McDONALD'S BEEF CARBON REPORT

MEASURING AND MONITORING CARBON EMISSIONS FROM BEEF PRODUCTION



FOREWORD



McDonald's is one of the biggest customers of UK farming and a major supporter of the British and Irish beef industry.

We are committed to working with our suppliers to develop sustainable methods of food production, to ensure that we can continue to source as many of our quality ingredients close to home wherever we can, while working to improve the environment, support positive workplaces and drive continuous advances in animal health and welfare.

Over 16,000 British and Irish farmers supply all of the beef we use and in 2015 we sourced over 40,000 tonnes of forequarter and flank to make our famous beef burgers.

The impact of greenhouse gas emissions from the agriculture industry on the environment has been widely reported. As a major buyer of British and Irish beef it was incumbent on us to take action to understand how, by working collectively with our suppliers and farmers, we could reduce this impact through positive action.

Knowing that our food is produced in a sustainable way is a priority for us and for our customers. Which is why since 2008, we have invested over £1 million to better understand how we could support the farming community to make incremental changes to their farming methods to meet this aim and at the same time, encourage knowledge sharing to broaden the impact of any benefits identified across the industry

We have now spent six years working side by side with a core group of progressive beef farmers and environmental specialists to create a carbon footprint for each farm.

Every year, we have run Sustainable Beef Clubs which are free for farmers to take part in, to share best practice, and discuss the impact of the progressive moves made by the core group. As a result of collecting data on farm, we have been able to develop a free on-line carbon tool to allow any beef farmer to assess their own business and identify areas to improve efficiencies.

I am delighted that through this work, the farmers in these clubs have, on average, managed to reduce the carbon emissions of their beef enterprises by more than 23% between 2008 and 2014. As carbon reduction is closely linked to financial performance, our farmers tell us that focusing on carbon has saved them money too. You can read their case studies in this report.

This greenhouse gas achievement is just the latest stage of a beef sustainability journey that we have been on for many years, and will help us secure a sustainable future for the farmers that supply the 100% British and Irish beef we serve in all our restaurants.

We know that our size and scale can have a big impact, by giving farmers certainty of demand for their produce. We take this responsibility seriously and through our Farm Forward programme, we remain committed to being one of the most valued customers of British and Irish farming and in helping the industry secure a strong and sustainable future.

Connor McVeigh
UK Supply Chain Director

EXECUTIVE SUMMARY

Climate change is one of the greatest environmental challenges faced by modern society.

As a major customer of the UK agricultural sector, McDonald's recognises this challenge and since 2008, has taken the lead in understanding and tackling emissions by coordinating one of the largest independent carbon studies ever carried out directly on beef farms.

The partnership approach adopted throughout the period of the study has driven a significant reduction in emissions of **23%** between 2008 and 2014 on the core farms that we've monitored.

When annualised, this carbon footprint represents a drop of **4.6%** per year for those in the study against an industry benchmark of **0.94%**[1]. This indicates that the beef industry could achieve the **11%** voluntary reduction target set by UK government by 2020[2], if farms can successfully apply the principles learned during the study.

> **"ONE OF THE GREATEST CHALLENGES IN ADDRESSING THE GREENHOUSE GAS EMISSIONS FROM AGRICULTURE IS ACCESS TO DATA AND INFORMATION ON FARM THAT CAN HELP DRIVE IMPROVEMENTS. THE EMISSIONS FROM LIVESTOCK ARE SIGNIFICANT, BUT SO IS THE OPPORTUNITY FOR REDUCTION.**
>
> **McDONALD'S IS HELPING THE INDUSTRY TO DEFINE WHAT BEST PRACTICE LOOKS LIKE, DEVELOPING A PRACTICAL, CREDIBLE PROGRAMME THAT HELPS FARMERS TO SEE HOW MAKING EMISSION REDUCTIONS CAN ALIGN WITH BETTER ENTERPRISE MANAGEMENT AND FINANCIAL RESULTS."**
>
> **- DR JOHN KAZER, THE CARBON TRUST**

Carbon footprinting

In partnership with Alltech E-CO_2, McDonald's UK has worked with farmers and beef processors across the UK and Ireland to collect real farm data and calculate a carbon footprint for each business.

Over 1,300 Beef EA™ carbon assessments have been completed in six years with over 200 farmers, gathering over 800,000 points of data.

Knowledge exchange

To increase the impact and value of the study, McDonald's developed Sustainable Beef Clubs which provide an opportunity for all those involved in the study to review the most recent results and share knowledge and best practice. The club members had access to the latest research, free consultancy from industry experts and the opportunity to learn from each other's experiences.

Empowering the wider industry

It is vital that the learnings from this study are felt beyond the McDonald's supply chain. To meet this aim, McDonald's worked with Alltech E-CO_2 to develop a free on-line program called the 'What If?' Tool. This can help farmers measure their carbon emissions and calculate potential financial savings by highlighting efficiency based changes they can make to their daily operations.

TOP TIPS FOR CARBON REDUCTION ACROSS ALL FARM TYPES

1. **MEASURE AND MONITOR** - if you can't measure it you can't manage it
2. **BENCHMARK** - to know where you stand versus other producers and other types of farm
3. **FOCUS ON DAILY LIVE WEIGHT GAIN** - to reduce days on farm and digestive emissions
4. **USE PROTOCOLS TO CONSISTENTLY IMPROVE ANIMAL HEALTH** - to safeguard welfare, reduce mortality and boost performance
5. **MAXIMISE HOMEGROWN FORAGE** - through improved grassland management and diet formulation
6. **REDUCE CALVING INTERVAL** - breeding for fertility in suckler herds, ensuring close heat management and optimum age at first calving

McDONALD'S CARBON FOOTPRINT STUDY

BACKGROUND

As one of the biggest customers of British and Irish farming, supporting the industry to create a sustainable and secure future is a priority for McDonald's. International agreements also stipulate that the agricultural sector must play its part in meeting climate change mitigation objectives.

Under the Climate Change Act 2008, the UK government is legally required to reduce greenhouse gas emissions across the UK economy by 80% between 1990 and 2050[3].

To do this, the UK government introduced a system of carbon reduction targets and encouraged industry partnerships to form to reduce emissions. Under this scheme the agricultural sector has a voluntary commitment of an 11% reduction on 2008 greenhouse gas levels by 2020[2].

In Ireland, agriculture accounts for a third of the country's greenhouse gas emissions[4], compared to an EU average of around 8%[3].

The Irish Government has recently agreed the Climate Action and Low Carbon Development Bill[5], in which it sets out a plan to deliver meaningful reductions by 2050.

Climate change will have a profound impact on global agriculture, putting more pressure on farmers' ability to grow food. Sustainable beef production involves working with farmers to look at a range of issues, including improving animal welfare, safeguarding natural resources and increasing economic performance.

CARBON FOOTPRINTING

A farm's carbon footprint is the total mass of greenhouse gas (GHG) emissions caused directly or indirectly and expressed per unit of production for that enterprise.

Emissions from agriculture are inevitable and it would be unachievable to target zero emissions from beef, however the aim of carbon footprinting is to help the industry achieve more from less. Lowering a farm's carbon footprint goes hand-in-hand with increasing farm efficiency and therefore profitability. A carbon footprint is a holistic indicator of on farm efficiency.



SOURCES OF GREENHOUSE GAS EMISSIONS

SOURCE: GERBER ET AL. 2013[6]



33%
ELECTRICITY



28%
TRANSPORT



20%
INDUSTRY



11%
RESIDENTIAL & COMMERCIAL



8%
AGRICULTURE

SOURCES OF GREENHOUSE GAS EMISSIONS FROM AGRICULTURE

SOURCE: ALLTECH E-CO_2 FARM DATABASE



39%
ENTERIC EMISSIONS
(METHANE FROM THE RUMEN)



22%
FEED USE



13%
INITROUS OXIDE FROM MANURE AND GRAZING



10%
ARTIFICIAL FERTILISER



7%
FUEL



6%
MANURE EMISSIONS
(METHANE)



2%
OTHERS (INC. BEDDING, SPRAYS & LIME)



1%
ELECTRICITY

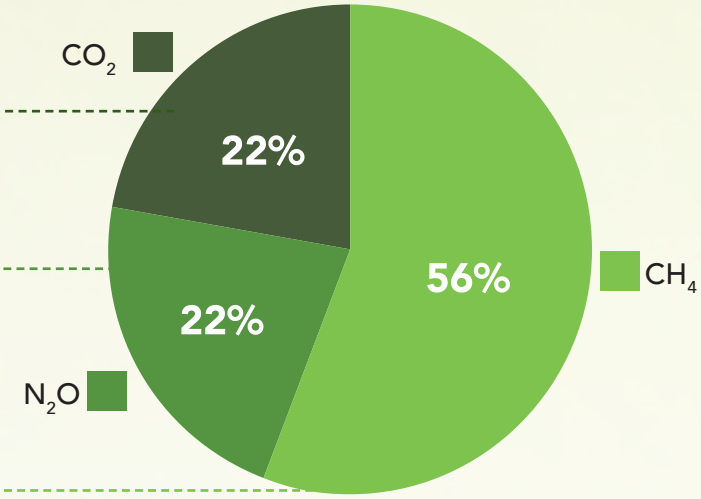
MEASUREMENT EXPLAINED

The carbon footprint is expressed in terms of kilograms of carbon dioxide equivalent (CO_2e) per kg of beef produced (measured as the live animal weight). This allows separate gases to be quoted together as a single unit of emissions.

Carbon dioxide (CO_2)
- Fuel
- Feed
- Fertiliser

Nitrous oxide (N_2O)
- Fertiliser spreading
- Manure storage and spreading
- 298 times more potent than CO_2

Methane (CH_4)
- Digestion
- Manure
- 22.25 time more potent than CO_2



CARBON ASSESSMENTS

Alltech E-CO_2 is a leading provider of on farm environmental and carbon assessments. McDonald's has been working with Alltech E-CO_2, investing over £1 million over six years in one of the largest independent beef farm carbon reduction programmes ever carried out, to help beef farmers run efficient and sustainable farm businesses.

Along with over 1,300 on farm carbon assessments and consultancy advice, Alltech E-CO_2 has coordinated the McDonald's Sustainable Beef Clubs and built the online 'What If?' Tool to combine carbon efficiency with projected financial performance.

Alltech E-CO_2 assessors visited each farm involved in the study on a yearly basis and carbon footprint figures were calculated for the beef enterprises using set guidelines to ensure consistency between farms. The Alltech E-CO_2 Beef EA™ model used to calculate the farm carbon footprint within this study has undergone repeated certification by the Carbon Trust. This is based upon PAS 2050 methodology[7] and took place over the course of the last six years.

Data was collected using written information, such as livestock records and farm accounts. This was graded to assess quality and then verified to identify and eliminate any anomalies which could grossly affect the carbon footprint and skew farm performance results.



"FARMERS ARE ASKED TO INPUT DATA SUCH AS DAILY LIVEWEIGHT GAIN, FEED USE PER ANIMAL, FERTILISER USAGE, SALE WEIGHTS AND CALF MORTALITY RATES. FROM EXPERIENCE WE KNOW THAT THE MOST ENVIRONMENTALLY EFFICIENT FARM BUSINESSES ARE OFTEN THE MOST PROFITABLE. CARBON ASSESSMENTS HELP FARMERS TO REVIEW THEIR BEEF OPERATION AND IDENTIFY THE SMALL CHANGES THAT CAN HELP THEM TO SAVE MONEY AND IMPROVE THEIR ENVIRONMENTAL PERFORMANCE."

- ANDY WYNNE, ALLTECH E-CO_2

LARRY NUGENT, COUNTY ARMARGH

For Northern Ireland suckler beef producer Larry Nugent, the appreciation that reducing his carbon footprint went hand-in-hand with boosting his farm's profitability was a classic 'light bulb' moment.

"Participation in a McDonald's Sustainable Beef Club and the realisation that steps to minimise our impact on the environment would actually put more money in our pockets really made us sit up and take notice," Mr Nugent says.

Situated in County Armagh, 80-hectare Dundrum is a family farm, originally purchased in 1943 by Mr Nugent's grandfather. Larry, his wife Liz and son Hugh now run the permanent pasture unit alongside a B&B and self-catering holiday business.

The 40-cow suckler beef enterprise includes a mix of continental Limousin, Charolais and Simmental cows put to a Belgian Blue bull. As a result, their carbon footprint is now 15.23kg of carbon equivalent emitted per kg of beef liveweight produced.

"Keeping control of fixed costs is key in this business; often there's not much you can do about variable costs. But the farm efficiency assessments undertaken over the last six years by Alltech E-CO_2 have helped us identify a whole host of areas where we can improve things and boost margins," Mr Nugent says.

"We wrongly thought that the emissions from the tractor and fertilisers were the areas contributing the most to our carbon footprint and were surprised to find out that most of the emissions come from the animals. So the shorter time the cattle are on the farm the less carbon we are producing, and hopefully making more profit."

The family is now proactively seeking opportunities to boost profitability. Through his involvement with a McDonald's Sustainable Beef Club, Mr Nugent recognised the value of extracting maximum nutritional value from the grass he can grow on his own farm.

"We now regularly analyse our silage and re-formulate rations more closely in line with cattle performance.



This is the second year (2015) in which we have been comparing set grazing with paddock grazing.

We have discovered that we are obtaining almost the same weight gains using either system, but actually utilising a third less ground with paddock grazing. We are also looking more closely at the type of grasses we are growing and now recognise the value of regular re-seeding to improve the quality of the sward. After all, grass is by far our cheapest source of energy," he says.

Such steps have enabled the Nugents to improve their efficiency. At 9.29kg CO_2e per kg of beef liveweight produced, the farm now has a carbon footprint well below the average for the system type.

"In the last year we have increased daily liveweight gains and the number of finished cattle sold. Finished cattle weights are also up by 42kg on average to 633kg allowing our greenhouse gas emissions to be offset against a greater mass of beef sold each year. Our culling rate is also lower, which also helps."

The most recent Alltech E-CO_2 farm efficiency assessment and use of the McDonald's 'What If?' Tool has identified even more opportunities to boost profitability.

"The tool suggests we could save £3,000 per year by cutting bought-in fertiliser use and finishing cattle at even higher weights. Consequently, we will consider analysing our manure to assess its potential as an organic fertiliser. We also plan to weigh finishing animals more regularly to ensure the ration is performing as well as it can."
Mr Nugent says.

THE STUDY GROUP

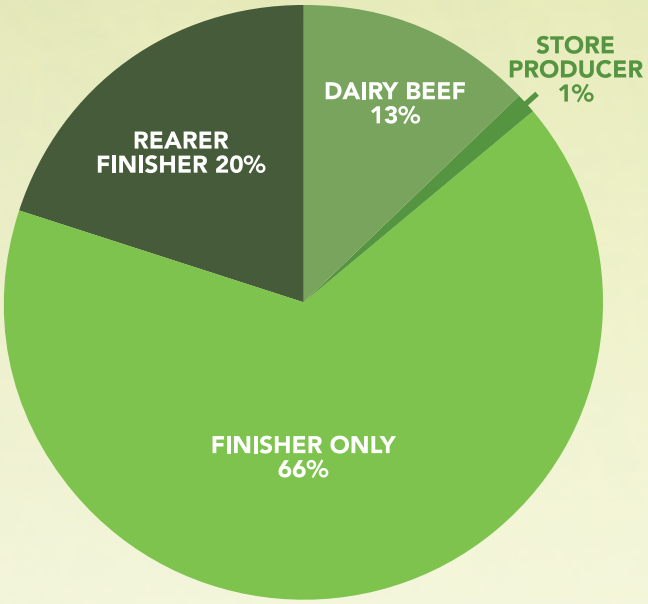
Initially, McDonald's and Alltech E-CO_2 launched the study with 350 beef farms from seven supplying processors. The 350 farm carbon footprints provided a representative sample of the McDonald's beef supply chain throughout the UK and Ireland.

As the study progressed the number of farms involved fluctuated slightly due to a number of factors including; changing business structure or no longer supplying one of the seven processors which were part of the study. During the six year period of the study a carbon assessment was completed every year for a group of 133 'core' farms which provided results for the analysis within this report.

THE CORE FARMS HAVE BEEN CATEGORISED INTO FOUR GROUPS:

- **Rearer-Finishers** – These farms are producing and rearing their own calves from beef suckler cows and finishing these calves to slaughter. They may also be supplementing the beef enterprise with purchased cattle, selling either as store or finished cattle. The average number of animal sales for this system type was 81 per farm each year.
- **Finishers** – These farms are purchasing beef cattle, growing and finishing them for slaughter. The average number of animal sales in this system type was 212 per farm each year.
- **Dairy Beef** – These farms are buying and finishing cattle which have been bred on dairy herds. The average number of animal sales for this system type was 200 per farm each year.
- **Store Producers** – The cattle on these farms are sold part finished for other farmers to grow to slaughter. The average number of animal sales on the store finishing units was 58 each year.

BREAKDOWN OF FARM TYPE



It is common for farmers to have a mixed farm type. For example, a farmer may have a herd of suckler cows with calves which are finished. However, they could also finish purchased animals. In these cases, although there is an element of home rearing and finishing, if the majority of the business is in purchased animals, for the purpose of the study the farm was classified as a finisher only.

The average farm size across the whole study was 69 ha, including land used for grazing and forage production, such as maize, grass and a small amount of whole crop.



ANGUS AND NIALL JEFFREY, EAST LOTHIAN

East Lothian suckler producers Angus and Niall Jeffrey are enthusiastic members of a McDonald's Sustainable Beef Club and are managing to both expand their 350-head farming operation and improve their overall beef production efficiency.

Over the last few years the Dunbar-based father and son team have developed their two spring calving Aberdeen cross beef herds in a sustainable way. At the same time average daily liveweight gains have increased significantly – improving by 0.15kg per day in the last year alone – to reach 1.04kg per day, some way above the industry average of 0.89kg per day. Annual farm efficiency assessments conducted by Alltech E-CO_2 are also identifying additional opportunities to improve performance and profitability still further.

Angus and Niall manage two farms: Bielgrange and Wetherley. Although located just four miles apart, the two units are very different, with Bielgrange comprising of 300 lowland hectares and Wetherley ranging over 240 hectares of hill ground rising to 1,300 feet. However, cattle on the two units are now run as one extended spring calving herd.

Since enrolling in the McDonald's Sustainable Beef Club five years ago the Jeffreys have made great strides in terms of improving calving and feed efficiency, and have also reduced their reliance on bought-in fertiliser. In the last year alone their farm carbon footprint has decreased by 0.56kg CO_2 emitted per kg of liveweight to 15.23kg.

The latest Alltech E-CO_2 farm assessment shows heifers calving at an average of 24 months, helping to reduce total methane emissions during the heifer rearing phase and maximising their lifetime output of calves.

Angus says better pasture management is probably the main area where they have made the most significant progress.

"Grassland management has been a key focus for us and there's no doubt we are getting better at it. For example, we now have a rolling plan to introduce clover into existing grass leys and this is definitely helping reduce bought-in fertiliser. We are covering about 12 hectares a year under our pasture rejuvenation plan. We will also look to analyse our manures and slurries to assess their nutrient values and fertiliser potential," he says.



The strategy is definitely working. The latest Alltech E-CO_2 farm assessment shows an extremely low artificial nitrogen usage regime at only 27kg N per ha, well below the average value for the beef production system type.

Feed efficiency is another focal point. **"Our aim is to reduce the total volume of concentrates being fed and move towards being self-sufficient in terms of feed. We've been working with SAC Consulting on rationing and now feed home-grown straw and barley plus pot ale syrup. We've experimented with different feeding methods for the syrup as it's not the easiest bought-in feed to work with, but intakes are really good and the growing cattle are responding well."**

Whilst pleased with the progress they have made, the Jeffreys are not resting on their laurels. **"Our last assessment was encouraging and I'm pleased that things are going in the right direction, but there's still plenty of room for improvement,"** Angus says.

"Calf mortality is higher than we would like, not necessarily at calving but at around two months of age, so we are working with our vet on that. Our last farm efficiency assessment also flagged up a relatively high culling rate, but this was because we scanned the cows at the end of October last year and sold the cows not in calf. More heifers have been retained partly to increase cow numbers and partly to allow us to reduce the number of old cows and hopefully improve fertility.

This recent assessment also suggests we could save more than £6,500 by making efficiency improvements in these areas and improving our pastures still further."

The Jeffreys say they have found the whole project extremely valuable. **"I was intrigued right from the start because every efficiency improvement that has been suggested to us has been financially beneficial,"** Angus says.

KNOWLEDGE SHARING

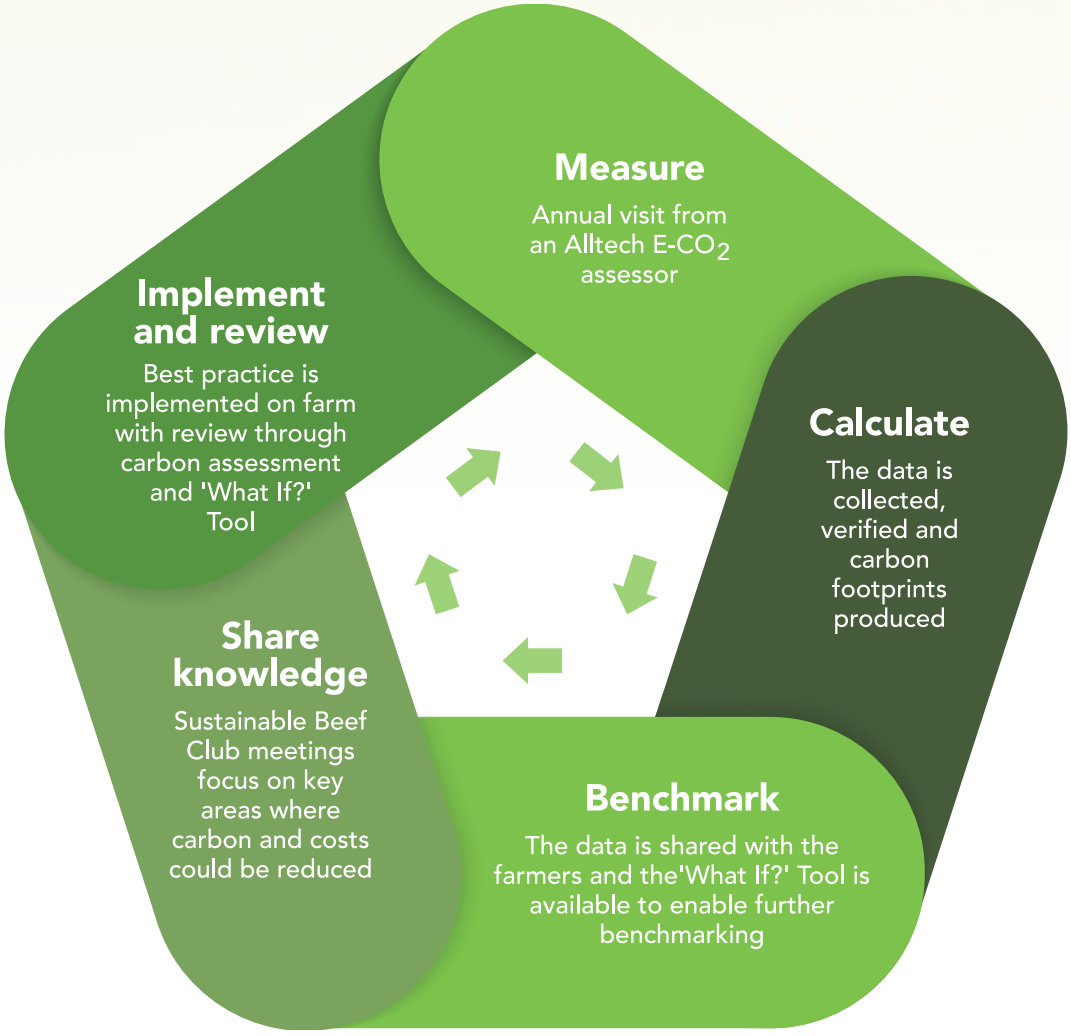
To add value to the carbon assessments McDonald's worked with suppliers to form Sustainable Beef Clubs (SBCs), providing a platform for beef farmers to come together in a group to share what they have learned and the impact that this has had on their business performance and carbon footprint.

There are seven clubs across the UK and Ireland which meet twice a year and involve around 200 farmer members, who have completed annual carbon assessments.

Through the SBCs, farmers have access to the latest research and McDonald's provides free consultancy from industry experts.
As well as talking about the theory, the meetings are hosted on a farm to discuss issues and challenges faced by the beef club members, which allows the group to work together to identify solutions that could apply to all. Coming together to share knowledge, combined with the measurement of the carbon footprint, has had a real benefit for many SBC farmers.

> **"ATTENDANCE AT BEEF CLUB MEETINGS HAS BEEN EXTREMELY WORTHWHILE, CERTAINLY TIME WELL SPENT"**
>
> **- PHILIP ABBATT, BEEF FARMER, DEVIZES**

THE CARBON REDUCTION CYCLE



PHILIP ABBATT, WILTSHIRE



Philip Abbatt, who farms at Potterne Park Farm near Devizes in Wiltshire, has actively embraced the McDonald's Sustainable Beef Club – finding the knowledge transfer meetings and annual farm assessment process particularly useful.

"Involvement in the project has served to reinforce that we are on track with our objective of farming efficiently and sustainably. And also the crucial fact that the beef units with the lowest carbon footprint are the ones that are the most efficient and profitable," Philip says.

"Attendance at the beef club meetings has been extremely worthwhile – certainly time well spent and I've been very happy to travel to wherever they have been held. Subjects have ranged from best practice worming programmes to alternative feed options and insight into carcass grading and I've never failed to come away without learning something."

Potterne Park Farm's relatively small spring-calving 70-cow Simmental suckler beef enterprise is based in two locations and run alongside more substantial 12,000-hen free-range egg production and 400-acre arable operations.

The beef herd is divided into two with cows on a Gloucestershire unit being put to a Shorthorn bull and extensively out wintered. The cows on the main Wiltshire farm go to a Simmental bull with the heifer calves reared either as replacements or sold fat at 18 months. The bull calves are left entire for intensive bull beef production, fed ad lib with a feed mix based on home-grown barley and beans.

The latest Alltech E-CO_2 annual farm assessment shows that the beef enterprise's carbon footprint is running at 15.12kg carbon equivalent per kg of liveweight produced – only just above the industry average of 14.3kg.

"We are a small herd and our carbon footprint does fluctuate a little year-on-year depending on how calving goes. For example, calf mortality last year at 14% was too high. In addition, all the heifers born this year have been kept as replacements because we are looking to expand the herd, and this has pushed the footprint up in the short term. But the long-term trend is downwards, which we are pleased about."

"We use home-grown cereals in the growing ration, which helps enormously to offset carbon produced on the farm. Forage quality is good, we utilise our grazing pretty efficiently through a paddock grazing system and have been enhancing the sward with clover. Our artificial fertiliser use is also way below the industry average, which is another carbon strength, so I do believe we are moving in the right direction," Philip says.

Mr Abbatt is a great advocate of monitoring farm efficiency performance.

"In addition to the annual Alltech E-CO_2 farm assessment, we are introducing EID this year to help us track performance and understand better the areas where we can improve. The new software and weight recording equipment will allow us to monitor daily liveweight gains even more closely and will probably highlight opportunities to tweak things even more and that has to be a positive thing."

EMPOWERING THE WIDER INDUSTRY

In March 2013 using the data collated from the study group, McDonald's worked with Alltech E-CO_2 to launch a bespoke online carbon tool for the beef sector. The 'What If?' Tool, complements the carbon assessments and beef clubs to help farmers to continue to monitor their carbon footprint between meetings.

> **"EVERY EFFICIENCY IMPROVEMENT THAT HAS BEEN SUGGESTED TO US HAS BEEN FINANCIALLY BENEFICIAL."**
>
> **- ANGUS JEFFREY**
> **BEEF FARMER, DUNBAR**

Following feedback from farmers, in February 2014 the tool was updated to measure potential financial savings from management changes. Developing the tool in this way allowed the farmers to witness the very clear link between environmental and financial benefits.

The tool has been used by many farmers, including Andy Foot from Dorset who identified £23,000 in potential savings by focusing on improving the quality of silage and improving feed efficiencies.

The 'What If?' Tool was a first for the beef industry, enabling farmers to enter their own farm specific data, benchmark against the top 10% of farms in their sector and production system, and review which parts of their enterprise they could adjust to potentially improve productivity and realise cost savings. To ensure that the benefits experienced by the beef club members are available to the broader industry, the tool was made freely available for any farmer. To date it has had over 16,000 hits across 22 countries.

> **"MONITORING BUSINESS PERFORMANCE ON THE FARM IS INCREDIBLY IMPORTANT AND I'M ALWAYS LOOKING TO LEARN FROM OTHER SECTORS AND USE TECHNOLOGY TO INCREASE MY FARM'S EFFICIENCY. THE 'WHAT IF?' TOOL DEMONSTRATES THAT MAKING SMALL CHANGES TO ANIMAL GROUPS CAN MAKE A BIG DIFFERENCE TO OVERALL PERFORMANCE."**
>
> **- ANDY FOOT, DORSET**



ANDY FOOT, DORSET

Beef producers need to record relevant animal performance data at least monthly to be able to make sustainable improvements to farm efficiency and maximise their profitability.

That's the view of Dorset farmer Andy Foot, who has always kept good records and is a strong advocate of the business management mantra: **"if you don't measure it, you can't manage it."**

Annual beef performance and carbon monitoring reports conducted by Alltech E-CO_2 on his dairy beef enterprise at Bookham Farm, Buckland Newton near Dorset show Mr Foot consistently achieving high standards across a variety of farm efficiency parameters. Carried out as part of the McDonald's Sustainable Beef Club programme, five years' worth of assessments highlight just what can be achieved.

"Whilst the annual Alltech E-CO_2 reports essentially highlight historical performance, they are an extremely useful management aid. And whilst I feel good about reducing our carbon emissions – our carbon footprint of 8.32kg of carbon equivalent per kg of beef liveweight produced is now well below the average for our beef production system – it really is all about improving farm efficiency. And frankly the more efficient we are, the more money we make," Mr Foot says.

Mr Foot's unit may have 500-600 cattle on it at any one time. The home farm is owned, but additional land is rented from time to time to accommodate the flexible beef and arable enterprise.

"Most of the 250 hectares we farm is grassland, but we do grow some cereals to integrate with the beef herd. We either harvest as whole-crop to feed back to the cattle, or sell the grain on the open market when prices are high," he says.

Bookham Farm is also home to a small suckler herd, but this is being wound down. The primary cattle enterprise is finishing cattle from the dairy herd.



Monitoring and evaluating farm efficiency is crucial, believes Mr Foot. This means weighing animals regularly, as well as recording feed, water, electricity, fuel and fertiliser usage. **"We also analyse our forage regularly and adjust the supplementary feed plan to maximise daily liveweight gain and reduce the number of days to slaughter. And we are introducing EID to be able to monitor weight gains even more accurately."**

Mr Foot is also using the McDonald's 'What If?' Tool to identify further efficiency improvements. This recently suggested savings of almost £23,000 could be achieved by improving silage quality. This will boost feed quality and allow feeding rates to be potentially reduced, whilst at the same time increasing daily liveweight gain and sale weights. Alongside these projected financial savings, the tool predicts the unit will also achieve a further 5% reduction in its carbon footprint.

"As a result we have re-seeded 30 hectares of grassland to improve forage quality and reduce our reliance on bought-in feeds," Mr Foot says.

Mr Foot believes all beef producers should be recording simple performance parameters regularly. **"Once a year is better than not at all, but really you should be measuring performance monthly. Identify five or six simple performance indicators and monitor them closely. For me it's all about maximising the kilos of meat sold off the farm and gathering data to assess whether key targets are being met. This is now a key part of our business sustainability plan,"** he says.

RESULTS

THE AVERAGE CARBON FOOTPRINT FOR BEEF FARMS IN THE CORE GROUP STARTED AT **13.76KG** CO_2 EQUIVALENT (CO_2E) PER KG LIVEWEIGHT

BETWEEN 2008 AND 2014, THIS REDUCED BY **3.17 KG TO 10.59 KG** CO_2E/KG LW A **23% IMPROVEMENT** IN CARBON FOOTPRINT

INDUSTRY RESEARCH PUBLISHED BY AHDB BEEF AND LAMB IN 2012[1], INDICATED THAT BETWEEN 1970 AND 2010 THE BEEF SECTOR **REDUCED ITS FOOTPRINT BY 9.4% EVERY DECADE**

ANNUALISED, THE LONG TERM INDUSTRY REDUCTION HAS BEEN **0.94%** BUT THE FARMERS IN THIS STUDY HAVE SEEN A FALL OF **4.6% PER YEAR**

A PREVIOUS STUDY BETWEEN ALLTECH E-CO_2 AND AHDB[8] FOR A GROUP OF FARMS NOT LINKED TO THIS STUDY, SHOWED THAT FOR EVERY **5KG REDUCTION** IN CARBON, A 50P PER KG IMPROVEMENT IN FINANCIAL MARGIN WAS REALISED

IF THIS WAS APPLIED TO THE GROUP OF FARMS ANALYSED IN THIS STUDY, IT COULD EQUATE TO A FINANCIAL BENEFIT OF **32P/KG** LIVEWEIGHT. A SIGNIFICANT POTENTIAL COST SAVING THROUGH A FOCUS ON REDUCING CARBON

HOW MUCH CARBON HAS BEEN SAVED OVER THIS STUDY?[9]



221 HOUSES POWERED FOR THE YEAR

OR



378 FLIGHTS AROUND THE WORLD

OR



1437 CARS OFF THE ROAD

OR



4,994,871 TRACTOR MILES

CONCLUSION

To achieve sustainability for our beef industry, it is vital that we work to monitor and reduce greenhouse gas emissions throughout the supply chain. In leading this project, McDonald's aimed to develop a better understanding of the carbon emissions of British and Irish beef production systems and to help farmers identify practical ways to reduce their carbon footprint.

Over the six years the project has carried out over 1,300 carbon assessments across the UK and Ireland collecting over 800,000 points of data.

> **THE AVERAGE OVERALL CARBON FOOTPRINT HAS SHOWN A SIGNIFICANT REDUCTION OF 23% BETWEEN 2008 AND 2014**

Small fluctuations in carbon footprint on a beef enterprise are inevitable, a consequence of farms being subject to uncontrollable factors such as weather. However, through efficient and adaptive management, all farming systems in this study have made efficiencies and have demonstrated that long term carbon reductions can still be achieved despite these variables.

Our results show that farmers can make real progress towards meeting official carbon reduction targets and that this can be a product of simple, realistic changes to beef production practices. Small changes to management, improving animal health and feed efficiency and reducing high carbon inputs can lead to a significant drop in the emissions from British and Irish beef herds and an improvement in their financial position.

To support farmers into the future, McDonald's has identified beef as a top sustainability priority globally.

For McDonald's UK, this will build on the work already completed and the lessons learned throughout the last six years of this study.

At McDonald's, we believe that by focusing on monitoring, benchmarking and improving the key areas identified in this report, we can work with suppliers and farmers to build a truly sustainable supply chain and ensure a thriving British and Irish farming industry, well placed to continue serving our customers with quality beef.

KEY AREAS TO REDUCE EMISSIONS ON BEEF FARMS

1. **MEASURE AND MONITOR**
   If you can't measure it you can't manage it
2. **BENCHMARK**
   To know where you stand versus other producers and other types of farm
3. **FOCUS ON DAILY LIVE WEIGHT GAIN**
   To reduce days on farm and digestive emissions
4. **USE PROTOCOLS TO CONSISTENTLY IMPROVE ANIMAL HEALTH**
   To safeguard welfare, reduce mortality and boost performance
5. **MAXIMISE HOMEGROWN FORAGE** Through improved grassland management and diet formulation
6. **REDUCE CALVING INTERVAL**
   Breeding for fertility in suckler herds, ensuring close heat management and optimum age at first calving

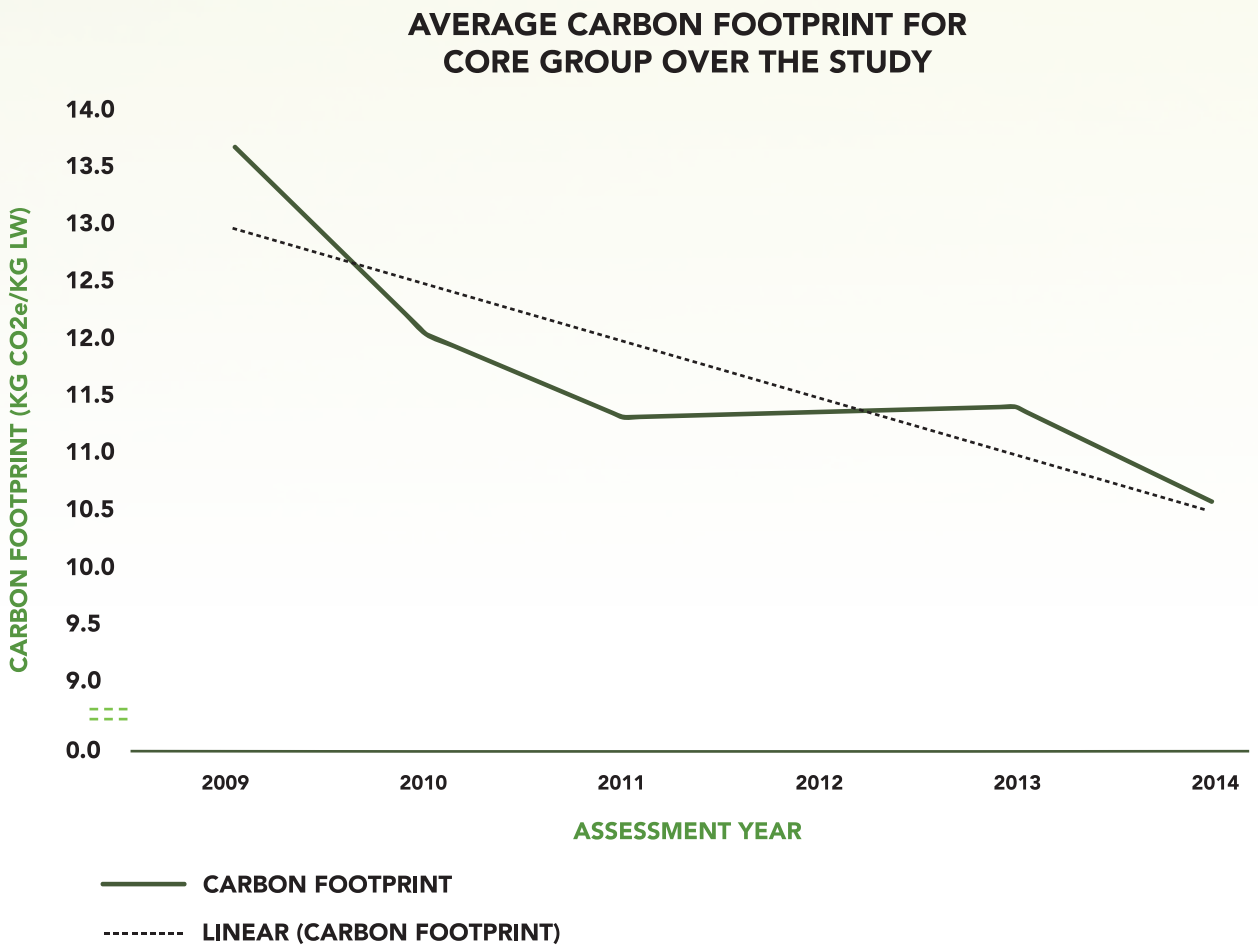
DETAILED BREAKDOWN

Beef production is a biological system, and there are many external influences that can effect a carbon footprint, for example the weather. The challenge in beef farming is to reduce carbon footprints whilst boosting the resilience of the farm to adapt to volatile weather patterns.

Despite the carbon footprint reduction achieved by the farms within the study, during some periods the poor weather has impacted the downward trend in carbon footprint.

This is illustrated by the upward fluctuation in carbon footprint in both 2012 and 2013.

In 2012, the UK had an additional eleven inches of rainfall above the annual average[10], leading to severe water-logging of farmland. This had a short term impact with the need to purchase more winter feed and forage to replace grazing land. In the long term, the damaged soil quality and grass fields also required large amounts of reseeding.



CARBON EMISSIONS BY REGION

There is no statistical difference identified between different regions assessed, with only very slight differences between the carbon footprint trends identified on the UK and Irish farms within this study.

CARBON EMISSIONS BY SYSTEM TYPE

The results of the study indicate that each system type has equal potential to tackle carbon emissions, with all system types reducing their footprint significantly. Finisher farms showed the greatest change and rearer finishers the smallest. This highlights that the key to success is maximising efficiency within the chosen system type.



RESULTS BY SYSTEM TYPE

A breakdown of the individual system types and key findings are discussed later. These are observations from the core farms.

2009 (KG CO_2E/KG LW)			
	DAIRY BEEF	FINISHER ONLY	REARER FINISHER
AVERAGE	9.49	14.04	14.88
MIN	5.59	6.91	6.09
MAX	20.09	39.98	26.78

2014 (KG CO_2E/KG LW)			
	DAIRY BEEF	FINISHER ONLY	REARER FINISHER
AVERAGE	7.55	10.26	13.19
MIN	4.80	1.15	5.06
MAX	12.25	16.75	19.48

REARER FINISHER

Over the term of the study the carbon footprint for farms breeding, rearing and finishing their beef cattle reduced by 11%. The growth rate of the cattle, expressed as their daily liveweight gain has increased by over 13% and careful monitoring of inputs showed that artificial fertiliser use has reduced by nearly 55%.

Calf mortality has reduced by 62% and at the same time the average heifer calving age has reduced by three months. This increase in annual productivity through a closer focus on breeding, feeding and animal health has led to a greater amount of beef being produced to offset the carbon emissions of the enterprise.

FINISHER ONLY

During the study the average carbon footprint of farms buying cattle and finishing saw a reduction of 27%. This can be attributed to improvements in key areas such as daily liveweight gain which improved by 7% through improved feed utilisation.

The study identified a reduction in artificial fertiliser use, in particular nitrogen use per hectare which has decreased by 24%. Other elements which are not as important to a farm carbon footprint but are a cost to any farm enterprise such as fuel use, have also reduced for finisher only systems.

DAIRY BEEF

Over the period of the study the number of farms buying dairy bred cattle to finish increased due to business changes. This was most noticeable in 2011.

The data collected during the study has shown the carbon footprint in dairy beef systems reduced by 20%. When a dairy calf is sold into the beef herd, it has a low initial carbon footprint as its carbon cost is mainly attributed to milk production. Conversely, for a calf from a beef suckler herd, the whole purpose of the cow is to produce and rear a calf each year and hence a much larger proportion of the emissions are allocated to the calf, meaning it starts life with a higher carbon footprint.

> **THE DATA COLLECTED DURING THE STUDY HAS SHOWN THE CARBON FOOTPRINT IN DAIRY BEEF SYSTEMS REDUCED BY 20%**

This leads to dairy beef finishing systems having lower carbon footprints than farms finishing suckler bred animals.

During the study the average daily liveweight gain for dairy finishers has improved by over 3%. These farms also reduced artificial nitrogen fertiliser use during the study by 36%.

STORE PRODUCER

Within the project there were a small number of farms classified as store producers, selling partly reared cattle to other farmers to finish for slaughter. It was not the intention to specifically select a farm operating this type of system, but in practice, as the market changed over time, it was economically viable for some rearing systems to sell animals as stores. Keeping these farms in the study allowed continual monitoring of long term participants whilst also refining the assumed emissions for store cattle.

The carbon footprint of these farms reduced during the study primarily driven by an improvement in daily liveweight gain and a reduction in calf mortality. This improvement in animal performance and health through improved management practices meant that more calves were successfully reared per cow and a greater weight of beef to be divided by the total emissions for the farm.

Similarly the study saw a decrease in the age at which heifers had their first calf by three months. This means that there is less time where the heifer is creating emissions without producing a calf. In line with all other farming systems, store producers reduced their artificial nitrogen fertiliser use by almost 12% through more precise grassland management.



KEY INDICATORS

The study demonstrates a significant range in results which suggests that there is great potential to further reduce carbon footprint on UK and Irish beef farms. Peer reviewed research and data collected during the study shows that the largest contributors to a farm carbon footprint are enteric emissions and feed use which applies to all types of production systems[11,12]. There are opportunities to reduce carbon footprint on all beef enterprises by targeting the following key hot spots on-farm.

1. DAILY LIVEWEIGHT GAIN

One of the main variables in the carbon footprint and profitability of a beef farm is the length of time it takes for an animal to be ready for slaughter. If the performance of the animal improves, the potential to reduce carbon footprint increases.

A number of McDonald's Sustainable Beef Club meetings focused on improving feed efficiency through feed use, grassland management and forage production which can lead to significant improvements in growth rate.

The daily liveweight gain increased for all farm types over the project. Fluctuations over the course of the six years demonstrate the impact of forage quality and the variation in the type of cattle being raised in the study.



2. FEED EFFICIENCY

Direct emissions from feed production (excluding home grown forage such as silage) represent, on average, 22% of a beef farm's emissions. Optimising the type and quality of bought in feed to match the animal's nutritional requirements and providing cattle with high quality forage will help to ensure efficient utilisation of the diet and reduce methane emissions.

During the six year study all farms reduced their purchased feed use, with some fluctuations which could be attributed to the difficult weather conditions. Farms finishing cattle within the study had an average purchased feed use of 929 kg per head sold per year.

IMPROVING DIET

How can this benefit my farm?

- Improved herd health and fertility
- Increased growth rate and reduced feed intake
- Improved stability and digestion within the rumen
- Reduced relative cost of feed
- Improved overall economic sustainability

Benefit to the environment

- More kilograms of beef produced to offset emissions
- Less methane produced from the rumen
- Less protein excreted as nitrogen

How to improve feed efficiency

- Forage analysis and feed budgeting with a farm nutritionist
- Examining dung to assess the digestibility of the ration
- Carry out selective rumen fill scoring during daily inspections
- Monitor herd health to ensure a consistent performance

This reduction in purchased feed use is a consequence of an improvement in the overall feed conversion ratio over the six years of this study. Feed Conversion Ratio is one of the most important feed efficiency measures to concentrate on when running a commercial beef unit and is calculated by dividing the total dry matter feed intake by the weight gained.

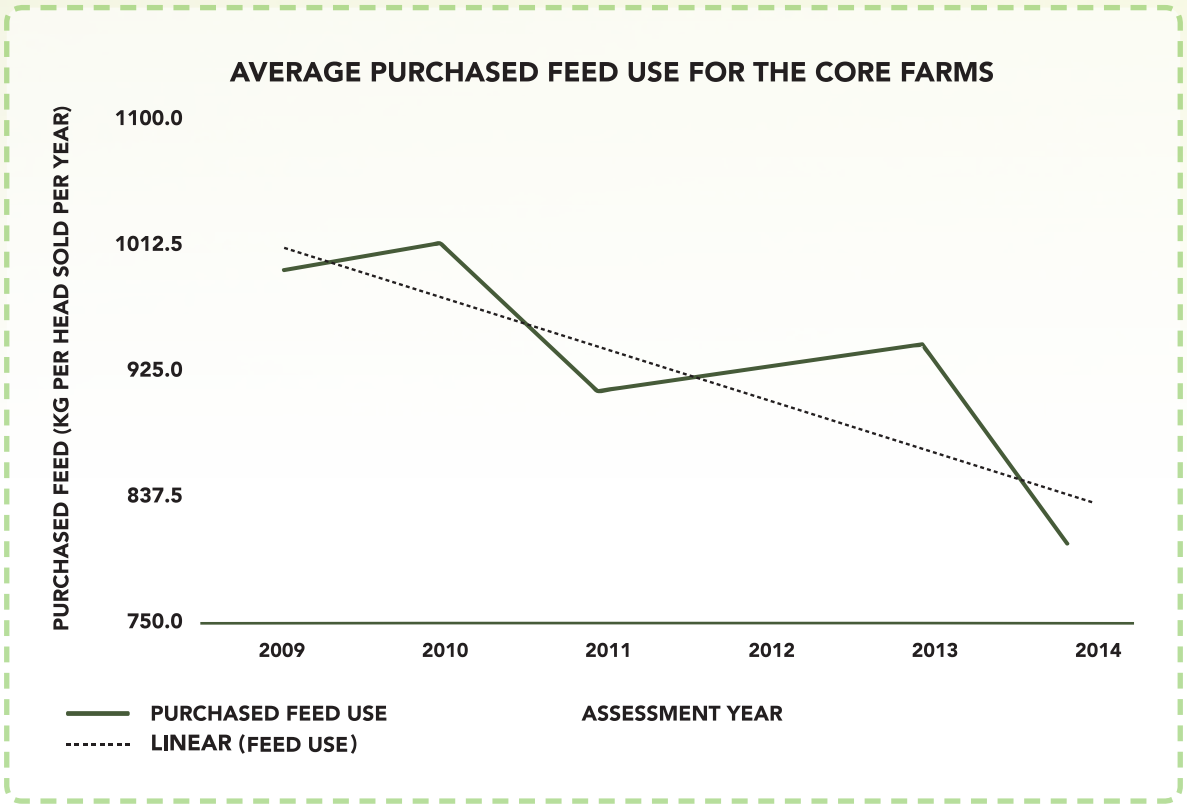
This will be greatly influenced by a number of factors, some related to the feed and some to the animal and environment, for example;

- **Physical quality of feed presented**
- **Appropriateness of the feed to the animal during its development stage**
- **The presence of moulds and mycotoxins within the feed**
- **Health and welfare of the animal**
- **Housing environment**
- **Genetic potential of the animal**

Although the home grown forage intake may not always be included in the measure directly, the feed conversion efficiency will invariably be linked to silage quality and the digestion efficiency of the forage offered.

For the rearer finisher group of farms, the 2013 assessments showed a large drop in the amount of forage fed compared to purchased feed. These results correlate with the wet weather that affected the beef industry during 2012, making forage production difficult, resulting in both poorer quality forage and lower availability.

During this period, forage was replaced with purchased feed which increased the carbon footprint of the rearer finisher group in particular. As part of the Sustainable Beef Club meetings, farmers discussed the importance of reseeding which can increase the energy content and quality of forage, thus improving the efficiency of the feed and also reduce digestive emissions.



DAVID AND GILES AUCHMUTY, COUNTY ROSCOMMON

Become more efficient or go out of business. That's the philosophy Irish producers, father and son, David and Giles Auchmuty pursue consistently for their integrated beef, sheep and arable farming enterprise at Ballygalda, County Roscommon.

They fully embraced the opportunity to participate in a McDonald's Sustainable Beef Club and have valued the engagement with various stakeholders to help drive their quest to be as efficient as possible.

"The more efficient you are, the more money you make. It's as simple as that. So I'm always ready to engage with any programme that helps us identify ways in which we can become more profitable," says David.

The Ballygalda beef enterprise focuses on finishing suckler-bred stores. **"We tend to buy in a mix of healthy 7-9 month old cattle from local markets and either finish young bulls or take animals right through to two years of age. Basically, we hedge our bets and keep our options open to be able to take advantage of different market opportunities. We only invest in good, healthy stock because it pays off."**

The overall efficiency of the livestock enterprise, which also incorporates 600 ewes, is helped by the fact that all the feed for the stock is grown on the farm's arable acres.

Giles explains, **"We grow barley, wheat and oats on our tillage acres, plus some maize and fodder beet alongside the grassland. We are constantly ploughing and rotating to get the most from our land. We test the soil to determine lime and fertiliser application rates and also reseed the grassland regularly, certainly at least every seven years for the most productive pastures. We even sow our poor ground every 10 years – occasionally putting rape into the rotation to help finish the lambs."**

The farm business uses an alkali treatment on the home grown cereal to enhance its feed value and this reduces the need for expensive bought-in protein.

Ballygalda's farm efficiency assessments, which have been conducted annually by Alltech E-CO_2 for the last six years, show that the beef enterprise's carbon footprint has been falling since 2012. It is now 13.61kg of carbon equivalent per kg of beef liveweight produced, due mainly to improvements in daily liveweight gain and the fact that soya is no longer purchased.

"To be fair our good liveweight gains are being achieved by a high feed rate – more than double the average farm – but because we are only feeding food grown efficiently on our own acres, fertilised by our own manures, our carbon footprint has actually been going down. And, importantly, we are making more money as a result," Giles says.

The latest Alltech E-CO_2 farm assessment and use of the McDonald's 'What If?' tool suggest that the farm could still save even more money. By making further alterations to the diet, and more efficient use of fertiliser and fuel there's the potential to recoup another £3,670 per year.

David concludes, **"The annual report always provides food for thought and allows us to challenge what we are doing. I'm always open-minded and will continue to experiment with different ways of rearing and feeding the cattle to ensure our integrated livestock and arable operation really is as efficient as it can be."**



3. SOYA BEAN MEAL USE

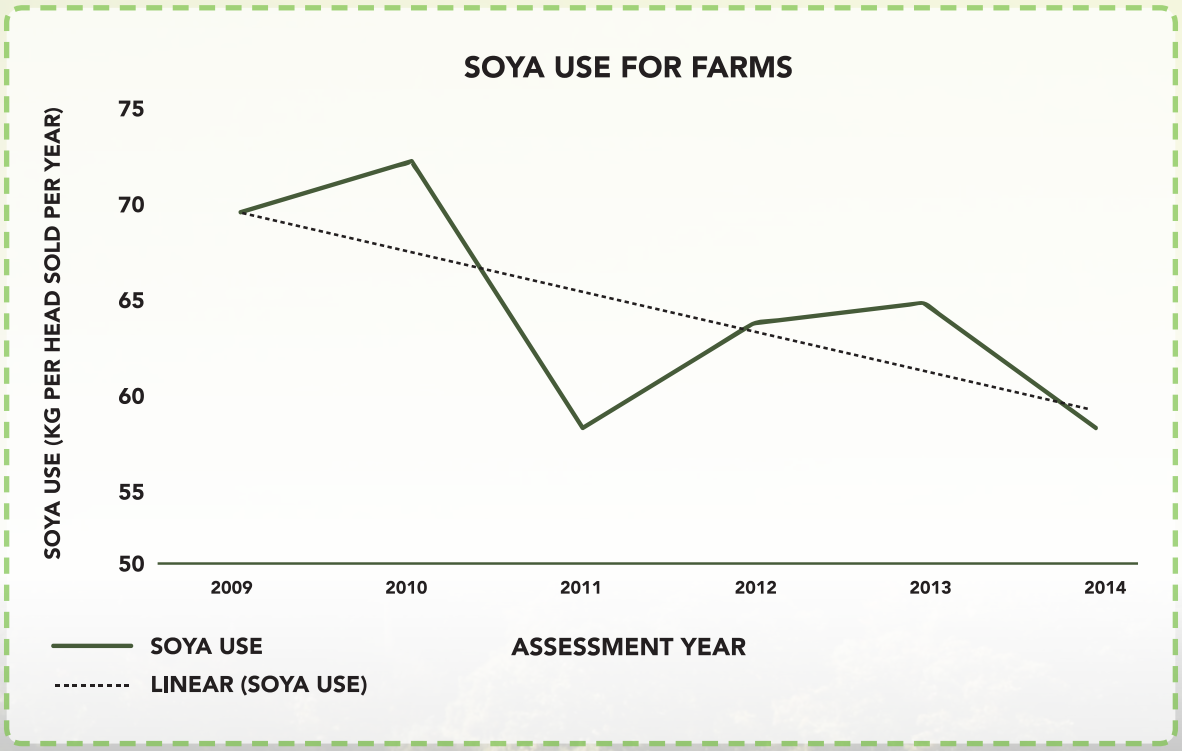
Results show that a large proportion of feed emissions on some finishing systems arise from the use of soya bean meal as a source of protein. The core farms in the study have reduced the amount of soya use per head sold over the six year period.

Soya bean meal is a high carbon feed, due to the land use change associated with its production in regions such as South America, where high carbon stock forests can come under threat in order to plant soy crops. Areas growing annual crops that had been deforested within the last 20 years are subject to an increased carbon footprint.

However, the PAS 2050 methodology still attributes an average carbon cost calculated pro-rata based upon global supply to soy products due to the land use change associated with soy production globally.

McDonald's is a signatory to the New York Declaration on Forests and has a global Commitment on Deforestation which encompasses the entire supply chain and aims to end deforestation across all products, including beef and the feed used for cattle.

Increasing the uptake of alternative, lower carbon and cost effective protein sources should be an area of future focus for beef farmers, which could lead to significant carbon and financial savings.





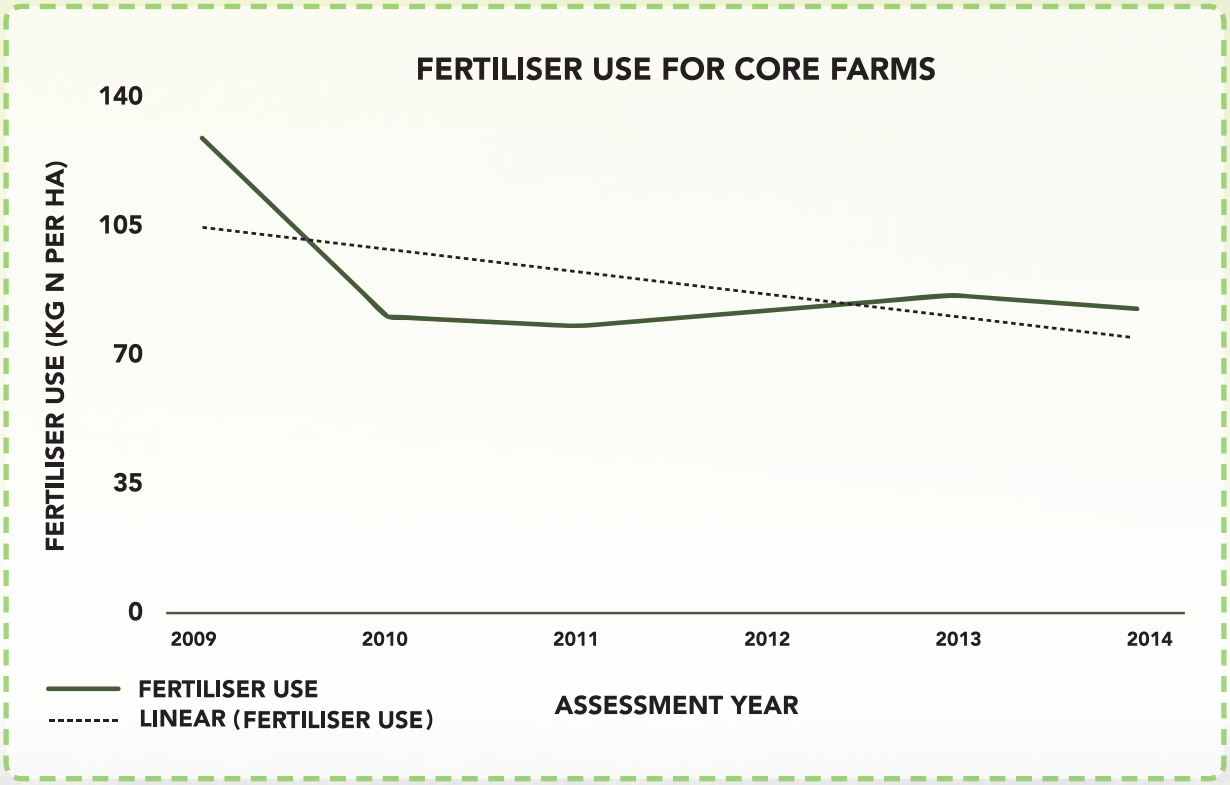
4. FERTILISER USE

The majority of the farms in the study were grass based. It is vital to maximise the efficiency and feeding quality of grazing land and forage produced. A key input for this is nitrogen fertiliser which is associated with high emissions in both the manufacture and application.

The study recorded that 84% of farmers are testing their soils and use these results to more effectively manage manure and fertiliser applications, saving money and controlling carbon emissions.

Effective use of organic manure, improvements in the application of fertiliser and better monitoring of soil conditions can all help to reduce artificial fertiliser use. Through the Sustainable Beef Clubs, best practice fertiliser and manure use was discussed as well as soil management issues including compaction.

Efficient use and timing of the application of fertiliser is crucial to ensure lower carbon footprints. For the last few years, fertiliser use within the study has largely remained the same for the core farms, with the observed year one peak not being wholly representative of the average fertiliser use in later years.





5. ELECTRICITY AND FUEL USE

Although fuel use decreased during the study, electricity use per animal saw a slight increase.

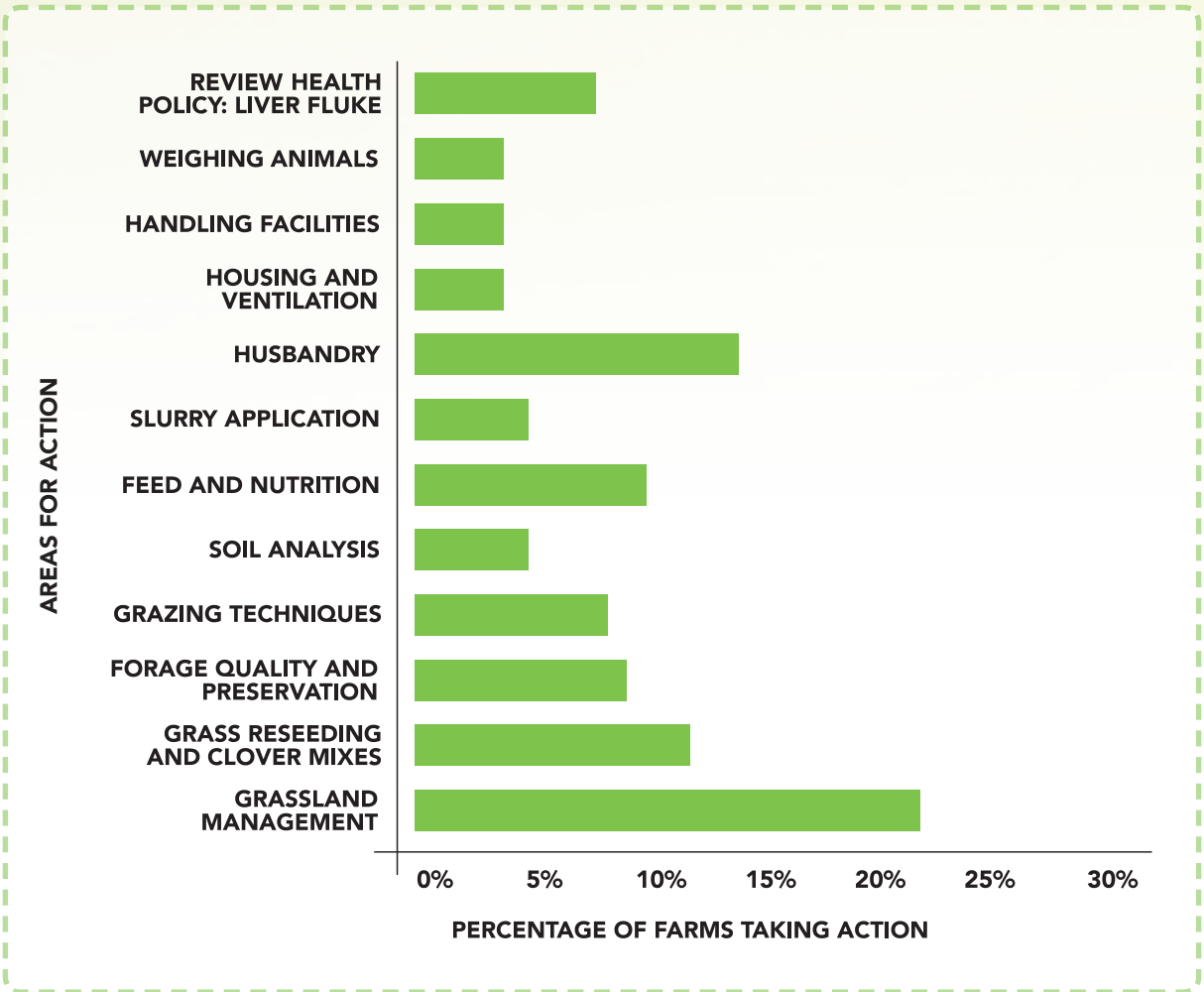
Even though energy costs only represent a relatively small proportion of a beef farm's carbon footprint, they still represent a significant proportion of the farm's variable costs and therefore must be monitored and targeted for improvement.

Simple cost saving measures such as cleaning lighting fixtures and bulbs for optimum performance and turning down or switching off equipment when possible can lead to significant savings in electricity use.

Regular maintenance of machinery including replacing filters, changing oil and keeping tyres balanced can help to reduce fuel use further.

FARMER ACTION PLANS

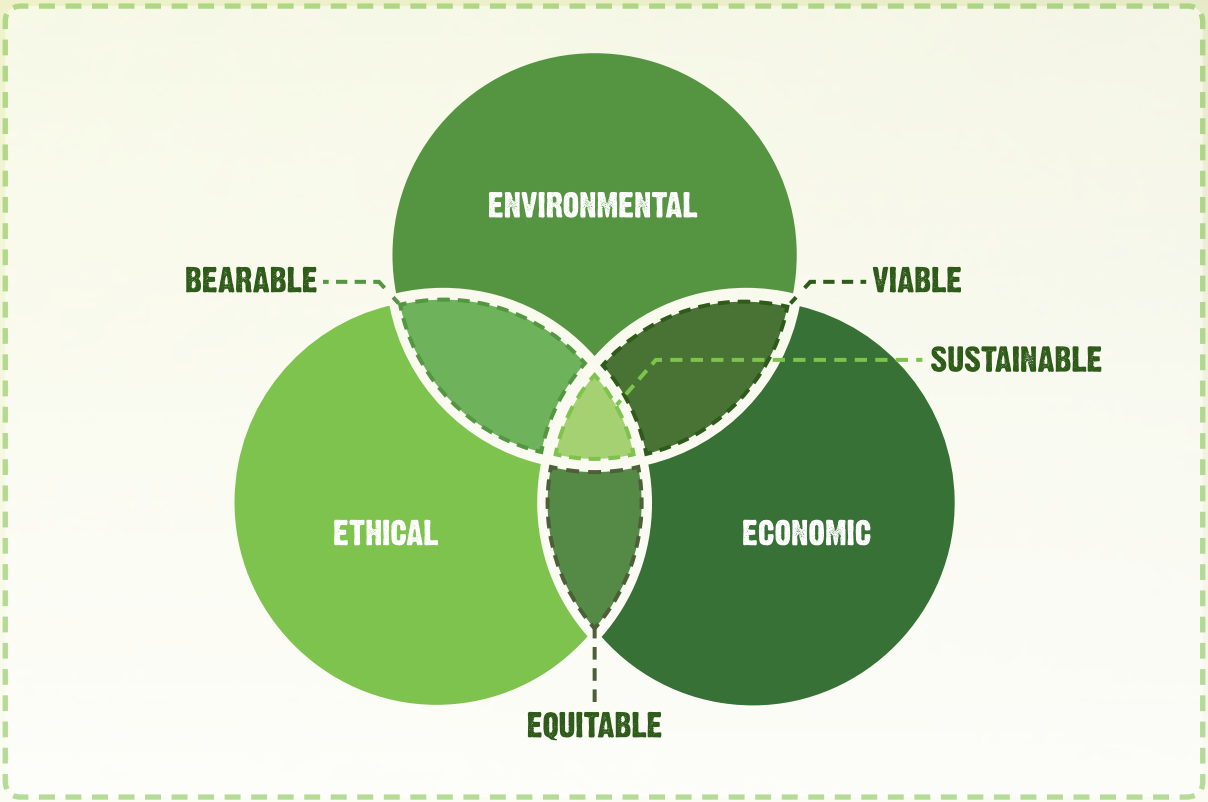
Following the farm carbon assessment, each farmer agreed an action plan with the farm assessor. Some of the main action points that farmers within the groups are looking to implement are summarised below. Action in these areas will lead to further reductions in their carbon footprint and improvements in their financial performance.



ACHIEVING SUSTAINABILITY ON BEEF FARMS

Sustainable beef production is not only dependent upon reducing a farm's environmental impact, but also about developing plans that combine long term profitability with ethical and social responsibility.

Whilst the carbon footprinting study set out to focus on the environmental element of sustainability, from 2013, farmers in the Sustainable Beef Clubs have also looked at economic and ethical sustainability.



ECONOMIC SUSTAINABILITY

To be truly sustainable, a farm must be economically viable. Data from Alltech E-CO_2 shows that farms with the lowest carbon footprint are often the most efficient with the lowest cost of production, regardless of farm system type. This is also demonstrated by the financial element in the McDonald's 'What If?' Tool.

The study showed that although some farms were currently managing and monitoring their business performance, there is scope to offer more support.

1. **15% have a documented business plan**
2. **24% complete benchmarking analysis outside this study**
3. **46% have a succession plan**

> **"WE ARE INTRODUCING ELECTRONIC CATTLE IDENTIFICATION THIS YEAR TO HELP US TRACK PERFORMANCE AND UNDERSTAND BETTER THE AREAS WHERE WE CAN IMPROVE. THE NEW SOFTWARE AND WEIGHT RECORDING EQUIPMENT WILL ALLOW US TO MONITOR DAILY LIVEWEIGHT GAINS EVEN MORE CLOSELY AND WILL PROBABLY HIGHLIGHT OPPORTUNITIES TO TWEAK THINGS EVEN MORE AND THAT HAS TO BE A POSITIVE THING."**
>
> **- MR ABBATT, DEVIZES**

ETHICAL SUSTAINABILITY

Ethical or social sustainability relates to the steps being taken to safeguard and improve cattle health and welfare as well as the quality of life for those who work and live on and around the farm. Many of the topics covered in the Sustainable Beef Club meetings focused on improving animal health and welfare as this is closely linked to economic and environmental performance through growth rates and mortality.



When questioned for this study, 36% of farmers employed staff, of which 37% currently offer training schemes and courses in areas such as foot trimming, artificial insemination and sprayer operating.

Encouraging skills and training has been a key part of the McDonald's Farm Forward Programme since its inception and as with any business, farm staff training is vital to enable best practice techniques to be applied consistently and safely.

Peer to peer knowledge exchange is also important and involvement in discussion groups can support an overall improvement in achieving sustainable farm businesses.

BASED ON FEEDBACK, 32% OF SUSTAINABLE BEEF CLUB MEMBERS HAVE ACTIVELY MADE CHANGES TO MANAGEMENT TECHNIQUES OR PRODUCTION PRACTICES FOLLOWING A DISCUSSION GROUP MEETING.

IN SUMMARY



The average overall carbon footprint for the core farms in the study has shown a significant reduction and all farmers involved in the McDonald's Sustainable Beef Clubs were able to work to reduce carbon emissions. The key to success is measuring, benchmarking and taking steps to maximise efficiency within the chosen system type.

There are still many areas which can be tackled to make further reductions in carbon footprint and gains in farm efficiency. McDonald's is committed to helping farmers to improve the sustainability of beef production in the future.

CARBON TRUST STATEMENT

"McDonald's Restaurants Ltd and Alltech E-CO_2 have been working to engage beef farmers in the Sustainable Beef Club for 6 years. During that time they have been committed to high quality data gathering, footprint modelling and regular farmer engagement using innovative tools. The Carbon Trust first certified this carbon footprinting system in 2009, an achievement that has been maintained throughout.

The results of this commitment are clear – a 23% carbon footprint reduction is a significant achievement. We look forward to the continuation of this excellent farmer engagement programme and hope that it will be seen by others in the sector as an example of what can be achieved.

The Carbon Trust has certified the average per kg liveweight beef footprint of 10.6kgCO_2e and a reduction between 2008 and 2014 of 23% was achieved by the 133 McDonald's 'Core' Sustainable Beef Club Members. The footprint and reduction boundary is at the farm gate and is as described in the McDonald's Carbon Report, Beef EA carbon footprint calculation system and certification letter 12220."

To support this statement, we have certified the footprint representing 2014 and the reduction achieved over the time period. Within that time period, McDonald's have calculated annual footprints and presented sufficient data to show how and why this has changed during the six year Sustainable Beef Club programme. We normally check reduction results at two yearly intervals. It is noted that the results do indeed show a reduction for each of the two yearly intervals over the whole six years."

McDONALD'S WOULD LIKE TO SINCERELY THANK ALL THE FARMERS WHO TOOK PART IN THIS STUDY AND THE SUPPLIERS AND PARTNERS INVOLVED IN COORDINATING THE WORK OF THE SUSTAINABLE BEEF CLUBS.

THIS REPORT, THE DATA, CALCULATIONS, FIGURES AND CHARTS HAVE BEEN COMPILED ON BEHALF OF McDONALD'S BY ALLTECH E-CO_2

1. AHDB Beef and Lamb review of historic carbon footprint using performance and production data for beef cattle between 1970 and 2010, Alltech E-CO_2 (2012).

2. Department for Energy and Climate Change (2009) The UK Low Carbon Transition Plan. National strategy for climate and energy.

3. Climate Change Act 2008. Available at: http://www.legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_20080027_en.pdf

4. Environmental Protection Agency (2014) Ireland's Greenhouse Gas Emissions in 2012. Available at: https://www.epa.ie/pubs/reports/air/airemissions/GHG_1990-2012_April_2014.pdf

5. Climate Action and Low Carbon Development Bill 2015 – http://environ.ie/en/Legislation/Environment/Atmosphere/FileDownLoad,40047,en.pdf

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7. PAS 2050 methodology is an independent Publicly Available Specification developed by the British Standards Institute (BSI) and Defra to provide a consistent method for assessing the life cycle GHG emissions of goods and services.

8. AHDB Beef and Lamb (Formerly EBLEX) (2010) – Testing the water. The English Beef and Sheep Production Environmental Roadmap – Phase 2

9. The carbon footprint reduction achieved within this study has been modelled against the equivalent carbon footprint of a number of scenarios. This carbon footprint conversion data has been produced by the Carbon Trust and Defra, and is available within the Carbon Trust Footprint Expert database.

10. Met Office (2013). Rainfall and Temperature Data.

11. Steinfeld, H., Gerber, P.J., Wassenaar, T., Castel, V., Rosales, M., de Haan, C. 2006, Livestock's Long Shadow. Environmental issues and options. Food and Agriculture Organization of the United Nations (FAO), Rome.

12. Sonesson, U., Davis, J., Ziegler, F. 2009, Food Production and Emissions of Greenhouse Gases. An overview of the climate impact of different product groups. SIK-the Swedish institute for Biotechnology. Swedish Presidency of the European Union, Stockholm.

13. McDonald's Restaurants Ltd, 2014, http://www.mcdonalds.co.uk/content/dam/UK01NewsAssets/Press%20releases/Serving%20the%20UK/McDonald%2527sReport-FINAL.pdf

APPENDIX

Average analysis for comparison - Dairy Beef		2009	2010	2011	2012	2013	2014
Carbon footprint result	Kg CO_2e/Kg LW	9.49	8.55	7.70	7.79	8.89	7.55
Daily liveweight gain	Kg per day	0.87	0.83	0.77	0.91	0.86	0.90
Fuel use	Litres per head	43	45	22	30	34	37
Artificial fertiliser use	Kg of applied N per Ha	123	66	79	68	81	78
Purchase weight of store animals	Kg	200	183	155	214	210	174
Sale weight of finished animals	Kg	590	610	568	609	620	590
Slaughter age	Months	-	20	20	21	23	22
Farm size	Ha	43	123	73	74	121	58

Average analysis for comparison - Finisher Only		2009	2010	2011	2012	2013	2014
Carbon footprint result	Kg CO_2e/Kg LW	14.04	11.88	10.98	11.30	10.91	10.26
Daily liveweight gain	Kg per day	0.88	0.90	0.92	0.91	0.95	0.94
Fuel use	Litres per head	45	37	36	31	30	31
Artificial fertiliser use	Kg	123	83	79	93	97	94
Purchase weight of store animals	Kg	387	399	400	419	413	422
Slaughter age	Months	-	23	24	24	24	23
Sale weight of finished animals	Kg	642	663	672	668	669	668
Farm size	Ha	60	64	69	63	56	51

Average analysis for comparison - Rearer Finisher		2009	2010	2011	2012	2013	2014
Carbon footprint result	Kg CO_2e/Kg LW	14.88	14.35	13.94	14.48	13.92	13.19
Daily liveweight gain	Kg per day	0.85	0.87	0.82	0.92	0.91	0.96
Fuel use	Litres per head	75	74	85	89	87	97
Artificial fertiliser use	Kg of applied N per Ha	150	92	75	76	76	68
Sale weight of finished animals	Kg	627	626	629	635	632	644
Slaughter age	Months	25	22	22	21	22	22
Calf birthweight	Kg	44	45	44	43	42	42
Calf mortality	%	13	7	7	6	5	5
Heifer calving age	Months	-	-	30	26	28	27
Farm size	Ha	57	77	72	71	71	83

Average analysis for comparison - Store Producer		2009	2010	2011	2012	2013	2014
Carbon footprint result	Kg CO_2e/Kg LW	17.56	-	18.42	13.00	14.60	3.15
Daily liveweight gain	Kg per day	0.83	-	-	0.84	0.90	1.10
Fuel use	Litres per head	55	-	48	40	34	45
Artificial fertiliser use	Kg of applied N per Ha	139	-	214	54	63	123
Calf birthweight	Kg	41	-	35	46	40	46
Calf mortality	%	7	-	-	6	4	-
Heifer calving age	Months	-	-	-	32	29	28
Farm size	Ha	72	-	23	64	59	24

NB: The number of farms classified as 'store producers' in the project fluctuated based upon market conditions. Due to the limited sample size, the scope for individual values influencing the above figures is high with no farms in this category in 2010.

ABOUT McDONALD'S

McDonald's has proudly run its business in the UK for over 40 years and currently operates over 1,250 restaurants, serving more than three million customers every day.

We believe our success comes from suppliers, franchisees and staff all working together. It's about the investment we are making together in our restaurants and in our 94,000+ staff. It is about the passion we have for developing skills and offering opportunity and our unwavering focus on our customers and sourcing the very best quality ingredients for our menu.

A report published in 2014[13], our 40th year of trading in the UK, revealed that each year, an investment of around £2billion can be traced back to our UK supply chain with around 53% of this being spent directly by McDonald's.

Serving safe, high quality food that our customers can trust is our number one priority. We look to source food locally wherever possible so we are very proud of the reputation we have earned as a key supporter of the British and Irish agriculture industry. The 'Serving the UK' report found that our annual supply chain spend amounted to more than £851 million a year.

In fact this commitment to source locally, wherever it makes sense to do so, has seen us spend around £26 billion with UK-based businesses over our 40 year history. A commitment which has helped the business deliver a total contribution of £40 billion to the British economy.

Around 70% of our restaurants in the UK are franchised to around 150 local business men and women, a model that stimulates investment in and builds strong relationships with the local community.



ABOUT FARM FORWARD

McDonald's is a food business, so we understand the importance of working in partnership with our suppliers to ensure we have a sustainable supply of quality ingredients.

We have always taken a responsible and long term approach to doing business, with many of our key suppliers working with us for decades. We know that for our business to thrive, we need the British and Irish farming industry to thrive and prosper too.

We invest for the long term, working side by side with our suppliers and farmers to make incremental improvements to ensure the future stability of the industry.

Four years ago we made a deeper commitment to support the farming industry through our Farm Forward programme.

Designed to respond to major challenges facing the agriculture industry, Farm Forward aims to help secure a sustainable future for British and Irish farming by supporting existing farmers and helping to attract new entrants to the industry.

Launched with an initial first year investment of £1 million, Farm Forward was created in collaboration with leading farmers and agricultural experts including the National Farm Research Unit and FAI Farms (Food Animal Initiative).

The programme is built around the knowledge gained from talking to hundreds of farmers and is made up of a series of projects designed to respond directly to the needs of industry now and in the long term.

Through Farm Forward, we aim to focus on:

- **ATTRACTING AND NURTURING THE BEST FARMING TALENT**
- **RAISING ANIMAL WELFARE STANDARDS**
- **MAKING ENVIRONMENTAL IMPROVEMENTS**

The multi-million pound investment made during the first four years has ensured that the programme has delivered against all of its original objectives and made a considerable contribution to the agriculture industry.





2016