New Entrants to Farming Fact Sheet

New Start to Agriculture Factsheet – Setting up a Carbon Neutral Business



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This factsheet aims to look at what issues need to be considered when trying to set up a carbon neutral business.

It is designed to give new entrants and new starts into agriculture an overview on the different areas and issues which will need to be considered when looking at moving to a low or carbon neutral business model.

This fact sheet will look at potential mitigation measures that can be implemented on Scottish farms.

Carbon Auditing

It is essential to measure a farms carbon footprint to identify where to start when reducing emissions. This should be the first step for any farmer or crofter looking to reduce their carbon footprint. A carbon audit will breakdown the emissions from the farm into different categories and make it possible to identify which areas can be improved quickest and to the most benefit. Funding is currently available for farmers and crofters in Scotland to have a carbon audit completed on their business. Details can be found on the farm advisory service website: https://www.fas.scot/carbon-audits/





The European Agricultural Fund for Rural Development Europe investing in rural areas





Livestock

The methane produced by cattle and sheep are a large part of the carbon footprint attributed to agriculture. To reduce this the efficiency of these classes of livestock need to be maximised. This can be done by reducing deaths, illnesses and increasing daily live weight gains. This will improve the output of an enterprise in comparison to the methane it is producing. This can be done through a number of ways. This may be health planning to ensure stock are as healthy and productive as possible. Feed analysis and ration formulation will ensure that the correct ration is being fed to stock and that waste is minimised and productivity is maximised. Implementing rotational grazing and using clover in grassland will also reduce reliance on fertiliser to maintain stocking rates.

In the future there are emerging technologies which may be very useful in reducing the methane emissions of livestock. Feed additives are a technology which could be adopted to reduce methane emissions. Trials have shown that additives could reduce methane emissions by as much 30%. However additives like this are still in the trial phase and are not commercially available yet. In the longer term there is evidence that some sheep and cattle produce less methane. If the genetics of these low methane producing stock can be used on a large scale across the national herds and flocks then a further reduction of 30% could be seen.

Handling and spreading of livestock wastes and manures is a source of emissions which can be reduced. Moving to low emission methods of slurry spreading is one example of this. Traditional splash plates increase the amount of ammonia released into the atmosphere. If low emission methods like trailing-shoe or slurry injection are used then there is less ammonia lost to the atmosphere. This will also mean more nitrogen is available to the crop and less bagged fertiliser is required.

Arable Farming

Arable farms will also have to contribute to the reduction emissions. The single largest emitter in arable systems is from bagged fertiliser inputs. Greater adoption of precision farming techniques are one route to reduce emissions by increasing the efficiency of bagged fertilisers. This includes technology like, GPS guidance, yield mapping, variable rate fertiliser and lime applications. These technologies make it possible to identify the areas of the field which are low in these key nutrients, in some situations this can be down to the quarter hectare. This means that total nutrient use can be reduced or yields increased through detailed and very precise nutrient management plans. Other avenues to reduce emission are protected fertilisers. These products release a lot less N2O than conventional fertilisers. This could be a very important aspect of reducing arable related emissions.

Reducing fuel use in field operations is another area for improvement. This can be done through a number of methods. Recording the fuel use in different field operations will help assess where fuel saving can be made. One example may be moving to a minimum tillage or even no-till system of crop establishment. Ploughing is one of the most fuel intensive activities there is, if it this field operation can be reduced or eliminated then there can be significant fuel savings. Other methods of ensuring optimum fuel use are more simple, like ensuring tyres are at the correct pressure, tractors are correctly ballasted and machinery is serviced and operating correctly.

Soils and Sequestration

Soils in Scotland are currently locking up a large amount of carbon. Although not as well understood as carbon in forestry this is another area where carbon stocks need to be protected and enhanced where possible.

Ploughing is generally bad for the soils stock of carbon. Exposing the root system to the air causes some of this carbon to be lost to the atmosphere. Where possible using the minimum soil disturbance possible to establish a crop will help to protect the carbon in the soil and stop it being released to the atmosphere. This can be mitigated with the use of green cover crops over winter to reduce the amount of time that bare soil is exposed. Cover crops will also help lock up nutrients which may otherwise be lost to the environment.

Agro-forestry

Agro-forestry is broadly defined as the integration of forestry and agriculture. In some places this may refer to lanecropping - wide lanes of trees with crops in between, or an orchard or similar fruit trees at a lower density of planting than traditional with grazing underneath. In a Scottish context agroforestry usually refers to upland permanent grass planted with low density woodland for timber production or slow growing native broadleaves for biodiversity value. These low density plantings would then allow for sheep and cattle grazing underneath the trees. Studies have shown that this can lead to greater total output per hectare.

Agro-forestry has a number potential positives with benefits of carbon capture, biodiversity increase, better water infiltration and shade and shelter for livestock. Funding may be available through the forestry grant scheme and more information can be found on the website: https://www.ruralpayments.org/topics/all-schemes/forestry-grant-scheme/

Implementation and Costs

All of these potential mitigation measures have a cost and an associated benefit in the potential CO2 equivalent reduction. The graphic below shows the cost effectiveness of some of these different measures. At the left hand side of the graph there is a number of options that are win-win and are no cost to the farm business. These are options like improving livestock efficiency and fertiliser use efficiency, which will also save the business money. These options should be the starting point for any business. At the other end is options which are a cost to the business, these are options like cover crops and forestry planting.





MACC (Eory et al. 2015

Summary

- Measure Carbon Audits are a valuable to assess where your business is and where it is most effective to start improvements
- Livestock Reducing methane emissions from ruminant livestock by increasing the efficiency of livestock and improving the utilisation and handling livestock wastes
- Arable Precision farming technology to target inputs and improve yields, using reduced cultivations can save fuel and protect carbon stocks in the soil
- Soil Carbon Carbon locked up in the root systems and organic matter of agricultural soils are a
 valuable carbon sink and need to be protected and enhanced
- Agroforestry A novel land use which can potentially deliver on improving carbon sequestration goals and bio-diversity improvements
- Greater detail on a number of these issues can be found in the farming for 1.5 report https://www.farming1point5.org/
- Many more practical ways to reduce on farm emissions can be found on the farming for a better climate website https://www.farmingforabetterclimate.org/