Vale of Belvoir Monitor Farm

Meeting title: Soils and cultivations

Date: 5 March 2020

Speakers: Philip Wright (Wright Resolutions Ltd.)

Soil and cultivations at the monitor farm

Past cultivation policy

- Plough based, originally followed by a power harrow
- More latterly followed by a Simba Toptilth, then drilled with a conventional tine drill
- Moved to a set of Simba 23C discs with a press towed behind, usually 2 passes per year followed by a conventional tine drill

Current cultivation practices

- 2 light cultivation passes, 2-3cm depth. Currently using a Sumo Mixidisc
- Cambridge roll
- Leave undisturbed 3 weeks prior to drilling
- Drill with as minimum disturbance method as possible- currently using a Amazone Cayena
- Mole plough heavy land every 4-5 years

Autumn drilling 2019 - % completed (and survived)

Winter wheat	70
Winter barley	0
Winter triticale	49
Winter oilseed rape	42
Winter beans	0

Spring barley	Cover crop* in
Spring linseed	Cover crop* in

*Cover crops aimed at deeper rooting (radish)

Soil health (Philip Wright)

Compaction

- Compaction costs us in yield through restricted drainage and waterlogging
- Data indicate the yield in drilling tractor wheelings can be only 85% of that in untrafficked areas
- Yield losses in plough based wheelings can be highly significant (61%)
- Compaction can also encourage certain weeds
- Poor aggregation reduces water infiltration and the passage of air and roots through the soil
- Effects depend on season, and you need to manage the risk of damage

Drainage

- Make sure you clear ditches and outfalls to keep drains running
- Look at drainage schemes to tell you the depth of the drains – this will help you to avoid moling through the drains
- Also dig down with a spade to see how deep the drains are

Compaction and soil structure

- Regular cutting at one depth creates the risk of a high plane of weakness
- This might be at the surface (drilling) or cultivation depth
- Silts will then wash down and block the pores in a similar way to the silting up you see in bends of rivers
- As a result, water cannot get through
- This effect is made worse by wheel slip
- If you have to cultivate, vary the depth if possible
- You might find you can work shallower than you think
- Roots indicate if there is a problem and they might fix it
- Moisture cycling creates tilth so you need to get plants growing

Effect of organic matter

- If you apply lift to a plastic soil it will fail in compression – this is a huge risk
- The ability of a soil to withstand pressure is increased by organic matter
- Soils with more organic matter have a longer window of workable soil
- There is much less waterlogging and crop loss on higher organic matter soils although this does depend on soil type

Measuring soil organic matter levels

- Be consistent so that you can compare: take soil samples at the same time each year using the same method each time and send them to the same lab
- Sampling depth depends on drilling method
- Ignore the very top because it is very variable
- Then take the top drilling depth layer, say down to about 30 cm (12”)
- Take at least two samples

Compaction reduction and prevention

- High tyre pressures increase the risk of compaction leading to a more variable crop and increased risk of black-grass
- Reduce tyre pressures and axle weight
- With reduced pressure there is less compaction and roots will get down better
- Target pressure should be 0.7 bar

- There is a huge effect of reducing from 2.5 to 1.0 bar
- Higher axle weights push the problem deeper
- This is particularly important in a wet season – damp soil makes the problem much worse
- Also use ballasting to correct balance
- Residue management is important
- Up to 70% of the damage can be in the first pass

Take-home messages

- Keep drains running by keeping ditches and outfalls clear
- Avoid cultivating at the same depth every time as it can produce structural weakness in the soil
- Add organic matter to soils – it will improve workability significantly
- Keep tyre pressures and axle weights down

Cultivations (Philip Wright)

Soil remediation

- It is very important not to lose all the structural strength when loosening soil
- The key is lift height
- Avoid loosening to depths greater than required and consider the actions of roots
- The choice of blade can be used to create tilth but discs are not good for wet conditions

Other considerations

- Wet soils are very vulnerable – what is the best compromise?
- Should you grow a crop and accept some soil structure damage?
- Work shallower - soil dries from the surface down so how shallow can you go?
- Will a forced crop cover its costs?
- For a compromise - drilling in adverse conditions – a tine drill might produce more movement than is desirable but you need to dry the soil out
- The problem is you then increase the risk of black-grass
- Is it better to have no crop than do this?
- For soil lifting with discs, using them in vertical format risks cutting and compression but if they are angled there is the potential for less damage

Drilling and grass weed control

- How can you control lifting? You could use a tine but with cutting at the front
- The slotting effect is determined by the tine's critical depth
- A simple disc with dual angles would produce less damage
- Individual contouring of tines plays a role – narrower tines (caused by wear) can cut slots especially in damp soil
- Slot closure is important to bring the tilth around the seed

Residue management

- Residue can be managed when drilling
- With the right settings you can avoid numerous cultivations
- Row cleaners need to be floating to follow the contour of the ground

Cover crops

- Can help with soil restructuring

- However sometimes they don't do very well because compaction prevents their roots getting down
- A bit of lifting with a sward lifter can loosen the soil enough to let the roots get down
- Avoid going too deep – the roots will do the rest of the work

Take-home messages

- Avoid working wet soils
- Work shallower – check the soil first, see how shallow you can go and avoid going too deep
- For soil loosening, lift the soil just enough to let roots get down below the compaction layer
- In addition to a bit of metal, use cover crops to open up the soil and increase water infiltration

Further information

- Testing soil health
- Soil assessment methods
- Soil health and biology partnership (91140002)
- Using the soil health scorecard case studies
- More information from the GREATsoils programme can be found at ahdb.org.uk/greatsoils
- Information on black-grass can be found at ahdb.org.uk/black-grass

AHDB resources

- Understand your business costs with AHDB's benchmarking tool Farmbench at ahdb.org.uk/farmbench
- Monitoring tools are available at ahdb.org.uk/tools
- Sign up to market information and research newsletters at ahdb.org.uk/keeping-in-touch
- Find out what's going on at other Monitor Farms and Strategic Farms at ahdb.org.uk/farm-excellence
- All AHDB events can be found at ahdb.org.uk/events
- For guidance on how Brexit will impact your business, see ahdb.org.uk/brexit

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