



Bairnkine Farm, Jedburgh – Carbon Footprinting Case Study

Introduction

The Bairnkine comprises of approximately 1,243 acres upland, located 4 miles south of Jedburgh. The farm is made up of 302 acres permanent pasture, 771 acres ploughable and 170 acres woodland, and approximately 65 % of the farm is LFA. The soil is mainly a medium loam but there are areas that are poor draining.

Bairnkine has been fully organic since 2008. At present there are 1,350 easycare ewes, 500 gimmers and 550 ewe lambs, all have been tugged to easycare this year. A further 350 ewe lambs are being kept for sale as gimmers in the autumn. Lambing is outside from the 26th April for approximately 3 weeks. Ewes are feed silage/haylage in the winter once the grass has run out. After scanning triplets and lean ewes are fed whole beans through to lambing. Ewes are put onto fresh pastures on or around the 1st April, and stocking rates depend on the ewes having x1, x2 or x3.



In addition to the sheep enterprise, store cattle are purchased and finished. 94 Limousin cross weaned calves were purchased in November. They were housed and fed red clover silage, turned out to grass in spring and sold in September as forward stores.

Over the past ten years, the farm has planted 3,200 m of new hedges, 38 acres of new woodland, and installed solar panels for the farm cottages.

Carbon footprint

The carbon footprint for Bairnkine Farm has been carried out using the new Farm Carbon Assessment Tool (FCAT). This is more of a 'toolkit' than the usual 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 enabling the user to identify specific 'hotspot' areas where improvement could be made and quantify the affect that such changes could have on the farm's carbon footprint. Unique to FCAT, the tool has twenty one technical factsheets incorporated into the report.

Farm activities in relation to carbon emissions can be divided into four areas. FCAT provides a graphical analysis for each area of farm activities, which are discussed 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 the 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

Energy Use

Fuel use on farm

Fuel Type	Emissions (kg CO2 eq)
Red Diesel	33,467.9
Diesel	2,016.7
Petrol	2,989
LPG	N/A
Heating oil	4,194.5
Propane	N/A
Coal	N/A
Natural gas	N/A
Total	42,668.1

Electricity

Electricity	9,931.1
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Energy used in contracting

Ploughing (light soil)	N/A
Ploughing (average soil)	7,177.6
Ploughing (heavy soil)	N/A
Subsoiling	N/A
Harrowing (cultivation)	1,863.2
Harrowing (plant protection)	N/A
Rolling	1,038.7
Drilling seed	382.4
Combi drill/cultivating	2,276.3
Potato planting	N/A
Fertiliser spreading	619.5
Lime spreading	856.7
Agricultural spraying	238.6
Manure spreading	2,570
Slurry vacuum tank lorry	N/A
Umbilical - towing pipe	N/A
Mowing	550.7
Tedder	146.9
Hay rake	367.1
Forage harvester	N/A
Harvesting - cereals	2,692.4
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	20,780.1

Total emissions from energy and fuel use	73,379
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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 three areas of energy use at Bairnkine. 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, Bairnkine's fuel use released 42,668kg of CO2 eq.

The second box shows that electricity use on the farm has generated a further 9,931kg of CO2 eq.

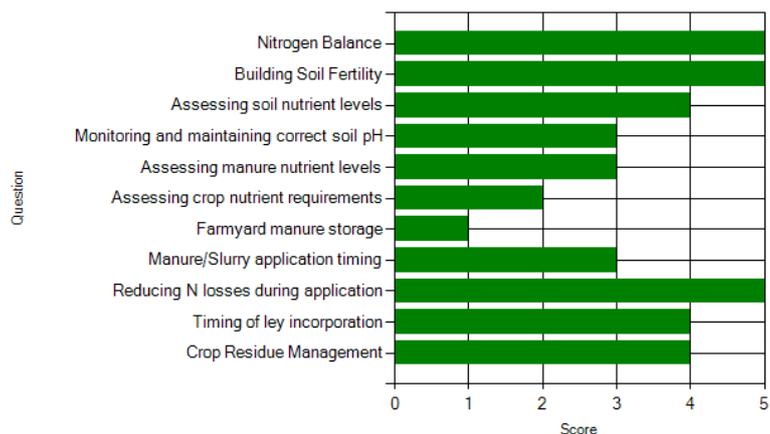
The third and largest box looks at energy used in contracting. FCAT converts the number of hectares of each activity into the carbon footprint. We can see that ploughing produces the most CO2 eq, at 7,177kg. The total CO2 eq released in this area is 20,780kg.

Adding these three boxes together, we see at the bottom of the table a total of 73,379kg CO2 eq. In other words, **over 2012, Bairnkine's energy usage released an equivalent of 73.3 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.



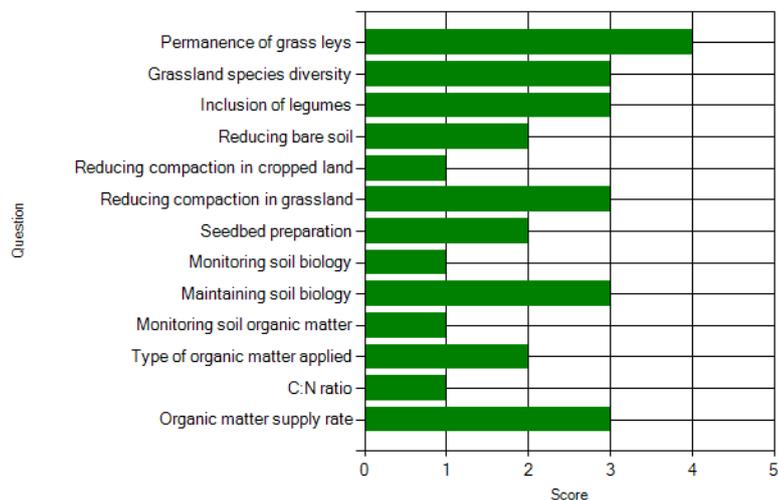
Nutrients and Manure



This graph looks at eleven 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 Bairnkine’s practice excels with three areas – nitrogen balancing, building soil fertility, and reducing N losses during application. The farm can be commended for this.

Where improvements are to be made can be seen in the middle of the graph, particularly with FYM storage. This activity has scored 1/5. Assessing crop nutrient requirements has scored 2/5. Within the FCAT online report, the factsheets provide information on how Bairnkine can improve on this. For example, to minimise emissions from FYM storage, the manure should be covered and placed on an impermeable floor.

Soil and Grassland

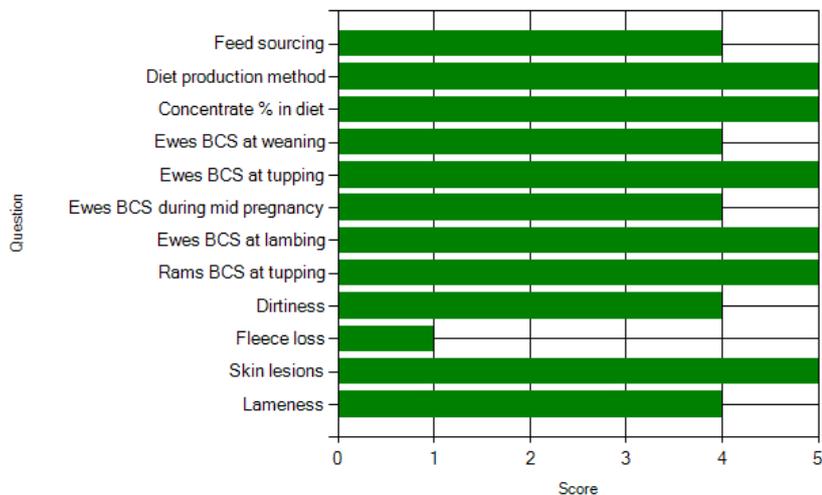


The second graph looks at soil and grassland management at Bairnkine. Immediately we can observe that the farmer has more to address in this area in order to move closer to low carbon farming best practice. Of particular mention are four areas, each scoring only 1/5.

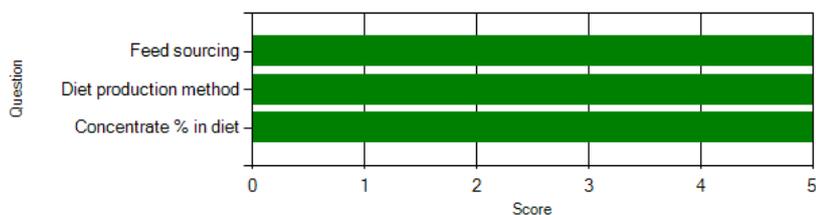
These include reducing compaction after cropping, monitoring soil biology, monitoring SOM, and the ratio of carbon to nitrogen. Again, the FCAT tool includes factsheets for addressing each of these areas. On the positive side, Bairnkine has scored 4/5 for the permanence of their grass leys. We know that the longer a ley is kept, the more carbon is stored in the soil and the less CO₂ and N₂O is released through soil disturbance.

Livestock

Sheep:



Beef:



For both sheep and beef, these graphs show very clearly that Bairnkine have excelled at low carbon farming practice. With the exception of just one area, the sheep enterprise is either the best practice, or close to it. The one area for improvement at Bairnkine in terms of sheep, is the fleece loss, which scored 1/5 and is an area to address in the following year.

The beef result is a different graph as the cattle are just finished at the farm. For all three areas, the farm has scored 5/5 for best practices to do with the beef.

Conclusion

In summary, the FCAT analysis has shown that Bairnkine 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 three of the activities within nutrient and manure management as well as the management of livestock in general.

'Hotspots' needing attention at Bairnkine include the storage of FYM, the four areas highlighted within the soil and grassland management, and the fleece loss found on some of the sheep.

It is recommended that Bairnkine, like any farm, selects only a few of these hotspots instead of taking them all on at once. Using technical factsheets, such as those within FCAT, will provide the farmer with the information required. It will be most effective to start small and make the changes in practice gradually. As farmers make such low carbon farming changes, positive results will follow with both environmental and economic benefits.