What's been happening?

Whilst day to day activities continue on farm, we are all still emerging out of an unprecedented national lockdown. We may not have travelled far during this time, but our digital skills have come a long way. Facetime, Zoom calls and the like have now become our substitute for meetings and events, both in our day to day work and keeping in touch with friends and family.

Here at Farming for a Better Climate, we too have been confined to barracks, meaning its been Teams calls with the Soil Regenerative Agriculture Group and sharing progress and activities between us via WhatsApp and social media. We have also embarked on a new and exciting series of podcasts, which have been easily recorded over the phone. More about that later.

In this newsletter, we will catch up with some of the activities in the Soil Regenerative Agriculture Group (pictured above right, pre Covid19 and social distancing) and take a more detailed look at ideas to help dairy farmers reduce emissions and benefit the farm business, along with picking up on a few other bits and pieces that have been happening over the summer months along the way.

Read on to see how other farmers are profitably tackling climate change, benefiting both the environment and farm business.
Focus on dairy: 
How do we reduce emissions AND benefit the farm business?

It's widely accepted that the livestock sector has a key role to play in reducing greenhouse gas (GHG) emissions from agriculture, helping Scotland work towards net zero carbon emissions by 2045. It's not all bad news; reducing emissions goes hand in hand with improving business profitability. Here we take a look at some of the practical measures dairy farmers could consider to identify and cut emissions from routine practices.

Where to start?
Managing herd health, feeding and fertility could all help to improve herd production efficiency. Alongside discussion with your vet and farm advisor, a carbon footprint could help you to take a wider look at your business.

A carbon footprint measures the greenhouse gas (GHG) emissions associated with the activities on your farm. It's worth noting that farms with a low carbon footprint are often the most efficient. At Farming for a Better Climate, we used Agrecalc to measure farm carbon footprints across the Climate Change Focus Farms to identify possible areas where the farms could make savings - there's more information on carbon footprinting on page five of the newsletter. Common target areas for attention in the dairy herd often include:

- **Herd health and disease management** - A healthy herd is more efficient at producing milk.
- **Nutrition and feeding management** – Well balanced rations will optimise performance and feed conversion efficiency.
- **Breeding and fertility management** – getting cows back in calf before 100 days will maximise litres of milk sold annually.
- **Nutrient management** – Timing and method of slurry and fertiliser application can save on costs and lower GHG losses.
- **Grassland management** – improved grazing and pasture management can maximise nutritional quality of grass and silage, driving more milk from forage.
- **Investing in soil health** – as well as improving grass yields, healthy soils can help extend the grazing season.
- **Electricity and fuel use** - simple measures around the parlour could cut energy use and give a quick saving on the electricity bill.

There's no 'one size fits all', but a range of measures that could be adapted and tweaked to suit your business. Read on for some ideas that might be worth a more detailed look.

How can cutting greenhouse gases benefit the business?

Each animal in the herd will produce methane; it's an accepted by-product of a healthy rumen. Livestock that are falling way below production targets for your business, for example difficulty getting into calf or with reoccurring health issues, are still producing methane. In effect, you are carrying a passenger who is not fully contributing to the farms saleable outputs. The aim for greenhouse gas mitigation, as it is for the farm business, is to maximise productivity from each animal, so their lifetime emissions are small when measured against the saleable outputs they produce.

Methane from the herd is relatively fixed; it's about maximising production through a contented, healthy and well managed herd, so each animal is performing to its full potential.

Improved efficiency in production means more milk from fewer and more targeted inputs. This will lead to less emissions when looked at on a per kg of milk output basis, leading to a lower carbon footprint and better return for the farm business.

Have a look at our webpages to see what other farmers have done.
**Improving fertility in the dairy herd**

Fertility improvements will drive productivity and reduce the farm carbon footprint, writes SAC Consulting’s Dairy Consultant Lorna McPherson. Every day added to a cow’s calving interval, postpones her next lactation and is replaced by an extra day at the end of her current lactation, when yield is lower. More milk per cow means less methane per litre.

The age of first calving can have a big influence on the carbon footprint of a farm. Heifers calving at two years tend to be more productive, with better fertility and produce more milk over their lifetime than older calving heifers. They also tend to have a longer lifespan in the herd and there is a faster rate of genetic improvement in the herd, with lower rearing costs and a quicker payback.

**Getting cows back into calf**

Getting cows back in calf is highly dependent on heat detection rates; these are easier to improve than conception rates. A number of fertility aids can be employed to help improve heat detection, although heat detection aids are not a replacement for visual observation and a combination of the two will give best results. Make sure all staff are trained in heat detection, know the key behavioural signs, and record all heat events appropriately. In some cases the use of synchronisation protocols with fixed time artificial insemination may be an option and eliminate the need for heat detection. You can read more in our ‘Improving fertility in the dairy herd’ practical guide on our ‘Optimising Livestock Performance’ pages here.

**Reducing feed waste**

Along with improving feed conversion efficiency (FCE), reducing feed waste is another area that can help enhance productivity, reduce waste, make best use of purchased feed and help reduce emissions intensity from the dairy herd, according to SAC Consulting’s Lorna MacPherson. Areas where feed wastage can occur include:

- **In the field**: Feed value can be maximised by reseeding regularly and using grass varieties on the recommended list e.g. FAS Technical Note Recommended Grass & Clover Varieties. Good grassland management with rotational grazing practices will also help to ensure high nutritional feed value. Cutting grass for silage at the optimal time also reduces nutritional losses.

- **During storage**: Losses in forage dry matter and quality can be minimised by ensuring good consolidation and sheeting of the pit during silage making to prevent aerobic spoilage. Once the pit is open, aim to move back by 1.5m/week and twice as much in summer to avoid spoilage/heating on the face which will reduce feed value.

- **At feedout**: Many factors may affect dry matter intake such as feed and water trough space and ration sorting. Intakes can be encouraged with regular pushing up of feed, ensuring it is evenly distributed along the length of the feed passage, and by moving from once a day to twice a day feedout. Fresh feed is the biggest stimulus for encouraging intakes, which will benefit milk production and FCE.

Read the full version in our “Working Towards Net-Zero - Improving feed conversion efficiency and reducing waste in the dairy herd” practical guide on our ‘Optimising Livestock Performance’ pages here.
Feed budgeting to improve resilience

As weather conditions become more extreme, consider techniques that make for agile farm businesses, writes Senior Specialist in SAC Consulting’s Livestock Team, Poppy Frater. Feed budgeting is simply calculating animal’s requirements and feed supply to determine the shortfall or surplus. With this approach, you can stress test your current feed situation, make decisions based on your predicted feed situation and build the business to be more suitable for your resources.

The simplest application of feed budgeting is an inventory of the hard feed supplies on the farm. For instance, you may know you have 20 tonnes of barley in store as part of the winter ration to feed your 40 head cow herd. The ration requires 2.5kg/head/day of barley; i.e. 100kg/day for 40 cows and 18 tonnes for 180 days. This is a healthy budget incorporating some margin for wastage or delayed turnout.

The more complex form of feed budgeting is with forage supplies. Bale weight, silage pit dimensions and the dry matter (DM) percentage are required to determine supply. At the start of the winter this exercise helps determine how long your supplies will last. If this falls short of your average winter, then you can make decisions early to address the shortfall. You can also build contingency plans for extreme weather or delayed turnout. Conversely, knowledge of requirements and yield can help determine the area required for cutting. An allowance for wastage must always be built in to these calculations.

Finally, we can feed budget at grass to gain better control over feed supplies on the farm. Measuring grass in kilograms of DM/ha using a sward stick or plate meter and knowing stock demand helps understand whether stocking rate is appropriate, forecast grass supply issues and ensure livestock performance and welfare is maintained through variable grass growing conditions.

Benefit from cow tracks

Cow tracks can help with grazing management as well as improving cow mobility scoring. Ayrshire’s John Kerr, a previous Climate Change Focus Farm host installed cow tracks at Woodhead, Newmilns with great results. You can watch John’s short video on his focus farm page here and find detailed info on cow tracks in the FAS Technical Note TN730 at www.buff.ly/39VLLoQ

Range of ideas in ‘Practical Guide’ series

From improving ventilation in the beef shed to monitoring energy use, we are continually adding new titles to our ‘Practical Guides’ series covering all 5 key action areas. You can take a look at our full list of Practical Guides and Case Studies at www.farmingforabetterclimate.org/download/

What are we missing? What would you like to see more of? Get in touch and let us know - our contact details are at the end of the newsletter.
Livestock; improving efficiency

“By making small changes such as checking heating timers and improving hot water tank and pipe insulation, fitting a variable speed milk pump and reducing hot water use in the parlour, we easily saved around £2,000 on our electricity bill and around 13 tonnes CO₂ off our carbon footprint”
Dairy farmer, Dumfries and Galloway.

FAS event - Cows v Cars

A recent Farm Advisory Service (FAS) webinar looked at the relationship between methane and climate change. Guest speaker, Dr Frank Mitloehner of the University of California, spoke about how agriculture should be seen as part of the solution to climate change rather than a part of the problem. Dr Mitloehner discussed how the Californian dairy industry has reduced its emissions by 2.2 metric tonnes, 25% of all emissions in dairy, over the last 5 years, by simply improving manure and soil management practices.

The short lifespan of methane in the atmosphere means that a reduction in methane emission can reduce warming quite quickly, unlike carbon that persists in the atmosphere for longer. Dr Mitloehner spoke about how this highlights the potential role livestock agriculture can play in reducing warming over a short period of time by making simple changes that can be done anywhere in the world. The full webinar is available to watch at www.fas.scot/publication/webinar-recording-climate-change-cows-v-cars/; for a reminder of the key climate change gases linked with agricultural production, see our Greenhouse Gas Emissions Practical Guide.

Can you improve technical performance and efficiency?

The old saying about ‘measure to manage’ rings true for all businesses. If you don’t know how much you are using, where and when, how can you begin to improve efficiencies and make cost savings? Complete a carbon footprint for your business; this could identify areas where you are performing above average in terms of efficiency and also areas where you are not as competitive as you think when benchmarked against like businesses. A carbon footprint can help you look at your business in another way, identifying previously hidden costs or waste that you could reduce. Agrecalc is free to use, see www.agrecalc.com for more details.

Funding support for carbon footprinting

Through Scotland’s Farm Advisory Service (FAS), farmers can apply for up to £500 worth of funding to commission an experienced agricultural consultant to carry out a full carbon audit of their business (VAT is covered by the participating business). For more details, see www.fas.scot or via this link.

How easy is it to cut carbon?

Typically, most farms can attain the first 10 to 15 per cent of carbon reduction with changes in practices, such as growing more legumes, sampling manures and soils to reduce fertiliser use, or implementing paddock grazing, according to Julian Bell, Principal Consultant at SAC Consulting, who’s team developed the carbon footprinting tool Agrecalc. Julian said: “The next level of 10 to 15 per cent improvement should be feasible from more significant investments such as new machinery or systems’ changes”. One of the questions consistently asked when talking about carbon footprinting is how much is stored in soils and grasslands on the farm? Now we can have a good go at answering that question through a new feature that is being trialled within the carbon footprinting tool Agrecalc. For more information on carbon footprinting, and to access the Agrecalc ‘farmers free pass’, visit www.agrecalc.com
Soil Regenerative Agriculture Group - new and old ways to protect farm soils

The Soil Regenerative Agriculture Group are aiming to find some answers to some challenging questions around enhancing farm soils and the wider benefits this can have for the farm business. Here we take a look at some of the ideas trialled and activities on the farms over the summer months. For more farm efficiency ideas and to read about other measures the Soil Regenerative Agriculture Group are considering, visit www.farmingforabetterclimate.org find us on Facebook and Twitter @SacFarm4Climate.

Experimenting with establishment

One of the things the group have been looking at is when and how cover crops are sown and what mixes to grow to maximise cover crop growth, writes SAC Consultant Zach Reilly. Finding a place within a rotation for cover crops is difficult due to later maturing cash crops such as spring barley and winter wheat.

Last year Ross Mitchell from Castleton Farm established a cover crop directly into a standing crop two weeks prior to harvest. This allowed the cover to germinate before being covered in chopped straw at harvest. The extra two weeks of growth ensured there was enough heat and moisture in the soil to gain full soil cover for the winter months.

This year, Ross has modified a sprayer to improve seed distribution after finding that spreading seed with a fertiliser spinner didn't throw the seed far enough. Following last years success, Ross and three others in the group have already started to broadcast cover crop seed into late harvested crops. There is some video footage on our Facebook and Twitter account @SACFarm4Climate.

Drilling precision

Having used the Claydon strip till drill for 8 seasons on his heavy soils, Douglas Ruxton at Moss-side of Esslie who is part of our Soil Regenerative Agriculture group, has found that seed depth is paramount.

Too shallow, and there is a lack of seed to soil contact; too deep and the newly sprouted seedling will not emerge. Seed depth presents a particular challenge following a wet autumn. Douglas’ keen eye for detail has meant he has a very even crop overall, but the importance of seed depth was confirmed in the occasional combine mark. These depressions in the soil caused the seed in these areas to be slightly shallower, and as a result, the emergence of spring crops in these patches was definitely affected.

Strip till - promoting better roots?

The abundance of roots in Douglas Ruxton’s crops is testament to his strip till system. Extra roots ensure maximum nutrient and water extraction from the soil, helping to increase the crops resilience. Douglas’ soil also has an abundance of fungi present, as shown by the white hyphae in the photo on the left. These mycorrhizal fungi forms associations with plants helping to increase nutrient uptake.

We have over 200 case studies, practical guides and notes from previous focus farm meetings, covering topics ranging from nutrient budgeting and soil sampling to renewables. You can view the full list via the Downloads page on our website at www.farmingforabetterclimate.org or keep up to date via Facebook or Twitter @SacFarm4Climate.
To till or not to till?

The primary aim of tillage is to create a tilth; however, tillage can also achieve levelling, optimise soil moisture, improve aeration and control weeds. So why is there a move to reduce tillage, asks SAC Consultant Zach Reilly?

Subsoiling, ploughing, power harrowing, grubbing – no matter how or why you chose to cultivate there is no doubt about it, it is time-consuming. Timeliness aside, there is a growing bank of evidence to suggest that tillage is destructive. As scientists and researchers slowly begin to understand the complex interactions of soil microorganisms, an increasing number of papers prove that tillage interrupts and destroys these habitats, not to mention the significant drain it has on resources. Ultimately, the more species which are disturbed, the less diversity we have in our soils and the less resilient we are to extreme events.

Nevertheless, if a field is compacted it can take years to remediate if a machine and some metal are not used – it might never fully recover. However, that isn’t the issue, it’s the repetitive and often unnecessary tillage which creates havoc within a soil. An overly aerated soil can increase organic matter decomposition; the extra-fine seedbed can create soil capping and runoff; or the land which has been worked when it is wet can have smearing and impermeable layers.

On the contrary, research also suggests that, when isolated, minimum and zero tillage can negatively affect yields. So, what is the answer? A study in 2015 found that crop rotation and permanent soil cover are two key drivers, recommending that these should be incorporated into farming practices alongside reduced cultivations. These same ideas are used in regenerative agriculture.

Maybe the question shouldn’t be to till or not to till, but instead how little cultivation can we get away with while maintaining a healthy soil? Perhaps agriculture needs to look further than the implement being used, towards ways in which nature can assist in the daily challenges of producing crops.

Sharing ideas; working as a group

The Soil Regenerative Agriculture Group is a great place to exchange ideas. One farmer commented “Soil is our greatest asset and we need to get the basics right before we go high tech. This group is great for sharing ideas, problems & solutions with other like-minded farmers and importantly from those on the ground actually speaking from experience”. Keep up to date with the activities in the group via our webpage and join the conversation on Facebook and Twitter @SAC Farm4Climate.

New break crops for the Soil Regen Agric Group?

Adding more break crops into the rotation will help to introduce more crop diversity, benefiting soils and following crops.

Break crops such as winter beans and winter peas would both make good additions to a predominantly cereal rotation, helping to fix additional nitrogen. Despite the obvious benefits, challenges the group have encountered so far have been sourcing seed for winter beans and winter peas and also finding market outlets.
Savings on fuel using Hydrogen technology

David Barron of Nether Aden in Aberdeenshire worked with us on the Climate Change Focus Farm project. One of things David encouraged us to explore as part of the project was the use of hydrogen technology, namely to retrofit of a hydrogen electrolyser to the farm telehandler. David estimates that the hydrogen electrolyser has saved him 20% on his fuel costs. David said “I’m totally sold on the technology, the unit has worked so well, and now that the price has come down to £1,000 each I’ve paid to have two more installed - one on another tractor and one in my jeep.” In addition to the 20% fuel saving for all three vehicles, he has also seen other benefits. “There’s certainly more torque when you drive the tractors in a higher gear, which is very like driving a superior horsepower vehicle, and added to this, there are no emissions - there’s just nothing coming out of the lum.”

In monetary terms, the savings for David Barron’s telehandler – the first machine to be converted – equate to 1,083 litres of fuel, equivalent to 43,440kg CO₂ and £596 annually, worth £2,980 over a five-year period. It was installed by a small business called Water Fuel Engineering from South Yorkshire, who suggest a reduction in fossil fuels of circa 20-25% and an 80% cut in vehicle emissions.

You can read more about David's experience with the HydroGen retrofit in his case study on the Farming for a Better Climate webpages here.

Aberdeenshire farmers investigate Hydrogen

Following on from the success of the HydroGen retrofit onto farm vehicles under Farming for a Better Climate, David Barron and a group of likeminded Aberdeenshire farmers were interested to know more and look at what opportunities existed to take this technology further. With the two biggest bills being fuel and fertiliser, could both be tackled by hydrogen?

A subsequent project funded by the Rural Innovation Support Service (RISS) has brought together six Aberdeenshire farmers to explore further applications of the technology, including how to use surplus energy from farm wind turbines. We had hoped to report on the findings in this newsletter, but with an unexpected change in the regulations around RTFO (Renewable Transport Fuel Obligations), it put a different take on our findings and may make future projects more viable. We hope to post our findings on the FFBC page. You can read more about the RISS at www.innovativefarmers.org/welcometoRiss/

NEW FFBC Podcasts

In June, we released our first podcast with Professor Davy McCracken, SRUC Head of Mountain Research at Kirkton & Auchtertyre speaking to SAC Consulting's Séamus Murphy about Climate Change in agriculture and rewilding.

In July, Séamus was in conversation with dairy farmer John Kerr & SAC Consulting’s Alex Pirie to discuss how John has continued to make efficiency savings since his time as a Climate Change Focus Farm host.

This month saw us join Specialist Beef Consultant, Robert Ramsay and Sam Parson, the Farms Estate Director at the Balcaskie Estate, Fife. Sam explains that the farm has a 50-year outlook for the business and as a result both economic resilience and climate change led farm management changes. We hear more about the grazing management employed on the estate, including the practicalities of managing bale and rotation grazing systems. Download the podcasts at www.buff.ly/3h9mz1S We’ve got more coming up and if the three we have done so far are anything to go by, they will definitely be worth a listen.
Further information and contact details

You can read more about the Soil Regenerative Agriculture Group, previous work with the Climate Change Focus Farms and download practical guides and case studies at www.farmingforabetterclimate.org

The Farm Advisory Service (FAS) also offers a range of webinars and podcasts across a number of topics, along with written information and the popular Technical Notes series. See www.fas.scot.

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Other useful links and information

At the time of writing, we are all navigating our way through the ongoing COVID19 pandemic and its legacy. Don’t be afraid to make contact with other organisations that could help you; sharing your experience and information could also help others too. A few good starting places include:

- FAS website - From emergency planning to keeping children safe on farm, the FAS webpages host a range of practical advice with more being added on a daily basis. Phone 0300 323 0161 or email advice@fas.scot

- NFU Scotland - Host of useful pages on COVID19 ranging from Employment opportunities on farms to Frequently Asked Questions.

- RSABI - Providing emotional, practical and financial support to individuals and their families across the agricultural sector including farming and crofting. Number of useful resources on their pages (including the FarmWell document with host of useful contacts), plus a support helpline on 0300 111 4166.

Thank you for reading the newsletter. If you would like to be notified when the next newsletter is out, email climatechange@sac.co.uk and ask to be included on the mailing list. Your email details won’t be shared with anyone else. You can also keep up to date with the project via Twitter @SACfarm4climate or find us on Facebook.

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Photos were taken pre-COVID19 and social distancing requirements.