Teagasc LIFE BEEF CARBON Newsletter 8

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MAP OF IRISH FARMS SUPPORTING LIFE BEEF CARBON (LBC) DEMONSTRATIVE OBSERVATORY

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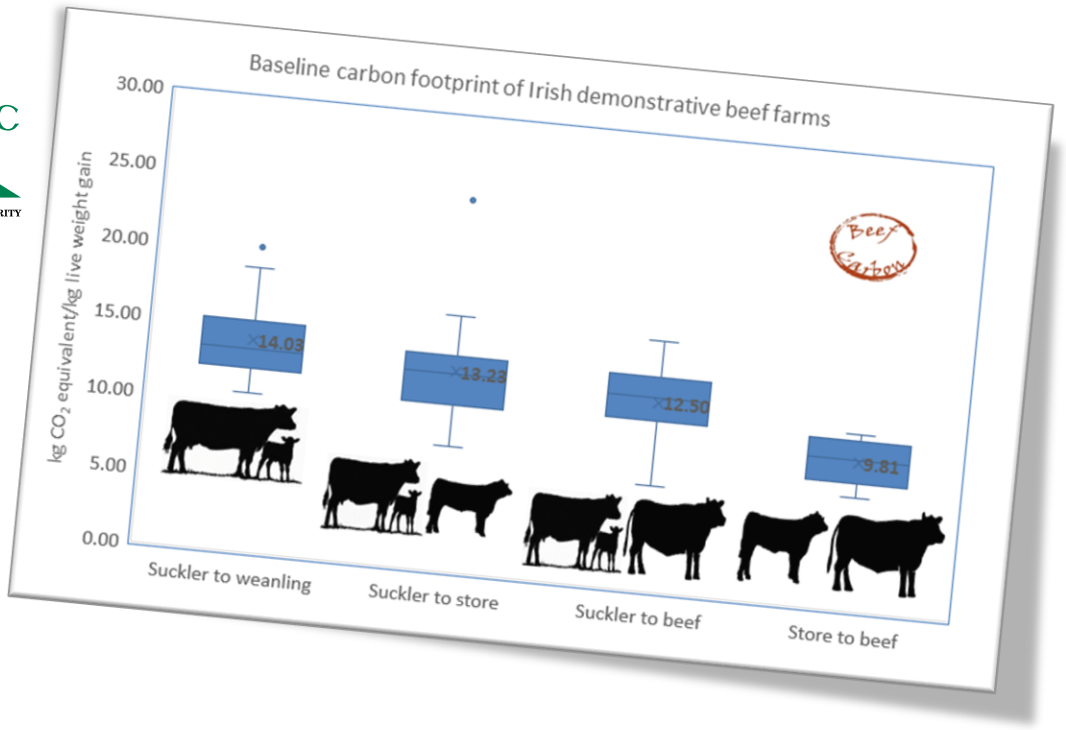
LBC Demonstrative Observatory:

Monitoring Irish Beef Systems Carbon Footprint

The demonstrative farm observatory of LIFE BEEF CARBON was founded in 2016 and is one of the largest multinational networks combating carbon emissions from bovine production. The network covers Europe's diverse systems of cattle farming, across a range of climatic conditions, from cool maritime weather in the north to warm Mediterranean conditions in the south. The unique observatory includes temperate grass-based beef production systems from Ireland and the northwest of France i.e. Bretagne, Normandy and Pays de la Loire. A hundred and twenty Irish cattle farms, spread throughout the country, are voluntarily participating in this important climate initiative.

All of the Irish beef producers in the LIFE BEEF CARBON observatory are members of the Irish Farm Accountancy Data Network (FADN) run by Teagasc. The Irish FADN or national farm survey (NFS) collects a raft of financial, technical and demographic farm information. Some of the technical data the NFS collects for BEEF CARBON includes, land areas, livestock inventories, cattle sales and purchases, turnout and housing dates, feeding plans, chemical fertilizer application rates, diesel and electricity consumption, housing type(s), manure storage facilities and methods of manure application.

The information in the NFS database is fed into Carbon Audit, a mathematical model of greenhouse gas (GHG) emissions from primary beef production. Carbon Audit applies the life cycle assessment (LCA) technique to simulate emissions, as it is currently too expensive to measure GHG from several beef farms. Carbon Audit is harmonized with French, Italian and Spanish models used in LIFE BEEF CARBON i.e. CAP2ER and BOVID-CO_2. The goal of these LCA models is to simulate GHG emissions and removals from all of the key processes associated with beef farming.



Post-farm stages were not considered in any of the LCA models used in beef carbon, as the majority, 85-95%, of GHG is emitted prior to beef processing.

The life cycle stages Carbon Audit, CAP2ER and BOVID-CO_2 evaluate are collectively referred to as the "Cradle to farm-gate stage". The boundaries of a cradle to farm-gate LCA model extends from the extraction of raw materials (e.g., minerals and fossil fuels) through to the rearing and finishing of beef cattle. On-farm GHG emissions from foreground processes e.g., spreading of lime and rotational grazing of livestock are largely simulated in accordance with national GHG inventory procedures. Pre-farm emissions from background processes (e.g., generation of gird electricity) are estimated with factors or equations from national publications or recognized international databases.

Greenhouse gas emissions from pre and on-farm activities i.e. methane, nitrous oxide and CO_2 are simulated for a production cycle by Carbon Audit. The warming potential of methane and nitrous is estimated over a 100-year time horizon in terms of CO_2 using conversion factors from the Intergovernmental Panel on Climate Change (IPCC). The factor for methane is 25-28 times greater than CO_2 and nitrous oxide has 265-298 times the warming potential of CO_2. The total amount of CO_2 equivalent (equiv.) emissions from a beef farms are reported on a gross and net basis by Carbon Audit. The latter includes the sequestration of carbon into soil and wood. The main outputs of Carbon Audit are the gross and net carbon footprint of beef farming i.e. kg of CO_2 equiv. per kg of live weight gain (LWG).

The amount of live weight beef cattle produce influences the herd's feed requirements, which strongly affects CO_2 equiv. emissions and the economic competiveness of beef farming systems. The NFS routinely record beef farmers expenditure on cattle purchases and the income they received from cattle sales. This data was supplemented with weight information from the Irish Cattle Breeding Federation (ICBF) to determine the carbon footprint of beef from common Irish beef farming system i.e. suckler to weanling, suckler to store, suckler to beef and store to beef. The CO_2 equiv. emissions associated with purchased cattle were excluded from the demonstrative farm analysis for a number of reasons, two of which were:

1) The method of rearing of cattle prior to purchase is outside of the control of the buyer.

2) Cumulative off-farm emissions from purchased weanling and/or store beef cattle are typically considerably greater than the on-farm finishing phase and thereby would dominant the carbon footprint of store to beef systems.

Carbon Audit's initial estimates of the GHG emissions from the demonstrative farms in 2016 (baseline year) illustrated there was considerable variability in the carbon footprint of beef, across each of the suckling systems of cattle production. The finding suggests there is scope to reduce emissions on suckling farms by bringing more farms closer to the current average. As expected, the store to beef systems had a lower beef carbon footprint than the suckling farming system, because finishing systems excluded the suckling and rearing/backgrounding phases, which allowed the farms to sell more beef.

A beef animal usually weighs 330-400 kg entering the store to beef systems and was sold for slaughter at 650-700 kg. Adding the emissions associated with suckling to weanling/store to the store to beef system increased the weighted average footprint of the finishing systems to ~12.3 kg CO_2 equiv./kg LWG in 2016. The total carbon footprint of the suckler to weanling/store and store to beef systems was therefore very similar to the footprint of the entire suckler to beef system, albeit the analysis was not nationally representative.

Carbon emissions from the Irish demonstrative observatory in 2018 will be analyzed in the coming months. The follow up assessement will be expanded to monitor other environmental measures and assess the progress the observatory is making in cutting the carbon footprint of beef.

Innovative Beef Farmers Lead the Way on Climate Action

Pioneering cattle producers in Wexford and Kerry are heading up LIFE BEFF CARBON's battle against climate change in Ireland. The innovative producers are contributing to curbing the impact of climate change by reducing the carbon footprint of beef production. Since 2016, Wexford farmers, Cathal and Peter Breen, have mitigated the net carbon emissions or footprint of beef by 33% to 8.2 kg CO_2 equivalent/kg live weight gain (LWG), while James and John Flaherty in Kerry have cut the net footprint of beef by 21% to 9.10 kg CO_2 equivalent/kg LWG.

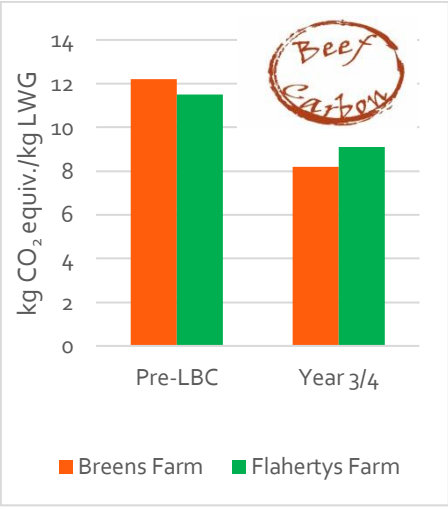


Figure 1: *Net carbon footprint of a selection of innovative Irish LIFE BEEF CARBON (LBC) farms in terms of live weight gain (LWG). Note: Life cycle assessment was used to calculate CO_2 equivalent emissions and CO_2 removals (sequestration).*

Both of these family farms have markedly reduced beef carbon footprint by tackling the challenges in the BETTER farm programme and by implementing the measures outlined in the LIFE BEEF CARBON action plan. The twin approach to combating climate change has improved the efficiency and productivity of the Flahertys' and Breens' beef enterprises, which has helped to improved the farms income.

The Breens and Flahertys run grass-based suckler to beef production systems and the Breens bring some surplus calves from nearby dairy producers to beef. Similar to many Irish cattle farm, the Breens and Flahertys farms were lightly stocked (<1.4 LU/ha) prior to joining the BETTER farms and mainly grew permanent pasture. The Wexford and Kerry beef producers have increased stocking rate in the last few years by improving grassland management and soil fertility in terms of pH, P and K. In addition, the Breens began growing some cereals on fallow areas and have reduced the finishing age of cattle, without compromising production. The latter change has been an important contributor to the improvement in the farm's beef carbon footprint.

The Breens and Flahertys calve suckler cow in spring & turn the animals out to pasture once weather permits. The herd typically graze outdoors for 245-280 days per annum. Fresh grass makes up the bulk or all of the herds diet during the height of the grass growing season in late spring and summer. When grass growth consistently exceeds the herd feed requirements, a section of the farm is usually closed for silage and harvested 6-8 weeks after closing. Cattle are put back into the sheds when ground conditions become unsuitable for grazing in autumn or winter. The diets fed to the herd indoors consists of silage, straw and supplements mixed with minerals.

Over the course of LIFE BEEF CARBON, the Flahertys transitioned from selling weanling cattle to finishing bulls, steers and heifers. The switch has not been without it challenges as regards farm management and facilities. Nevertheless, it has enabled the Kerry farmers to produce live weight from bulls and heifers in the winter and early spring months. The extra live weight gained during these months diluted carbon emitted by suckler cows in the transition (dry) period. The Breens further diluted emissions from suckler cows by bringing dairy cattle to beef. The Flahertys focused on the suckler herd and reared more calves per cow by adopting a vaccination plan. The health plan increased output, which contributed to cutting carbon footprint and improved efficiency and profitability.

Several of the measures the Flahertys and Breens selected from the carbon action plan targeted efficiency and were often "win-wins" i.e. reduced carbon footprint and production costs. The benefits of individual "efficiency" measures in terms of carbon emissions were generally small. However, the Flahertys and Breens demonstrated that by implementing a suite of efficiency measures, substantial improvements in carbon footprint are possible. These efficiency gains required significant financial investment that was not without risk. Sustaining this level of investment will be challenging on these farms, without financial rewards or credits for reducing carbon emissions. The new EU farm to fork strategy has indicated climate finance may be available to livestock farmers in the future. The possible follow up to LIFE BEEF CARBON will explore how climate finance could be deployed to support low carbon Irish cattle producers.

National Committee 2020

FOR MORE INFORMATION

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On Friday, 28th of February 2020, members of the national committee of LIFE BEEF CARBON came together to review the challenges innovative Irish beef farms are tackling and discussed the producers goals and ambitions for the final year of the initiative. In addition, the group planned possible open days, farm walks and seminars on grass-based beef farms. The forum was organized and chaired by Teagasc and the Irish Farmers Journal, and supported by leading meat processing companies: Anglo Beef Processor (ABP), Dawn Meats and Kepak.

The group first appraised the financial performance of the innovative farms participating in phase 3 of the BETTER farm programme. The analysis was conducted with the e-profit monitor tool, created and hosted by Teagasc. The preliminary financial results illustrated that since the commencement of LIFE BEEF CARBON in 2016, the gross output of the innovative BETTER farms increased by 37% to an average of €1,642/hectare in 2019. Most of the extra revenue came from an increase in the number of cattle beef producers sold. Farm-gate beef prices had a limited or slightly adverse impact on gross output.

The improvement in beef output was largely driven by an increase in stocking rate, which contributed to an increase in expenditure. Over the 3-years of the programme, the average variable cost increased by €252/hectare to €894/hectare. Fixed costs increased as well, but by a smaller amount (€86/hectare). The increases in variable, fixed and total costs were generally less than the growth in gross output. As a result, the average gross and net margins of the BETTER farms improved. The former increased by 34% to €748/hectare in 2019 and the latter grew by slightly more than a €100/hectare.

The challenges the innovative farmers choose to address were responsible for the bulk of the improvement in gross and net margins. For example, the "Two Tonne Grass Challenge" increased growth and utilization of herbage on most innovative farms, which allowed producers to sell or finish more cattle from the same area and helped to control or reduce expenditure on feed and cattle housing. Moreover, it contributed to reducing carbon emissions from the farms by decreasing conserved forages and concentrated feedstuffs in the animals' diet. The extra growth in grass was achieved on farm by:

1) Correcting imbalances or deficiencies in soil P and K.
2) Liming acidic soils i.e. mineral soils with a pH <6.
3) Reseeding old unproductive fields of pasture.
4) Switching from set stocking to rotationally grazing of cattle with a paddock system.
5) Monitoring grass covers and utilization using a wedge or PastureBase.

The innovative beef farms experience implementing the programme's challenges to date has largely been positive. Some of the innovative farmers have commented that the actions have helped to reduce workload, improved financial returns and made cattle easier to rear and finish. In 2020, the innovative producers aim to build on the lessons they have learned during phase 3 of the BETTER farm programme by refining the new practices and technologies they have adopted since joining the initiative. These refinements are expected to improve the viability of the producers beef enterprises and contribute towards meeting LIFE BEEF CARBON's sustainability goals.

The national committee concluded with a discussion on potential open days and farm walks on the BETTER farms in 2020. These events were subsequently postponed or cancelled because of the COVID-19 pandemic. The LIFE BEEF CARBON European networks in Ireland and Spain were affected as well. These networks are expected to take place virtually in 2021. The webinar details for these online networks will be advertised on the "Beef Carbon" section of the Teagasc website in the forthcoming months. We hope you can attend the network webinars in the coming months.