

Saltburn Monitor Farm meeting report

Meeting 2: Controlling weeds, rotations and understanding soil chemistry

Speaker: Steve Townsend (Soil First Farming)

Date: 1 November 2017

Location: Guisborough Rugby Club

For more information, visit: cereals.ahdb.org.uk/saltburn



Meeting summary – key messages

- Make sure you know which weeds you are dealing with
- Use minimal soil disturbance at drilling – this reduces loss of soil carbon and also makes weeds easier to control
- Use cover crops in the rotation to help in suppressing weeds, aid good drainage and feed the soil biology
- pH levels in soil can be very misleading
- Use soil testing to make sure calcium and magnesium levels are balanced in the correct ratio for soil type and location

Saltburn Monitor Farm – aims

Three important aims at Saltburn Monitor Farm

1. Improve the soil
2. Reduce the brome population
3. Look at profitability pre- and post-Brexit

To achieve these, the principles of “conservation agriculture” will be used:

- Minimal soil disturbance – just enough soil movement to get the job done
- Rotations (minimum 3 different crops) and spring crops
- Residue cover and cover crops
- We need to put more carbon into the soil than we take out

Targets for soil components

- Aim for soil to have 25% air and 25% water
- Too much air is bad news because there will be more oxidation which releases carbon from the soil

Weed control

It is very important to know what you are dealing with. At the monitor farm the main problem is giant brome (rather than sterile brome) which is less sensitive to herbicide than sterile brome but it has two weaknesses - it is:

- a cultivation weed
- dormant in UV light

Six keys to weed control

1. *Minimal soil disturbance*

2. *Stabilised weed seed zone*

- Cultivation encourages weed germination so it is important to minimise soil disturbance at drilling
- A stable seed zone then results with the weed seeds confined in a narrow layer, whereas in a cultivated soil the weed seeds are mixed up in the soil profile

3. *Residue cover*

- Allelopathy is the effect of decaying organic matter on crops; acids are released which directly affect the weeds/seeds
- This can mean that no broad leaved weed herbicide is needed after a particular cover crop such as oats
- Residue and slugs – increased residue will increase slugs in the short term but there will be an eventual decline as a balance is achieved, eg beetles move in gradually and eat slugs
- Chop all residue/straw – this will improve the soil because you are putting more carbon into the soil than you are taking out
- If you are concerned about chopped straw keeping the soil wet, autocasting or broadcasting into the crop, use a cover crop like mustard – this then grows up through the residue and dries the soil out via transpiration
- If you are chopping straw do the combining at an angle so that a tine drill will even out any poorly spread areas without resorting to cultivations
- Why covered soil is important – it prevents capping (soil surface compaction)

4. *Cover crops* – why grow them?

- To feed the bugs
- To suppress weeds – if a brome plant gets too big it releases chemicals that suppress the germination of other brome seeds so you need to make sure this doesn't occur so the brome keeps germinating and offering opportunities to control
- Drainage – any root greater than 0.5 mm across provides soil drainage
- Oilseed rape can be a very good cover crop. If you direct drill wheat into OSR the slugs eat the OSR and leave the wheat. By the time the slugs have eaten the OSR the wheat has grown away enough
- Examples of good (and cheap) cover crops – mustard, linseed, volunteer OSR

Minimal soil
disturbance

Stabilised weed
seed zone

Residue cover

Cover crops

Rotation

Double breaks

5. *Rotation*

- Never miss an opportunity to put roots into the soil
- Make sure you have a sterile strip round the field margin

6. *Double breaks* – good for weed control

Rotations

The new rotation replaces a block of continuous wheat which was costing more to grow than anything else.

Old (still used on 80% of farm)	New (now used on 20% block)
Oilseed rape Winter wheat Winter barley	Winter beans Winter wheat Cover crop Spring barley Cover crop

Notes on the rotation

- Why winter beans – because they are early harvesting so you can get done when soil conditions are better
- Why not oilseed rape – it is important not to let oilseed rape drive the rotation
- Why avoid winter wheat/winter barley – you can end up with a lot of wheat in the barley. This is not a problem if you are growing for feed but could be a problem if you are selling it
- Minimal soil disturbance has been achieved by changing the drill to a Horsch with knife coulters. These result in very little soil being moved which creates a stabilised weed seed zone
- Straw will be chopped to create residue
- Broadleaved cover crops are growing which create a live stale seed bed, so graminicides can be used to spray off flushes of brome

Soil chemistry

- Elements can affect soil structure and health
- Calcium (Ca) is the main one after carbon – it improves soil structure and health through soil particle flocculation (tilth)
- Magnesium (Mg), potassium (K) and sodium (Na) reduce soil structure through deflocculation
- The Ca:Mg ratio is very important

What about pH?

- It can be very misleading because it is affected by all positive elements – not just calcium
- If you get the calcium and magnesium balanced the pH will look after itself

Albrecht (cation exchange capacity)

- Tells you the percentage of positive elements attached to negative sites on soil clay or organic matter
- Main elements – Ca, Mg, Na, K
- Related to soil type and location
- Ca : Mg = 80% of cation exchange (68% Ca:12% Mg)
- Ca : Mg in sandy soils is 60% to 20%, and clays 72%:8%

Using precision soil data and Albrecht at Saltburn Monitor Farm

- Aim – to make the precision data as practical as possible
- Colour differences on soil conductivity maps indicate different ratios
- This gives an idea of how balanced the soils are
- Target Ca + Mg = 80%
- Ca is advised to be 72% due to the farm's soil types, dominated by silt & clay and location, ie high rainfall
- From the ratios you can work out how much lime to add – standard granulated lime is recommended because nearly all the calcium is available (lime particle size is often too large to be useful/available)
- 240 kg/ha will be added over the next 3–5 years which will help to spread the cost

Using gypsum

- High magnesium land is very wet because magnesium holds on to more water than any other element
- Use it to increase calcium and reduce magnesium in heavier soil
- The soil needs to be well drained
- The calcium needs to be 60–68% for gypsum to work, so raise it with lime first
- What about recycled gypsum? A cheaper option but it would have to be used only with no-till



Mustard and oilseed rape cover crop – showing patchy establishment



Cover crop and chopped straw residue



Soils compared – compacted heavy clay soil under cover crop (right) compared with non-compacted from edge of field

Cover crops at Saltburn Monitor Farm

- Mustard and oilseed rape
- Nitrogen was applied in the seedbed but there is evidence of a lack of fertiliser due to soil compaction
- Put more N on when straw is chopped because the straw locks up N
- Other options include swapping straw for compost
- Spread the straw residue more by combining at an angle which will help to spread the carbon

Find out more

Weed control

[Managing weeds in arable rotations](#)

[Encyclopaedia of arable weeds](#)

[Encyclopaedia of arable weeds – interactive tool](#)

[Autumn grass weed control in cereals and oilseed rape](#)

[Black-grass: Solutions to the problem](#)

[Identification and control of brome grasses](#)

[Agronomy 2017 presentation](#)

Rotations

[Opportunities for cover crops in conventional arable rotations](#)

[RR90: A review of the benefits, optimal crop management practices and knowledge gaps associated with different cover crop species](#)

For more information on cover crops, visit cereals.ahdb.org.uk/covered



Next meeting

Date: 12 December 2017

Topic: Controlling fixed costs ([register to attend](#))

Time: 11.30

Location: GRUFC, Belmangate, North Yorkshire TS14 7BB

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

contact: Judith Stafford

E: judith.stafford@ahdb.org.uk

M: 07891 556623

[@Cereals_North](#)

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law, the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document. Reference herein to trade names and proprietary products without stating that they are protected does not imply that they may be regarded as unprotected and thus free for general use. No endorsement of named products is intended, nor is any criticism implied of other alternative, but unnamed products.

AHDB Cereals & Oilseeds is part of the Agriculture and Horticulture Development Board (AHDB)

© Agriculture and Horticulture Development Board 2017