Thrive to Survive Conference: Wales

18 February 2020

Presentation Information

Tillage, Soil & Crops in adversity

Blair M McKenzie

CEREALS & OILSEEDS

We want:

- soft, stable soil that allows root proliferation including to depth;
- can drain excess water but can hold water & nutrients;
- is not contaminated e.g. pesticides, heavy metals;
- has functioning “good” biology to cycle OM & nutrients; and
- free from pests & disease.

What do we know about ploughing?

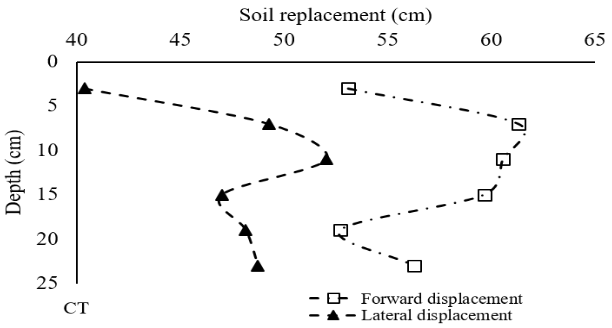
How far will the soil move forward?

How far will the soil move laterally?

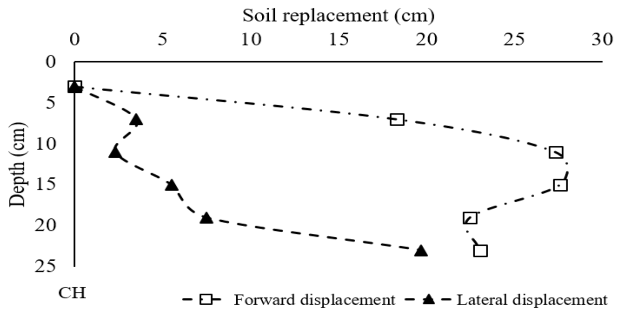
What information would help your estimate?

Perspective

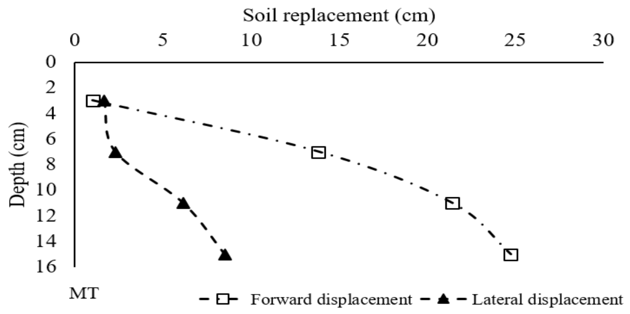
Plough



Chisel



Disc



Simple calculation

1 ha to a depth of 0.25 m $=2500\ m^3$.

Assume bulk density 1200 kg m^{-3} means

3,000,000 kg soil moved.

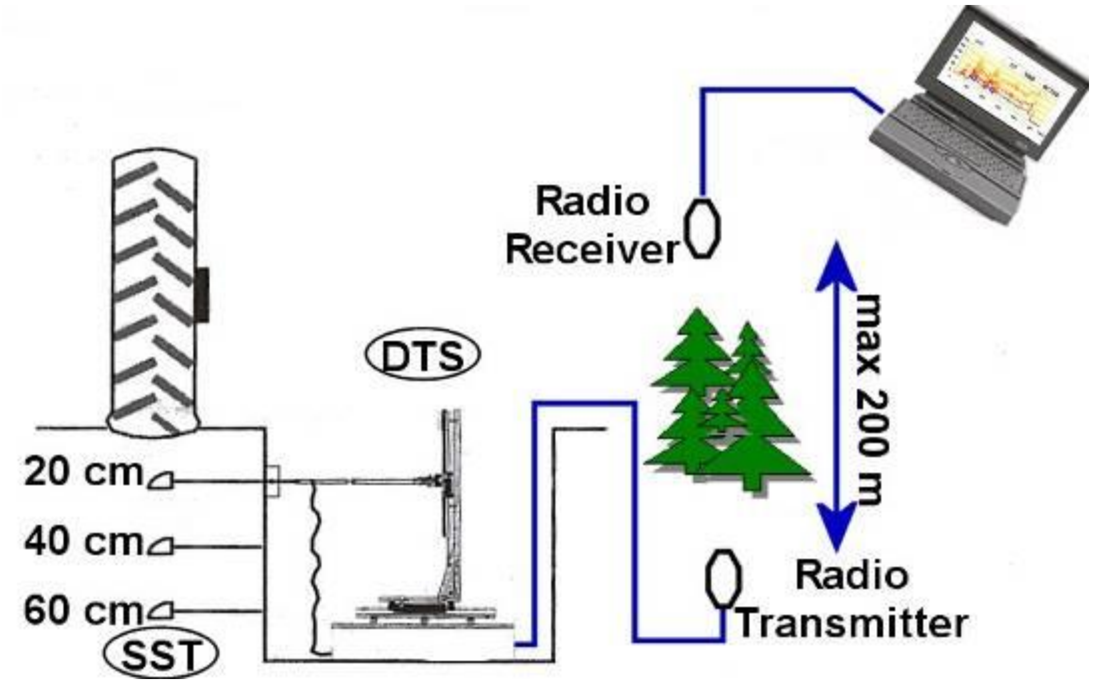
Tillage erosion (movement of tilled soil downslope by gravity) overlooked problem.

Kouselou et al M 2018 Quantifying soil displacement and tillage erosion rate by different tillage systems in dryland, northwest of Iran. Soil Use and Management 34: 48-59.

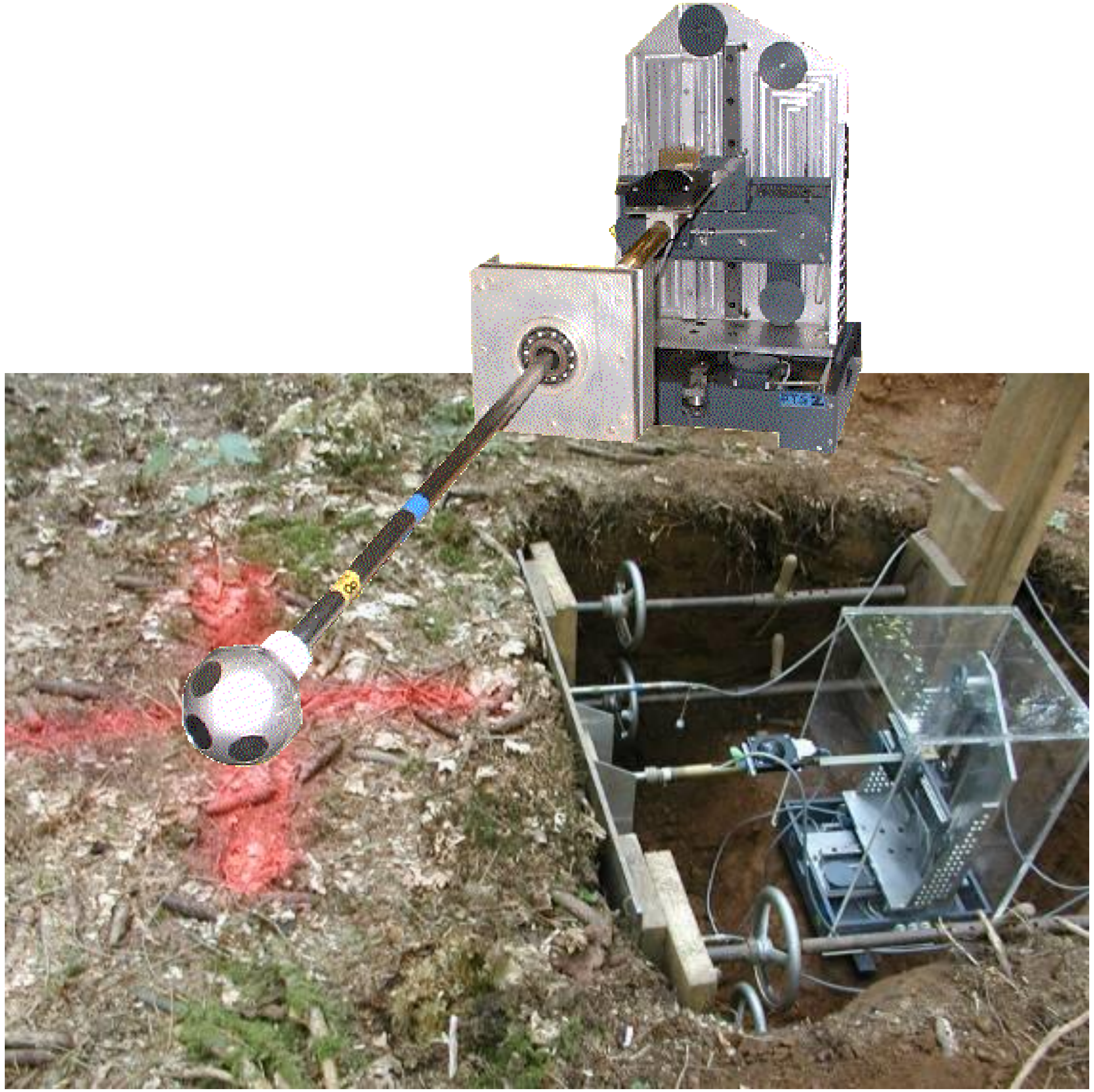
Interactions between threats & synergies from benefits

- Compaction and erosion
- Loss of OM and compaction
- Soft soil and root proliferation

In situ measurements of stress and strain distribution



In collaboration with the University of Kiel, Germany but now at University of Kassel

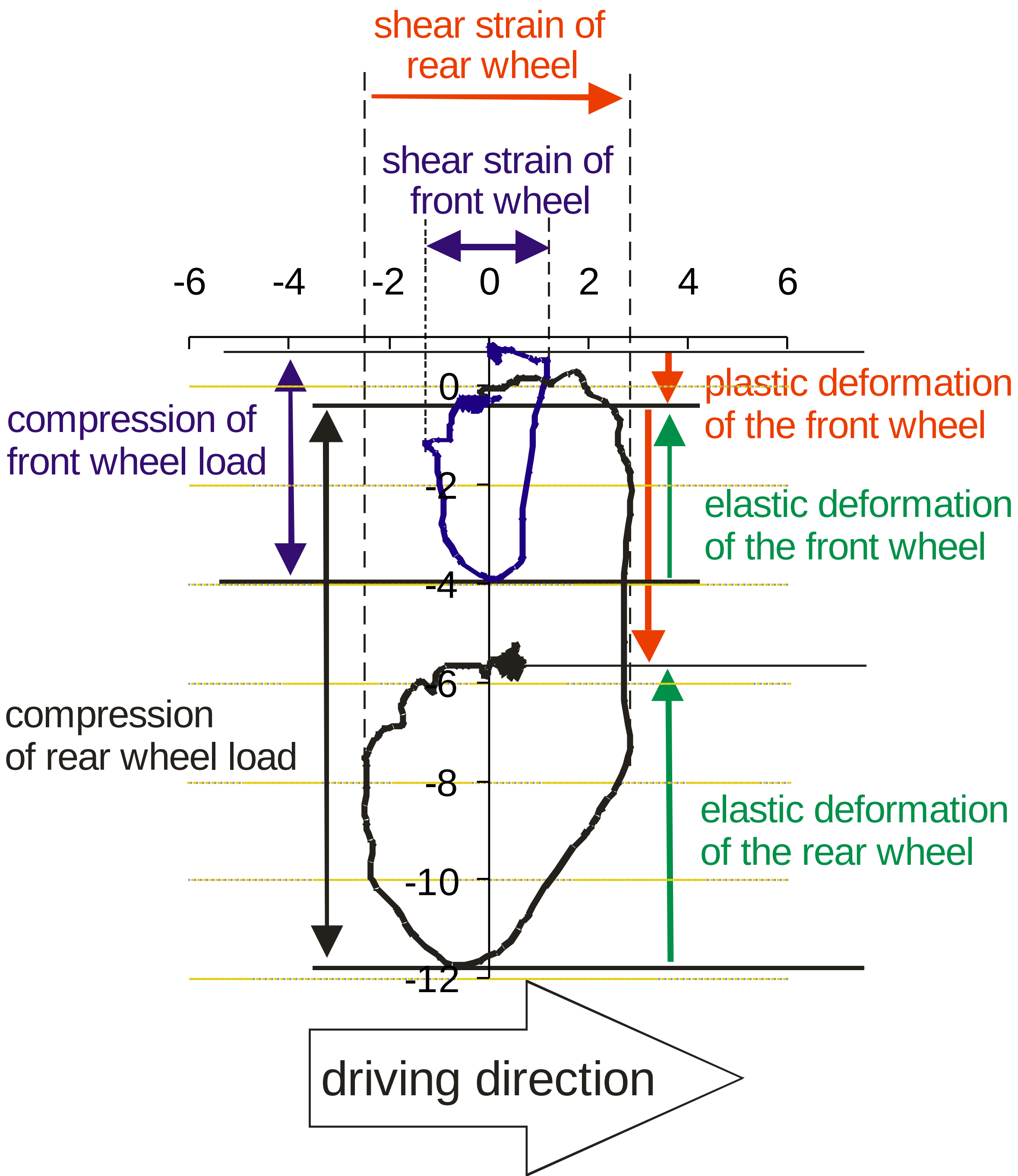


Test vehicle

- Tractor, ripper, harrow and packer
- 9,2 Mg total load / 3,6 Mg wheel load
- 135 kPa contact pressure

Displacement measurement at 20cm

AHDB



Study soil conditions under different management

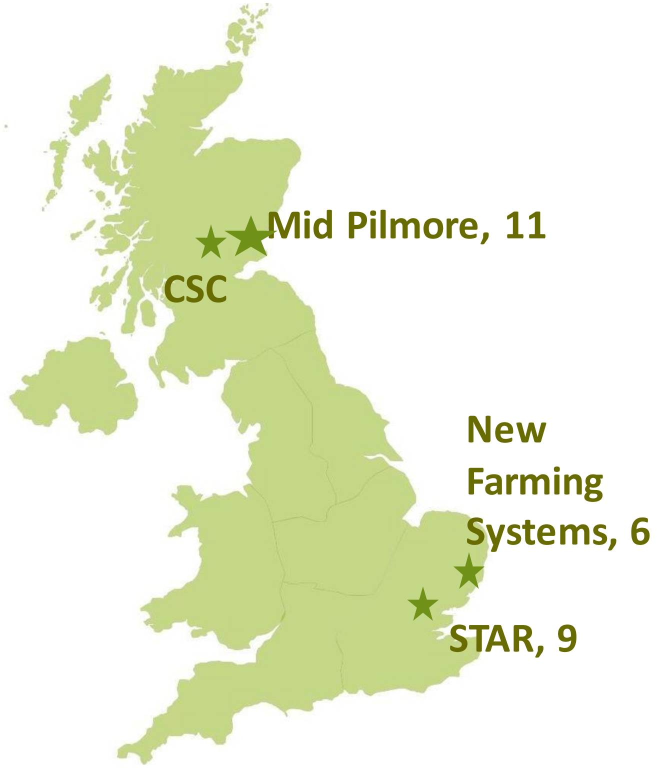
Sites with long term cereals ★

Large shifts in soil management take years to establish a new equilibrium.

Non-inversion and ploughed at all sites.

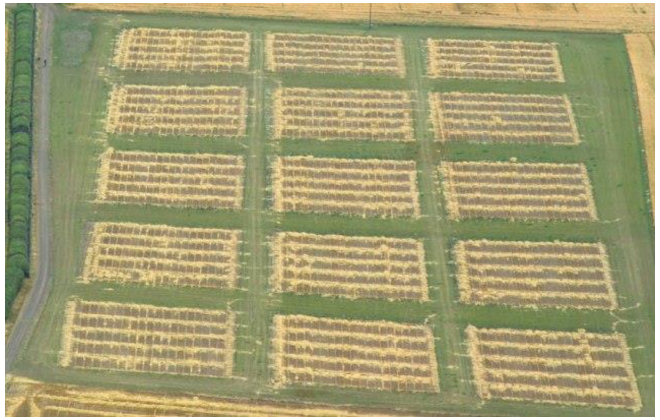
Combined with experiments on rotational design and nutrients to determine best soil management practices.

Cultivar performance vs. soil management.



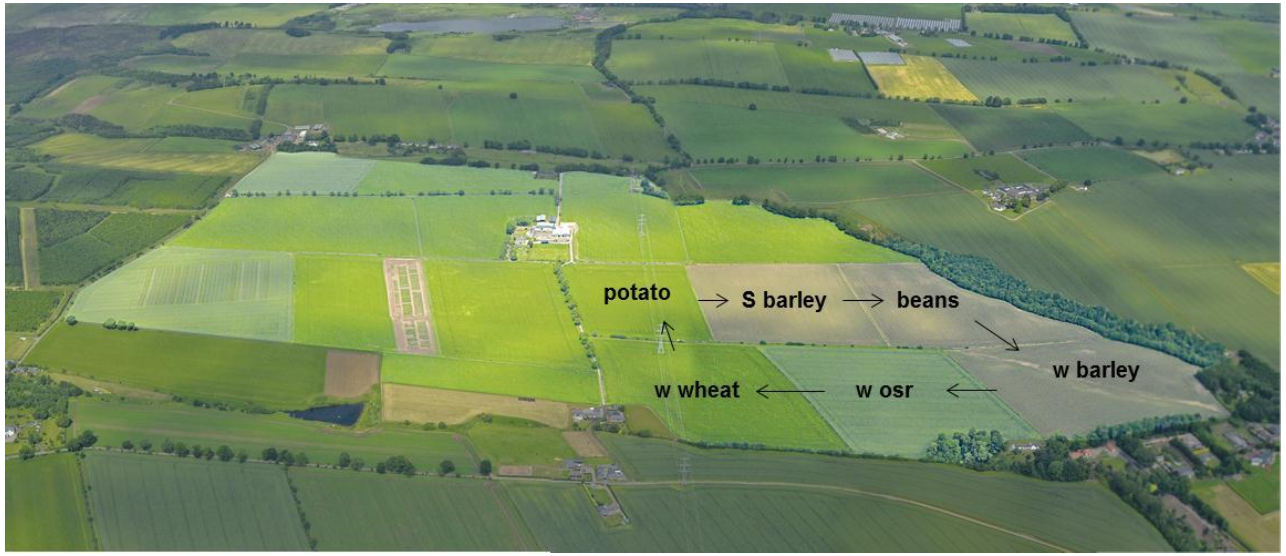
Sites operated at different scales

Mid Pilmore, JHI



STAR, NIAB-TAG

NFS, NIAB-TAG



Centre for Sustainable Cropping, JHI

Seasonal Changes : Mid-Pilmore

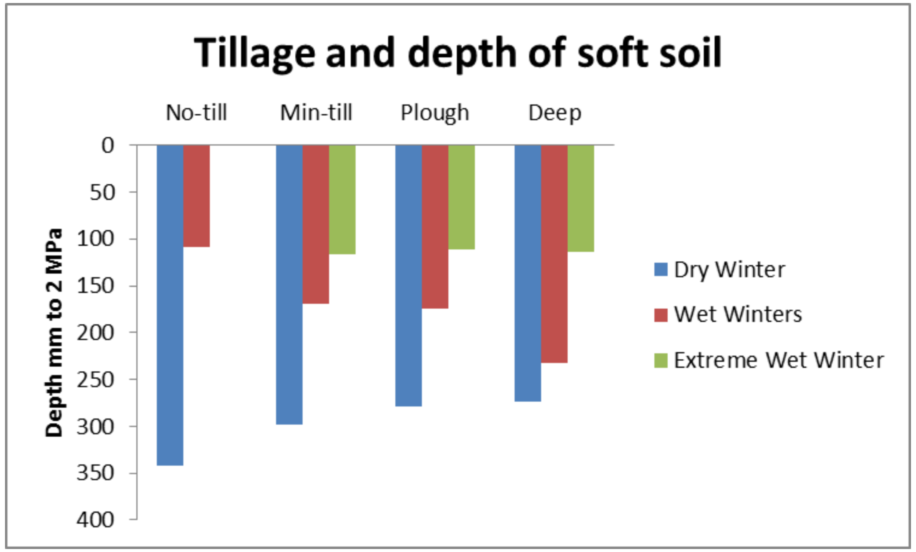
Taking field measurements in mid-late May each year.
Stopped No-Till in 2015 as it was over-run with weeds.
Other treatments finished at end 2016. Note winter conditions.

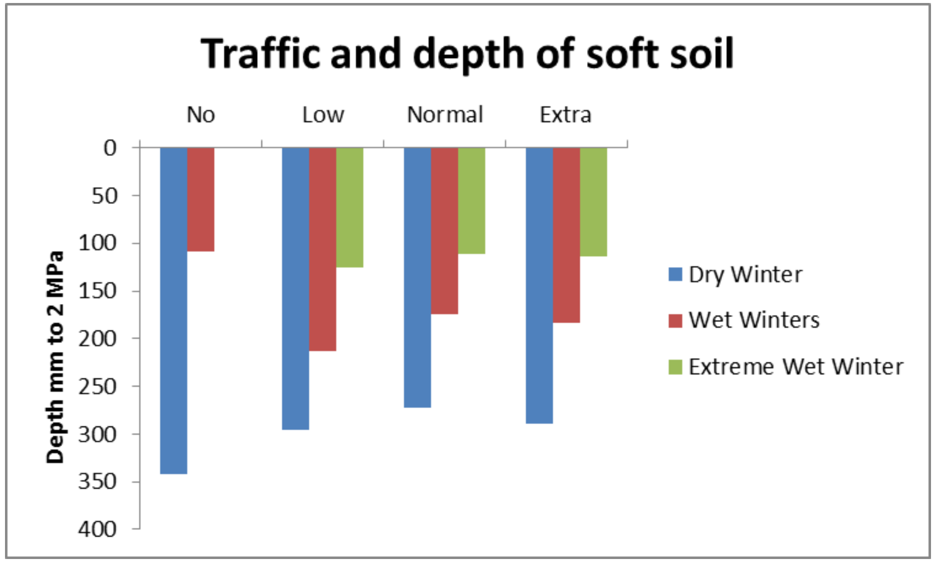
	Winter (December – February) rainfall (mm) in months preceding soil measurements	Rank order of the winter rainfall for the 62 available winters			Rank order of the mean daily winter temperatures for the 62 available winters
2011-12	108	57			23
2012-13	276	6			21
2013-14	290	4			18
2015-16	380	1			9

winter 2012 dry: winter 2013 & 2014 wet: winter 2016 record wet

Weather: soil conditions in spring cereal in May following mild winters with different rainfall.

Dry winter 11/12
Wet winters 12/13 & 13/14
Extreme wet 15/16





Waterlogging of soil causes slumping, stops aerobic processes, denatures OM, increases erosion risk,

Mid-Pilmore yield and genotypes

2013, 2014 & 2015 identical genotypes and agronomy

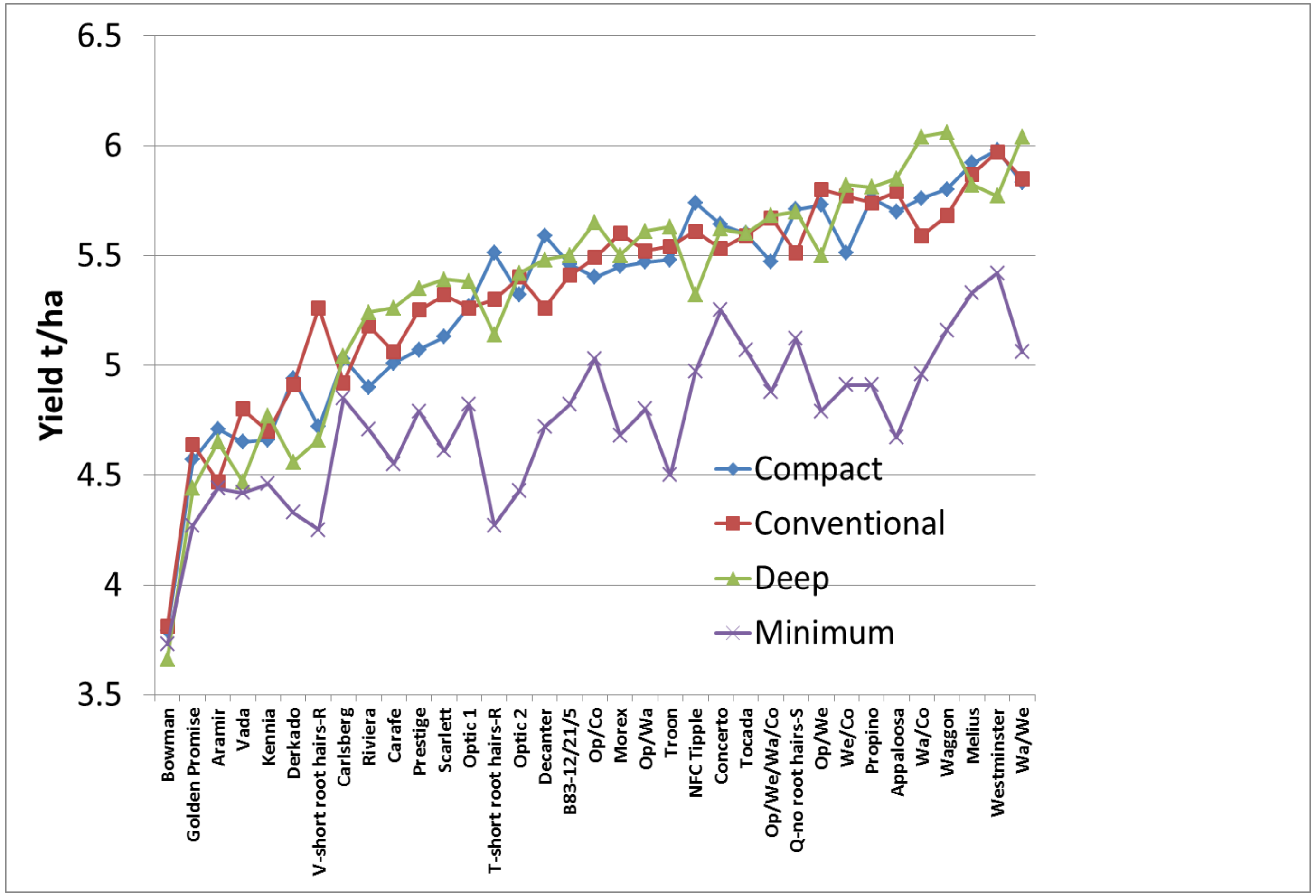
Replicated plots (6 m x 1 m) – treat yields as relative

30 genotypes under established cropping systems

Continuous barley for > 10 years

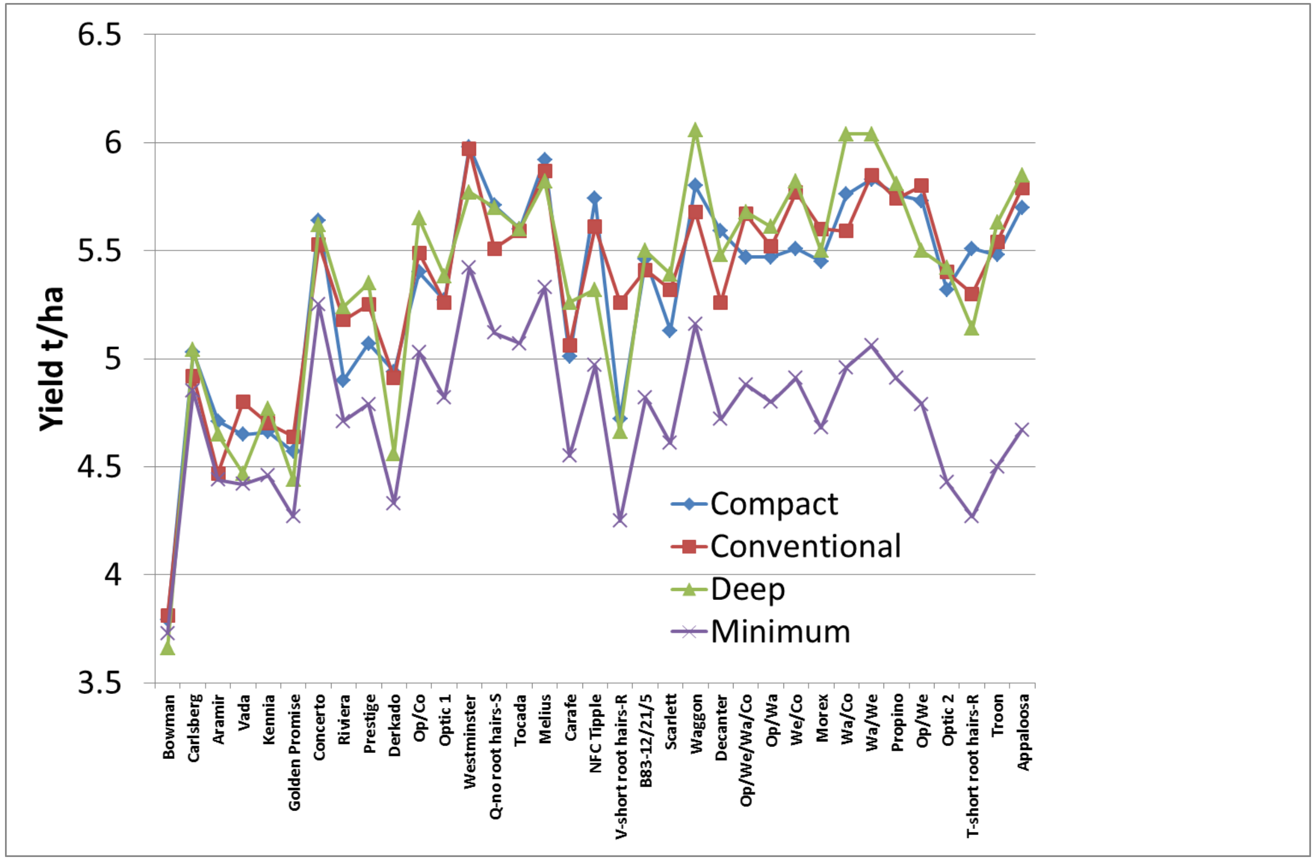
Plough (x3) vs shallow non-inversion (Min-till) with same agronomy

Mid-Pilmore yield and genotypes



Mean cultivar yield response differences between tillage treatment.

Mid-Pilmore yield and genotypes



Mean cultivar yields ranked by difference between non-inversion and inversion tillage treatment.

Mid-Pilmore yield and genotypes

Non-inversion yields were lower than inversion yields in every year (no differences between the three inversion tillage treatments). Evidence for both winter and spring barley.

The highest yield cultivars under non-inversion tillage tended to have the highest yield under ploughing but the yield difference between inversion and non-inversion was not correlated with cultivar yield overall.

Breeding under ploughed systems.

STAR Project

(**S**ustainability **T**rial for **A**rable **R**otations)

AHDB

Rotations

- Winter Cropping
- Spring Cropping
- Continuous W Wheat
- Alternate Fallow

X

Establishment

- Annual Plough
- Deep non-inversion
- Shallow non-inversion
- Managed Approach

= 16 treatments

X 3 replicates

Rotation	Cropping											
	2006 (Yr 1)	2007 (Yr 2)	2008 (Yr 3)	2009 (Yr 4)	2010 (Yr 5)	2011 (Yr 6)	2012 (Yr 7)	2013 (Yr 8)	2014 (Yr 9)	2015 (Yr 10)	2016 (Yr 11)	2017 (Yr 12)
1 Winter cropping	WOSR	Wheat	Winter beans	Wheat	WOSR	Wheat	Winter beans	Wheat	WOSR	Wheat	Winter beans	Wheat
2 Spring cropping	Spring Beans	Wheat	Spring Oats	Wheat	Spring Beans	Wheat	Spring Linseed	Wheat	Spring Oats	Wheat	Spring beans	Wheat
3 Cont wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat	Wheat
4 Alt fallow	Fallow	Wheat	Fallow	Wheat	Fallow	Wheat	Fallow	Wheat	Fallow	Wheat	Fallow	Wheat

In the managed approach the cultivation regime is decided annually by the project steering group; this decision is based on soil conditions / assessments, previous cropping, weed burden and local best practice. The techniques used have ranges from single pass approaches through to ploughing.

STAR: long term yield and margin trends (all crops)

(Heavy soil: Hanslope / Beccles series)

Years 2006-2015

	Relative yield return (relative to ploughed approach)				
	Winter	Spring	Cont	Alt Fallow	Mean
Plough	100	100	100	100	*100*
Managed	95	103	107	94	*100*
Deep	99	97	98	99	*98*
Shallow	93	93	100	98	*96*
Average	*97*	*98*	*101*	*98*	

	Cumulative gross margin minus costs (£/ha)			
	Mean			*Mean*
Plough	4326 (100%)		Winter	6103
Managed	4572 (106%)		Spring	4100
Deep	4516 (104%)		Cont	4315
Shallow	4272 (99%)		Alt Fallow	3183

NIAB TAG New Farming Systems (NFS)

AHDB

- NFS cover crop and cultivation experiment
  - 4 cultivation systems (plough, deep and shallow non-inversion and managed)
  - ± autumn cover crops ahead of spring sown crops
  - medium soil (Ashley series)

Rotation	**Year 1 (2008)**	**Year 2 (2009)**	**Year 3 (2010)**	**Year 4 (2011)**	**Year 5 (2012)**	**Year 6 (2013)**	**Year 7 (2014)**	**Year 8 (2015)**	**Year 9 (2016)**	**Year 10 (2017)**
Spring break based	ww	sosr	ww	sbn	ww	sbrly	wosr	ww	so	ww

Long term yield and margin (all crops 2009-16)

	Relative yield (cf. plough)	**Cumulative gross margin minus costs(£/ha)**	**Relative margin (cf. plough)**
Plough	100	4133	100
Managed	100	4468	108
Deep	95	4364	106
Shallow	89	4131	100
Average	-	4274	

(margins as gross output minus input costs and direct machinery costs)

Long term trends in yield and margin data – summary

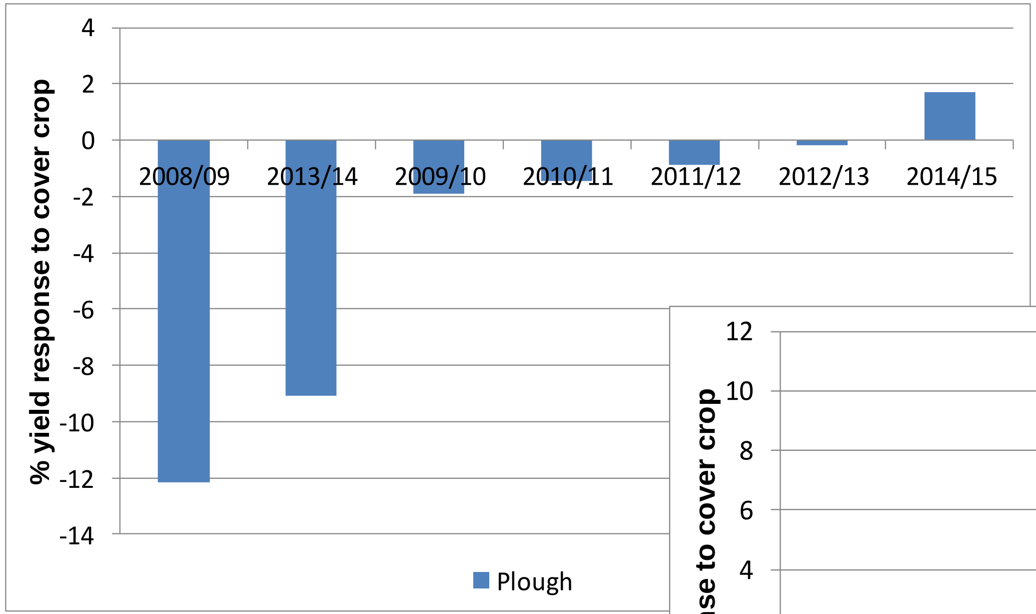
	Plough	***Deep non-inversion***	***Shallow non-inversion***
Yield - all crops (% of plough)			
STAR	100	98	96
NFS	100	95	89
Yield - winter wheat (% of plough)			
STAR	100	100	98
NFS	100	100	96
Cumulative margin - all crops (£/ha)			
STAR	4326	4516	4272
NFS	4133	4364	4131

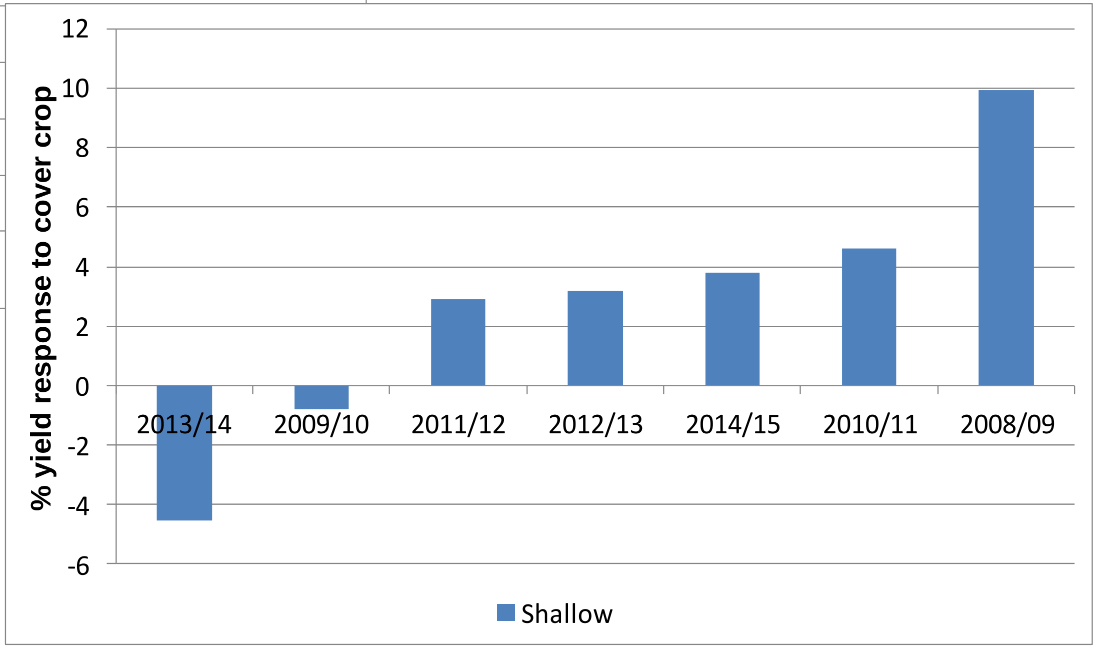
Cumulative yield (t/ha) margin (£/ha) for NFS years 6 (2012/13) to 9 (2014/15)

	Cumulative yield over seasons 6-9 (t/ha)			**Cumulative margin over seasons 6-9 (£/ha)**		
Tillage	No cover crop	Cover crop	Mean	No cover crop	Cover crop	Mean
Plough	27.63	27.38	27.51	2295	2210	2253
Managed	28.29	28.04	28.17	2604	2533	2569
Shallow	27.27	27.67	27.47	2457	2479	2468
Deep	28.68	28.21	28.45	2557	2461	2509
Mean	27.97	27.83	-	*2478*	*2421*	-

Yield response (%) to the use of a brassica cover crop in the NFS long term rotation study at Morley.

- Generally positive responses with cover crops and shallow tillage systems. Benefits less clear where plough based systems were used





Questions from the Fife monitor farm on cover crops in Scotland

Will the soil be wetter / drier under a cover crop?

Will cover crops help prevent erosion?

Will the soil organic matter improve?

Will there be more slugs?

Will there be more earthworms?

Will the yield of the following cereal crop be greater?

Experiment to (try to) answer these questions using farm scale equipment

Direct drilled cover crop followed by ploughed barley for 3 years replicated 3 times.

Strips 200 m long x 6 m wide (to suit our combine).

Sloping site at Balruddery.

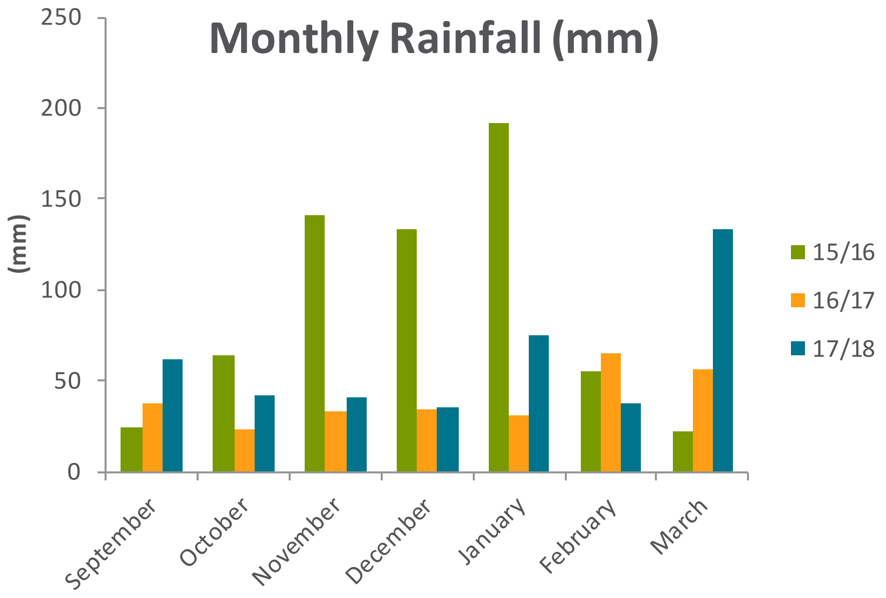
Experiment to (try to) answer these questions using farm scale equipment at Balruddery

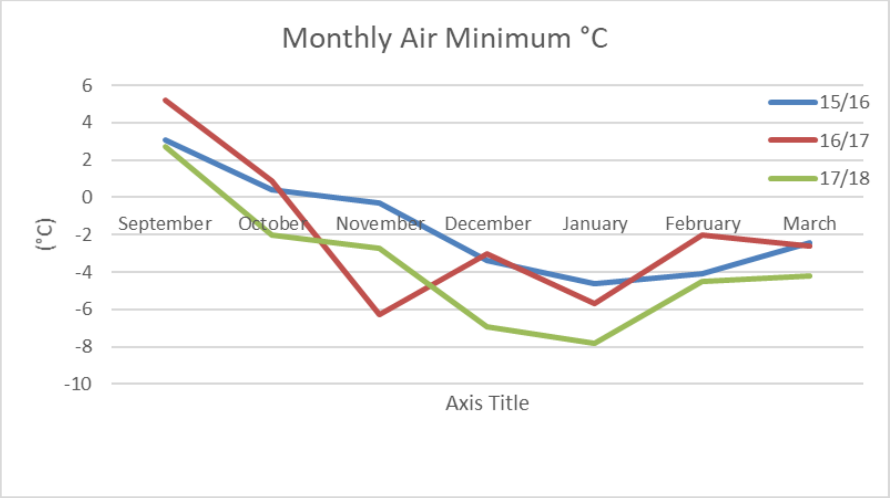
Binns field 6.9 ha: strips 200m long x 6 m wide to suit our combine

3 blocks each with 8 strips (stubble control + 7 cover crops) = 24 strips for 3 years.

Cover crops were direct drilled into barley residue in early September with 30 kg N, 5.4 kg P and 19 kg K placed with the seed.

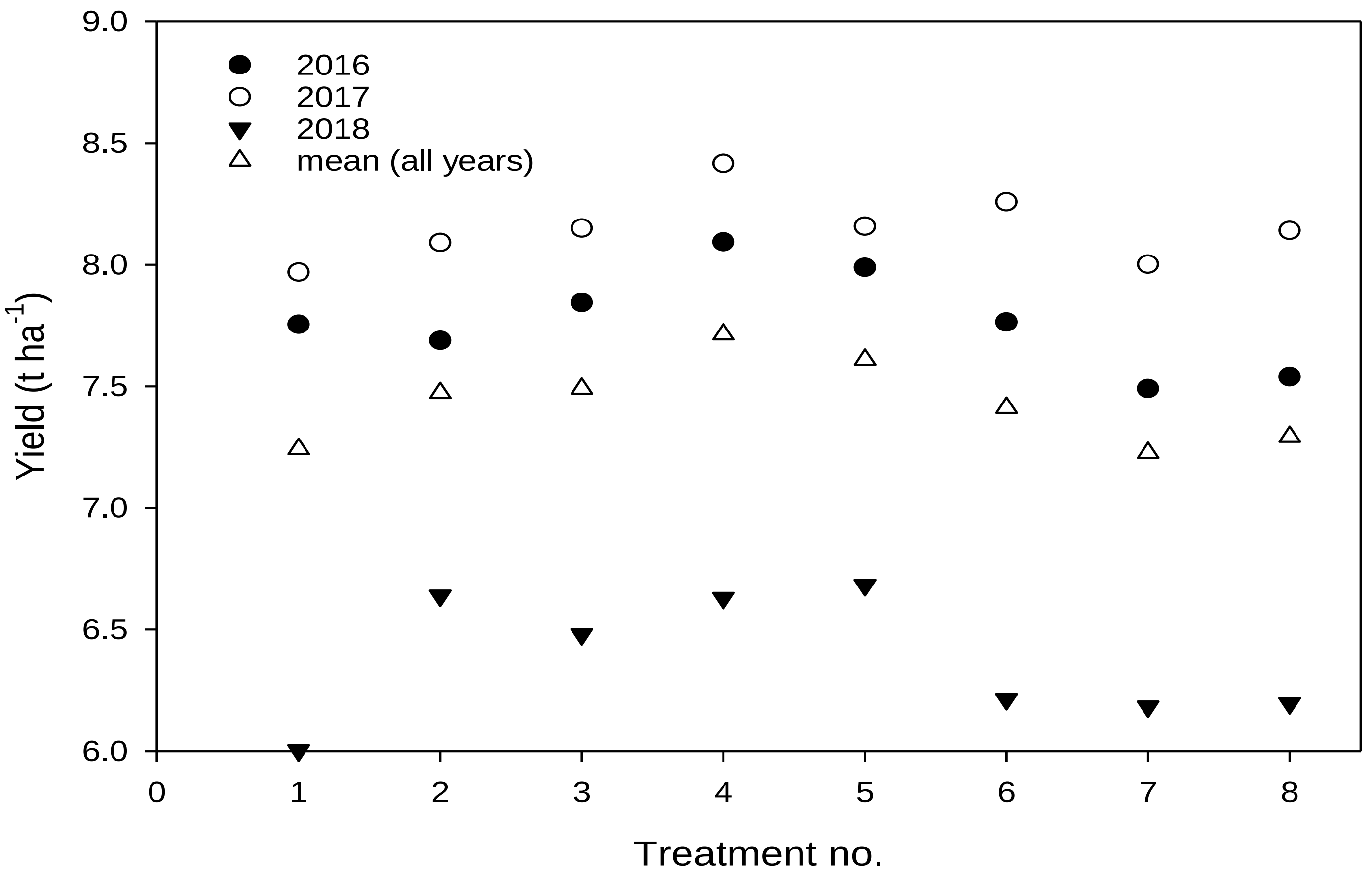
Rainfall & Temperature





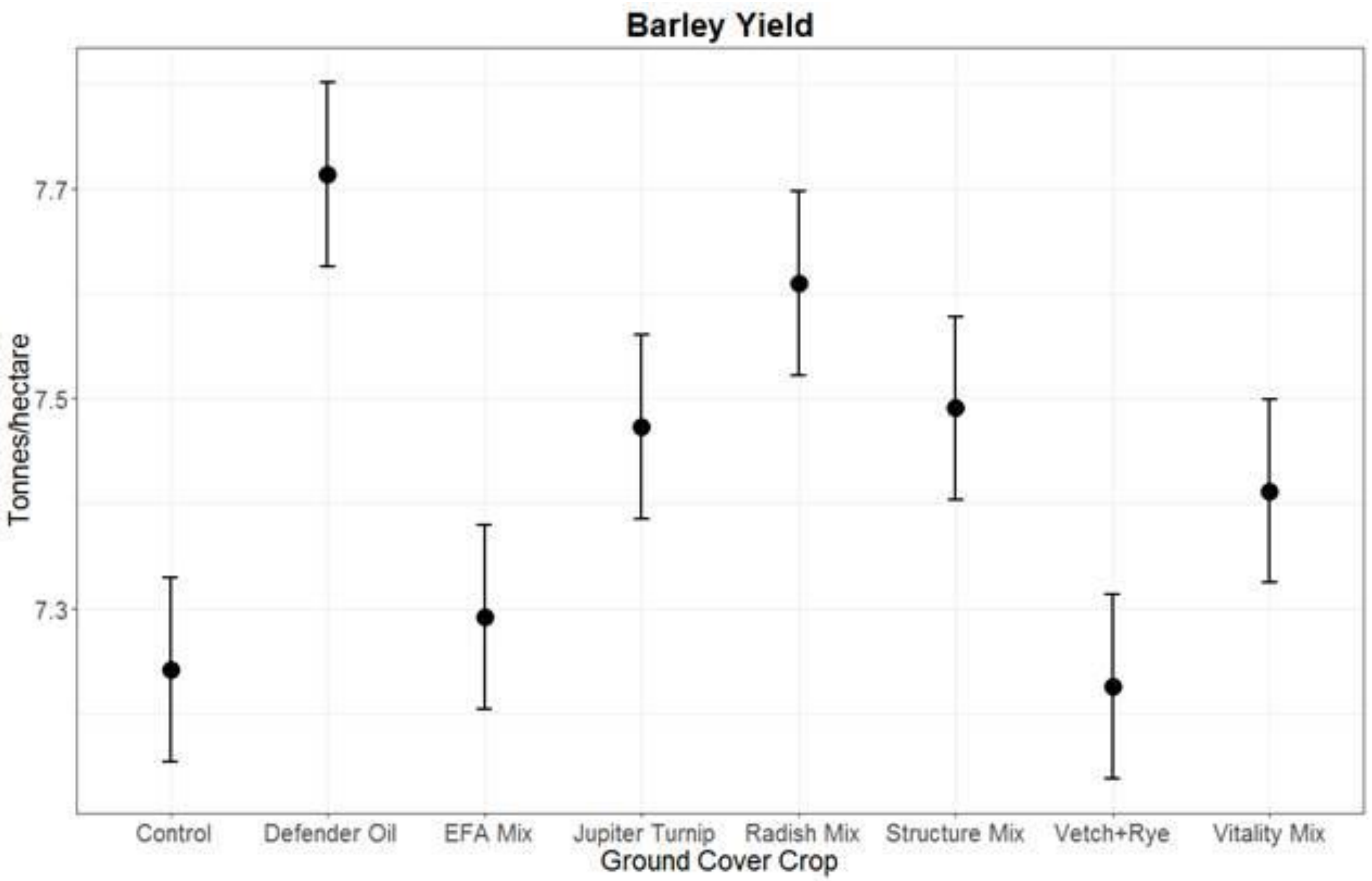
15/16 winter (Dec, Jan, Feb) was wettest on record with 380 mm (since 1954). Long-term averages about 60 mm/month. 16/17 & 17/18 rainfall "normal". 17/18 cold winter and in late Feb to early March the "beast from the east" arrived which was detrimental to many plants.

Spring barley yield 3 years and mean



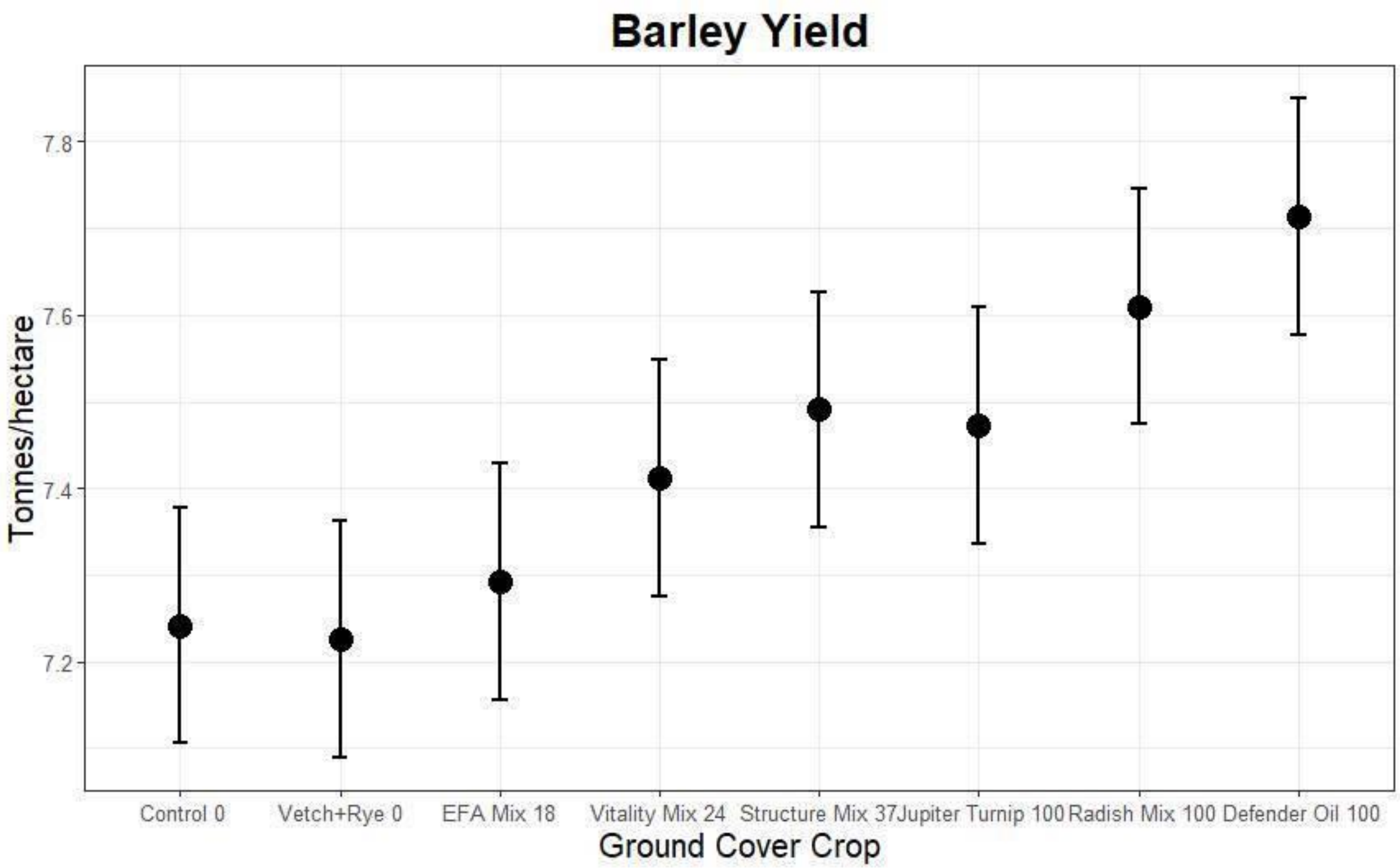
2016 average 7.8 t/ha. 2017 average 8.1 t/ha. 2018 average 6.4 t/ha

Spring barley yield mean of 3 years



2016 average 7.8 t/ha. 2017 average 8.1 t/ha. 2018 average 6.4 t/ha

Spring barley yield mean of 3 years by % Brassica



2016 average 7.8 t/ha. 2017 average 8.1 t/ha. 2018 average 6.4 t/ha

Interventions: Cover crops
Why we are using them? Need to know

Currently analyzing data from 3 (very different) years of range of cover crops (or barley stubble) experiment followed by conventionally ploughed spring barley.

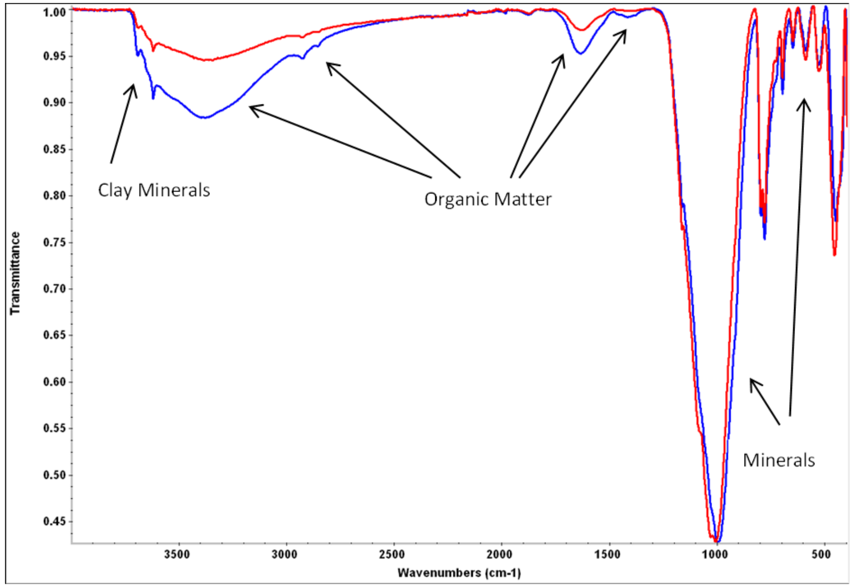
Some drying of the soil prior to sowing cereal

Any differences in soil fauna are minor

Help to minimize erosion risk

Benefit to following crop?

Possible changes to the nature of OM

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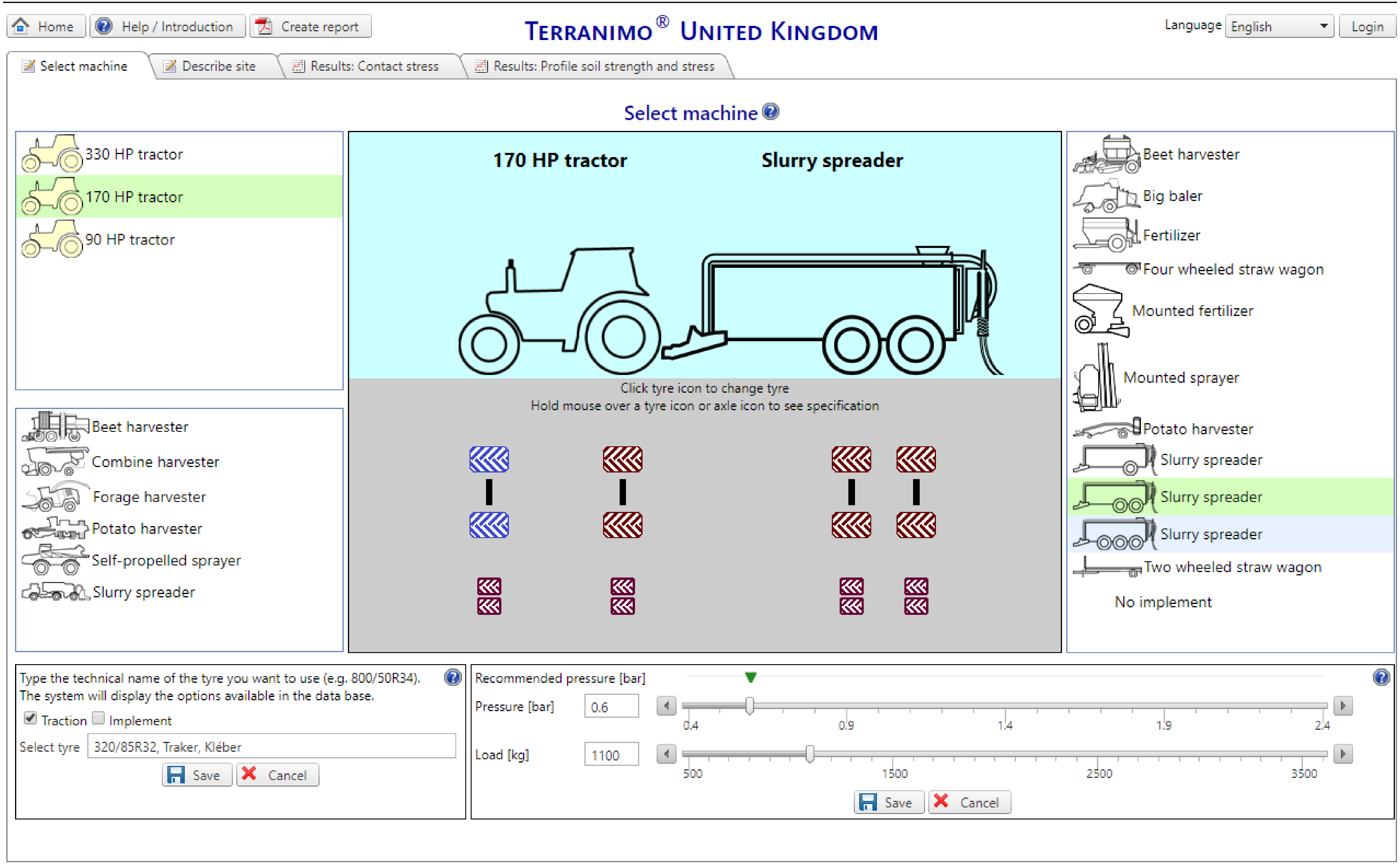
Terranimo® Finland
The different versions provide country-specific soil types
An introduction to Terranimo®
Vejledning på dansk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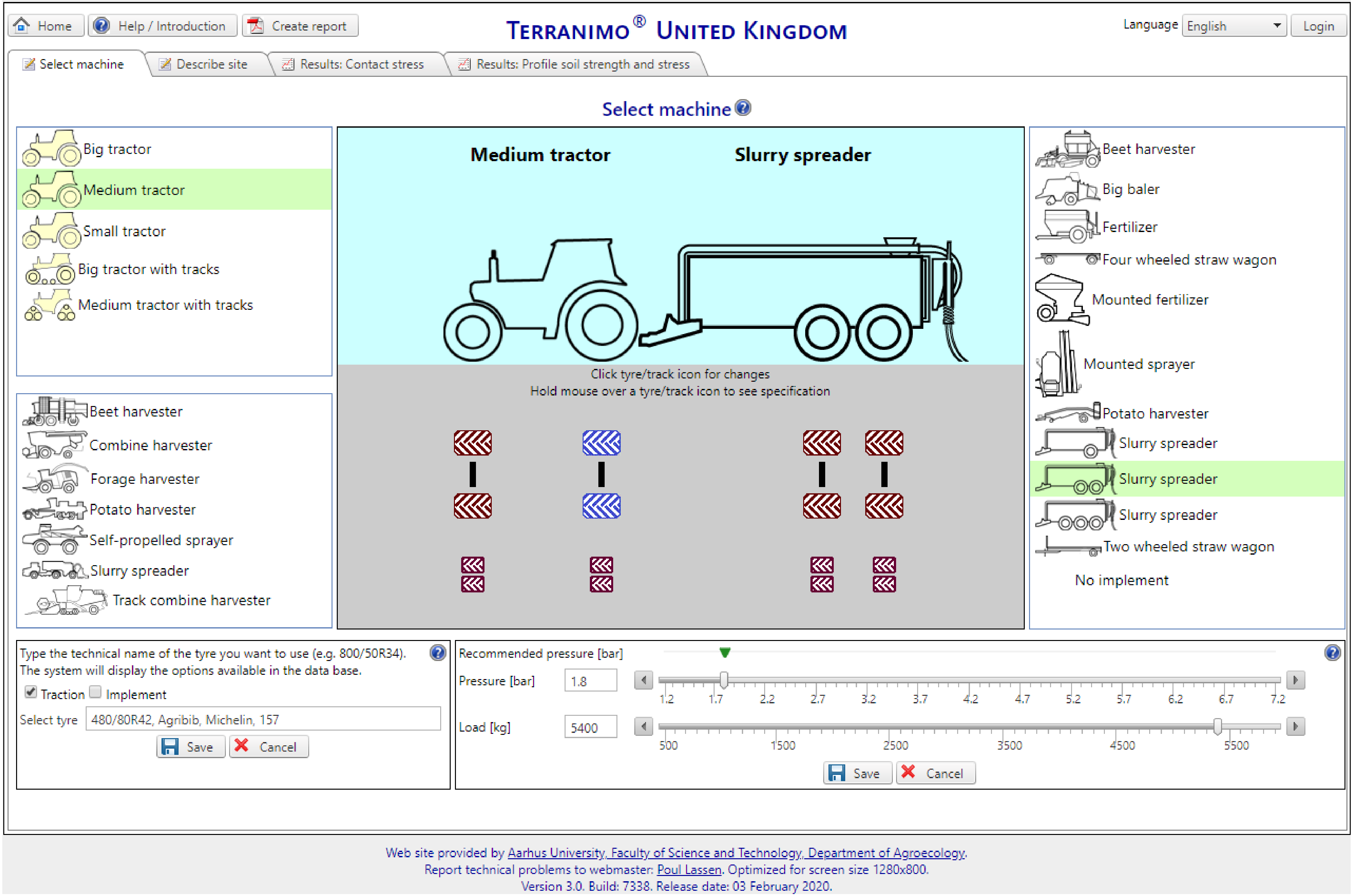
TERRANIMO® UNITED KINGDOM
Language English
Login
Select machine
Describe site
Results: Contact stress
Results: Profile soil strength and stress
Select machine
330 HP tractor
170 HP tractor
90 HP tractor
Beet harvester
Combine harvester
Forage harvester
Potato harvester
Self-propelled sprayer
Slurry spreader
170 HP tractor
Slurry spreader
Click tyre icon to change tyre
Hold mouse over a tyre icon or axle icon to see specification
Beet harvester
Big baler
Fertilizer
Four wheeled straw wagon
Mounted fertilizer
Mounted sprayer
Potato harvester
Slurry spreader
Slurry spreader
Slurry spreader
Two wheeled straw wagon
No implement
Type the technical name of the tyre you want to use (e.g. 800/50R34).
The system will display the options available in the data base.
Traction
Implement
Select tyre 320/85R32, Traker, Kléber
Save
Cancel
Recommended pressure [bar]
Pressure [bar] 0.6
0.4
0.9
1.4
1.9
2.4
Load [kg] 1100
500
1500
2500
3500
Save
Cancel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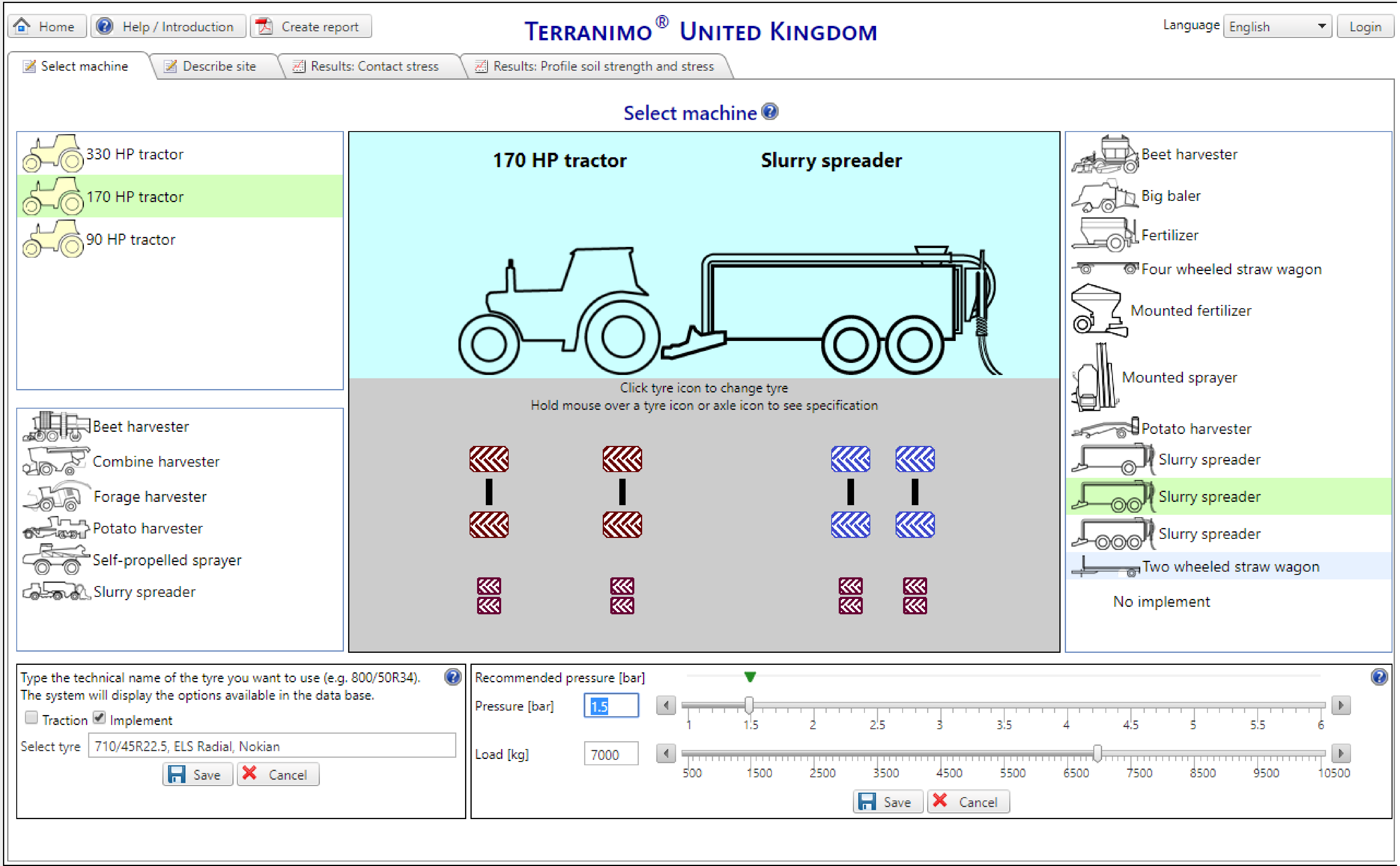
Language English
Login
Select machine
Describe site
Results: Contact stress
Results: Profile soil strength and stress
Select machine
Big tractor
Medium tractor
Small tractor
Big tractor with tracks
Medium tractor with tracks
Beet harvester
Combine harvester
Forage harvester
Potato harvester
Self-propelled sprayer
Slurry spreader
Track combine harvester
Medium tractor
Slurry spreader
Click tyre/track icon for changes
Hold mouse over a tyre/track icon to see specification
Beet harvester
Big baler
Fertilizer
Four wheeled straw wagon
Mounted fertilizer
Mounted sprayer
Potato harvester
Slurry spreader
Slurry spreader
Slurry spreader
Two wheeled straw wagon
No implement
Type the technical name of the tyre you want to use (e.g. 800/50R34).
The system will display the options available in the data base.
Traction
Implement
Select tyre
480/80R42, Agribib, Michelin, 157
Save
Cancel
Recommended pressure [bar]
Pressure [bar]
1.8
1.2
1.7
2.2
2.7
3.2
3.7
4.2
4.7
5.2
5.7
6.2
6.7
7.2
Load [kg]
5400
500
1500
2500
3500
4500
5500
Save
Cancel
Web site provided by Aarhus University, Faculty of Science and Technology, Department of Agroecology.
Report technical problems to webmaster: Poul Lassen. Optimized for screen size 1280x800.
Version 3.0. Build: 7338. Release date: 03 February 2020.



Home
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Create report
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Language English
Login
Select machine
Describe site
Results: Contact stress
Results: Profile soil strength and stress
Select machine
330 HP tractor
170 HP tractor
90 HP tractor
Beet harvester
Combine harvester
Forage harvester
Potato harvester
Self-propelled sprayer
Slurry spreader
170 HP tractor
Slurry spreader
Click tyre icon to change tyre
Hold mouse over a tyre icon or axle icon to see specification
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Fertilizer
Four wheeled straw wagon
Mounted fertilizer
Mounted sprayer
Potato harvester
Slurry spreader
Slurry spreader
Slurry spreader
Two wheeled straw wagon
No implement
Type the technical name of the tyre you want to use (e.g. 800/50R34).
The system will display the options available in the data base.
Traction
Implement
Select tyre 710/45R22.5, ELS Radial, Nokian
Save
Cancel
Recommended pressure [bar]
Pressure [bar] 1.5
1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6
Load [kg] 7000
500 1500 2500 3500 4500 5500 6500 7500 8500 9500 10500
Save
Cancel

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Language: English | Login

Select machine | Describe site | Results: Contact stress | Results: Profile soil strength and stress

Site information

Tillage: ○ Yes (only if recently ploughed) ● No

Soil texture

● Automatic by soil type ○ Manual texture ○ Texture from soil database

Select soil type: ABERDEENSHIRE

No.	Bottom [cm]	Clay [%]	Silt [%]	Sand [%]	Organic matter [%]	Bulk density [g/cm³]
1	10	3.0	47.3	49.7	4.2	1.08
2	20	3.0	47.3	49.7	4.2	1.08
3	30	3.0	47.3	49.7	4.2	1.08
4	40	4.4	43.1	52.5	4.0	1.19
5	50	3.1	20.5	76.4	0.6	1.52
6	60	3.2	19.2	77.6	0.1	1.89
7	70	3.2	19.2	77.6	0.1	1.89
8	80	3.2	19.2	77.6	0.1	1.89
9	90	3.2	19.2	77.6	0.1	1.89
10	100	3.2	19.2	77.6	0.1	1.89
11	110	3.2	19.2	77.6	0.1	1.89
12	120	3.2	19.2	77.6	0.1	1.89
13	130	3.2	19.2	77.6	0.1	1.89
14	140	3.2	19.2	77.6	0.1	1.89
15	150	3.2	19.2	77.6	0.1	1.89

Soil water

● Automatic by wetness ○ Manual matric potential

Select wetness: Moist

No.	Bottom [cm]	Matric potential [hPa]
1	10	100
2	20	100
3	30	100
4	40	100
5	50	100
6	60	100
7	70	100
8	80	100
9	90	100
10	100	100
11	110	90
12	120	80
13	130	70
14	140	60
15	150	50

Reset soil and water to default

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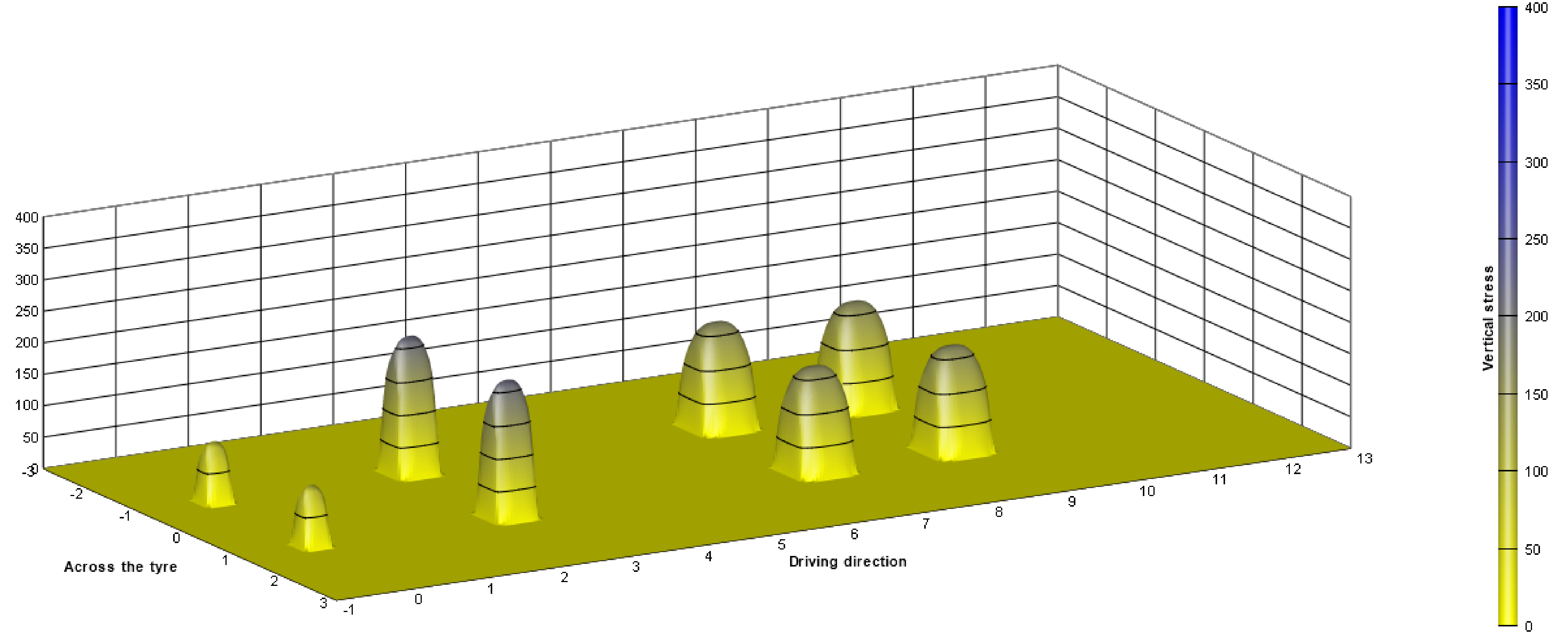
Select machine | Describe site | Results: Contact stress | Results: Profile soil strength and stress

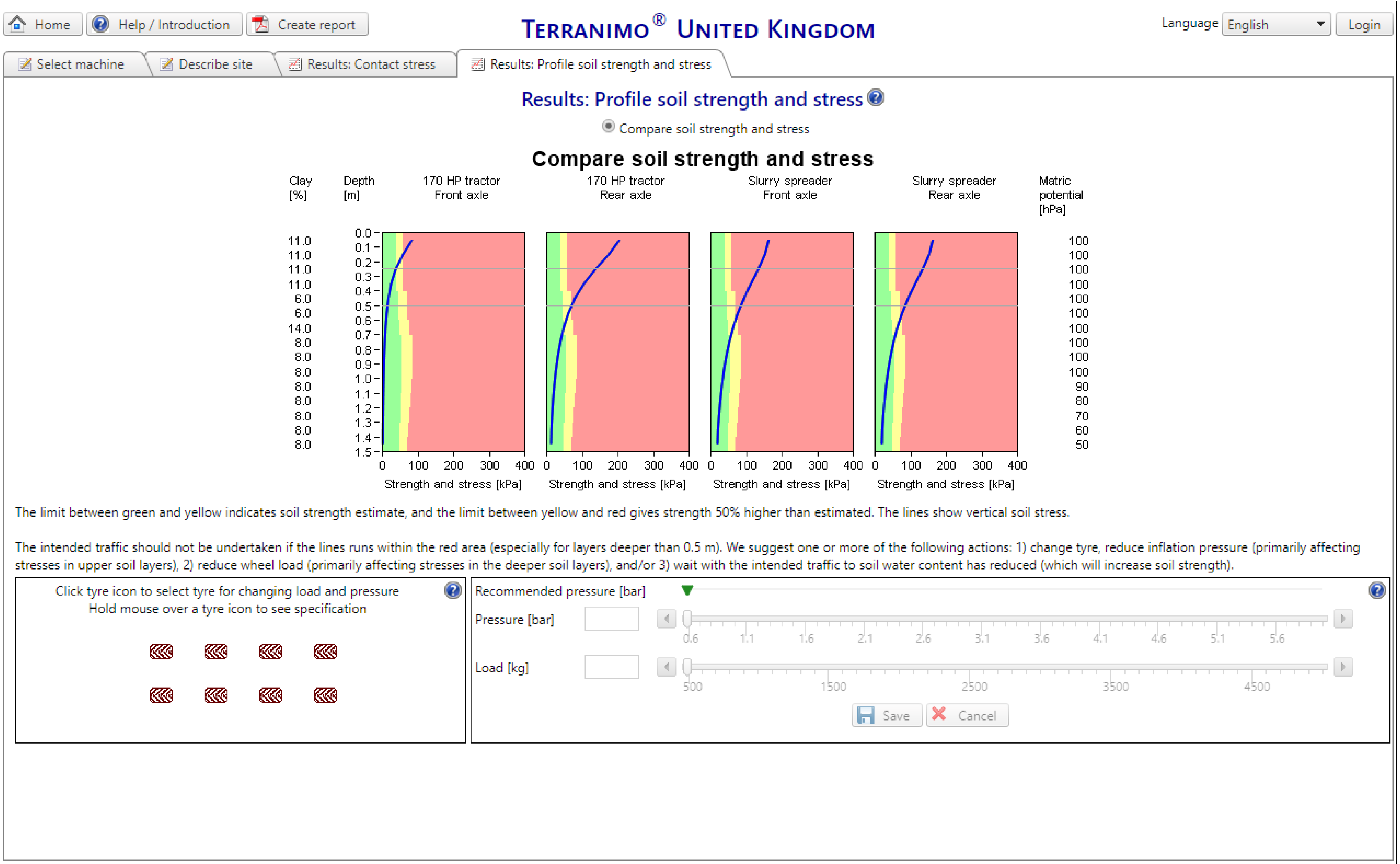
Results: Contact stress

Surface Contour

Contact stress [surface]



Select machine	Axle	Wheel	Tyre	Wheel load [kg]	Pressure [bar]	Recommended pressure [bar]	Contact area [m^2]	Mean ground pressure [kPa]	Maximum stress [kPa]
170 HP tractor	Front axle	Right	Kléber, Traker 320/85R32	1100	0.6	0.6	0.232	46	96
170 HP tractor	Rear axle	Right	Michelin, Agribib 480/80R42	5400	2.3	2.3	0.465	114	217
Slurry spreader	Front axle	Right	Nokian, ELS Radial 710/55R34	6965	1.5	1.5	0.715	96	166
Slurry spreader	Rear axle	Right	Nokian, ELS Radial 710/55R34	6965	1.5	1.5	0.715	96	166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Language English
Login
Select machine
Describe site
Results: Contact stress
Results: Profile soil strength and stress
Results: Profile soil strength and stress
Compare soil strength and stress
Compare soil strength and stress
Clay [%]
Depth [m]
170 HP tractor Front axle
170 HP tractor Rear axle
Slurry spreader Front axle
Slurry spreader Rear axle
Matric potential [hPa]
Strength and stress [kPa]
The limit between green and yellow indicates soil strength estimate, and the limit between yellow and red gives strength 50% higher than estimated. The lines show vertical soil stress.
The intended traffic should not be undertaken if the lines runs within the red area (especially for layers deeper than 0.5 m). We suggest one or more of the following actions: 1) change tyre, reduce inflation pressure (primarily affecting stresses in upper soil layers), 2) reduce wheel load (primarily affecting stresses in the deeper soil layers), and/or 3) wait with the intended traffic to soil water content has reduced (which will increase soil strength).
Click tyre icon to select tyre for changing load and pressure
Hold mouse over a tyre icon to see specification
Recommended pressure [bar]
Pressure [bar]
Load [kg]
Save
Cancel

Terranimo - Conclusions

Terranimo model : have a play – it's free

Real machinery and UK soils data

Does my choice of tyre and inflation pressure matter?

do I need to change inflation from road to field?

Is it important to avoid wet conditions?

Can I suggest limits on what contractors can do?

What's just arrived - tracks

Some of this talk is based on results from long-term experiments

Funded in different ways by multiple agencies

Multiple organizations involved

For full 176 page report (or summary) see:

https://cereals.ahdb.org.uk/publications/2017/july/06/platforms-to-test-and-demonstrate-sustainable-soil-management-integration-of-major-uk-field-experiments.aspx

Many people and funders to thank

NIAB: Ron Stobart, Nathan Morris, Mark Stalham
University of Aberdeen: Paul Hallett
James Hutton Institute: Tracy Valentine, Tim George, Adrian Newton, Jonathan Holland, Kirsty Binnie, Jennifer Brown, Anna Taylor, Lawrie Brown, Dave Guy
SRUC: Bruce Ball, Joanna Cloy
Kings Seeds: Alan Johnson

Funding from Scottish Government & AHDB

Used the platforms to measure changes in soil carbon

Why carbon? - relate to soil function

Need to allow for soil depth i.e. consider entire profile

Need to all for differences in soil bulk density

May need to consider stone content

Carbon – STAR allowing for bulk density

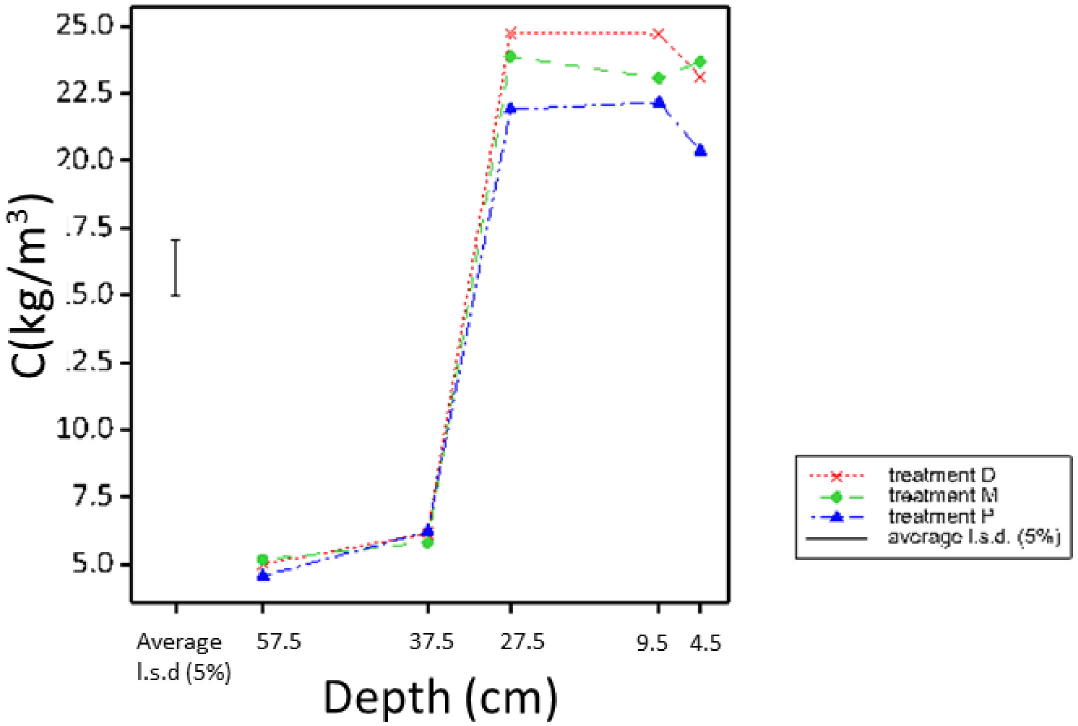


Figure 4.4.2: Soil organic carbon by tillage treatment and depth in STAR. D= deep non-inversion tillage, M= minimum or non-inversion tillage, P= mouldboard plough/inversion.

Carbon – NFS allowing for bulk density

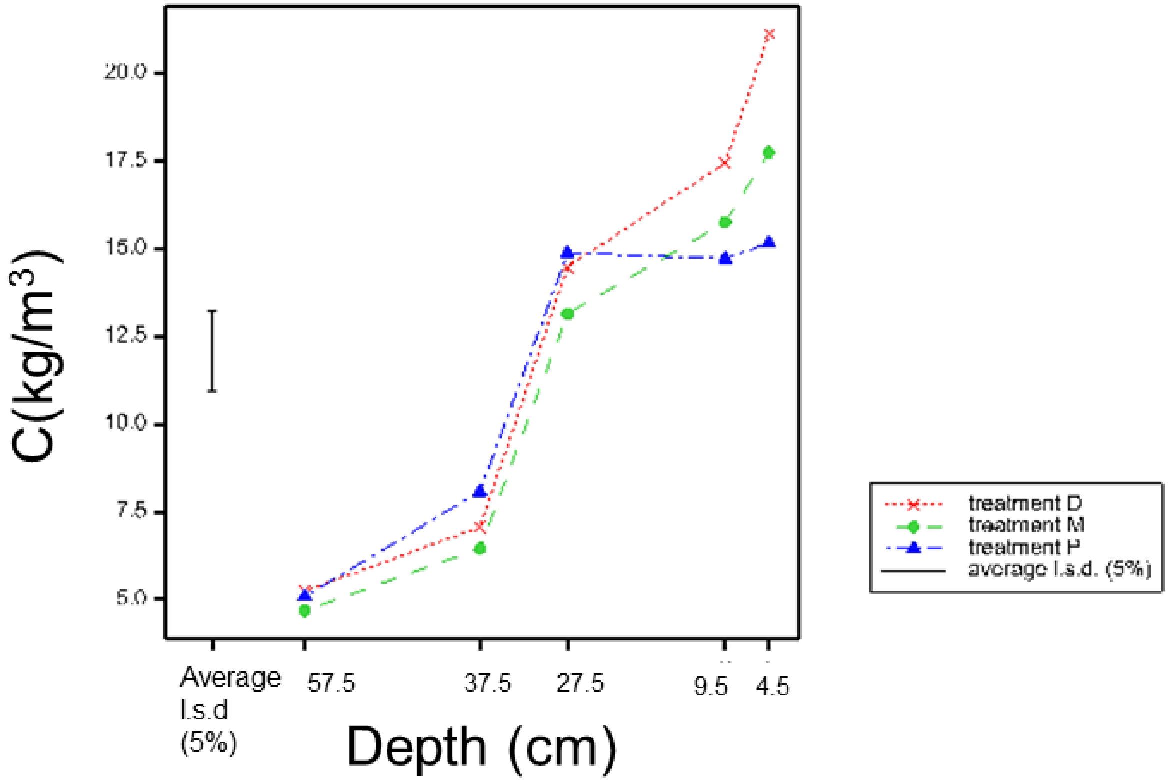
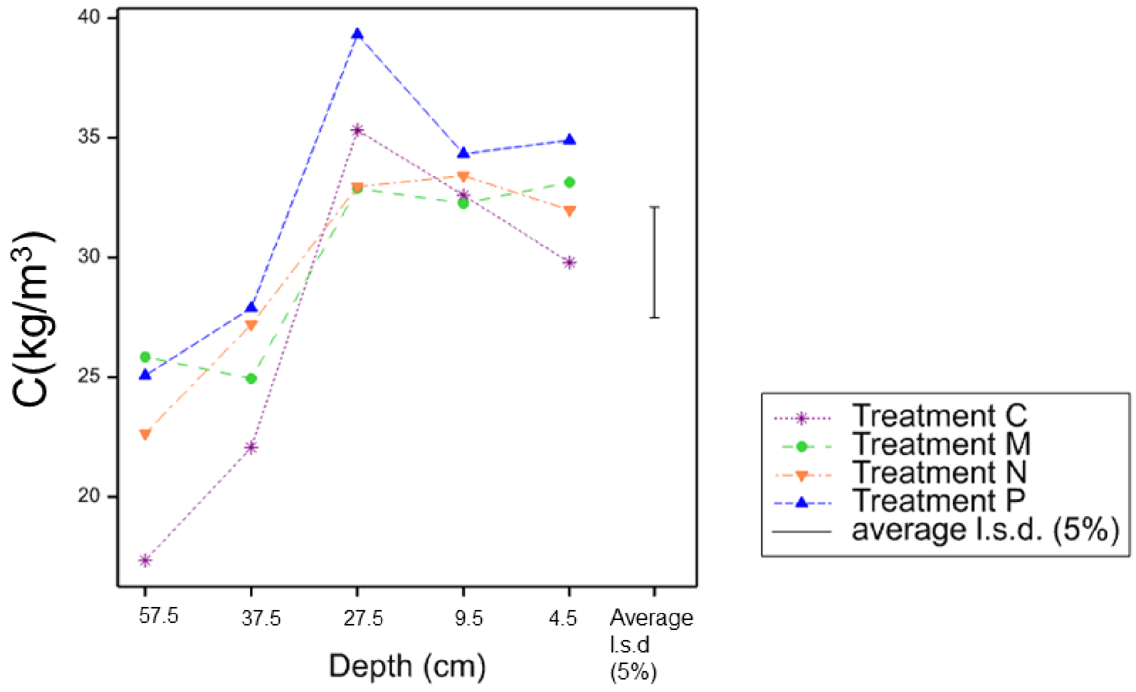


Figure 4.4.4: Soil carbon distribution by depth and tillage treatment in the NFS site. D= deep non-inversion tillage, M= minimum or non-inversion tillage, P= mouldboard plough/inversion.

Soil Carbon Mid-Pilmore



Soil carbon distribution by depth and tillage treatment in Mid-Pilmore. C= compaction treatment, M= shallow non-inversion tillage, N= No-Till, P= plough.

Carbon messages

Even after multiple years of No-Till there was no increase in soil carbon store (vs plough).

Similarly for non-inversion tillage vs plough.

Large applications of compost over multiple years (combined with non-inversion tillage) did increase soil carbon.


‘Inspiring our farmers, growers
and industry to succeed in a
rapidly changing world’

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News from the East

Tom Mead

Bleak House Farm

@meadsfarm

CEREALS & OILSEEDS

Business Priorities

1. Justifying Scale
2. Growing Good Crops
3. Sustaining two Families
4. Making the most of Time

CEREALS & OILSEEDS

Justifying Scale

DAIRY

Bleak House Farm

AHDB

- Started 1926 (35 acres, Milk Round and Coal Round)
- Today (312ha)
- 127 ha Owned
- 62 ha Contract Farming
- 65 ha rented on AHA and FBT's
- 58 ha stubble to stubble contracting on 2 holdings

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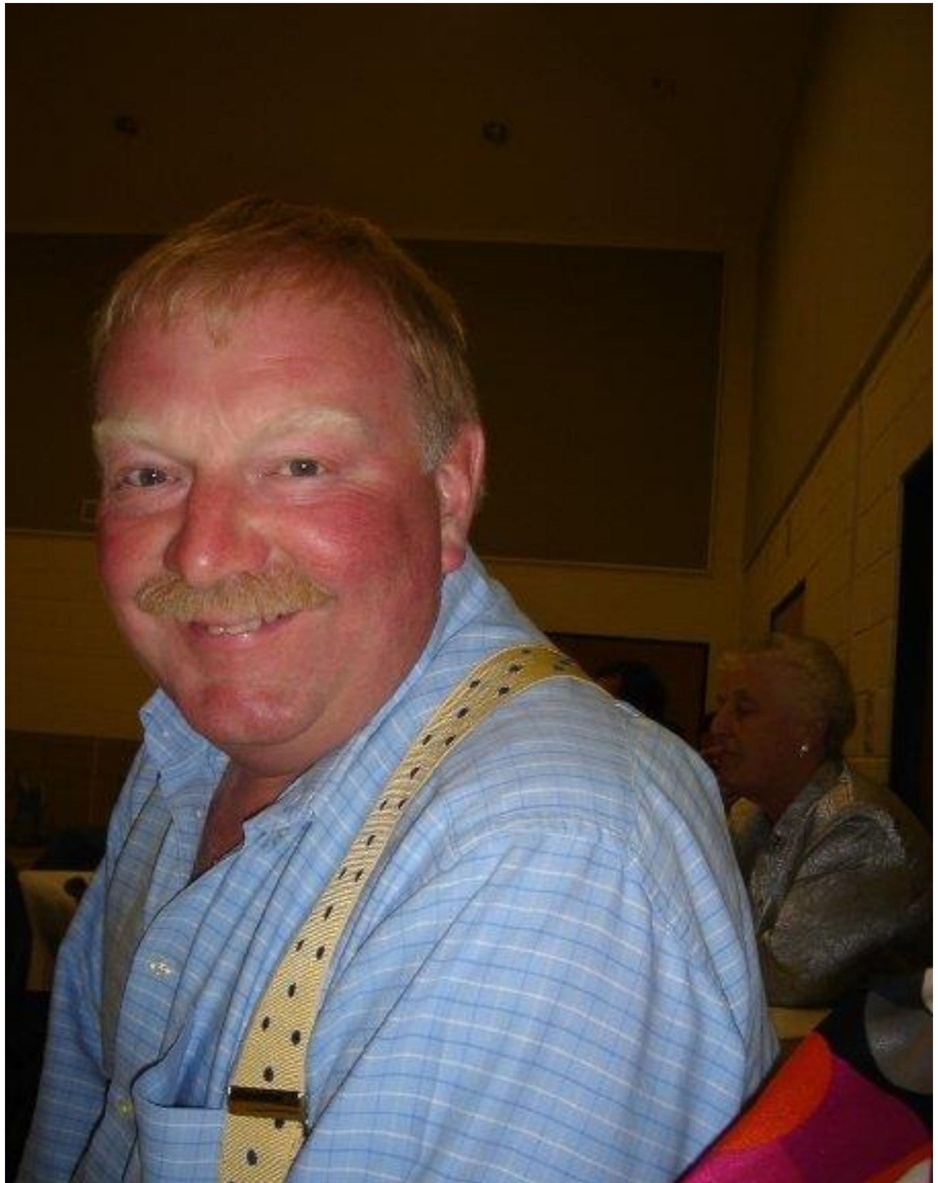
Area

Av Field size 10.5ha

Labour

AHDB



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Machinery

AHDB

- 1 John Deere 6190R 190HP
- 1 John Deere 6155R 155HP
- JCB Forklift
- 7.5m Claas Combine
- 30m Sprayer
- 6m tine Drill

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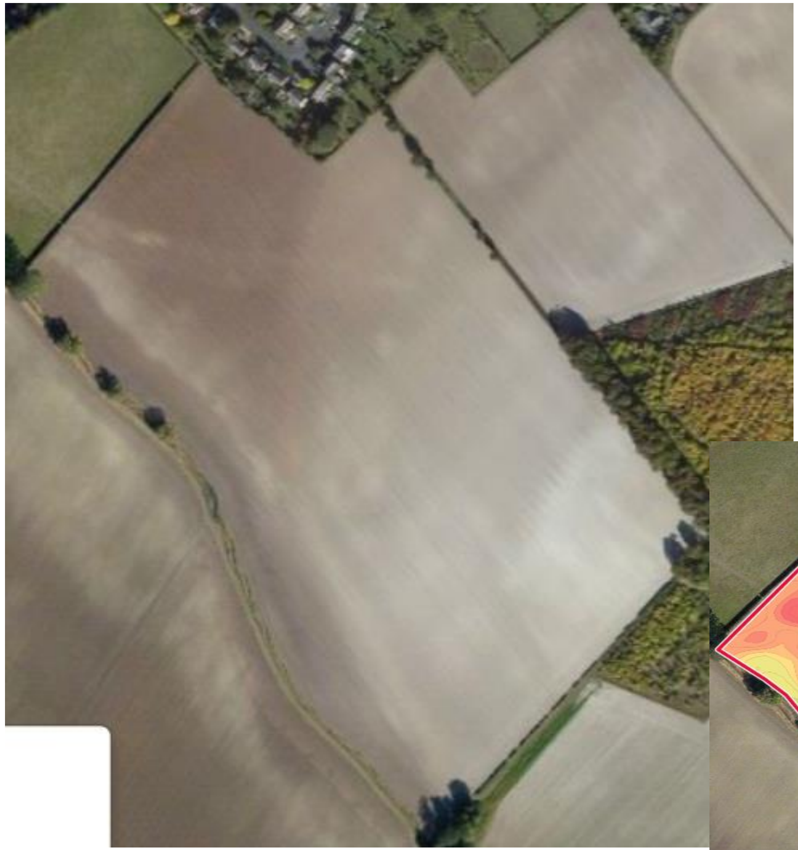
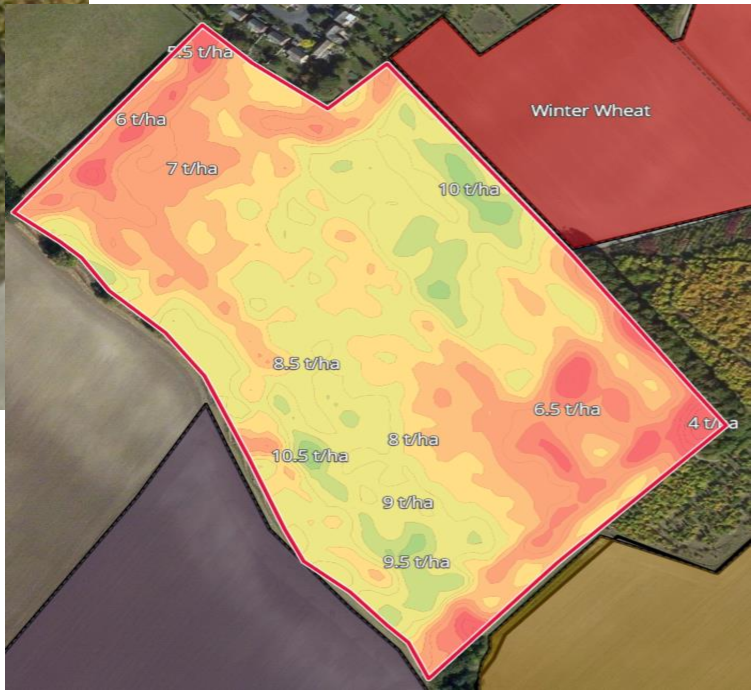
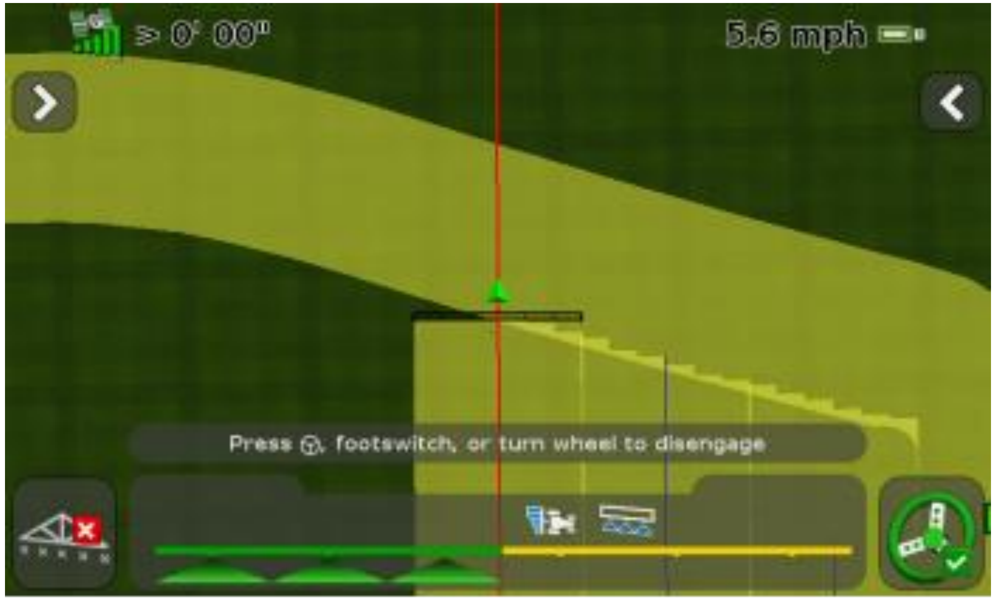
Innovation & Technology



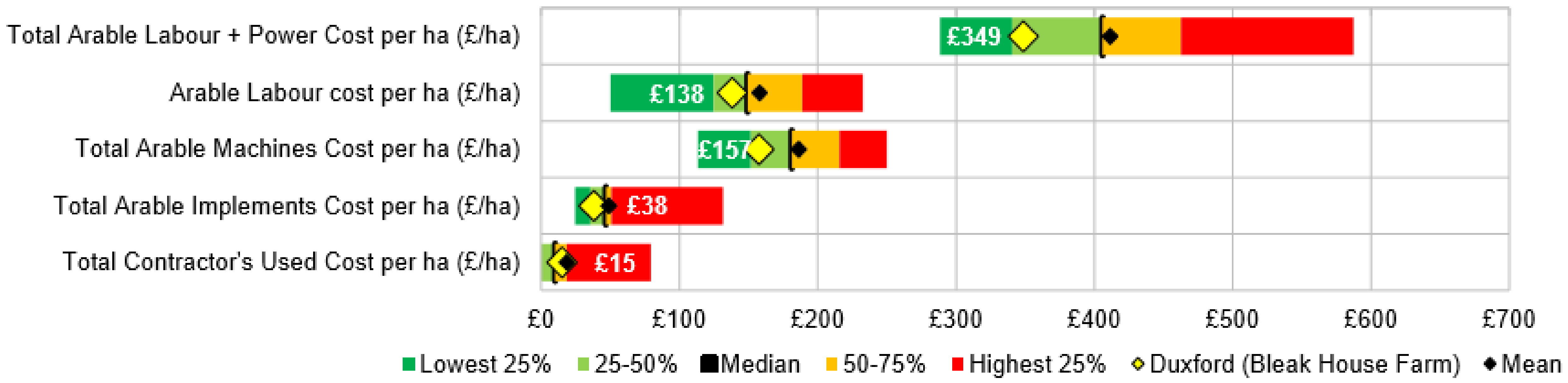
- Section control
- Yield mapping
- Yen
- Variable rate inputs
- Implementation cost V return
- Grants





Trimble CFX-750 Display with Field-IQ
Six boom sections


SABRE 6000M
WEAVING



CEREALS & OILSEEDS

Chart 6: Sprayer, Drill and Combine utilisation per cropped hectare[6]

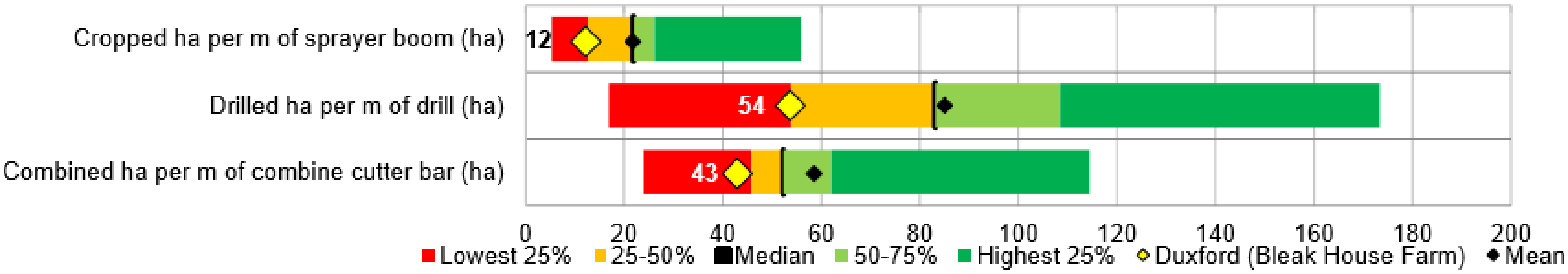
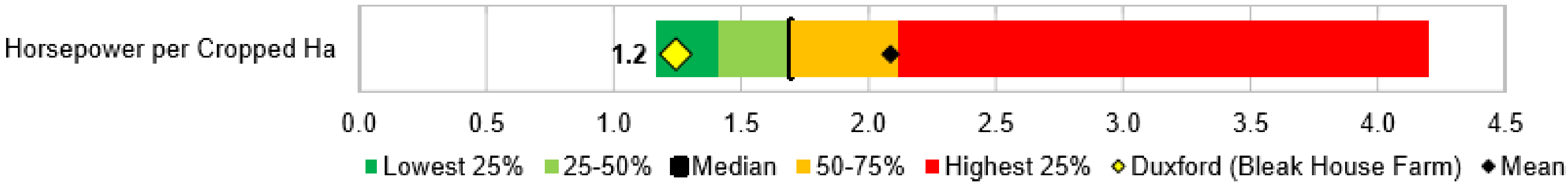


Chart 5: Horsepower per cropped hectare[5]



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Storage

- 1000t Flat Store New in 2012
- 1000t Flat Store New in 2017
- 250t Brick built barn suitable for short term storage
- 175t Brick built barn suitable for medium term storage

Growing Good Crops

CEREALS & OILSEEDS

Soil Type

- Sandy Loam over Chalk
- Sewage sludge applied for the last 10 years
- Small fields, straight Phosphate and potash applied depending on sample results
- Liquid N used since 2016

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Crop Rotations

2 or 3 cereals followed by break crops of

- Sugar Beet
- Pea's
- Winter Beans
- OSR
- Winter Oats

Decisions depending on Crop prices field conditions/ locations, weed control options

<u>Current Cropping</u>

150 Ha Wheat

53 Ha Winter Barley

25 Winter Beans

30 Ha Sugar Beet

32 Ha Peas

CEREALS & OILSEEDS

Establishment

Option 1
Plough
Roll
Cultivate
Drill
Roll

Started Drilling 30th Sept
Finished Cereals 15th November
TSP Applied to seedbed Pre Drilling or sewage cake.

Option 2
Light Tine Cultivation
2nd Tine Cultivation
Drill
Roll

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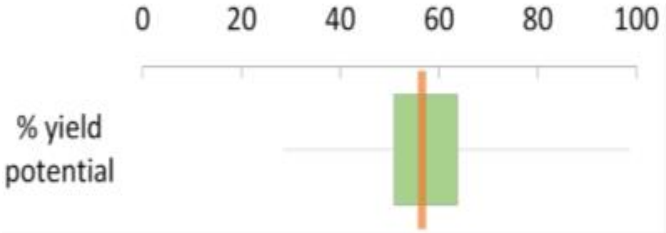
YEN Results

	Rank	Grain yield (t/ha)
	1	**16.2**
	2	15.4
	3	14.1
Your entry	**138**	**9.3**

Rank	Grain yield (% potential)
1	**103%**
2	98%
3	96%
103	**57%**

YIELD FORMATION	
*Biomass, t/ha	16.5
Harvest index, %	48
Weighbridge grain yield, t/ha	9.33
Combine grain yield, t/ha	
Agronomics yield, t/ha	
% yield potential	56.6%
Spikelets, #/ear	16.1
*Ears, #/m2	525
Grains, #/ear	38
*Grains, '000s/m2	20
Grains set per g chaff	110

GRAIN FORMATION AND SIZE	
TGW, g	37.7
Specific Wt, kg/hl	75.7
Grain length, mm	6.6
Grain width, mm	3.4
Grain L:W, ratio	1.9
Grain vol., mm3	39.8
Gn density, kg/l	1.0
In-grain void	0.3
Bulk grain void	0.2



The average % of yield potential across YEN entrants was 60% in 2018, compared to 50%, 51%, 60%, 40% and 56% in the previous five years.

Productivity

- Benchmarking
- Monitor farm program
- Lessons from other businesses
- Analysing market demands/ consumer needs
- New varieties, Improvements to plant breeding
- Chemistry
- Soil health
- Environmental Stewardship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Sustaining two families

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CEREALS & OILSEEDS

Bleak House Farm

AHDB

- Started 1926 (35 acres, Milk Round and Coal Round)
- Today (312ha)
- 127 ha Owned
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Diversification

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Making the most of Time

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Lessons from other businesses

AHDB

TESCO
Future Farmer Foundation

NOBLE FOODS

HILTON Food Group plc

- Customer Choices
- Efficient use of inputs
- Personal/family time important to be efficient
- 1 or 2% improvements add up
- Larger businesses having experts in different areas
- Environmental pressures
- Cost of implementing Improvements

<u>Will it increase Profit?</u>

Putting a precise science in a unprecise environment

Why become a Monitor farm?

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Business Aims

1. Remaining a sustainable business
2. Increased diversification
3. Maintaining resilient yields
4. Increasing Profit
5. Happy Farming

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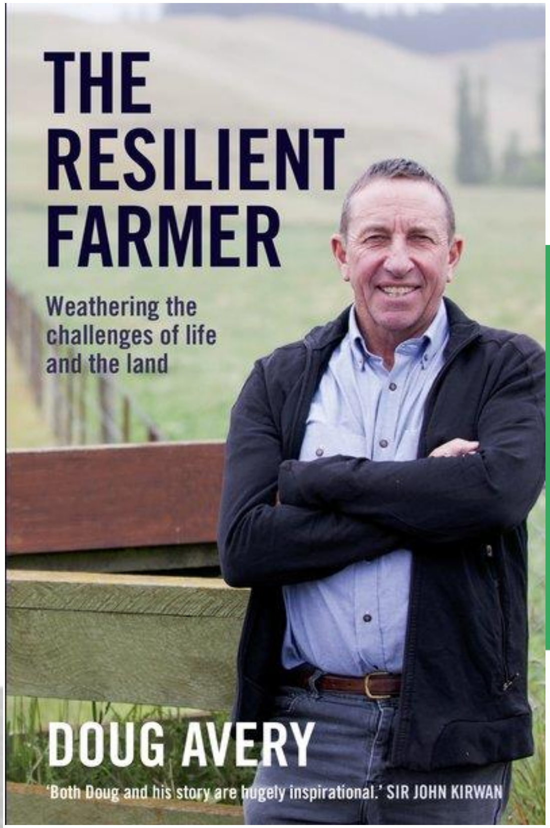
How Resilient are we all?!!

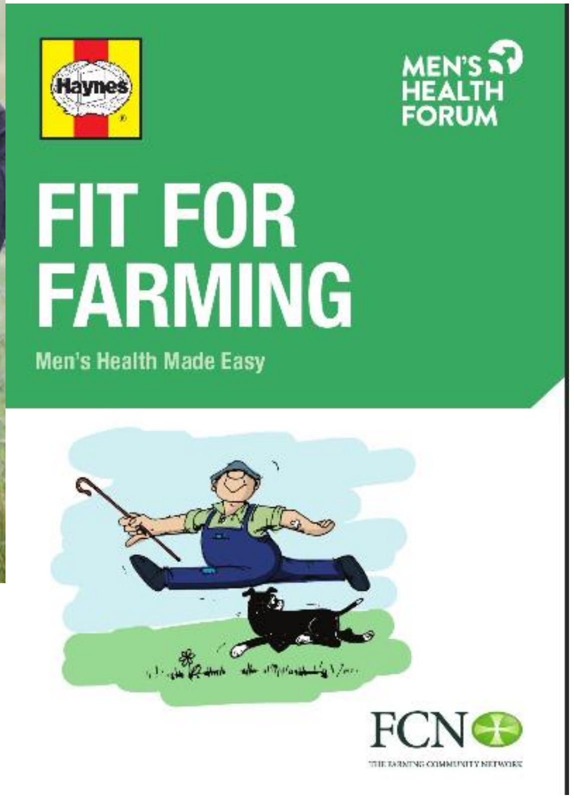
AHDB

FCN
THE FARMING COMMUNITY NETWORK

farmwell.org.uk

FarmWell
INFORMATION | SUPPORT | RESILIENCE





R·A·B·I
Supporting Farming Families

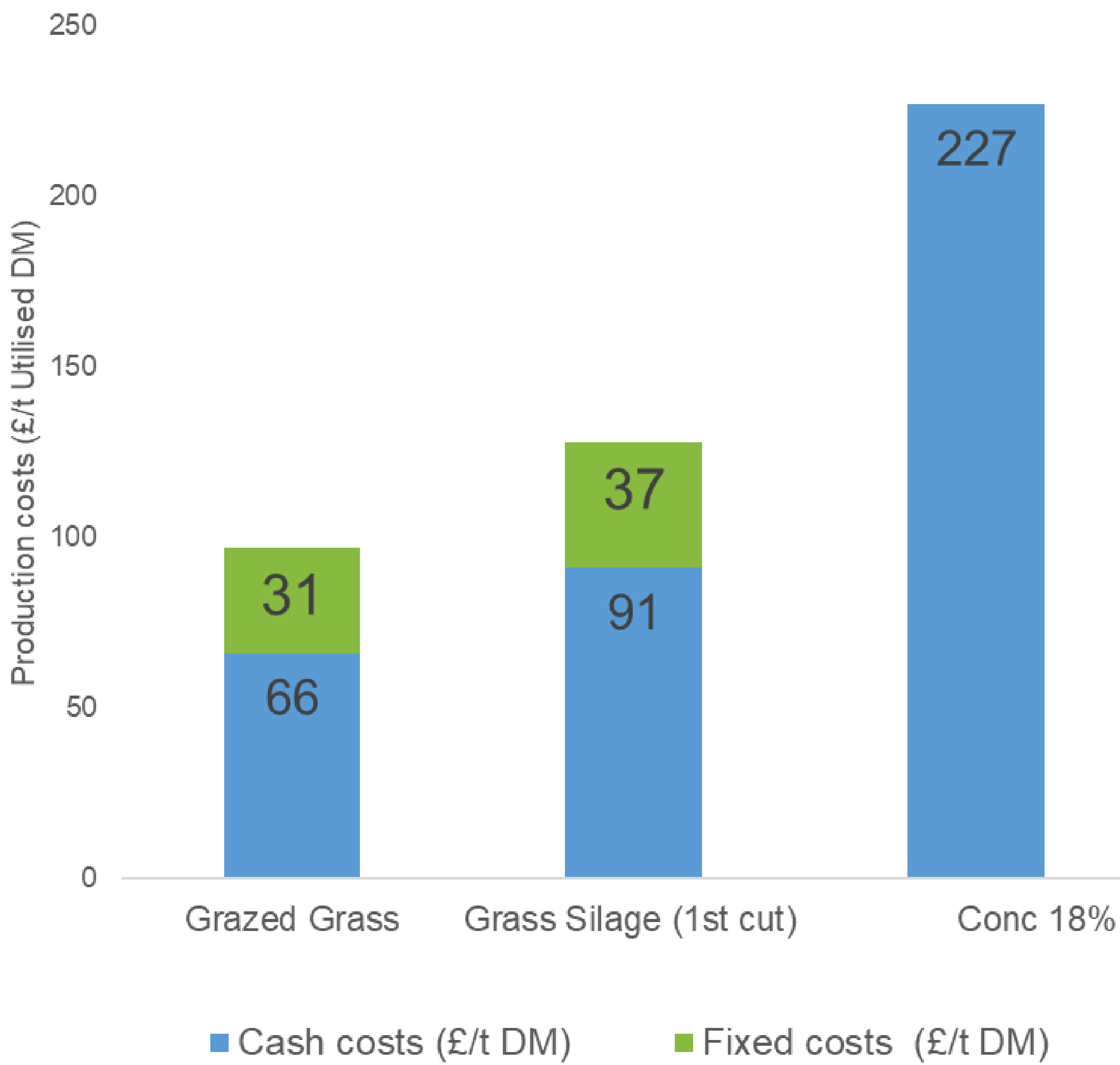
Thrive to survive – Forage session

Maximising the value of forage

Siwan Howatson

DAIRY

Total production costs (£/t DM)



(Kingshay)

AHDB

Checking conserved forage requirements and stocks

This simple calculator can be used to understand your conserved forage requirement for your stock and used to evaluate the stocks.
It can be used to highlight any deficits so decisions can be made early
The small table of the right can be used to calculate hay and straw requirements if some the allocation was being replaced by straw or hay

Calculating conserved forage requirement for the autumn and winter

Animal type	No. of stock	No. of weeks	Allocation (kg DM per day)	Dry matter (%)	Total requirements (tonnes FW)	OR Bales (@0.6t FW)
Dairy cows - milking			15	30	0.0	0
Dairy cows - dried off			12	30	0.0	0
Lactating suckler cows			12	30	0.0	0
Dry suckler cows			10	30	0.0	0
Cattle (up to 200 kg)			6	30	0.0	0
Cattle (up to 400 kg)			9	30	0.0	0
Cattle (up to 600 kg)			12	30	0.0	0
Ewes (>65 kg)			1.6	30	0.0	0
Ewes (>50 kg)			1.3	30	0.0	0
			TOTAL		**0.0**	0
	Add safety margin (10-20%)		10		0.0	0
		TOTAL including safety margin			**0.0**	**0**

Effect of early cutting

	Early cutting		Conventional cutting	
	First cut	Second cut	First cut	Second cut
ME (MJ/kg DM)	11.8	11.4	11.1	11.3
Yield (t DM/ha)	4.2	4.1	5.5	2.5
Total yield (t DM/ha)	8.3		8.0	
Energy yield (MJ)	96,300		89,300	
Potential milk yield (L)	18,519		17,173	
Contracting costs/ L (@£131/ha)	0.70p		0.76p	

Thomas et al., 1998

Moisture content

The target DM should be:

✓28–32% for clamp silage

✓ 35–45% for bales of silage

Amount of squeezing	DM %
Juice easily expressed by hand	<20
Juice expressed with some difficulty	20–25
Little or no juice expressed but hands moist	>25
"Ball" shape	**DM %**
Ball retains its shape and some free juice expressed	<25
Ball retains its shape but no free juice is expressed	28–32
Ball slowly falls apart	32–40
Ball rapidly falls apart	>40

Cutting date targets

- Before cutting, targets to aim for include:
  - ✓CP 16%
  - ✓ Sugars 2-3%
  - ✓ Nitrate-N levels <0.1%

A week’s delay in cutting first cut

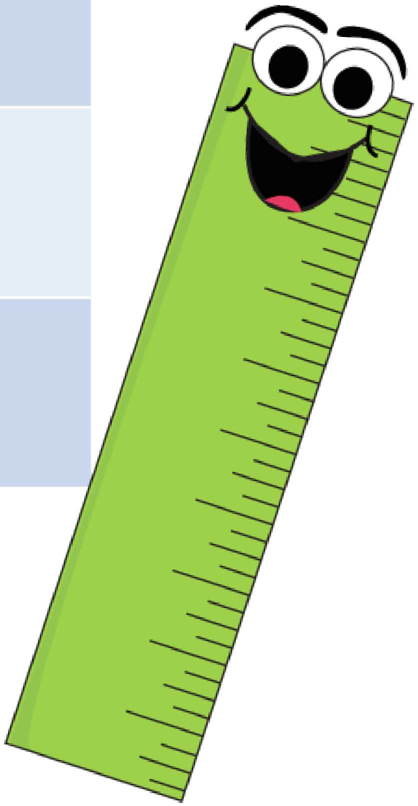
- DM yield ⇧ 10%
- Digestibility ⇩ 3.5% units
- ME ⇩ 0.6 MJ/kg DM
- Slower re-growth = ⇩ annual yield

A LOT COULD HAPPEN IN A WEEK. JUST LOOK AT THE LAST ONE.

JULIA QUINN

Chop length

DM of silage	Ideal chop length
28–35%	2.5–5 cm
20–28%	8 cm
< 20%	8–10 cm

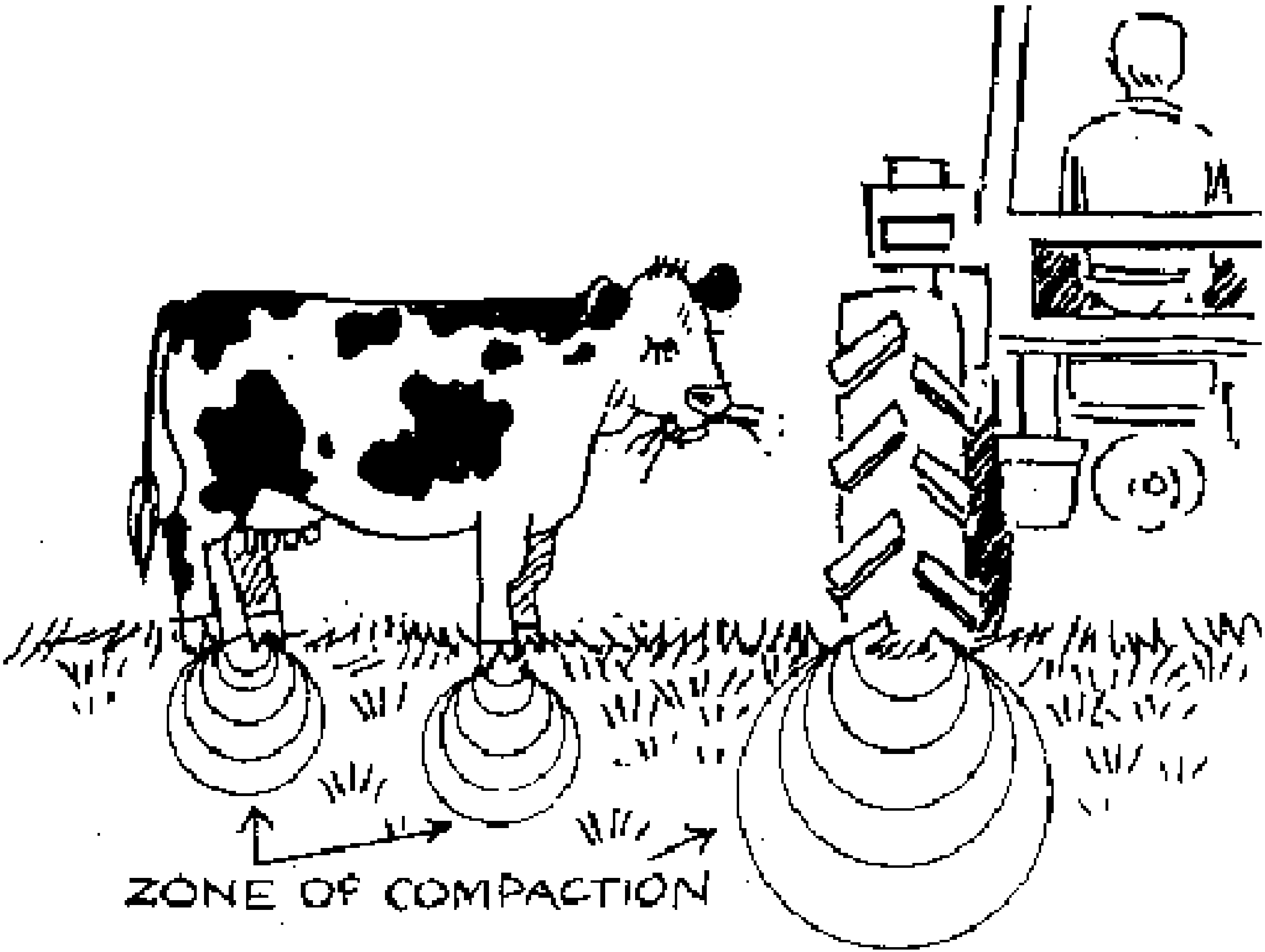


Managing silage effluent

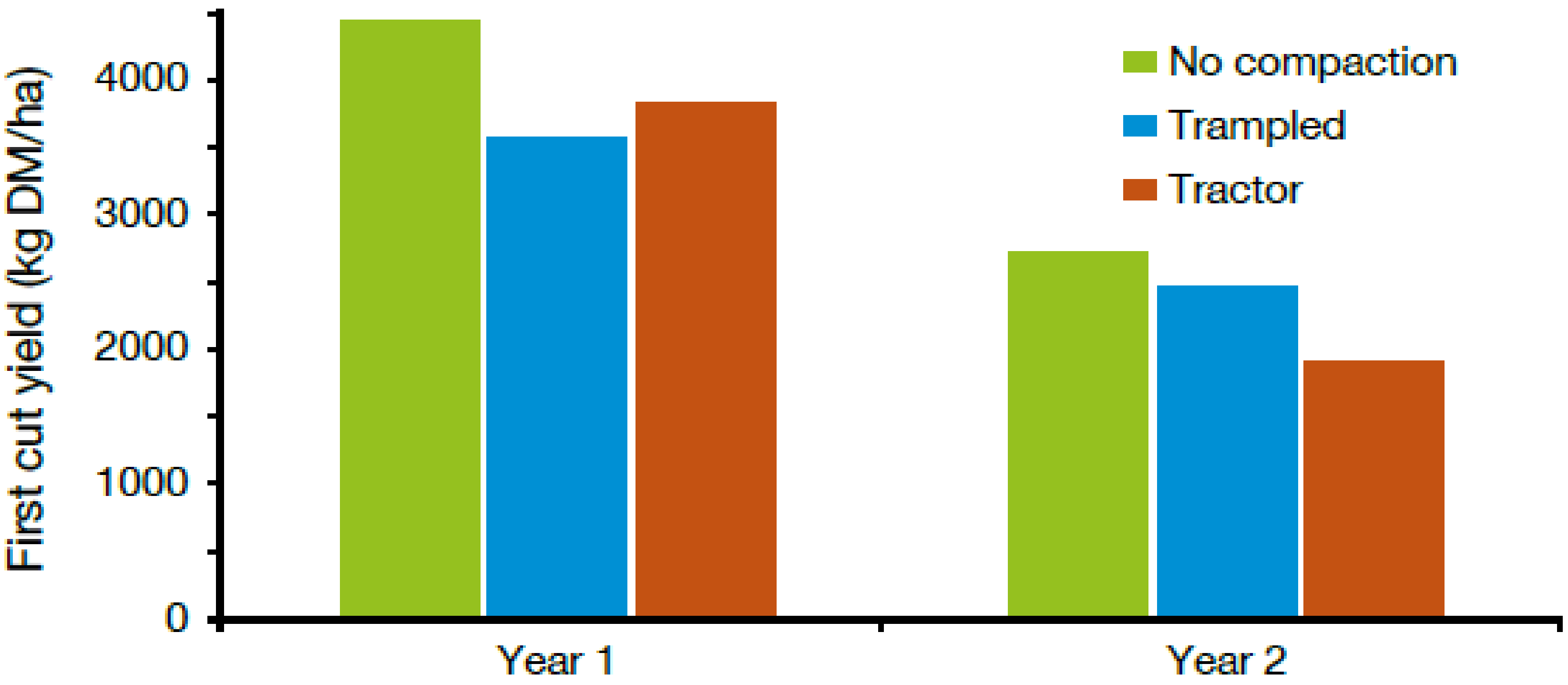
DM % of crop	Amount of effluent released
25	Little
18	100 litres/tonne fresh weight per day at peak flow
15	200 litres/tonne fresh weight per day at peak flow

The role of precision technology

Most common reasons of compaction…



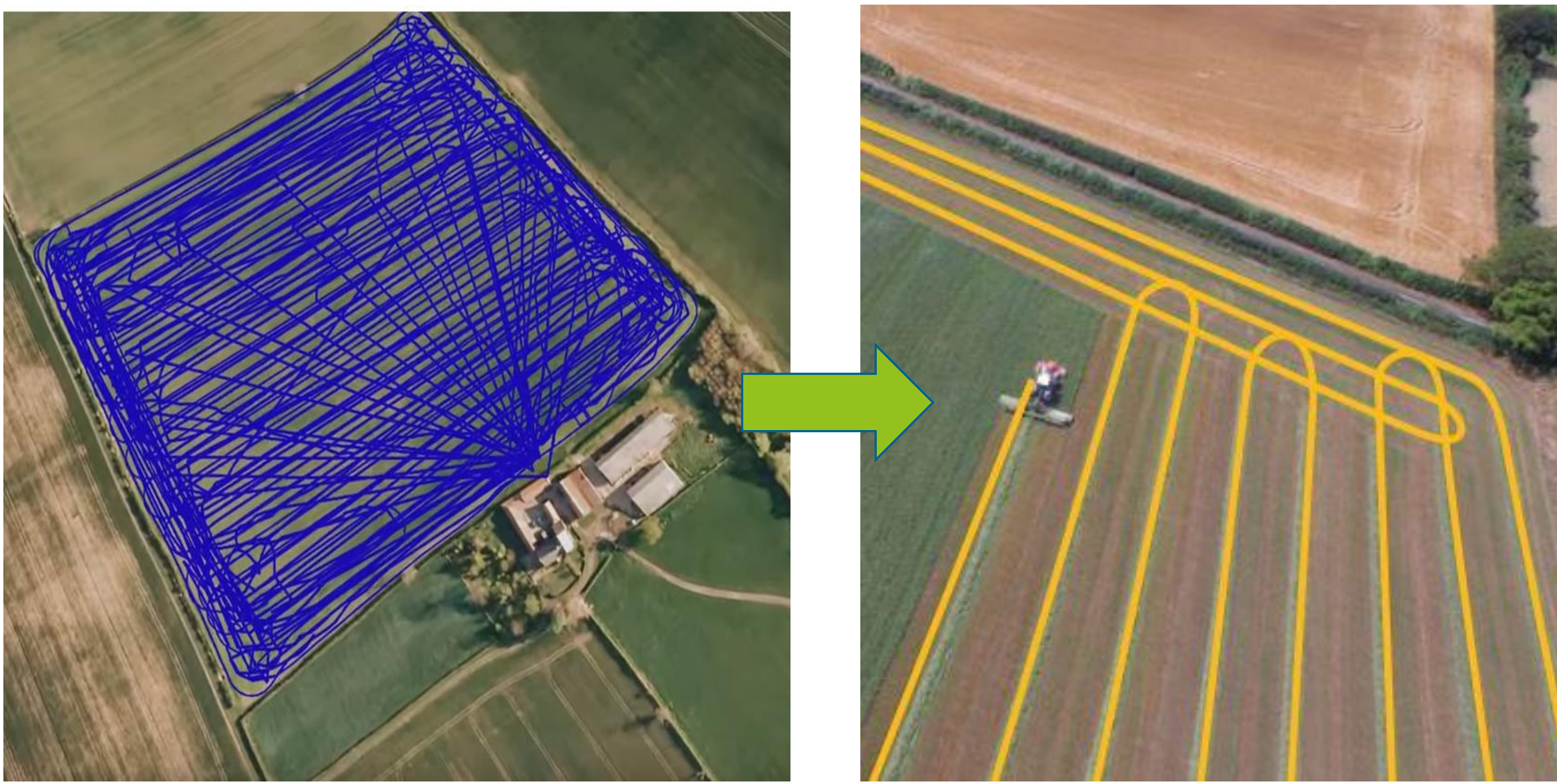
Soil compaction study



Tractor compaction ⇩grass dry matter yield by 22%

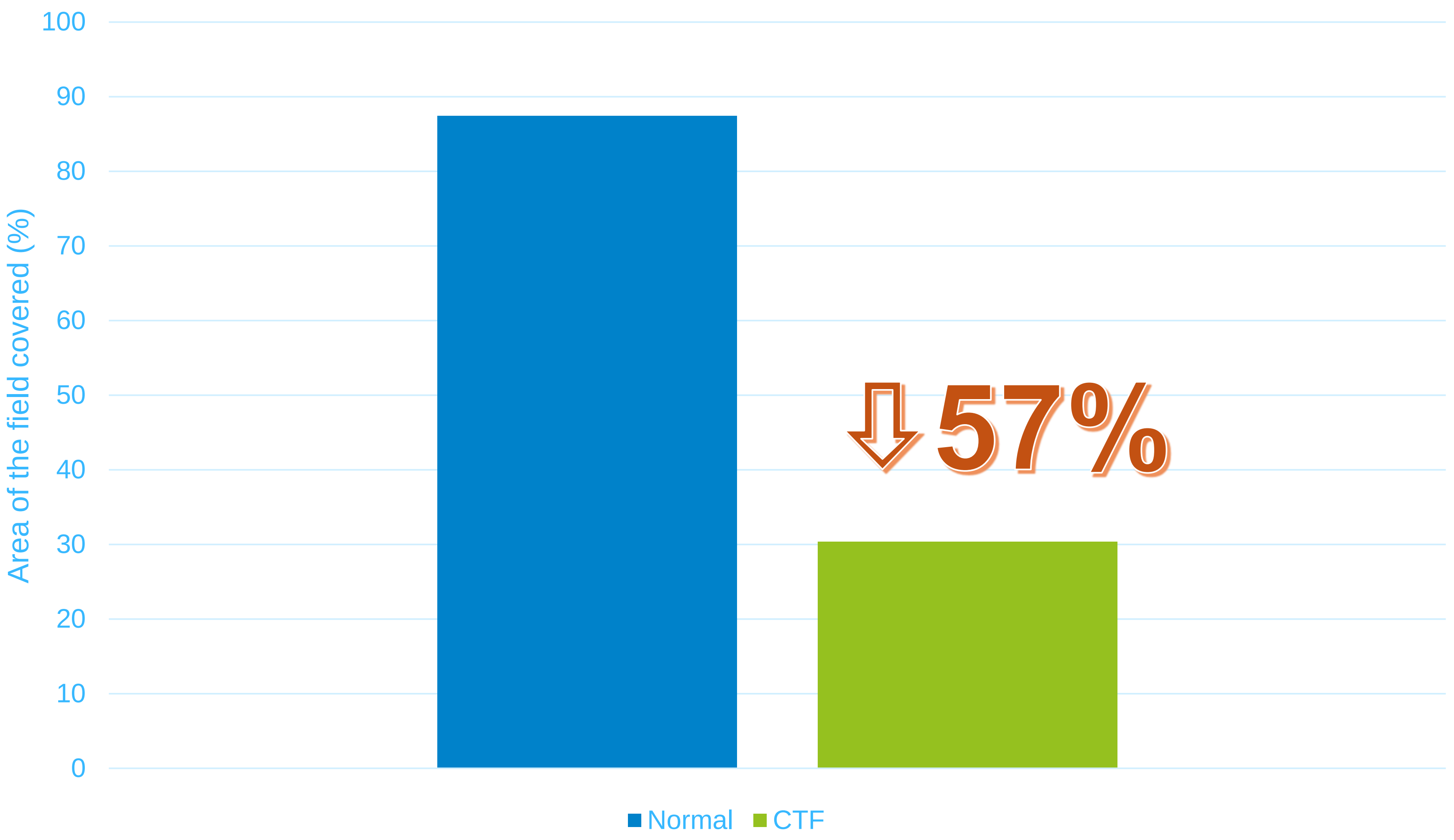
Controlled traffic farming

- A management tool used to reduce the damage to soils caused by heavy/repeated passing of machinery

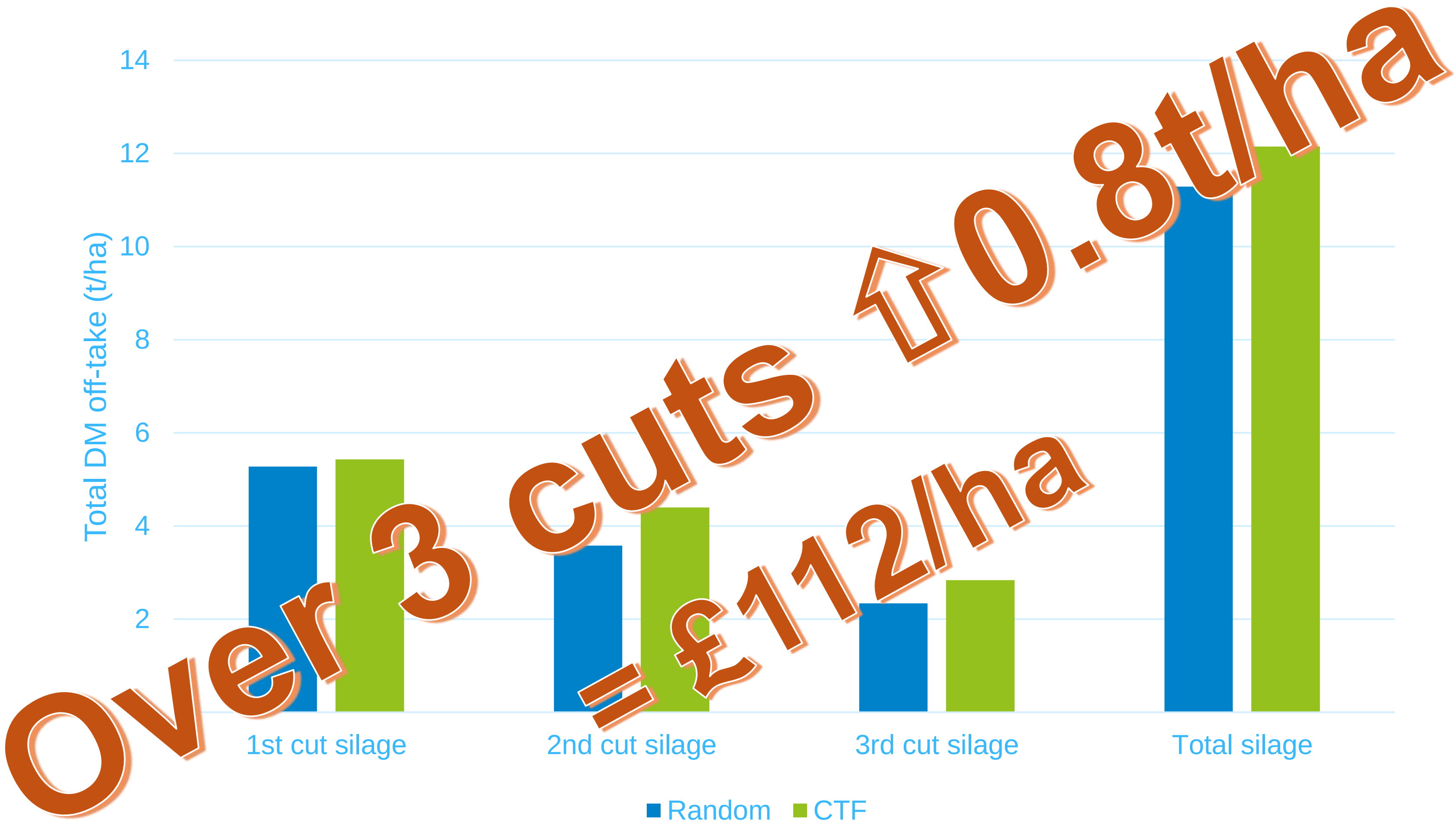


Study sites

Area covered



Silage DM yield



On-farm experience

Cost of CTF

- Low accuracy and non-repeatable positioning manual steered system = £18.70/ha for +100ha
- Fully integrated system, high accuracy systems = £85.50/ha for +200ha

Top tips for CTF implementation

Working width that is compatible with all farm machinery

Use permanent field markers to aligned GPS

Field sizes and area to be cut need to be considered

DAIRY

THE SUCCESS OF A PRODUCTION DEPENDS ON THE ATTENTION PAID TO DETAIL

DAVID O SELZNICK

Thank you for listening
Questions?

E: siwan.howatson@ahdb.org.uk
M: 07580741010
Siwan_howatson

Farming through challenge and change

18th February. 2020.

Eurig Jenkins

Pentrefelin Farm Ltd

- Grazing platform 94ha (232 acres)
- 410 spring calving NZ Friesians
- Block calving
- Aim to rear 100 heifers annually (surplus sold)
- Litres per cow 6069
- Milk from forage 4593 litres
- Concentrates fed per cow - 1025kg

AHDB

How we aim to be the best (why aim to be average). Our goal top 10% kpi

- Measure everything. Grass, weigh stock
- Set high standards
- Benchmark
- Attention to detail
- Pay staff on time (1st of following month worked)
- Friday night beer after milking
- Encourage days off
- Have non cow days


DeLaval


DeLaval


saber
saber
saber

Strengths of the business

- Family labour
- Block calving
- Ability to grow grass
- Infrastructure
- Low cost structure
- High output
- Succession in place
- Merlin discussion group (mix with like minded)

Threats of the business

- Grazing platform
- TB
- Milk price
- Availability of rented ground


NEW HOLLAND
EASY
KRONE
KRONE


CLAAS


McHale


6930
JOHN DEERE
512 SE
40

AHDB

Opportunities

- Became demo farm for farming connect
- Study tour Sweden and Denmark
- Travelled visiting farms around the world
- Now a Mentor on the Mentoring scheme

AHDB


ALPINE
LGP 2300
MAJOR

Why keep it simple

- All grass
- Easy to manage
- Everything planned out same as last year (dates never change)
- Profitable
- Give animals fresh grass every 12 hours

AHDB