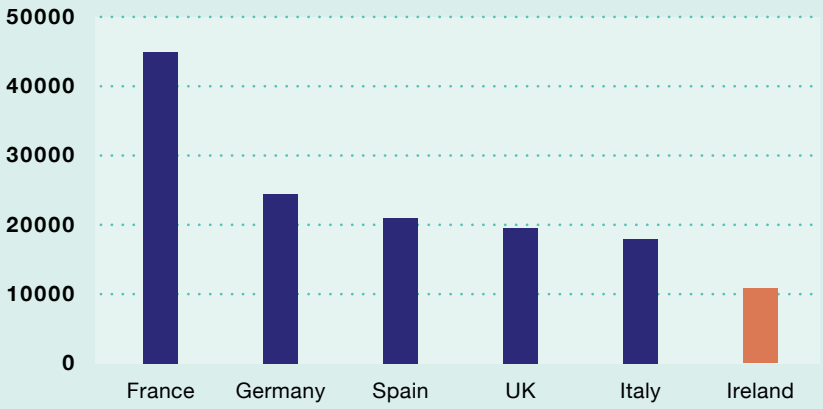
Reports by the FAO and Joint Research Centre of the EU Commission have shown that temperate grass-based systems such as that prevailing in Ireland typically have half the emissions intensity compared with tropical or arid grassland systems.

It is worth noting that within Europe, data from the Joint Research Centre (JRC) of the EU Commission highlighted that Ireland had the lowest absolute emissions and second lowest footprint per kg of beef among the top six European beef producing countries (including the UK), which collectively account for over 80% of total output. The carbon footprint of Irish beef stands at less than a quarter of Brazil's beef carbon footprint according to the report.

This analysis recognises the natural strength of our grass-based production system.

European GHG fluxes of beef production among top six producing countries

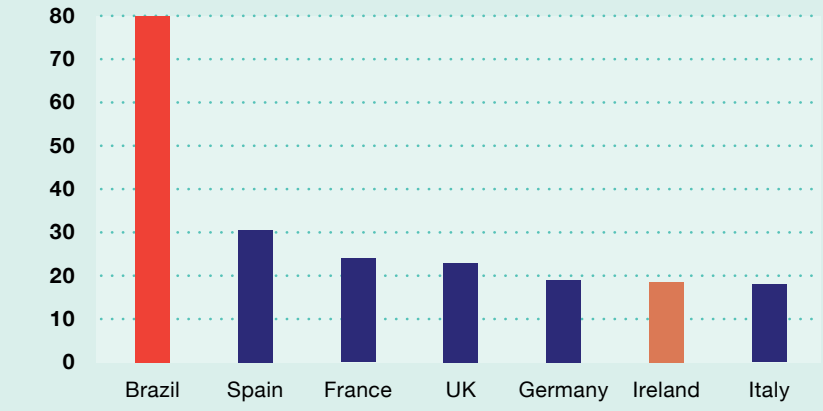
KT CO_2-eq



Source: JRC — Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions, 2011

Beef carbon footprint by top six European beef producing countries compared to Brazil

Kg CO_2-eq per Kg Beef



Source: JRC – Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions, 2011

Ireland's relative GHG emissions

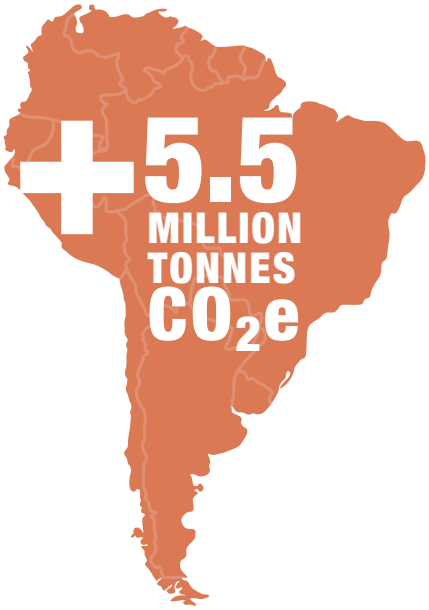
The figures presented earlier highlight the relatively low emissions intensity from Irish beef production systems compared to other regions.

To put this in context, if 100,000 tonnes of beef production currently taking place in Ireland moved to Mercosur, it would result in up to 5.5 million tonnes CO2e in additional greenhouse emissions on an annual basis. This equates to almost one quarter of Ireland's total agriculture emissions and is equivalent to the 2030 GHG quantum agriculture reduction target set by the Government.

Any such impact in terms of carbon leakage is even more important when projections for global beef demand are considered with the OECD suggesting 1% p.a. growth between now and the end of the decade, driven by Asia and Africa.

Asia currently has an annual beef import requirement of almost six million tonnes and growing. Europe currently holds less than 2% of this market. Given the relative difference in emissions intensity between Europe and Mercosur, increasing Europe's share of Asia's beef imports to 10% would help reduce global beef emissions by 26.5 million tonnes CO2e, which equates to more than Ireland's total annual greenhouse gas emissions.

It should also be noted that, with European beef consumption remaining broadly stable, any reduction in European and Irish beef production would result in increased imports of higher emissions intensity beef at a time when the European Commission is aiming to deliver a 57% cut in GHG emissions by 2030 relative to 1990 levels.



If 100,000 tonnes of beef production currently taking place in Ireland moved to Latin America, it would result in up to 5.5 million tonnes CO_2e in additional greenhouse emissions on an annual basis.

Source: Meat Industry Ireland based on FAO Gleam & JRC

Biodiversity

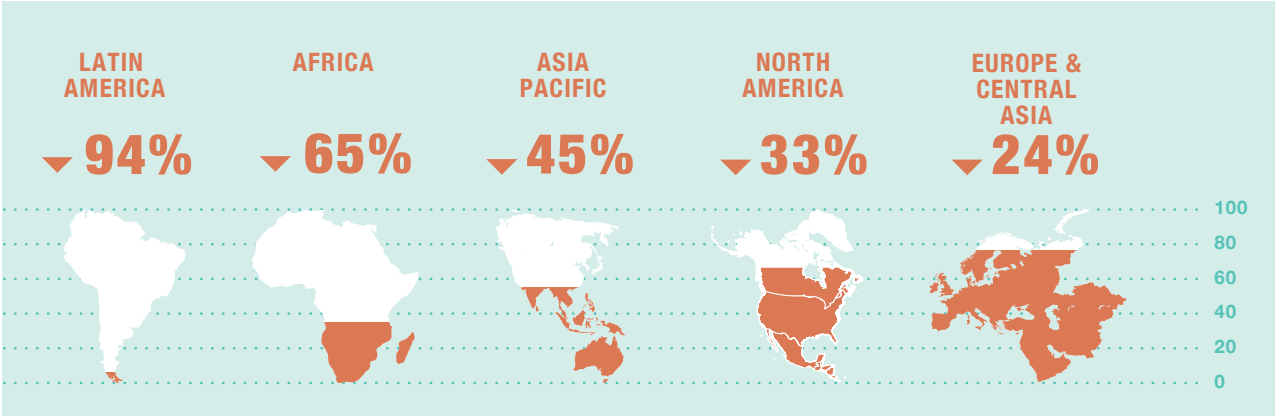
The global biodiversity crisis was highlighted in stark terms in the recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services report, which concluded that one million species of plants and animals are facing extinction across the globe. The report also highlighted the essential role of Biodiversity in mitigating climate change.

The 94% decline in the LPI for Latin America is the most striking trend evident. The conversion of grasslands, savannahs, forests and wetlands are listed among the key drivers of the decline. All of this reflects the ongoing rapid expansion of meat and arable output in South America.

The LPI in the Asia Pacific region has declined 45% since 1970, with half showing ongoing declines, including grassland and woodland habitats.

However, some progress is being made with the population of 72% of species protected under the EU Habitats Directive stable or improving. It showed that 30% of Ireland's breeding bird species were stable or increasing while a fifth were in long term decline, including breeding farmland songbirds. One third of bee species are threatened with extinction in Ireland. These trends, while not as severe as some other regions, highlight the need for urgent, ongoing corrective action.

Living Planet Index Trends by Region, since 1970



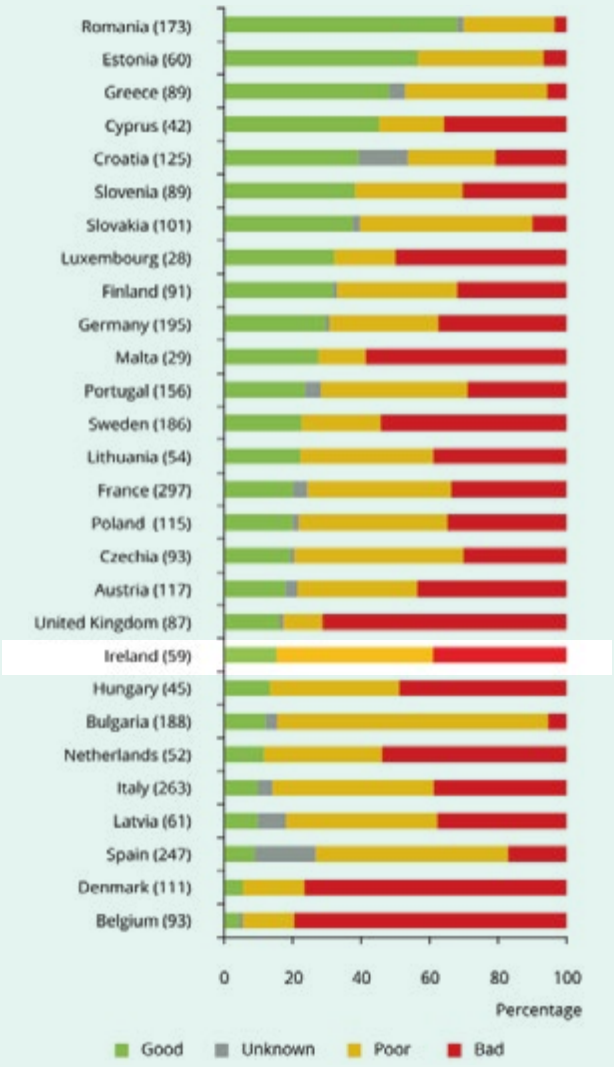
The nature of the global crisis was further highlighted by the WWF's Living Planet Report 2020, which showed ongoing ecosystem decline across the planet. The WWF Living Planet Index (LPI) demonstrates the ongoing declines across the globe since 1970.

Africa 65%, North America 33% and Europe/Central Asia by 24%.

Ireland is not insulated from these negative trends. A National Parks & Wildlife Service report in 2019 provided a status update on Ireland's 59 protected natural habitats and 60 protected species and showed most had an unfavourable status

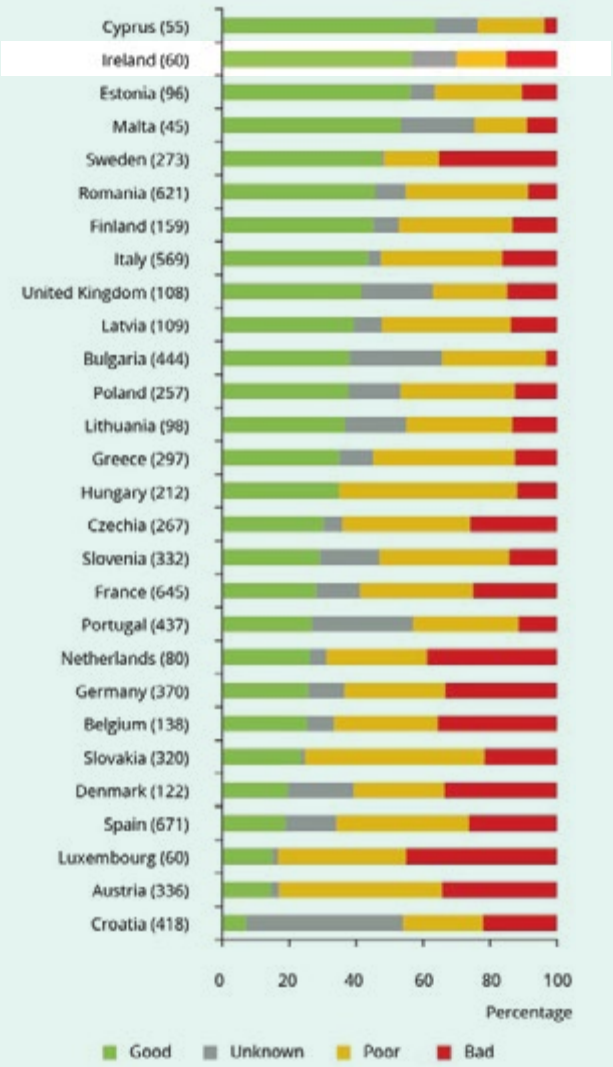
EU Biodiversity Indicators

Conservation status of habitats by Member State for reporting period 2013 – 2018



Source: EEA Report, State of nature in the EU

Conservation status of species by Member State for reporting period 2013 – 2018



Source: EEA Report, State of nature in the EU

Water

A report from the European Environment Agency in 2021 suggested that good ecological status had been achieved for only around 40% of surface waters across the EU by 2015, with little improvement evident since 2009. Ecological status is influenced by water quality and habitat degradation and is used as a proxy for the overall status of water bodies.

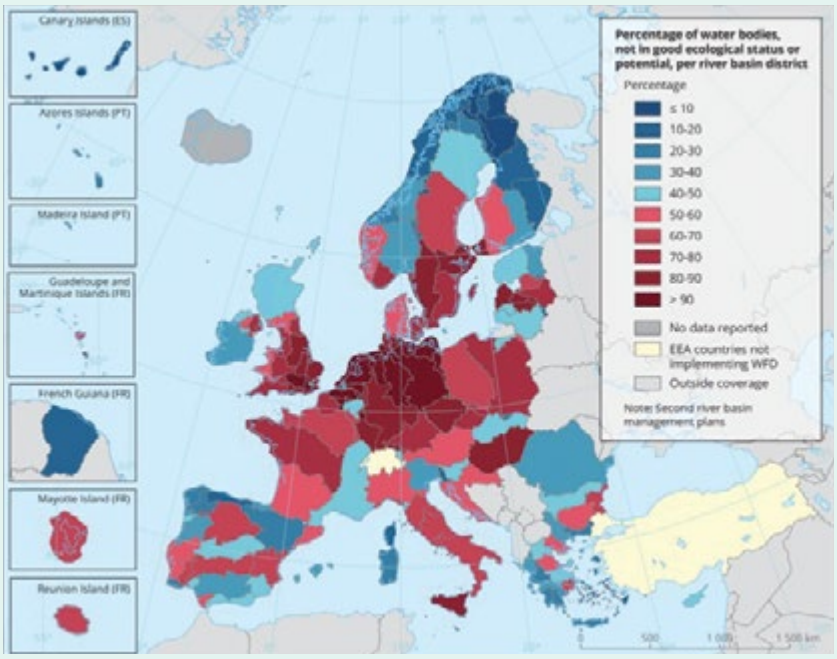
The percentage of water bodies with less than good ecological status varies across Europe. Surface water bodies in north-western Europe have the lowest status. In Belgium, northern Germany and the Netherlands, the ecological status of more than 90% of surface waters is reported to be less than good. In contrast Ireland was among the countries with a high proportion of water bodies with good or better (high) ecological status.

The Water Quality in Ireland 2016 – 2021 Report from Ireland's Environmental Protection Agency found that 50% of the river bodies assessed in Ireland over the period were in high or good biological quality with a further 32% in moderate quality.

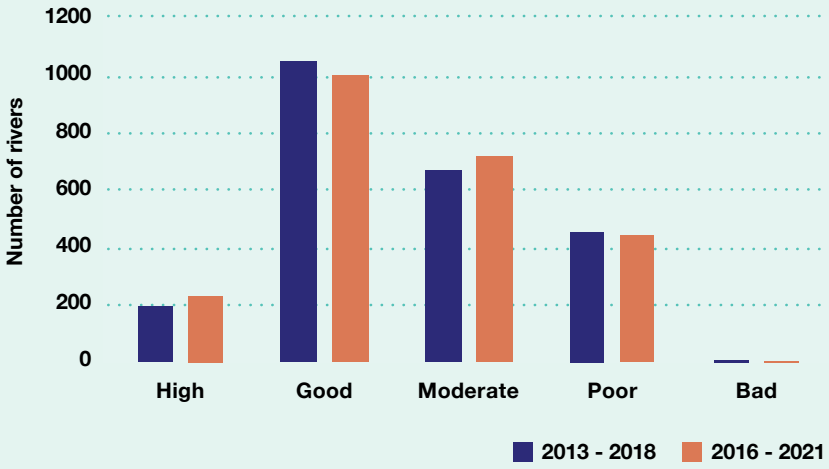
Of the 2,401 river water bodies assessed over the period, 398 improved in quality and 369 declined, resulting in a net improvement in 29 river water bodies.

While undoubtedly there is significant work to be done to further improve water quality in order to meet EU and national goals, Ireland currently has the highest water quality among major beef and dairy producers across Europe.

Percentage of water bodies, not in good ecological status, per river basin district



Ireland's River Water Biological Quality



Source: Environmental Protection Agency, Water Quality in Ireland 2016 - 2021

Progress delivered to date

Managing and protecting natural resources while supporting local communities has always been a key consideration of the beef sector. As part of their commitment to enhancing the sustainability of the beef sector, MII members have invested more than €150 million in sustainability initiatives since 2015.

These investments have helped deliver a co-ordinated, sector-wide approach to tackling the critical areas of greenhouse gas emissions, biodiversity and water quality at farm and processing level. The following pages outline some of the key developments over recent years.


Meat Industry Ireland members have invested more than €150 million in sustainability initiatives since 2015

Infrastructure in place to drive progress

Signpost farms

The Teagasc-led programme involving over 120 farmers across the country is a multi-annual campaign to lead climate action by all Irish farmers with a focus on greenhouse gas emissions, water quality, biodiversity and farm viability. It also assesses on-farm carbon sequestration through measurement technologies that in time will allow it to be taken into account in the national Greenhouse Gas inventory. The programme represents an industry-wide collaboration involving around 40 partners from across the supply chain. The major focus is on showcasing science based technologies that can reduce agricultural emissions as identified in the Marginal Abatement Cost Curve (MACC).

The focus within the Teagasc Climate Action Strategy on the Signpost Advisory Programme and Sustainability Digital Platform recognises the importance of strong knowledge transfer to drive the widespread adoption of measures needed to deliver real change at farm level in the period ahead.

The beef sector has been a driving force behind the development and roll out of the programme, which involves more than 30 cattle farms, including four processor-funded demonstration farms. Meat Industry Ireland members represent a significant share of the industry partners for the programme.

Beef Industry Partners

abp
Ashbourne Meat Processors Est. 1985
DAWN MEATS
Euro Farm Foods Beef Processors
Foyle Food Group
KEPAK
Kildare Chilling Co. Quality Beef & Lamb Processors
Liffey Meats
Moy Valley Meats

Breeding to reduce emissions

ICBF has significantly scaled up its work over recent years to bring an enhanced focus to its herd replacement index. Results to date on the impact of the herd replacement index in relation to the beef carbon footprint highlights a 10% difference between the top and bottom 20%.

ICBF in partnership with Teagasc and MTI have launched a Beef Carbon Sub-Index that focuses on methane and age at finish. Initial results are showing significant potential to mitigate emissions. In addition, genomic evaluations for methane traits are due to launch in 2023, which will represent a world first for the Irish cattle sector and will be built using the largest dataset available globally.

Ireland is now recognised as a world leader in the use of DNA within our agri-food industry. Progressing to genotype all animals at birth will help provide confirmation of genetic merit for climate and the environment, and ensure these factors are front and centre in breeding strategies for the national herd. Initial work suggests that genetics offer the potential to mitigate 300,000 – 400,000 tonnes of GHG emissions from the beef sector annually by 2030.

As part of its work, ICBF is partnering with Bord Bia & Teagasc to finalise new carbon models to provide a more granular and accurate picture of emissions at farm level.

All of these initiatives combine to provide an invaluable infrastructure to drive the right breeding decisions with a focus on animals that can produce high quality beef in a way that minimises emissions.

Beef processors are actively working with ICBF through tailored individual and collective programmes to help ensure robust science remains at the heart of Irish cattle-breeding decisions.

Animal health

Delivering ongoing strong national livestock animal health programmes provides a critical foundation to securing a sustainable beef supply chain. AHI continues to drive an ambitious work programme that is delivering real benefits. The organisation is funded on a private/public basis with DAFM matching industry contributions.

AHI proactively delivers a suite of animal health programmes ranging from Beef Health Check, BVD eradication, Johne's, IBR and its Parasite Control TASAH service.

Such initiatives play an important role in minimising the beef sector's impact in the short and medium term.

Origin Green

Origin Green offers an independent auditing infrastructure that allows the sustainability performance of almost 54,000 cattle farms to be monitored on an ongoing basis against the requirements of the Sustainable Beef & Lamb Assurance Scheme. These farms accounted for over 92% of beef output in 2021.

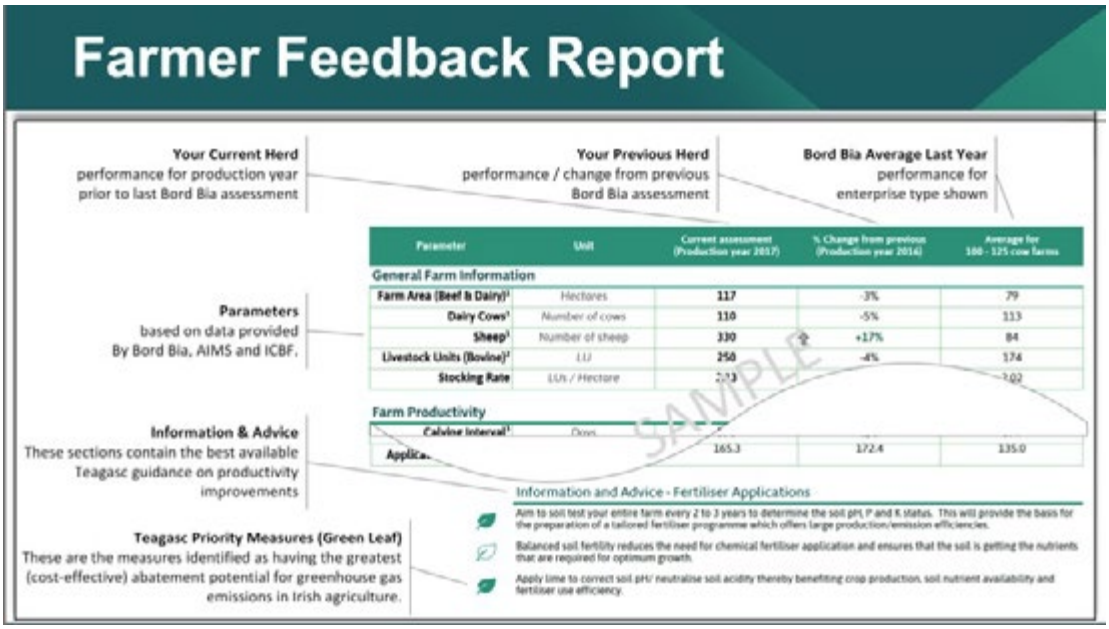
Since the formation of the programme in 2012, a core focus has been carbon footprint assessments across each farm utilising a PAS 2050 accredited model and methodology. In the region of 35,000 assessments are completed on an annual basis.

In addition, it provides a mechanism for providing personalised feedback reports to scheme members. Over 20,000 feedback reports were shared with farmers in 2021.

Ongoing collaboration by Bord Bia with ICBF and Teagasc has led to ICBF now undertaking the footpint analysis, which helps ensure greater system integration and delivers the most robust assessment possible for farmers.

Origin Green's scope extends to food manufacturing with over 90% of beef processing taking place on Origin Green verified member sites. Membership requires a comprehensive multi-annual plan that focuses on reducing environmental impacts and ensuring companies play a positive role in their local community. Each plan contains independently verified, measurable and timebound targets that are monitored annually for progress made.

A gold membership system was introduced in 2020 to recognise those companies making the most rapid progress across the target areas. Five beef processors achieved gold status over the 2021 to 2022 period. Between them they account for over 70% of beef processing, which highlights the positive steps being taken by the sector to proactively minimise its impact.



Meat Technology Ireland

Launched in 2017 by the meat sector to develop a partnership approach involving processors, Enterprise Ireland and academia, MTI has become the central driver of the research and innovation agenda for the Irish meat sector. MTI brings coherence and an innovative approach to each work area through collaborating with selected partners and industry members to drive practice implementation.

Phase I of MTI saw a total budget of €8 million invested to support the work programme, which among other things delivered the world's first national genetic breeding index for meat quality.

Phase II of MTI, which commenced in 2022 will see a significant increase in industry funding and collaboration with a singular focus on sustainability across its work programmes. The activity areas are focused on the following:

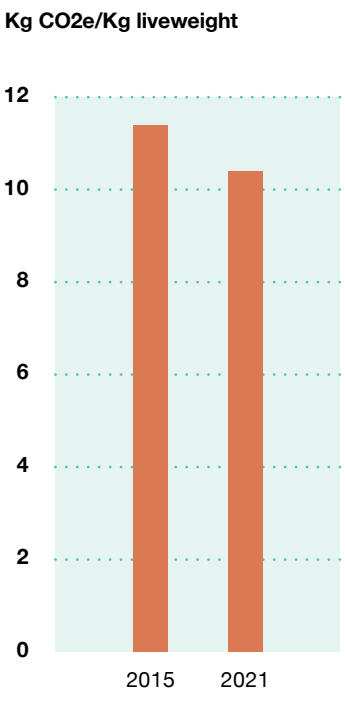
- The launch of the world's first beef carbon footprint sub-index
- Role of genetics in reducing age at finish and improving meat yield
- Packaging innovation and shelf life extension to minimise waste
- Further roll-out of meat quality initiatives
- Ongoing research in the role of meat in a healthy diet
- Factory process efficiencies
- Bioeconomy potential for the meat sector

Results

The development of the collaborative, industry-wide infrastructure outlined above has created the solid foundation from which the sector has been able to deliver real progress in relation to sustainability while also leaving it well-placed to drive the further improvement required in the period ahead. The progress made across the supply chain over recent years can be summarised as follows:

Farm level emissions

Beef Carbon Footprint Trends



Source: Bord Bia SBLAS data

Data from SBLAS carbon footprint assessments show a decline of 9% or 1kg CO2e per kg liveweight between 2015 and 2021 to average 10.39kg CO2e/kg liveweight. This equates to one million tonnes less CO2e being produced in 2021 relative to 2015 on the basis of the static cattle numbers and output levels.

It should be noted that Bord Bia has recently updated its beef carbon footprint model to reflect refinements in recommended methodologies. Preliminary results using the refined model suggest the average carbon footprint across SBLAS farms is 12% lower as a result.

The results of carbon footprint assessments continued to show a significant variation with the top 10% of herds averaging a footprint of 7.22kg CO2e/kg liveweight while the bottom 10% stood at 15.23kg. This equates to a difference of more than 100% and highlights the potential to deliver real further progress by adopting practices evident in the top 10% of farms more widely.

Every 10% reduction in the footprint for those farms greater than the average would reduce emissions by more than 500,000 tonnes CO2e on an annual basis.

One of the key contributors to reduced emissions is younger age at finish. The last decade has seen the average age of prime cattle decline by two months with carcase weights marginally higher and conformation

maintained. This trend towards younger finishing age has a positive impact with progress since 2010 mitigating up to 400,000 tonnes CO2e annually.

The beef industry has been proactively encouraging younger finishing ages through the Quality Payment System with an estimated €500 million allocated to reward 'in-spec' animals that are finished under 30 months of age. Enhanced industry partnerships with Teagasc, ICBF and AHI to support their activities, combined with a number of processors developing their own farm level programmes, have also helped to bring a greater focus to age at finish as a key factor in reducing emissions.

Biodiversity

Measuring biodiversity at an individual farm level remains logistically challenging.

A Teagasc study across 119 more intensively managed farms, covering beef, dairy and tillage, found that almost 10% of the total area of farms was comprised of habitats beneficial for wildlife, with hedgerows, buffer strips and drainage ditches accounting for 43% of the total area of wildlife habitat surveyed.

While it is extremely difficult to compare habitat areas across the EU, the level of Ecological Focus Area in Ireland at 12.3% is above the EU average of 9% based on a 2017 European Court of Auditors examination of Greening.

Recognising the challenge to maintain and enhance biodiversity, the beef sector has been

KEPAK

Twenty20 BEEF CLUB

Dairy Beef

Kepak/Tirlån Twenty20 calf to beef programme

The Twenty 20 Beef Club is a fully integrated calf to beef programme between Kepak Group, Tirlån and their respective farmer suppliers. The programme offers a fully traceable, closed loop input supply chain involving more than 20,000 calves annually.

The Club's vision has sustainability at its core – both financially and environmentally. Improved feed efficiency with methane reducing feed additives, farm to fork traceability, genetic evaluation, technical support for participating farmers and a market premium for finished cattle combine to create a sustainable beef supply chain.

Early analysis indicates the programme brings GHG emission reductions in the region of 20% relative to the national average.

Suckler Beef

Newford Suckler Demonstration Farm

Established in 2015, the 68 hectare Newford suckler demonstration farm in Co. Galway represents a Dawn Meats/ Teagasc partnership supported by McDonalds & The Irish Farmers Journal. The farm demonstrates best practice on commercial cattle farms and shares learnings with suckler farmers to help drive the future viability of the sector. The farm is part of the Teagasc Signpost programme. The farm demonstrates best practice as follows:

- Calving interval – 37 days lower than the national average
- Age at first calving – 100% of heifers calved at 26 months compared to 23% nationally
- Finishing age – Steers finished at 21 months, heifers at 20 months
- Beef output per hectare – Twice the national average
- Net profit per hectare – €276 in 2021

Open Days, the Irish Farmers Journal and social media channels provide regular updates of farm performance to deliver ongoing sharing of knowledge with suckler farmers

actively supporting the roll out of a number of important initiatives. These include:

All Ireland Pollinator Plan
The beef sector is supporting the All-Ireland Pollinator Plan by committing to relevant biodiversity targets as part of their Origin Green plans. These targets range from increased planting of native hedgerows, trees and meadows on site, creating wild bee habitats, encouraging employees to embrace the pollinator plan in their gardens and supporting local community groups in their efforts.

This is reflected in Origin Green member plans, which now contain almost 90 biodiversity targets in total. In addition, Bord Bia commenced a partnership with the National Biodiversity Data Centre in 2021 to support companies in identifying and implementing smart biodiversity targets. As part of this partnership Bord Bia is funding a dedicated Biodiversity Officer at the National Biodiversity Data Centre to provide expertise and guidance to member companies.

Farmers that are members of Bord Bia's Sustainable Assurance Schemes planted in excess of 1.1 million trees between 2014 and 2019. In addition, farmers are placing an even greater emphasis on soil health with nearly 90% of SBLAS members now conducting soil testing to ensure good nutrient management plans are in place.

Hen Harrier Project
Since 2017, Dawn Meats has been supporting the Hen Harrier Project in its efforts to save the species from extinction. This involves working with a cohort of 1,600 farmers to graze cows

and older beef animals on upland grasses for the summer before processing them in the autumn.

In 2020, 61 breeding pairs were recorded in the 6 Special Protection Areas in Kerry, Limerick, Cork, Tipperary, Laois and Monaghan. The project focus is to protect the Hen Harrier breeding grounds, safeguard bio-diversity and improve soil carbon sequestration.

Bride Project
Kepak Group is an operational partner of the BRIDE Valley biodiversity project, based in the River Bride catchment of North East Cork and West Waterford. The project implements a results-based approach to conserve, enhance and restore habitats in lowland intensive farmland.

In addition, Kepak Group is working in conjunction with Trinity College Dublin and the Irish Research Council are funding pioneering research to enhance pollinator diversity through biodiversity friendly management actions at farm and business level with biodiversity champions in place at each site

Irish Dock Beetles
ABP has recently launched a project on its demonstration farm to trial Irish dock beetles to tackle dock weeds in their pastures. Dock weeds can reduce yields by as much as 40% with the beetles offering a means of controlling them without the need for sprays, thereby helping to enhance biodiversity on the farm. It also encourages more white clover in swards, which reduces chemical nitrogen requirements. This project forms part of a broader regenerative

Origin Green – All-Ireland Pollinator Plan Partnership

The All-Ireland Pollinator Plan is a shared initiative with over 80 partner organisations which aims to work with every sector to create sustainable pollinator-friendly habitats.

From 2016, Origin Green and the Heritage Council have jointly provided funding for the National Biodiversity Data Centre (NBDC) to employ a project officer to help implement the All-Ireland Pollinator Plan.

Through Bord Bia's partnership with the NBDC, they provide funding and support the implementation of the All-Ireland Pollinator Plan by Origin Green members. Bord Bia has also worked closely with the NBDC, collaborating on guidelines to make farmland more pollinator-friendly.

agriculture programme with a view to sharing results and practice recommendations with their farmer suppliers.

Water

Water scarcity and declines in water quality present major challenges across the globe. Despite our mild temperate climate, Ireland is not immune to such challenges and hence the need to understand water usage at an enterprise level while ensuring strong nutrient management practices are in place to protect water quality.

In 2012 Bord Bia partnered with Cranfield University to assess water usage on different cattle production systems across the country. The work explored green water (rainfall used where it falls) and blue water (mains or pumped water).

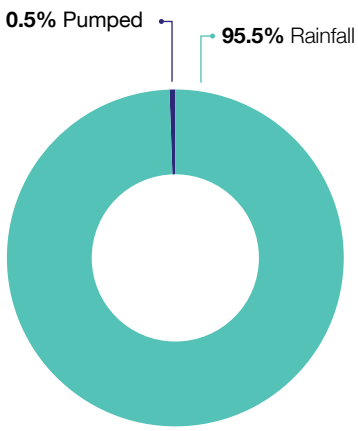
The results of the research showed that 99.5% of the water consumption across all beef systems came from green water with overall water consumption figures up to 25% lower than other European beef producers due to the strong grass growth evident in Ireland.

Blue water (mains or pumped water) usage ranged from 14 – 50 litres per kg carcase, which is significantly lower than international comparisons where more intensive feedlot systems dominate.

In relation to water quality, nutrient management is key. DAFM and Teagasc provide clear guidelines around nutrient management with compliance checked as part of each farm's Basic Payment Scheme. Teagasc have an online nutrient management plan in place for farmers to provide practical guidance.

In addition, Bord Bia's Sustainable Assurance Scheme contains a renewed focus on nutrient management with farmers' slurry and fertiliser application methods analysed. Specific advice is provided to farmers in their feedback report on the most suitable timeframes, techniques of application and types of products that could be used to improve soil fertility and reduce ammonia emissions.

Source of water used for beef production



Source: Bord Bia

Progress at processing level

At processing level, the beef sector has invested heavily in delivering progress across raw material sourcing and resource efficiency with an enhanced focus on renewables and an even greater focus on playing its part in the circular economy.

The sector has increasingly embraced the Science-Based Targets Initiative to copper-fasten its commitment to further progress in GHG emissions by 2030. In addition, a number of processors are reporting annually to the Carbon Disclosure Project in the United Kingdom.

Raw Material Sourcing
The beef sector has consistently increased its **sourcing of animals from SBLAS farms**. In 2021, over 92% of cattle were sourced from member farms.

In addition, a number of processors have enhanced their engagement with farmers in relation to their sustainability performance. ABP launched a pilot Beef Benchmark Report initiative in partnership with ICBF, which provides carcase and greenhouse gas data on an individual animal basis with herd performance benchmarked against the ABP national average and the top 10% of animals. The report highlights the role of genetic improvement in increasing carcase quality, reducing finishing age and cutting emissions. Some 5,000 reports have been delivered to date.

Packaging has also been an area of strong focus with an emphasis on reducing the amount of packaging material used while

increasing the proportion that is recyclable and made from recycled materials. Most processors are members of Repak and the UK Plastics Pact.

In total across beef processors that are members of Origin Green, the following progress has been made:

- 20% plastic removed since 2015
- Two thirds of packaging is now recyclable
- Rigid plastic trays used for retail packs have an average recycled content approaching 90%
- Approaching 100% Forest Stewardship Certified (FSC) paper and board

Resource efficiency

Beef processors have consistently focused on minimising resource use that has resulted in real progress in reducing usage levels and associated emissions.

Emissions

As part of their sustainability commitments, beef processors have delivered real progress in reducing emissions related to their operations. This has been strengthened further by the introduction of mandatory carbon emissions targets as part of Origin Green with Bord Bia supporting companies through their Pathways to Net Zero plans.

Beef processors have made the following progress since 2015:

- Reduction in emissions intensity of almost 20% per tonne of output
- Absolute emissions savings of around 200,000 tonnes CO2e over the 2015 – 2021 period

ABP Advantage Beef & Benchmark Report

Incorporating both suckler and dairy calves, the Advantage Beef scheme encourages participation in breeding, genetics and sustainability programmes.

Partnering with ICBF the Beef Benchmark Report being piloted by ABP represents a world first in terms of the provision of carcase and greenhouse gas data on an individual animal basis.

The report has a strong focus on genetic improvement, comparing beef animals within a herd using ICBF's Commercial Beef Value (CBV) Index. It highlights the importance of breeding and buying high index animals to increase carcase quality and reduce age of slaughter, to enhance farm revenue and minimise each farm's carbon footprint.

Results have shown improvement in profits of up to €200 per head are possible.

Some 5,000 reports have been generated to date.

- Around 70% of beef processed by companies committed to Science Based Targets
- Progressive phasing out of F gases from refrigeration systems to reduce emissions

Beef processors are increasingly accredited to ISO14001 and 50001 covering environmental impact, the reduction of greenhouse gas emissions and energy management. The ISO framework enables processors to follow a systematic approach to ongoing measuring, tracking and enhancing performance.

Energy

Energy is typically the main source of emissions at processing level. The progress made by the sector can be summarised as follows:

- Drop in energy intensity of more than 30% since 2015. This equates to an annual energy saving from electricity of 45 million kilowatt hours equivalent.
- Approaching 100% of electrical energy being procured from certified renewable sources with guarantees of origin.
- Investment in heat recovery technologies to reduce energy requirements.
- Increased investment in wind turbines on site.
- Investment in greening of logistics to minimise emissions with a 20% reduction achieved in trials to date.

Waste

Significant efforts have been made by beef processors to minimise waste, increase the level of recycling, and eliminate waste to landfill. Some of the key achievements of the sector since 2015 include:

- Zero waste to landfill by all major processors
- More than 50% of waste is now recycled

Water

All major processors have been actively working on delivering progress in relation to water usage levels, water recycling and water quality. Since 2015, the following improvements have been delivered by the beef sector:

- 8% reduction in absolute water usage, which equates to cumulative savings of almost 250,000m3
- Drop of almost 22% in water intensity over the period

Food waste & circular economy

The beef processing sector has been actively working to minimise food waste within their operations and partnering with initiatives such as Food Cloud to ensure surplus product is utilised with commitments to reduce food waste by 50% by 2030.

By 2021 the level of food waste from beef processing after surplus product was donated to charity stood at less than 1%.

An important element of resource utilisation in beef processing is the management of animal by-products, which are not for human consumption. Over recent years, the beef sector has been proactively finding ways to utilise different categories of by-products for pet food, energy production and household products.

Liffey Meats – Green Logistics

Liffey Meats has embarked on a pilot programme with its logistics partner Virginia Transport to trial a move away from fossil fuelled to gas powered trucks.

In October 2019, Virginia Transport completed its first zero carbon delivery to mainland Europe using a lorry fuelled by renewable gas, which led to a 22% reduction in CO2 emissions relative to a diesel powered lorry.

By the end of 2021 the majority of Liffey Meats deliveries to mainland Europe are delivered by trucks using compressed natural gas (CNG) thanks to Virginia Transport installing their own refuelling station at their headquarters.

The potential for CNG to reduce CO2 emissions is even more considerable when Bio CNG is utilised with Virginia Transport calculating an 84% reduction in emissions compared to a diesel equivalent.

International collaboration

The Irish beef processing sector has been a leading contributor to initiatives such as the European Roundtable for Beef Sustainability, the Global Roundtable for Sustainable Beef and SAI Platform Regenerative Programme.

Involvement in these programmes ensures sharing of learnings, adoption of best practices and a common approach to tackling the challenges facing the sector globally. Ireland has been at the forefront of the development and roll out of the European Roundtable for Beef Sustainability framework, which focuses on eight outcome based measures across environment, animal health & welfare, farm management and animal medicines.

The engagement of processors with the Science Based Targets Initiative marks an important step in its commitment to setting long term emissions targets.

Similarly, processors have started signing up to the EU Code of Conduct on Responsible Food Businesses & Marketing Practices, which brings further transparency to their commitments and progress.

Role of meat in a balanced diet

The role of meat in a healthy balanced diet has come under increased scrutiny over recent years, reflecting an increased emphasis on providing healthy diets from sustainable food systems.

MTI undertook a review of the scientific evidence relating to meat consumption, meat intake and the contribution of meat to energy and nutrient intakes across different life stages of consumers in Europe.

The findings highlighted the nutrient dense nature of fresh beef and its significant contribution to the intake of a number of important macro and micro nutrients for consumers while representing relatively small portions of total fat, saturated fat and sodium.

Irish beef contains four nutritionally relevant vitamin D related compounds that are vitally important for a healthy diet and not naturally found in more processed foods. It is estimated that red meat contributes around a fifth of the daily vitamin intake by Irish adults.

Grass fed beef has specific nutritional properties, with recent studies showing that in addition to vitamin D, Irish grass fed beef has significantly higher concentrations of beneficial minerals and vitamins including Calcium, Manganese, Iron, Zinc, Selenium, Sodium, Magnesium, Potassium, Phosphorus and Vitamin E. It also has a higher fatty acid profile.

The meat industry through MTI and initiatives such as Meat and Dairy Facts have been investing in programmes to help consumers make an informed decision when pursuing a healthy sustainable diet for their families.

Driving progress to 2030

The global challenge facing society is to deliver significant progress in addressing the climate impact caused by human activity of all kinds. The Glasgow Climate Pact provides the global framework to accelerate action on climate for the period ahead.

In Ireland much of this ambition is captured within the National Climate Action Plan. The decision by the Irish Government in July 2022 to target a 25% reduction in agriculture emissions by 2030 equates to 5.75 MT CO2e annually and represents a significant challenge.

The beef sector has already invested significantly in developing the infrastructure and technologies that have delivered considerable improvements over recent years. It remains committed to delivering further, significant progress up to 2030. However, the scale of the ambition as set out in the sectoral target requires strong Government policy support and investment across the sector to move at the pace required.

In addition to our policy commitments, the marketplace is also accelerating its ambitions to secure net zero supply chains in the period ahead. Many of Ireland's key global and European customers have made commitments of achieving net zero operations by 2035 and a carbon neutral supply chain no later than 2050. This is further evidenced by the participation of retailers, foodservice companies and processors in initiatives such as WRAP's Meat in a Net Zero World pledge.

Consistent across all the commitments made by retailers and foodservice companies is their intention to work with suppliers to deliver on their ambitions. It is clear that customers will increasingly prioritise sourcing from suppliers that contribute to and support their own sustainability agendas. This provides a crucial opportunity for the Irish beef sector, but only if it can position itself as a solutions provider to deliver on customer targets. Failure to do so would create a real risk of losing market share with leading customers and impact negatively on the future viability of the sector.

Meat in a Net Zero World

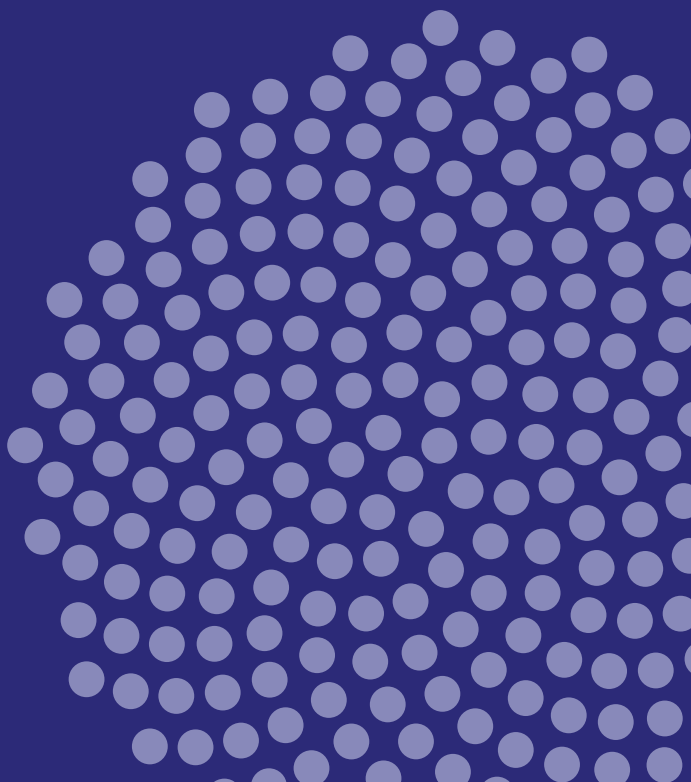
40 key stakeholders from across the UK meat supply chain pledge to make the UK meat industry one of the most efficient and sustainable in the world.

Retailers typically aiming for net zero operations by 2035 & across value chain by 2050

Meat Industry Ireland priorities

The policy and market imperatives to reduce emissions in the period to 2030 are clear and MII members will continue to proactively influence and support real change over the period.

The following pages discuss MII priorities for the period to 2030 and outlines the role they can play in driving further change across the beef sector.



Farm level

Further strengthening of integration between beef and dairy

Recent years have seen an increase in the proportion of finished cattle originating from the dairy herd. For 2021 this figure stood at around 60%. This highlights the importance of strong integration between the beef and dairy sectors to ensure the right breeding decisions are made to deliver a good quality beef animal with the lowest possible emissions.

A number of beef processors have developed stronger links with the dairy sector through programmes such as Twenty20 (Kepak), Advantage (ABP) and Ballyvadin Farm (Dawn Meats), all of which involve a partnership approach between beef processors and dairy co-ops.

The beef sector is committed to building further on these and additional initiatives in the period ahead. Such programmes will focus on:

- Reducing age at finish with a focus on weight for age to ensure emissions are minimised and a financially sustainable dairy-beef system is delivered.
- Delivering better and more consistent integration between beef and dairy farms.
- Implementation of dairy breeding strategies that utilise the Commercial Beef Value Index, methane traits and carbon sub-index to ensure calves most suitable for beef production are produced.
- Minimise nutrient loss and promote enhanced biodiversity practices.

The beef and dairy sectors are committed to working with Teagasc and the private advisory network to deliver strong knowledge transfer and best practice learnings to help influence change across both dairy and beef farmers. This includes utilisation of their demonstration farm funding as means of commercially testing management practice and new technologies. In 2023 each of four main beef processors will have a knowledge transfer programme in place for suppliers while dairy processors will have incorporated beef genetics into their advisory programmes.

Reducing age at finish

The last decade has seen significant progress in reducing the finishing age of steers, with a decline of two months delivered to bring the average age in 2021 to 27 months. The average age for all prime animals stood at 26 months compared to 28 months in 2010. Since 2018 the average steer finishing age has reduced by almost one month with further improvements evident to date in 2022, which compares to a 30 month average in 2010. These trends highlight the ever increasing momentum toward younger finishing.

The Quality Payment System and the in-spec bonus has been instrumental in providing financial incentives to farms to reduce finishing age with a 20c/kg and 12c/kg bonuses in place for in-spec animals (level of bonus dependent on conformation and fat score) that are processed under 30 months of age. Over the last decade the beef sector has allocated an estimated €500m in bonus payments to encourage finishing at less than 30 months.

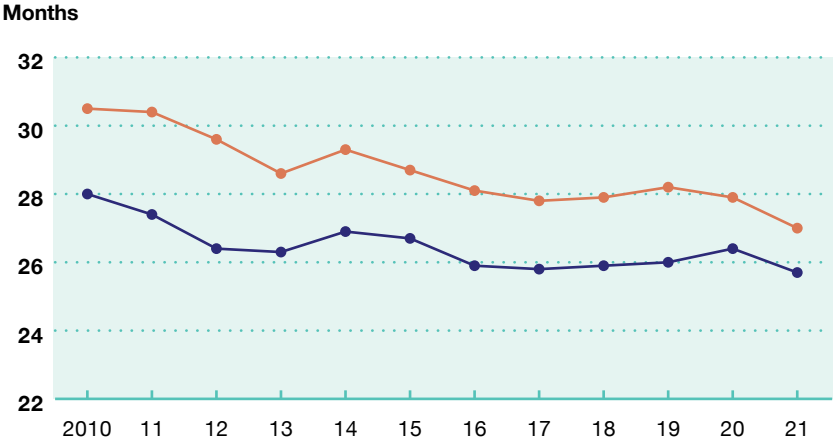
The Climate Action Plan outlines the ambition to deliver an average age of finish for prime cattle of 22/23 months by 2030, which requires a further 3/4 month reduction relative to 2021. Achieving this could help reduce emissions by up to 820,000 tonnes CO2e annually. Customers are seeking further

reductions in emissions over the period ahead and view younger finishing ages as an important driver to deliver on this ambition.

There are a number of elements required to deliver this action, namely:

- Encourage producers to finish prime cattle at younger ages and minimise emissions
- Further investment in genetics to deliver good carcase quality at a younger age
- The roll out of a genotyping programme for all animals at birth (see section below)
- Strong knowledge transfer programmes to ensure optimum weight for age is delivered
- Ongoing investment in herd health to provide the basis for strong animal performance

Average age at Finish 2010 to 2021



Source: ICBF

Encouraging younger finishing

MII members remain committed to working with Government and suppliers to encourage younger finishing. Currently the sector invests €46m annually in age-related bonuses as part of the Quality Payment System (QPS) with €43m allocated to animals under 30 months.

In line with the ambition outlined in the Climate Action Plan Meat Industry Ireland will engage with farm organisations and DAFM to agree a roadmap to deliver younger finishing ages in a way that minimises emissions intensity.

Steers continue to represent Ireland's unique point of difference in marketing Irish beef in the European marketplace. Recognising this and noting the potential highlighted by Teagasc to further reduce steer finishing ages, MII member incentives will focus on steers and heifers for the period ahead.

Young bull production remains the dominant beef production system across Europe with specialised production systems in place, which makes it challenging for Irish young bull beef to secure the market position needed to deliver sustainable market returns. Farmers considering young bull production need to ensure that they do so in conjunction with a beef processor to ensure they have a secure market outlet in place for their finished animals.

Investment in genetics

Teagasc and ICBF research shows that 46% of the observed differences in finishing age within herds is under genetic control. Sustained government funded supports and incentives to further boost the genetics of the national herd, represents an important enabler to help farmers produce animals with the ability to be finished at younger ages. The rollout by ICBF of new genetic evaluations for earlier finishing age will help provide a more targeted, data led approach to driving genetic improvement.

Weight for age

Reducing finishing ages requires a clear focus on ensuring animals are meeting critical weight for age targets throughout their lifetime. Programmes such as BEEP-S, which had almost 28,000 farmers participating in 2021, represent a vitally important incentive to encourage farmers to weigh animals to track performance. To ensure strong performance throughout their lifetime, weighing of animals needs to be undertaken in year 1 and year 2. The further rollout of programmes such as BEEP-S need to reflect this.

Driving genetic improvement

Significant investments have been made to boost the genetics of the national breeding herd through programmes such as the Beef Data Genomics Programme (BDGP). Over 23,000 farms participated in BDGP in 2021. The programme has delivered strong results with 76% of replacement heifers now 4/5 Star compared to 52% in 2015.

The work undertaken by ICBF in relation to the Commercial Beef Value Index, a Beef Carbon Sub-Index and age at finish all point to significant potential to mitigate emissions. Initial indications suggest that genetics offer the potential to mitigate up to 400,000 tonnes of beef-related GHG emissions by 2030.

Successfully delivering on this requires the following initiatives:

- Genotyping of the national herd and farm level utilisation of genetic evaluations
- Successful rollout of the Suckler Carbon Efficiency Scheme from 2023
- Industry led programmes to encourage progress at farm level

Genotyping

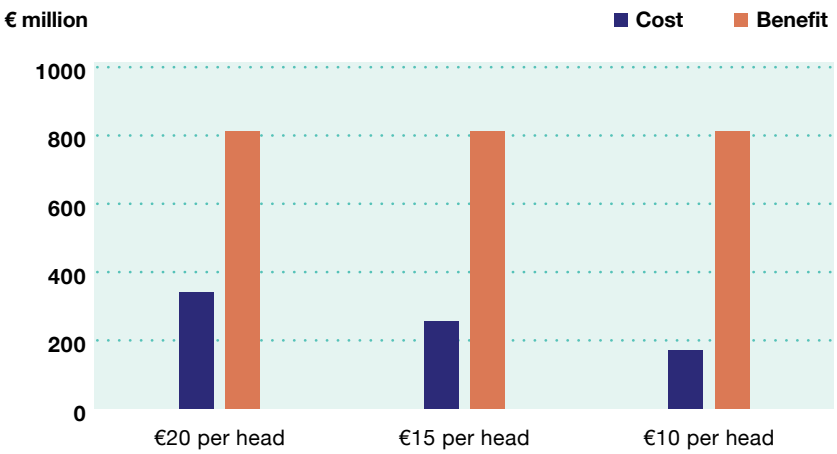
Genotyping the national herd represents a critical step to drive sustained genetic improvement with MII ready to play its part to ensure its delivery. Genotyping all animals at birth is critical in providing the surety needed in terms of genetic merit for climate and the environment and ensuring these factors are front and centre of breeding strategies. Breeding changes require a longer term focus to yield their full benefits but investing now is important to help build farmer confidence in the data.

The cost of genotyping stands at an estimated €15 per animal. Farmers are already contributing €5 for tags and postage leaving up to €10 required to deliver full DNA calf registration. This equates to €170 million over a 10 year period.

A cost-benefit analysis undertaken on behalf of ICBF suggest a return on investment of 4.8:1 based on more accurate information on rate of genetic gain and higher value animals, delivering a potential net benefit of €650 million with potential for further economies of scale benefits to help reduce costs.

MII is committed to working with DAFM, the dairy industry, ICBF and other relevant stakeholders to deliver a national genotyping programme as a matter of urgency. This programme would act as the cornerstone to provide the genetic information needed to allow farmers make informed breeding decisions and better understand the beef attributes of different animals.

Cost/Benefit of Genotyping National Herd



Source: AbacusBio for ICBF

Commercial Beef Value Index

The Commercial Beef Value Index (CBV) launched by ICBF in December 2021 brings a real focus to the traits that are linked to profitably growing and finishing cattle. The CBV represents the first tool to allow non-breeding beef farmers to select animals based on their genetic merit and control the quality of animal for their beef system. Results from research to date shows that high CBV animals had a higher growth rate and lower feeding costs, which can help further reduce emissions.

Strong visibility of CBV for animals is going be critical to drive farmer utilisation. A positive first step is the availability of CBV data on mart display boards for genotyped calves to help farmers make informed decisions. This further highlights the need for genotyping of all calves.

Breeding lower methane animals

The number of animals assessed for methane traits by ICBF and MTI continues to grow. Results to date suggest significant variation in daily methane output across genders, systems and breeds. The average figure for gross methane emissions stands at around 250g/day with some sires at 50g/day less and others 20g/day higher.

The next step is to capture the growing part of an animal's life as well as on grass/off grass. This will involve a number of commercial beef farms with on grass measurements captured through GreenFeeds. The outputs from this work will lead to Ireland launching the first genomic evaluations for methane traits globally in 2023.

MII members will work closely with MTI and ICBF to further enhance knowledge around methane traits to help build a commercial dataset that can better inform breeding decisions.

Engaging farmers on genetics

MII members recognise the need to play a proactive role in 'socialising' the messaging around genetics at farm level to drive change.

MII members will deliver an extended rollout of the Beef Benchmark Report initiative with ICBF, commencing from mid-2023 with a view to ensuring all beef finishers have access to this information on their herd performance.

The Benchmark Report programme, which represents a global first in providing carcase and greenhouse gas data on an individual animal basis. The report is available through ICBF's HerdPlus system and benchmarks performance based on the following areas:

- Carcase weight
- Finishing age
- Average daily gain
- Fluke & Abscess
- Carbon footprint
- Herd average performance for key traits based on Commercial Beef Value Index

Reducing age at first calving for suckler cows

Suckler farms remain the lynchpin of Ireland's beef sector, accounting for around 40% of all calves for beef production. This cohort of farms is critically important in helping the sector reach the 2030 targets.

These farms can deliver further improvements to calving intervals and age at first calving. Teagasc analysis suggests that these two factors offer GHG reduction potential of 7% of overall beef related emissions by 2030.

Delivering progress in these areas requires strong knowledge transfer and MII members will proactively support this through partnering with Teagasc and through the ongoing funding of demonstration farms.

Supporting animal health

MII remains committed to funding the work programme of AHI for the period ahead.

In addition to the direct benefits of improving animal health, current and planned AHI programmes all have a strong role to play in optimising the sustainability of the beef sector. This is clearly highlighted in the Teagasc Marginal Abatement Cost Curve (MACC), which suggests that animal health can contribute 147,000 tonnes CO2e mitigation annually over the period to 2030, which equates to more than 7% of the anticipated total savings and equates to cumulative savings of 1.8 million tonnes CO2e over the period.

These gains are also cost beneficial in terms of abatement costs, delivering an average return of €46/t CO2e mitigated. This highlights the role for Animal Health measures as part of the Signpost programme.

The key diseases highlighted in the MACC that impact on emissions in the beef sector are already being addressed by AHI including BVD, IBR, liver fluke, calf diarrhoea and pneumonia. The MACC assumes a linear rate of adoption over the period. A more rapid rate of adoption could further enhance the mitigation potential of Animal Health.

Priorities for MII in relation to Animal Health are as follows:

» **Beef Health Check**
This programme delivers batch level reports for cattle processed by participating companies with farmers receiving a report indicating a disease score relating to any liver or lung conditions present at the time of processing. These can be important indicators with research showing that steers and heifers with liver fluke averaged 33 days older at finish while those with a history of pneumonia or abscess were up to two weeks older. Combined these could result in an animal being six weeks older at finish, which adds significantly to their emissions.

Beef Health check has successfully helped reduced fluke incidence from 25% to 9% since its commencement.

MII commitments in relation to Beef Health Check for the period ahead include:

- Secure 100% adoption of Beef Health Check data collection by the end of 2023, assisted by DAFM's programme of capturing ante mortem and post mortem data.
- Deliver batch reporting from all members by mid 2024 with a farmer communication campaign to encourage them to access their data on the ICBF website.
- Meat Industry Ireland will support initiatives from AHI, DAFM and ICBF to ensure data processing agreements are in place to allow regular sharing of information with vets

» **Antimicrobial Resistance**
The issue of antimicrobial resistance continues to grow in importance as part of the overall sustainability performance of the beef sector. The development of Ireland's second One Health National Action Plan on Antimicrobial Resistance (AMR) 2021 – 2025 outlines a clear plan for improving awareness and knowledge of AMR, enhancing surveillance of antibiotic resistance and usage and optimising antibiotic utilisation in animal health. It clearly highlights the importance of having detailed data available to make informed decisions in tackling the issue.

MII will proactively support the implementation of this Action Plan and work with DAFM, AHI and other stakeholders to ensure the enhanced collection and reporting of data.

» **BVD**
Significant progress has been made to eradicate BVD with more than a 20 fold reduction in the prevalence of PI calves born annually. It is estimated by AHI that this reduction

delivered almost €90 million in benefits to the cattle sector in 2021 through better animal performance and reduced mortality. MII fully supports the pathway to BVD freedom by 2023..

- **IBR**
  AHI report a widespread prevalence of IBR in Irish beef and dairy herds, which is resulting in an average annual cost of the disease in affected herds running at €350 - €735. MII supports the draft programme put forward by the IBR Implementation Group to secure formal recognition for the disease under the Animal Health Law in order to allow the development of an eradication approach.

- **Animal Welfare**
  Strong animal welfare remains a critical part of the Irish beef production systems. Increased investment in outcome-based welfare measures will be key to maintaining and demonstrating the welfare credentials of Irish beef. Ongoing research to guide best practice will be vitally important to ensure farmers are equipped with the knowledge needed to maintain strong welfare. Ongoing collaboration between the beef and dairy sectors will be important to ensure strong welfare across all life stages.

- **Other MACC Measures**
  MII members are partnering with Teagasc and other agencies as part of the Signpost programme and are strongly committed to playing their part in the successful delivery of both the Signpost Farms and Advisory Campaigns to help ensure the scaled delivery of the mitigation measures identified in the MACC.

  A number of the areas where MII members can clearly influence progress have been highlighted already. In addition, there are a number of other technical measures with strong mitigation potential for the period to 2030 and beyond.

  These include:

- Replace 90% of CAN fertiliser with protected urea by end of 2025
- Reduce chemical N use in the beef sector by 27% - 30% by 2030
- 20% of farm grassland incorporated with clover/multispecies by end of 2025
- 80% - 90% of slurry spread by Low Emissions Slurry Spreading by 2025
- Optimising of soil fertility

The combined potential mitigation impact of technical measures utilising existing technologies stands at 2MT CO2e annually by 2030, which equates to around 35% of the agriculture target. Teagasc analysis suggests that cattle farms have the potential to deliver around a quarter of this.

Achieving this is highly dependent on the implementation of these measures at the scale required as soon as possible. This requires the availability of strong knowledge transfer resources and policy incentives to encourage adoption at farm level.

MII members stand ready to proactively support the scaled roll out of these measures and will articulate the policy and market imperative of delivering on these measures to suppliers.

Regenerative agriculture

Regenerative Agriculture restores the natural rhythm of ecosystems and revives landscapes. Biodiversity represents a critical component of regenerative agriculture systems in Ireland. Notwithstanding the investments being made through environmental schemes under CAP, considerable challenges remain to encourage on farm practices that can enhance the biodiversity value of livestock farms.

Protecting Farmland Pollinators

A critical element of this is ensuring that farms are more pollinator and biodiversity friendly, which also helps to protect water quality. The All Ireland Pollinator Plan provides clear actions that can deliver real progress at farm level. It focuses on the following five areas:

- Maintaining native flowering hedgerows
- Allow wildflowers to grow around the farm
- Provide nesting places for wild bees
- Minimise artificial fertiliser use
- Reduce pesticide inputs

MII has included these action areas in its Beef Sustainability Charter, which will shape the sustainability programmes rolled out by its members as they work to influence further change at farm level.

Processing level

The beef sector has already made significant progress in minimising emissions and resource usage at processing level. The focus for the coming decade is centred around decarbonisation. There are a number of areas that will form a phased approach to decarbonising as outlined below.

Three processors have committed to the Science Based Targets Initiative with Scope 1 and 2 emission targets in place, and an additional focus on Scope 3 emission targets based on a 1.5 degree pathway, which seeks to limit global warming to 1.5 degrees Celsius.

Examples of the targets set by beef processors to date include:

- Reduce Scope 1 & 2 emissions by more than 50% by 2030
- Scope 3 emissions targets aiming to reduce emissions intensity by around 30%.

The sector is well placed to contribute positively to the delivery of Ireland's Circular Economy ambitions. With the emergence of additional technology there is considerable potential to utilise by-products further to build on the considerable progress made over the last 10 years.

Further progress in relation to recyclable packaging and materials made from recycled content offers clear potential to minimise plastic usage provided the necessary investments are made in Ireland's plastic recycling infrastructure.

The work being undertaken by MTI in relation to packaging and shelf life extension is critical in delivering further progress.

Meat in a healthy balanced diet

The work planned by MTI on the contribution of meat to energy and nutrient intakes across life stages is vitally important to further build on scientific evidence gathered to date.

The nutrient dense nature of beef needs to be communicated clearly to consumers to help them make informed purchasing decisions.

Information initiatives such as Meat and Dairy Facts need to be further strengthened to make it easy for consumers to find fact based information as they strive to pursue a healthy sustainable diet for their families.

Influencing change at farm level

Delivering change at farm level requires a co-ordinated, partnership approach involving all parts of the supply chain in order to help farmers adapt their systems and deliver a viable return to secure the financial sustainability of their enterprises.

Central to this will be the successful delivery and scaling of the Signpost programme.

MII members fully recognise the important role they have in influencing change at farm level. Over the period ahead there are number of areas of focus for members. These include:

» **Progressive Roadmap to incentivise the younger finishing ages**
MII is committed to engaging with DAFM, farm organisations and other stakeholders to agree a roadmap that will encourage change at farm level to deliver on the targets set out in the Climate Action Plan.

» **Individual processor programmes**
In addition to a national roadmap, MII members are committed to delivering individual programmes to incentivise their suppliers to drive change across their enterprises. In many cases this will involve an extension of programmes developed over recent years.

The future direction of such programmes will be guided by an overall MII Beef Sustainability Charter.

This Charter outlines priority action areas to help inform individual processor sustainability programmes. Examples of focus areas include:

- Genetic merit
- Methane EBVs
- Carbon footprint
- Biodiversity measures
- Water quality
- Animal welfare

The Charter will work in tandem with the dairy sector Sustainability Charter to help ensure a co-ordinated approach to driving the sustainability performance of beef animals from conception to finish.

» **Knowledge transfer from processor demonstration farms**
The four largest beef processors have invested in supporting demonstration farms to deliver best practice for both suckler and dairy beef production systems in partnership with Teagasc, ICBF, Bord Bia and AHI. The objective behind these farms is to provide commercial case studies to act as knowledge transfer centres of excellence.

Each processor is fully committed to expanding their knowledge transfer activities to provide detailed insights and intelligence on the impact of farm changes on both the environmental and economic performance of each farm.

» **Expanded role of agriculture teams**
Recognising the need to support farmers in their efforts, MII members will expand the role of agriculture teams to incorporate the hands-on sharing of best practice information to suppliers with a particular focus on suckler farms.

This will involve technical teams working closely with Teagasc and private advisory networks to deliver a co-ordinated and practical approach to sharing best practice. This will be focused on addressing the results outlined in the ICBF generated benchmark reports across weight for age, genetic merit and carbon footprint as well as Origin Green feedback reports.

Issues to be addressed

There are a number of issues to be addressed to deliver and accurately track progress by the Irish beef sector between now and 2030. These include:

Measurement approach

The delivery of a robust and comprehensive national agriculture GHG inventory measurement approach is critical to accurately monitor progress and provide confidence to the sector that efforts made are being recognised in annual emissions reporting.

It is important that the right infrastructure is in place to capture information on the MACC measures implemented at farm level. This information needs to be fully utilised in the inventory methodology while ensuring emissions factors appropriate to Irish systems are used.

Enhanced co-ordination is needed to ensure all available datasets are combined to provide the depth of information required. Over time this would allow the transition to individual animal carbon footprinting at scale, which would further enhance data-based decision-making.

In the context of the beef sector's contribution to delivery of Ireland's climate targets in sectors other than agriculture, most notably energy, there is a need to embrace an 'all farm' approach to measuring and recognising the overall contribution of the sector. This will be increasingly important in meeting the needs of key customers as they transition towards a carbon neutral supply chain.

Data gaps on suckler farms

Suckler farms remain the lynchpin of Ireland's beef sector, accounting for around 40% of all calves for beef production. Gaps exist currently in the sustainability performance of this cohort of farms with less than half being members of Bord Bia's Beef & Lamb Sustainable Assurance Scheme. When combined with the part-time nature of many of these farms, it makes it more challenging to influence adoption of different mitigation measures.

This cohort of farms is critically important in helping the sector reach the 2030 targets. In addition to the areas discussed above, these farms can deliver further improvements to calving intervals and age at first calving. Teagasc analysis suggests that these two factors offer GHG reduction potential of 7% of overall beef related emissions by 2030.

Addressing this gap will be key to delivering the rate of progress required for the beef sector between now and 2030. A co-ordinated approach involving all stakeholders is needed to put the necessary supports and systems in place to ensure sustainability assessments are undertaken and knowledge transfer activities reach this critical cohort of farms at the scale required.

Adoption levels

A key factor in delivering the GHG reduction target by 2030 will be the extent to which the abatement technologies identified in the MACC are adopted at farm level. MII Members will support government policy aimed at achieving adoption rates at the scale required.

Sequestration potential of cattle farms

Further investment is required to measure the level of carbon sequestration on cattle farms in order to develop a more in-depth picture of the net emissions from each enterprise. The investment in 30 Flux Towers as part of the Signpost programme will help provide more data on the level of carbon sequestered on farms in different parts of the country and help strengthen the quantification of sequestration at a national inventory level.

Previous Teagasc research suggests that sequestration rates of up to 2 tonnes CO2e per hectare are evident on Irish cattle farms. This would suggest that many farms are close to being carbon neutral, but the absence of data prevents this from being verified at scale. Addressing this data gap needs to be a priority.

Biogenic methane

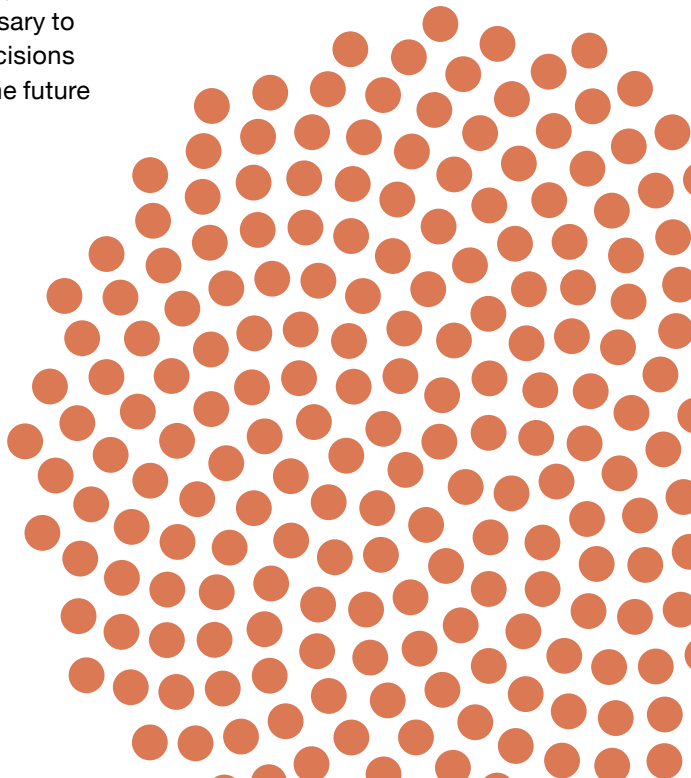
The measurement and reporting of biogenic methane is an area that requires further significant research to ensure that emissions from the beef sector are accurately reported. The short lived nature of biogenic methane and the fact that it returns to the atmosphere as recycled carbon means that its global warming impact is lower than other forms of methane. Reducing livestock methane emissions by approximately 0.3% annually has the same temperature impact as closing a coal fired power station, i.e., it results in no additional warming (Source: Prof. Allen's Research Group, University of Oxford)

It is important that international and national emissions measurement approaches take this into account to ensure the most accurate assessments possible of climate impact are being undertaken. This is necessary to ensure the right policy decisions are being made to drive the future direction of the sector.

Enabling the decarbonisation of beef processing

There are a number of structural enablers required to incentivise the delivery of a decarbonised processing sector. These include:

- Clearer framework to encourage the adoption of Anaerobic Digestion (AD) with incentives in place to deliver a co-ordinated AD infrastructure.
- Stronger grant supports for the adoption of solar photovoltaic technology (PV) to provide greater certainty regarding the return on investment.
- Streamlined planning process for wind, solar and AD.



Meat Industry Ireland action areas

Appendix

Action No.	Action	MII Member Role	Timeline
1	National Roadmap to encourage earlier finishing ages	Roadmap developed with relevant stakeholders	June 2023
2	MII Beef Sustainability Charter	Sign off on framework	Q1 2023
3	MII Member Sustainability Programmes	Individual programmes based on Beef Sustainability Charter in place to incentivise farmers	2023 Onwards
4	Extension of Beef & Dairy MII member partnership programmes. Focus on: » More consistent integration between beef & dairy farms » Dairy breeding strategies that utilise CBV » Minimise nutrient loss » Promote biodiversity measures	Four partnerships in place	Ongoing from 2023
5	Dairy Beef knowledge transfer programmes involving four beef and dairy MII member	Delivery of knowledge transfer programmes in partnership with advisory providers	Jan 2023
6	Support the expedited rollout of national genotyping programme	Agree roll out plan with relevant stakeholders	March 2023
7	Extend commercial dataset to feed into genomic evaluations for methane traits	Work with MTI & ICBF to deliver commercial dataset	June 2023
8	Industry wide rollout of Beef Benchmark Report with ICBF	All members to roll out Benchmark Reports for their suppliers and farmer engagement campaign	Commence June 2023
9	Extended role for MII member Agriculture Teams	Programme to share best practice with suppliers using Beef Benchmark and Origin Green Feedback reports	From July 2023
10	Continue funding of AHI work programme	Member financial contribution	Ongoing
11	Extended adoption of Beef Health Check	100% adoption of data collection and batch reporting	Completed by mid-2024