AHDB
AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

Petworth Monitor Farm meeting report

Meeting 2: Machinery and soil investment
Date: 18 October 2018
Location: Medhone Barn, Blackhouse Lane, Petworth GU28 9NZ
For more information, visit: cereals.ahdb.org.uk/petworth

Meeting summary – key messages

- Dig holes and know your soils – looks can be deceiving: the top soil doesn't always reflect what's going on underneath
- Don't get hung up on cosmetics and do things without justification
- Be patient and wait for the right conditions
- Prevention is better than cure when looking at compaction damage; the key is pressure
- Rotations and general husbandry as a part of effective grass weed management

Machinery and soils

- Axle load (weight) is also important, but pressure determines the extent and severity of the problem. Axle load determines how deep this is then pushed through the soil to depth. A balanced machine (tractor & implement) is what you must aim for
- Critical to manage pressures when soils are vulnerable (loose or damp/wet) – hence when drilling, rolling, etc.
- Controlled Traffic: maintaining tramline positions and as a result, keep operational passes in the same place as this helps to minimise the extent of such damage over time.
- Tines and soil interaction – be aware of critical depth, and ensure tine width, for example, is adequate for the depth to be operated at, and conditions are suitable. This also applies to deeper working tines with or without wings. In all cases, dig behind the machine to check the results are as required. If not, adjust to less than full depth. Effective, is better than full depth but ineffective.
- Roots and metal: consider what the most cost-effective combination is when looking to structure a compacted soil.
- Direct drilling, remember that some soil types are not well suited, especially in the short and medium term.

Cover crops and organic matter

- Organic matter, residues roots are important to maintain and stabilise soil structure especially on "slumping" prone soils.
- Cover crop roots assist here where soils are left for delayed, or spring drilling. Grazing is a good way of managing these surface residues and canopies to avoid holding in moisture (see Livestock and the arable rotation)

- Cover crop canopy management is essential ahead of spring drilling on the heavier soils especially – need for an open surface to allow weathering for tilth, as cultivations at that point must be low distsurbance;

Mark's farming update

Harvest results have been very variable with lower farm average yields on everything but spring barley.

Average Yield T/Ha	2015	2016	2017	2018	4yr Average	% Change on 4 year Average	% Change on 2017
W Wheat	10.98	8.74	10.27	8.2	9.55	↓4%	↓20%
S Barley	7.37	6.11	5.07	5.45	6.00	↓3%	↑7%
OSR	4.47	3.67	4.11	3.04	3.82	↓6%	↓26%
Beans	4.54	2.98	2.99	1.82	3.08	↓12%	↓39%
Soya				2.36	2.36		

Soil surveying was undertaken to compliment variable rate (VR) seeding on 50% of the arable hecterage. The return from undertaking the necessary analysis was worked out requiring, that over 5 years, a 1.3% yield increase is required in order for the VR cost to break even.

Tillage 2019
The aim at the moment is to move the ground as early as possible to create stale seedbed and reduce soil movement at drilling, however a big question is – does the ground need cultivating?

Drilling
- Duet Coulters have now been replaced by Bourgualt points to reduce soil disturbance and enable direct drilling.
- Claydon Drill been sold and replaced with Amazone Cayenna 6m LD trailed drill as it was moving too much soil at drilling time and results/yield over 5 years were too variable.

Sprayer
Household 4000l 24m replaced by Sands 5500l 30m now spraying over 10,117 ha/yr. Depreciation budgeted at £6.73/ha

Change of strategies for 2019

- 60 Ac hybrid winter barley will be planted on the worst black-grass land to replace wheat

- Double spring break: spring barley followed by a pulse crop instead of beans followed by wheat – black-grass break / poor spring beans margin
- Cover cropping vs fallow for the autumn through the ASSIST programme
- Increased acreage of soya for 2019 – 60 acres
- Biostimulant try-outs

Mark's questions (from his summer MF launch meeting):

- How do we change our rotation to a more sustainable one whilst remaining profitable ?
- How do we combat our increasing blackgrass problem ?
- How do we manage variable soil types ?
- How do we make more efficient use of nutrients and maximise yield ?
- How do we deal with the increasing loss of chemistry ?
- How do we know if we are at top of our game or do we need to improve ?
- How do we approach Stewardship within the arable rotation ?

Farm walk, objectives & discussions

Objective

How different levels of cultivation and types of drilling (disc v tines) affect his wheat crop that are following beans?

Soil types and rotation

The soils are extremely variable across farms and within fields. Soil type ranges from heavy clay loam over weald clay – this is the predominant soil type at the home farm. Other soil types include green sand, sandy clay loam and calcareous clay.

The experiment at Moor Farm:

- Six plots, 2ha each, two tramlines wide
- Three plots undisturbed
- Three plots cultivated
    - Simba SL cultivator straight after combine
    - Vaderstadt Carrier Disk
    - Weaving LD
- Half of each plot was drilled with Skyfall (wheat) to a depth of 2.5cm with a Horsch drill (tines) and half with a Sky Easy Drill (discs)

Conclusion

We found that looks can be deceiving. The cultivated plot, although it looked good, was over-cultivated because actually the baseline soil structure was okay. But, by cultivating, it made the top four inches too fine which held the moisture up so it was sitting wetter and therefore, we found it didn't walk as well.

The unmoved ground which was disc drilled was cosmetically poor but actually the soil structure under the surface was good, with good water penetration. Although it's very early to judge the emergence / crop establishment, the rooting depth was looking good.

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Key messages from discussions

- Be flexible with regards to cultivation strategy and account for each block on a field by field basis, more management input is required toward decision-making when deciding how to move ground – look at each field and decide what and when to do.
- Understand the balance between maintaining soil structure and encouraging black-grass – this is often conflicting, especially when spring cropping and trying to create stale seedbeds over winter and striking a balance between soil disturbsance to encourage chit and avoiding over disturbance.
- The interaction between discs and tines and how the cultivation and drilling tactics complement each other – once decision taken away from the meeting was what to do to the overwintered stubbles. The structure is good but we need to cultivate the black-grass so depending on soil moisture (be careful with discs) we will be running the carrier discs over it at 1–2 inches to encourage germination, remedy the tramlines and headlands with the low disturbance cultivator and leave the SL cultivator in the shed.
- It is likely that splitting the main components of the current SL cultivation into separate operations (shallow discing into firm soil followed by low disturbance tine loosening in appropriate areas as needed, not as part of the same operation), will benefit the improving soils long-term plus save unnecessary soil movement, and the need for high horsepower to do the combined operation.
- Also interesting discussions regarding tyre pressures and changing from a tracked tractor to a wheeled one – a decision that will need to be made in the next 2 years – tyre manufacture and pressures down to 0.7 bars coupled with correct ballast and we should be able to achieve it. We only need the big HP tracked machine to pull the SL but if we can get to a point where discs and Weaving LD is required on only a proportion of the land then we can get to a point where the challenger is not required – huge cost saving. This will be achievable with much more attention to individual fields and parts of fields and having the ability to target the cultivations.
- The above has been made achievable with the introduction of the Borgualt point on the Sprinter drill, the vast difference in metal and the effects that has on disturbance means direct drilling is leaving a more acceptable seedbed due to the lack of soil disturbance and with a nosed tine seed depth and coverage can be maintained without leaving it too rough.
- Interestingly this week the Horsh Plots are all green box hedges and the area that we SL cultivated is only just coming up and is more fragile. At least 4-5 days difference in emergence.
- We need to have the ability to cultivate if required – we are not breaking the law and sometimes on soil with high silt contents that don't readily restructure, metal can do a good job.
- Mark is now more open to the possiblility with regard the possibility of having the opportunity to reducing his tractor fleet – doing away with the Cat Challenger for a 280 HP wheeled tractor (which can also corn cart) and not needing to replace the SL – by doing this he could get to a point where he farms 1,214 ha with a 5m carrier, a 4m Weaving LD cultivator and the drill with 1 tractor less – It may even result in not needing the 3rd man but this aspect would need constant review and the ability to adapt and be flexible depending on the conditions.
- Finally as Mark states "A really good but simple bit of the meeting was how to dig a hole properly – sounds daft but actually really important!"

Find out more – Links to AHDB information sheets or research

Machinery cost calculator
Measuring and managing soil organic matter
Testing soil health
Soil biology and soil health partnership
PR576: Improvement of soil structure and crop yield by adding organic matter to soil
Livestock and the arable rotation
Opportuntities for cover crops in conventional arable rotations
Cover crops: Farmer experiences
For more information on soils, visit ahdb.org.uk/greatsoils

Next meeting

Date: 6 December 2018
Topic: Controlling grass weeds with and without livestock
Time: 10:00
Location: Medhouse Barn, Blackhouse Lane, Petworth, West Sussex, GU28 9NZ

For more information or to find out more about Farmbench, AHDB's benchmarking tool, contact:

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