The ninth meeting of the Castlemains Climate Change Farm Focus discussion group focused on Controlled traffic farming, GPS soil analysis, soil quality trials at Castlemains and an update on the greening rules for 2018.

Key points:

- Soil structure can be very fragile
- CTF can be used as a tool to protect soil from compaction and to reduce fuel savings.
- #SoilYourUndies, know your soil, the application of organic matter has shown a visual illustration of how it can directly affect soil biology.
- Consider GPS soil sampling before applying lime.
- Soil quality can be related to numerous factors. pH and structure play an important part in root development.

#SoilYourUndies

As part of the social media trending #SoilYourUndies or #SoilYourPants we buried three pairs of 100% cotton pants in different fields at Castlemains. These were buried on the 15th September 2017 and dug up on the 25th October 2017. The idea behind this experiment is to provide soil organisms with an organic food source and the less of the pants that are left the more activity there is in the soil. The pants were buried at a spade depth in a permanent grass field, a stubble field and a growing crop of winter oilseed rape all of which had differing soil types.

The results were surprising in the fact that the permanent grass field had no signs of the pants degrading. Not so surprisingly neither did the pair buried in the stubble field. However the pair buried in the growing crop of oilseed rape as pictured showed significant levels of activity. The field has had hen pen applied before sowing so it is possible that the increased organic matter and nutrients available to the soil and the growing crop has increased the level of biological activity in the soil. The other pants were reburied and we will look again at these in a few weeks.
Controlled Traffic Farming (CTF)

Robert Ramsay who farms at West Mains of Kinblethmont, Angus, manages 650ha of arable ground, growing cereals, oilseed rape and potatoes. Robert’s land ranges from pure sand to Balrownie silty/sandy loam. With the ground conditions being so light, there are issues of it drying out during dry spring seasons, whilst posing the risk of flash flooding during heavy winter rainfall.

Robert decided to adopt minimum tillage techniques in order to reduce his reliance on heavy cultivations and reduce the risk of ground drying out. After his switch to min till Robert noticed that even light trafficking was causing noticeable reduction in yields. After looking at other CTF systems Robert took the decision to adopt this management style on his farm by matching implement to suit tramline widths.

The system in place at West Mains of Kinblethmont is based on 6m intervals with the exception of a 9m combine on tracks. Post harvest where all of the straw is chopped, a 6m straw rake is used, prior to cultivating with a Lemken Krystal or roller discs. Ground is then sown with a Vaderstaad spirit drill, then rolled and all of this is over 6m intervals. Robert has adopted the use of RTK autosteer on all machinery which allows wheelings to be kept consistent each year. Working with a 6m combine would have fitted in nicely with the trackings, however Robert would have struggled with output. The decision was taken to buy a 9m combine on tracks meaning every bout is either on a tracking or not. To rectify this, where the tracks from the combine have run on fresh ground, this is subsoiled out prior to the following crop. This ground preparation process then repeats with the exception of potatoes grown within the rotation.

Benefits to the use of controlled traffic farming are that the wheelings in the field are drastically reduced. Furthermore, by mapping where the wheelings are, targeted action can be taken to alleviate compaction (if necessary) as opposed to whole field treatment due to widespread tracking. Robert has seen improved water infiltration and root development since implementing CTF, allowing him to benefit from both earlier sowing and the ability to get back onto the ground sooner following prolonged periods of wet weather. Robert has saved approximately 40% of fuel and time when establishing a crop compared to the conventional system of plough and drill. The use of RTK has also removed any over/under-lap, reducing wastage of seed, fertiliser and pesticides. The main issues with the system are with slug damage in rape after wheat, however the use of the straw rake and rollers has made a beneficial impact on this.
Soil quality and yield

Bryan Griffiths soil scientist (SRUC) and Laura Thomas Msc student looked at comparing soil quality to yield at one of the fields at Castlemains.

The model to assess soil quality took account of pH, visual evaluation of soil structure guide (VESS), potential mineralisation nitrogen, electrical conductivity, and nitrification. From this they derived a score out of 100 for each of the 80 plots in the field placed at 50m grid intervals with 4 samples per ha.

The vast number of samples taken allowed the creation of a detailed spatial map of the field showing the range of soil quality of the field. The formula to compare soil quality to yield placed emphasis on soil pH and structure through the VESS guide. During discussion at the meeting, Bob highlighted that the bottom of the field was a heavier soil which may indicate the reason for higher yields. The top of the field being lighter tends to dry out. The field has since been split with the top end growing veg and potatoes and the bottom remaining in cereals.

The results from the trial highlighted a distinct correlation between soil quality and yield based on the previous crop of spring barley which was measured using the yield monitor on the combine.

Improved soil quality benefits can be measured by the maintenance and improvement in yield through more efficient fertiliser usage, improvements in plant root development, a reduction in levels of compaction, and improved soil drainage. Other benefits include reduced fuel usage and increases in the number of days available for field work. All of these will have a positive impact in reducing the farms carbon footprint either through increased output or reduced inputs.
The meeting also focused on GPS soil analysis and the merit of this to the farm by identifying areas deficient in pH, P, K & Mg.

Craig Bothwell talked about various GPS sampling methods and the benefits of taking 4 pH samples per ha in comparison to 1. Craig also showed the potential cost savings of analysing pH on GPS grids vs on one single routine analysis per field. The field pictured below had an average pH of 6.3 which if used to plan a blanket lime application would have been the target pH. However when looking at the GPS sampling of the field the westerly side has a lower pH of 5.7—6.0 & the easterly side has a range 6.7—6.8. The result is that half of the field needs 9.3 tonne of 55% magnesium lime to bring this up to a target pH of 6.2. By analysing pH to this level of detail areas of a pH of lower than 6.2 can be the primary focus of application and allows a targeted application where needed to bring lowest areas of the field up to the required level. The benefit of this, in most cases is that you can apply less lime over the whole area of the farm since you know where the poorest pH areas are.

Using a case study farm as an example, over 119ha of mixed grassland and arable crops were sampled. GPS sampling for pH highlighted there was a lime requirement of 266 tonnes. A similar calculation was used to calculate how much lime would be required if only the field average pH value was used when only one sample per field would be taken. This calculation showed a total lime requirement of 297 tonnes. This would result in a total saving of £930 (reduced lime requirement of 31 tonne at £30/t) which equates to £7.80 per ha. With sampling costing around £20/ha not all costs have been saved, however the hidden benefits of improved yield in poorer areas and fuel saved during spreading have not been accounted for.

What’s next?

The next meeting will be on the 22nd November, on Integrated control of grass weeds.

Meetings are free to attend and all farmers are welcome.

For Castlemains, contact farm facilitator Craig Bothwell on 0131 603 7521 or via email at craig.bothwell@sac.co.uk for more information.

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