

Carbeth Home Farm – Carbon Footprinting Case Study

Introduction

Carbeth Home Farm is a 400 acre farm situated on the historic Carbeth Estate, north of Glasgow. The farm grows some crops, but is mainly given over to permanent grass and around 150 acres of mixed woodland and rough ground. 130 breeding ewes graze on the farm and there are equestrian facilities including livery and indoor arena.

The farm will inevitably have a low carbon footprint, due to minimal cultivation of the land and the large portion given over to permanent vegetation. The owners have also shown carbon awareness as they use woodburning stoves, have a 3.66 KW solar PV roof installation and continue to plant trees across the farm.



Carbon footprint

The carbon footprint for Carbeth Home Farm has been carried out using the Farm Carbon Assessment Tool (FCAT). This is more of a 'toolkit' than other carbon calculators¹. Instead of just giving a numerical figure of the farm's carbon balance, it shows farmers how their activities compare with recommended low carbon practices.

Although developed by the Soil Association, it is applicable to farmers from all sectors, including organic and non-organic. It is available to use freely at www.soilassociation.org/fcat. It produces a 'whole farm' report which indicates the level and type of emissions of different areas of the farm system rather than of a single product line. The whole farm approach enables the user to identify specific 'hotspot' areas where improvement could be made and quantify the effect that changes would have on the farm's carbon footprint. Unique to FCAT, the tool has twenty one technical factsheets incorporated into the tool.

FCAT provides a graphical analysis for each area of farm activities, which are looked at in turn below. The graphs rank specific farming practices from 0 – 5, the higher the number the closer to low carbon farming 'best practice'. The lower the number, the higher the GHG emissions and therefore a higher carbon footprint. These lower numbers are the 'hotspots' that should be addressed by the farmer in order to decrease carbon emissions on the farm.

¹ Other calculators include CALM www.calm.cla.org.uk, the COOL Farm Tool www.coolfarmtool.org, and Cplan www.cplan.org.uk

1. Energy Use

Fuel use on farm

Fuel Type	Emissions (kg CO2 eq)
Red Diesel	7,036.9
Diesel	853.6
Petrol	1,248.3
LPG	N/A
Heating oil	N/A
Propane	N/A
Coal	N/A
Natural gas	N/A
Total	9,138.8

Energy used in contracting

Ploughing (light soil)	N/A
Ploughing (average soil)	N/A
Ploughing (heavy soil)	N/A
Subsoiling	1,285
Harrowing (cultivation)	N/A
Harrowing (plant protection)	214.2
Rolling	N/A
Drilling seed	N/A
Combi drill/cultivating	N/A
Potato planting	N/A
Fertiliser spreading	1,147.3
Lime spreading	N/A
Agricultural spraying	N/A
Manure spreading	N/A
Slurry vacuum tank lorry	N/A
Umbilical - towing pipe	N/A
Mowing	734.3
Tedder	N/A
Hay rake	N/A
Forage harvester	N/A
Harvesting - cereals	N/A
Potato harvesting	N/A
Peas	N/A
Maize	N/A
Baling silage (round bales)	N/A
Wrapping silage (round bales)	N/A
Baling hay/straw (small bales)	N/A
Baling hay/straw (round bales)	N/A
Baling hay/straw (square bales)	N/A
Total	3,380.7

Total emissions from energy and fuel use	12,520
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Energy use contributes to a farm's carbon footprint through the burning of fossil fuels, which in turn releases CO2 into the atmosphere. Reducing energy use on the farm will decrease both CO2 levels as well as costs. Generating your own energy has the exciting potential of selling it to the grid and adding a new source of revenue.

The tables on the left show two areas of energy use at Carbeth. The top box looks at how many litres of fuel the farm has used. This is then converted into kg of CO2 equivalent released into the atmosphere.

The first box shows that over 2012, Carbeth's fuel use released 9,138.8kg of CO2 eq.

The second box looks at energy used in contracting. FCAT converts the number of hectares of each activity into the carbon footprint. We can see that fertiliser spreading produces the most CO2 eq, at 1,147kg. The total CO2 eq released from these field activities is 3,380.7kg.

Adding these two boxes together, we see at the bottom of the table a total of 12,520kg CO2 eq. In other words, **over 2012, Carbeth's energy usage released an equivalent of 12.5 tonnes of carbon dioxide into the atmosphere.**

The FCAT tool does not compare figures with other farms or a national average. The recording of energy usage is intended for the farmer to monitor on an annual basis, working towards improving efficiency. However, having worked on the carbon audit of other Scottish farmers, we know Carbeth's energy usage to be significantly smaller than other farms, due to the limited cultivation.

Note, as data was not available, the electricity used on the farm has not been taken into account, although this would be a similarly small amount.



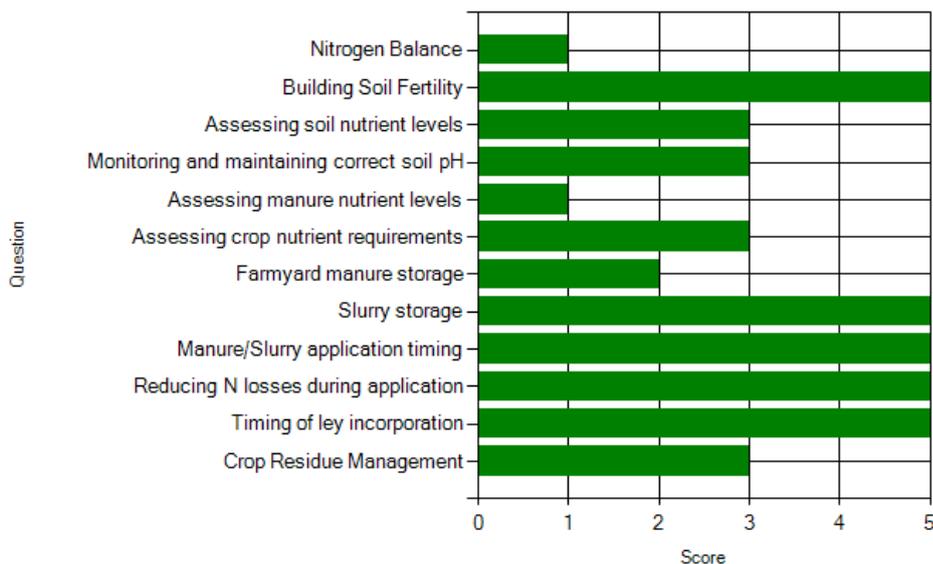
2. Nutrients and Manure

This graph looks at twelve farming activities to do with nutrient and manure usage on the farm. There is a mixture of 'best practice' in this area – we can see that Carbeth's practice excels with five areas – building soil fertility, slurry storage, manure/slurry application timing, reducing N losses during application, and timing of ley incorporation. From a low carbon perspective, the farm can be commended for this.

There are two areas that stand out as needing attention, scoring only 1/5. Firstly, the 'Nitrogen Balance' scored low. From the information supplied

by Carbeth, we know that this was simply because the 'farmgate' nitrogen balance (kg/ha) is not monitored. Secondly, 'Assessing manure nutrient levels' would have scored higher if the farm monitored nutrient levels in the FYM/slurry.

Within the FCAT online report, the factsheets provide information on how Carbeth can improve with these areas. These two areas can very simply be remedied through expanding the farm management and monitoring activities.



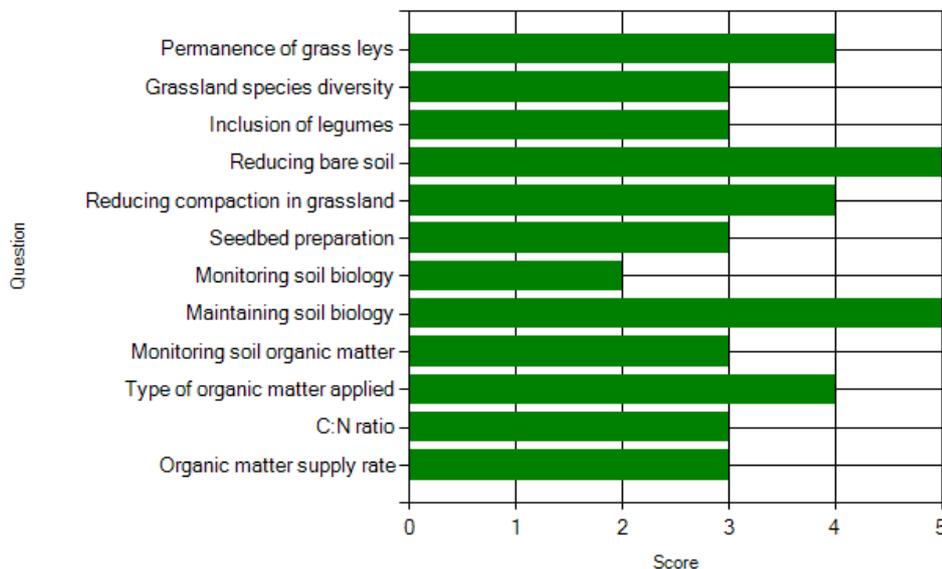
3. Soil and Grassland

The second graph looks at soil and grassland management at Carbeth.

Immediately we can observe that the farm is doing very well in this regard. Averaging at 3/5, the farm scores highly, with 'Reducing bare soil' and 'Maintaining soil biology' outstanding.

'Monitoring soil biology' scores lowest, at 2/5 and could be improved through regular basic or advanced soil biology tests.

Again, the FCAT tool includes factsheets for addressing each of these.



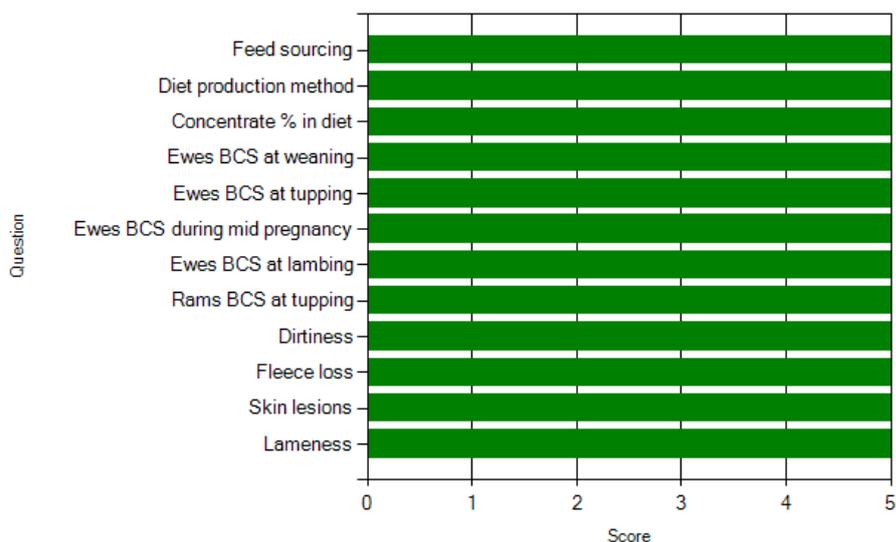
4. Livestock (Sheep)

The final graph ranks the livestock management activities at Carbeth with low carbon farming best practice. Carbeth has a small flock of sheep that are reared in an extensive system. Extensive systems by definition are low carbon as the methane production per acre of land is very low. The graph therefore gives Carbeth full marks for their low carbon livestock management.

The first three rows of the graph look at diet and feeding. Because the Carbeth sheep are typically 100% pasture fed, there is no carbon footprint associated with their feed. If feed was imported, then carbon emissions would be produced through transportation.

The next five rows relate to BCS (Body Condition Scoring). The Carbeth sheep are well managed and over 90% of the flock reach their target BCS score at each stage of their life cycle.

The final four rows of the graph look at sheep health and welfare. As with body condition score, the health of the sheep is excellent with less than 5% of the flock at any stage showing signs of dirtiness, fleece loss, lesions or lameness.



Conclusion

In summary, the FCAT analysis has shown that Carbeth farm is already farming according to many of the best practices recommended within low carbon farming research and advice. Of particular mention for best practice are four of the activities within nutrient and manure management, two within the soil and grassland management, and the sheep management in general.

‘Hotspots’ needing attention at Carbeth relate to the monitoring of nutrients on the farm. In particular, the farmgate nitrogen balance, the manure nutrients, and the soil biology levels.

It is usually recommended that the farmer chooses a few hotspots instead of taking them all on at once. However, in the case of Carbeth, each area for improvement falls within the field of nutrient testing and monitoring. The farm can therefore address each of these hotspots quite easily, which will have an instant improvement on the farm’s carbon footprint.

With the extensive low-impact style of farming at Carbeth, the farm has a low carbon footprint with few areas for improvement. Furthermore, there is huge carbon sequestration (carbon capturing and storage) that takes place at Carbeth due to the abundance of forestry, permanent pasture, and rough ground.

Carbeth can be commended for their low carbon activities, including their solar panels, wood burners, the continued planting of trees, and their excellent livestock management practices.

The technical factsheets within FCAT will provide Carbeth and other farms with the information required to make any low carbon farming changes and improvements. As farmers make such low carbon farming changes, positive results will follow with both environmental and economic benefits.

For more information, visit www.soilassociation.org/lowcarbon