



The Beef Carbon Navigator

Improving carbon efficiency on Irish beef farms



The Farm Carbon Navigator was developed by Teagasc and Bord Bia as an advisory tool to support the roll out of Origin Green at farm level.

www.qas.bordbia.ie



CARBON NAVIGATOR

Lowering Agricultural Greenhouse Gases

Facts and Figures

Agriculture accounts for approximately 30% of Irish greenhouse gas production with most of the remainder being contributed by the transport and domestic sectors. Ireland is committed to reduce GHG emissions by 20% by 2020.

- Agricultural emissions are in steady decline and are 9% lower than 1990.
- The Irish grass based beef production systems are relatively carbon efficient.
- The three main greenhouse gasses from agriculture are:

Methane - From rumen fermentation and slurry storage. Methane is 25 times more potent than carbon dioxide. It accounts for almost 2/3 of agricultural GHGs.

Nitrous Oxide - From organic and chemical nitrogen fertiliser and excreted N. It is 300 times more potent than carbon dioxide. It accounts for almost 1/3 of agricultural emissions

Carbon Dioxide - Associated with the use of fossil fuels for energy and the manufacture of fertiliser. It accounts for a relatively small proportion of agricultural emissions

With the expected increase in cow numbers and dairy output post 2015 the industry faces a challenge to reduce its carbon footprint.

While agricultural GHG emissions are difficult to reduce farmers who adopt a number of practices and technologies can significantly improve efficiency, improve profitability and lower GHG emissions.

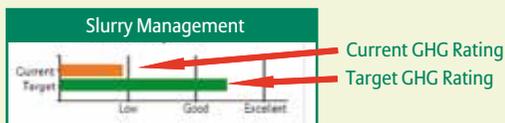
Using the Carbon Navigator



Increases beef efficiency reduces GHG footprint and increases income

Reductions in agricultural emissions per unit of output can be achieved by improving farm efficiency. The Beef Carbon Navigator focuses on the 6 win-win efficiency measures that reduce GHG emissions and increase profit.

- **Longer grazing season**
- **Lower age at first calving**
- **Increased Calving Rate**
- **Improved Growth Rate**
- **Improved nitrogen use efficiency**
- **Improved slurry management**



The Beef Carbon Navigator is linked to the Bord Bia BLQAS database and data required for the completion of the current values is mostly captured by the BLQAS auditors during their inspection visits. This is used to assess the performance of the farm against peers. It rates performance from poor to excellent as shown in the graphic. The orange bar reflects current performance.



Working with an adviser you can set targets for improvement. The Carbon Navigator estimates the % reduction in enterprise GHG emissions that will result from the achievement of the targets. While the individual amounts for each measure may seem small the overall impact can be very significant. The final column shows the financial benefit from reaching the target.

Achieving Targets A key aspect of the programme is the advice on what the farmer needs to put in place to achieve the targets. This is set out in a pre-populated page highlighting the key actions in respect of each of the measures.



CARBON NAVIGATOR

Lowering Agricultural Greenhouse Gases

The Carbon Navigator report compares your farm performance with other similar farms and highlights the potential impact on income and GHG emissions of reaching the targets set.

				Overall Impact	-16.9%	+€5,654
Year 2013		Current	Target	Chart	GHG Change	€ Benefit
Grazing Season-Suckler Cows	Turnout Date	01 Apr	20 Mar		-1.9%	+€809
	Housing Date	01 Nov	10 Nov			
Grazing Season-Yearlings/followers	Turnout Date	01 Apr	20 Mar		-1.4%	+€798
	Housing Date	01 Nov	10 Nov			
Age at First Calving	Age at first calving (months)	27.00	24.00		-0.9%	+€753
Calving Rate	Calving Rate (calves/cows)	0.85	0.95		-8.3%	+€2150
Live Weight Performance	System Lifetime live weight per day of age (g)	Steers and Heifers 800.00	Steers and Heifers 830.00		-0.2%	+€756
Nitrogen Efficiency	Total CAN and equivalent N in Compounds (t)	15.00	4.00		-1.6%	+€100
	Total urea used (t)	0.00	8.00			
	Total concentrate fed (t)	42.00	45.00			
	Output kg beef live/ha	500.00	600.00			
Slurry Spread Timing	% in Spring	20	40		-2.7%	+€289
	% Summer following 1st cut	20	60			
	% Later in Summer	30	0			
	Application method	Splash Plate	Trailing Shoe			

Extended Grazing



How a longer grazing season lowers the Carbon Footprint

Increasing the grazing season length lowers GHG emissions in two ways

Grazed grass in the early and late grazing season is a higher quality more digestible feed than grass silage leading to improvements in animal productivity as well as reductions in the proportion of dietary energy lost as methane.

The shorter housing season leads to reduced slurry methane (CH₄) and nitrous oxide (N₂O) emissions from storage. Energy use from spreading is also reduced.

It is estimated that for every 10 Day Increase in Grazing season there is a 1.7% reduction in GHGs and profit is increased by €25 / Cow or €1, 000 in a 40 cow herd.

Increasing Grazing Season Length on your Farm

Based on your location and soil type you may have an opportunity to extend your grazing season by improving your grassland management.

- Effective autumn grassland management with attention to minimising damage and achieving correct closing covers is essential for spring growth.
- Early nitrogen is essential for early grass.
- Ensure soil fertility is good—sample your soil and apply fertiliser accordingly.
- Carefully manage early spring grazing, limiting grazing time in wet conditions.
- Monitor grass covers and adjust to ensure good quality grass available to animals at all times.

Excellent grassland management is the key to the profitability and sustainability of Irish beef farms. Sharing experiences in a beef discussion group is the most effective way to improve skills.



Age at First Calving

How a younger age at first calving lowers the Carbon Footprint

The average age at first calving for replacement heifers on Irish suckler herds is 30.5 months while the top 10% of herds achieve an average figure of 26 months. This indicates that there is significant scope for improvement in the vast majority of farms.

- Higher age at first calving increases the lifetime emissions burden of the cow and emissions per kg of beef produced.
- The increased emissions are from enteric fermentation, feed energy and manure management.

The impact of age at first calving is to increase GHG emissions by 0.3% for each month that first calving is greater than 24 months of age. The economic impact of lowering age at first calving by one month is estimated at €50 per cow.

Improving Age at First Calving on your farm

- Replacement heifers need to achieve a high weaning weight by achieving a daily live weight gain of 1.1-1.3kg/day up to weaning.
- They need to gain at 0.6 – 0.7kg/day over the first winter and go to grass early in spring to have them at the correct bulling weight.
- Ideally heifers at bulling should be at 60% of their mature weight.
- With 2 year old calving the selection of an easy calving bull is critical. The objective is to avoid calving difficulty, deliver a live calf and to ensure heifers go back in calf.
- Choose breeding heifers from the best cows in the herd, that were sired by bulls with strong maternal traits and were born early in the calving season.

Calving Rate



How a higher calving rate reduces the Carbon Footprint

It is stating the obvious that in any year every cow that does not produce a calf reduces the profitability and increasing the carbon footprint of the rest of the herd. The national average calving rate for suckler cows is approximately 0.83 calves per cow per year.

- Non productive cows continue to produce almost the same emissions and incur the same costs as a producing cow.
- Poor fertility and a protracted calving season also increase work load.

For a 40 cow herd improving the calving rate by 5% will increase the profitability of the herd by €1720 and reduce GHG emissions by 4%.

Improving the Calving Rate on your farm

Achieving a consistently high calving rate involves good performance across a wide variety management practices. It begins with having a written plan in place, knowing your current performance and setting targets. The plan should define the calving period and set down clear objectives for calving interval and mortality and work towards achievable targets over a 3 year period. It should focus on:

- Ensuring that cow condition score is appropriate at calving and breeding.
- Reduce calving difficulty particularly through sire selection and feeding management.
- Ensure that your bulls are fertile and in good condition to meet their demands.
- Implement an effective herd health plan including dosing and vaccination regimes and quarantining of purchased animals.
- Use records and reports (ICBF) to identify cows with poor productive performance and cull if necessary.



Improved Growth Rate

How improved growth rates reduce the Carbon Footprint

Achieving higher growth rates leads to a higher final weight at finishing and/or lower finishing age. This means more beef relative to the length of time the animal is on the farm producing emissions. Specifically, per Kg beef it leads to:

- Lower enteric fermentation.
- Lower emissions associated with slurry storage and spreading.
- Lower emissions related to dung and urine.

The impact of increased weight gain on GHG emissions is estimated at 1% per 100g increase in lifetime average daily gain for beef cattle systems.

The economic impact is estimated at €63 for an increase of 100g /head day.

Increasing Growth Rate on Your Farm

Set target growth rates for your animal groups and track performance by weighing. Achieving optimal growth rates requires that you achieve a balance between output and cost for your system. However, there are a number of general principles:

- The cheapest feed is grass. Good grassland management can deliver high levels of production of quality grass at all times.
- Make high quality silage and supplement with meals to achieve target winter performance.
- Keep animals healthy through a planned approach to dosing, vaccinations and biosecurity.
- Use a high genetic merit terminal sire.
- Where appropriate to your circumstances bull beef systems are significantly more carbon efficient than steer systems.

Being part of a beef discussion group is the best way to improve performance from your beef herd and increase income.



Nitrogen Efficiency

How nitrogen efficiency lowers the Carbon Footprint

Nitrous oxide (N₂O) is a green house gas which has almost 300 times more global warming potential than CO₂. It is lost to the atmosphere from the breakdown of organic and chemical fertiliser. The higher the proportion of fertiliser that is absorbed by plants the lower the losses to the environment.

- Improving nitrogen efficiency leads to improved utilisation of N by plants and lowers losses to the air and water.
- The timing and method of slurry application has a significant effect on N utilisation.
- Increasing the proportion of clover in the sward reduces the requirement for Chemical N.
- Urea requires less energy (and CO₂) to manufacture than CAN.

A reduction in N fertiliser of 10Kg per Ha will reduce farm GHG emissions by 1% and improve income by €10 / Ha.

Increasing N efficiency on your Farm

- Increased use of clover in swards reduces the amount of N fertiliser used.
- Match N application to grass growth.
- Ensure that other elements of soil fertility are optimised. Utilisation by plants of N will be reduced if P or K levels or pH are too low.
- Manage grazing effectively. Focusing on high levels of grass production and utilisation lead to increase beef output per unit of N applied.
- Applying urea early in the year when conditions are appropriate reduces the GHG emissions associated with fertiliser manufacture and cost.



Slurry Management

How slurry management lowers the Carbon Footprint

Moving slurry application from summer to spring application and the use of low-emission application methods can significantly reduce emissions.

- *Spring application reduces emissions following land spreading due to the more favourable weather conditions (cool, low sunlight) at that time of year.*
- *Storage losses are reduced due to the shorter storage period.*
- *Reduced Ammonia losses increases the fertiliser replacement value, reduces fertiliser N and associated manufacture and spreading emissions.*
- *Low emissions application technologies such as trailing shoe lead to reduced ammonia losses and increases the fertiliser replacement value of slurry.*

A 20% shift to spring application can reduce farm GHGs by 1.3% while a shift to trailing shoe can lead to a reduction of 0.9%.

Improving Slurry utilisation on your Farm

Get better value from your slurry and reduce GHG emissions

- *Increase the proportion of slurry used in spring.*
- *Ensure that slurry is spread in appropriate conditions:- on a cool, still day and, if possible, avoiding direct sunlight by applying in the evening.*
- *Factor in the N value of slurry and reduce chemical N accordingly.*
- *Do not apply chemical N for 2 weeks after slurry.*
- *If possible use band spreading or trailing shoe.*



Sustainability and the marketing of Irish Beef



Sustainable production is becoming a key part of the business strategies of leading supermarkets, foodservice customers and manufacturers. This has seen them set out 5-10 year plans with ambitious improvement targets. Such customers are heavily dependent on their suppliers to achieve many of these targets. This offers opportunities for suppliers with strong sustainability credentials.

Ireland is very well placed in this regard. Ireland enjoys a strong international reputation as a source of natural, high quality food in the marketplace. In relation to sustainability, research from the EU Commission shows our livestock sector performs very well with Irish milk production the most carbon efficient in Europe with beef in the top five.

This is a great starting point. However, increasingly customers are asking us to prove our sustainability credentials and show how we are improving over time. This led Bord Bia to launch the Origin Green Sustainability Programme in 2012. The programme, which is the first of its kind at a national level anywhere in the world, aims to prove our credentials at both farm and food manufacturing level.



Farms are a key element of Origin Green. This has seen Bord Bia roll out sustainability programmes for both beef and dairy through our Quality Assurance infrastructure. To date more than 65,000 farm assessments have been undertaken. This allows us credibly market the sustainability credentials of Irish farms in export markets.

While collecting information is important to identify any potential for improvement, being able to demonstrate how we are striving to be as good as possible is vitally important. This led to the launch of the Teagasc/Bord Bia Carbon Navigator. The Navigator is designed to help farmers engage with practical measures that can improve on farm profitability while at the same time enhancing environmental performance.





Using the Carbon Navigator

Beef Carbon Navigator Input Sheet

Farmer & Plan Details

Herd Number	<input type="text"/>
Farmer Name	<input type="text"/>
County & Region	<input type="text"/>
Soil Type	<input type="text"/>
Area Farmed (Ha)	<input type="text"/>
Plan Year	<input type="text"/>

Av. no. of Suckler Cows

Av. Livestock Units young stock

		Current	Target
Grazing Season Suckler Cows	Turnout Date	<input type="text"/>	<input type="text"/>
	Housing Date	<input type="text"/>	<input type="text"/>
Grazing Season Young Stock	Turnout Date	<input type="text"/>	<input type="text"/>
	Housing Date	<input type="text"/>	<input type="text"/>
Age of First Calving	Age of First Calving (Months)	<input type="text"/>	<input type="text"/>
Calving Rate	Calving Rate (Calves/Cow/Year)	<input type="text"/>	<input type="text"/>
Live Weight Performance	System (Steers and Heifers or Steers and Bulls)	<input type="text"/>	<input type="text"/>
	Lifetime liveweight gain per day of age	<input type="text"/>	<input type="text"/>
Nitrogen Efficiency	Total CAN (or equivalent compound N) (T)	<input type="text"/>	<input type="text"/>
	Total Urea (T)	<input type="text"/>	<input type="text"/>
	Total Concentrate FED	<input type="text"/>	<input type="text"/>
	Output-Kg beef/Ha	<input type="text"/>	<input type="text"/>
Slurry Spreading	% in Spring	<input type="text"/>	<input type="text"/>
	% in Early Summer (After 1st cut silage)	<input type="text"/>	<input type="text"/>
	% in Late Summer/Autumn	<input type="text"/>	<input type="text"/>
	Application Method (Splash Plate, Trailing Shoe or Band)	<input type="text"/>	<input type="text"/>

'Sustainable beef' production protects our environment and protects the income of beef farmers. Your Teagasc beef adviser can assist you in assessing your potential to become more carbon efficient.