



2021

AFTER LIFE PLAN - IRELAND



AFTER LIFE PLAN – IRELAND Beef sector

1. Objectives

Innovative Irish beef producers in LIFE BEEF CARBON clearly demonstrated it is possible to mitigate the carbon footprint of beef farming by 10%-15% in a 4-5 year period. The Beef Carbon action plan for Ireland aims to replicate this level of improvement in carbon footprint across suckler beef and dairy calf to beef farms. Each of the mitigation measures in the new carbon action plan were carefully selected based on cost, effectiveness, and feasibility. The wider environmental impacts of carbon mitigation actions were also considered. Many of the actions that made it onto the Irish beef carbon plan are already in 'Ag-Climate', the national climate and air roadmap for the agricultural sector (DAFM, 2020). Ag-Climate is largely based on Teagasc's strategy for controlling greenhouse gas (GHG) emissions and can be implemented straightaway. The central tenets of the Teagasc strategy are:

- Stabilise methane emissions and reduce nitrous oxide losses from agricultural sources.
- Enhance carbon sequestration and reduce carbon losses from organic soils.
- Increase energy efficiency and bioenergy production.

Specific measures for each tenet of the strategy are described in detail in the second iteration of the Teagasc marginal abatement cost (MAC) curve for GHG emissions (Lanigan and Donnellan, 2019). This analysis estimated technical efficiency measures could cost-effectively reduce agricultural emissions by an average of 1.73 MT CO₂ equivalents (CO₂e)/year between 2021 and 2030, while meeting the growth targets set out for the industry in Food Wise 2025 (DAFM, 2015). A further 38 MT CO₂e could be abated over the commitment period by enhancing CO₂ sequestration via land-use measures and by displacing fossil fuels with bioenergy. Together, the land-use, bioenergy and technical efficiency measures in the Teagasc MACC have the capacity to reduce emissions by an average of 5.5 MT CO₂e/yr. The mitigation potential of the bioenergy measures is not however fully attributed to agriculture in the national GHG inventory. Nevertheless, the remaining abatement potential for the sector should be sufficient to meet agriculture's targets for the 2021-2030 commitment period:

- Reduce GHG emissions by 10%-15% to a range of 17.5-19 Mt CO₂e/year.
- Increase carbon sequestration by an average of 2.68 Mt CO₂e/year.

The beef sector will play an important role in delivering the reductions necessary in GHG emissions and may be able to implement additional climate actions not specified in the Teagasc MACC. These extra mitigation measures largely focus on improving the technical efficiency of cattle production. They are part of the Beef Carbon action plan and will be implemented with the actions in the Teagasc MACC for 5-10 years after the end of the project.

2. Description of activities to reach the objectives

Several measures were identified to mitigate beef carbon footprint in action plans for the main cattle farming systems in Ireland. These plans along with Teagasc MAC curves were synthesised to produce a national carbon action plan for the beef sector. The 22 measures in the plan are listed in Table 1 and are classified based on their mode of action into three broad types: 1) Technical efficiency, 2) Technological intervention and 3) Carbon Sequestration and Land-use.



Table 1. The Irish Beef Carbon Action plan's measures for reducing the carbon footprint of beef production with targets for 2030 (10 years after the end of the project).

Type of measure	Name of measure	2030 Target
Technical efficiency	Extended grazing	Turn cattle out to pasture a week earlier in spring and house stock a week later in winter via on/off grazing and other management strategies.
	Better grassland management	Increase grass utilisation by 2 t DM/ha and reduce purchases of feed.
	Mixed grass/white clover swards	20%-25% of the annual sward consists of white clover.
	Spring slurry spreading	Apply 70% of cattle slurry in spring when weather and ground conditions are suitable.
	Reduce age at first calving	Minimum of 75% of heifers calving between 22-26 months of age.
	Increase calving rate	At least 0.95 calves/cow per year.
	Optimise replacement rate	18%-20% of cows replaced annually for a stable herd; Average of 5 lactations over the lifetime of a beef cow.
	Increase 6-week calving rate	Calve 80% of eligible beef females within 6 weeks in spring or/and autumn.
	Improve weaning efficiency	200-day calf weight more than 42% of dam weight; Reduce cow size and/or increase weight gain for progeny.
	Reduce age at slaughter for suckler beef	Finish steers at 22-24 months of age and slaughter heifers at 20-22 months. Finish bulls under 16 months of age.
	Reduce age at slaughter for dairy calf to beef	Slaughter steers at 23-26 months old and finish heifers at 19-22 months. Slaughter bulls at 16 months of age.



Type of measure	Name of measure	2030 Target
Technical efficiency	Improve genetic merit	Breed cattle with a terminal index above 3 stars; improve replacement index of heifers by 20% (1-star).
	Reduce crude protein (CP)	Offer a low protein diet (11%-12% CP) to finish cattle. Lower CP of concentrate feed to 14% on a DM basis during the grazing season.
	Improve animal health	Substantially lower prevalence of bovine tuberculosis and reduce occurrence of infectious bovine rhinotracheitis (IBR) disease. Eradicate bovine viral diarrhoea (BVD).
Technological intervention	Protected urea ¹	Shift 50% of straight calcium ammonium nitrate (CAN) fertiliser to protected urea.
	Low emission slurry spreading (LESS) equipment	Apply cattle slurry with LESS equipment e.g., trailing shoe/hose, band spreader and/or dribble bar.
	Drain wet mineral soils	Install drains in 10%-15% of wet mineral soils on beef farms.
	Sexed Semen	Increase the usage of sexed semen on Holstein-Friesians. Dairy dams mated to Jersey sires will receive only sexed semen via artificial insemination (AI).
	Energy saving devices	Switch at least 90% of incandescent bulbs to low energy lighting e.g., LED or fluorescent bulbs. Fit solar photovoltaic (PV) panels on 33%-50% of beef farms.
Carbon sequestration & land use	Improve soil fertility	Reduce soil acidity and correct P, K and S deficiencies; optimise 30% of soils in terms of pH & nutrients.
	Raise water table in peatland	Convert deep drains to shallow drains in peaty grassland. Cease re-drainage of restored peatland and maintain natural water table.



Type of measure	Name of measure	2030 Target
Carbon sequestration & land use	Habitat conservation	Maintain habitat cover of 12%-14% on extensive beef farms and increase cover to 10% on intensive farms. Replant old hedgerows and plant new hedgerows on marginal land.

¹ Urea stabilised with a urease inhibitor e.g., Agrotain, Limus.

Most mitigation measures in the plan fall into the first type (technical efficiency). Normally, these measures are cost effective and many have negative costs i.e. improve farm income (Schulte and Donnellan, 2012). Measures to enhance carbon sequestration in the action plan slightly increase farm costs, except improving soil fertility. Technological interventions also adversely affect farm income. Financial supports are available to offset partially the cost of investing in LESS and energy saving technologies. Further financial and advisory support will be required to make these carbon mitigation measures attractive for beef producers. The Teagasc Signpost programme, launched in May 2021, will offer advisory assistance to farmers in relation to climate actions (Teagasc, 2021).

3. Human and financial means

Teagasc, the agricultural industry and state agencies will encourage cattle farmers to adopt viable mitigation measures in the Beef carbon action plan. A hundred demonstration farmers, spread across Ireland, in the new Signpost programme will continue to trial and promote the carbon plan to the wider beef farming community. Furthermore, the Signpost farms will monitor the influence different management practices have on carbon sequestration as part of the national agricultural soil carbon observatory. This will create a national network of farms where carbon sequestration in grassland soils can be scientifically assessed. The Signpost programme is a multi-annual campaign to lead climate action in the agricultural sector. It will focus on mitigating carbon emissions without harming other important environmental indicators e.g., water quality and biodiversity. Lowering carbon emissions from agriculture is expected to make farming businesses more competitive and sustainable.



Figure 1. Partners, sponsors and supporters of the Teagasc Signpost programme.

To realise the objectives of the initiative at a national scale, a collaborative approach has been adopted with meat processors, dairy companies, animal breeders, feed mills, farm co-operatives and organisations, media groups, agrichemical and seed companies, banks and public bodies (Figure 1). The 40 partners currently in the programme represent all relevant industry bodies and state agencies. New partners are expected to contribute to the collaboration during the decade (2021-2030).

4. Progress/impact indicators

Gross carbon footprint has become an essential measure of environmental sustainability. It will be tracked using accounting or auditing tools deployed in LIFE BEEF CARBON and/or the Teagasc national farm survey (NFS). Net carbon footprint will be estimated as the difference between gross GHG emissions and carbon sequestration. The latter will be simulated with soil carbon or ecosystem models, which will be calibrated with field measurements from the Signpost farms (Figure 2). Air pollutants i.e. ammonia emissions released by demo farms will be evaluated as well, along with nutrient balances and biodiversity levels. Light detection and ranging (LIDAR) surveys will measure biodiversity in terms of hedgerow cover at the start and end of the Signpost programme. Water quality will be examined throughout the programme by trained advisors. Recommendations to main or improve water quality will be incorporated into farm sustainability plans.



Figure 2. Map of demonstration farms in the Teagasc Signpost programme.

Besides evaluating environmental sustainability, the programme's participants and advisors will measure farm performance and profitability. Information will be gathered on farm revenues, costs and investment and used to estimate profit and loss at the end of each year. Productivity and efficiency will be measured through a variety of important metrics including grass utilisation, soil nutrient indexes, age at slaughter and calving rate. The productivity and profitability of beef farms outside of the Signpost programme is determined annually by the Teagasc NFS. This survey is nationally representative of Irish beef production. It was expanded in 2013 to include environmental sustainability metrics, including carbon footprint. The NFS sustainability report (Buckley and Donnellan, 2021) is published annually. Progress in the sustainability of cattle farming in the NFS will be reported throughout the Signpost programme and compared to the demo farms.

5. Monitoring methodology

Signpost demo farms will receive knowledge transfer support to create tailored carbon action plans. An advisor or consultant will involve farmers in the process of identifying actions to mitigate carbon emissions during in person and/or virtual farm visits. As part of the visits, the advisor(s) will gather activity information needed to operate farm-level carbon accounting and sustainability tool(s). The team will work with demo farmers to establish reference levels for carbon emissions. The reference level will be based on a period prior to the start of the signpost programme to evaluate the full impact of the farmers' actions. After establishing the reference level of emissions, the potential impact of low carbon farming practices and technologies will be projected with the navigation features of a decision support tool. The projected benefits of the carbon mitigation measures will be presented to the Signpost demo farmers for approval.

Carbon sequestration will be measured on a selection of farms using eddy co-variance towers. This "living lab approach" will ensure climate actions are fit for purpose and meet farmers' expectations. Mitigation measures and carbon emissions will be monitored on an annual basis. Key environmental and economic indicators will be reported, and expressed on an absolute and intensity basis for carbon equivalent emissions. Teagasc will assess how carbon action or sustainability plans created in the programme could be re-created or adapted with online self-assessment tools. A generic carbon/sustainability planning tool for use by the wider farming community will be evaluated. It could act as a model for future carbon farming initiatives. To find out more about the tools and monitoring approach in the Signpost programme please [click here](#)

