



# A Tale of Two Rotations 1991- date

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- Designing the Tulloch organic experiment – constraints and questions
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1990: The original question – what is the best rotation for an organic farm in North East Scotland?



A rotational trial or a system experiment... a rotational trial or a systems experiment...



## Design constraints



- Desire for a “mixed farm” system
- Plot size for grazing animals
- Need for flat land...and replication.....
- All looks well in this picture



# The reality...

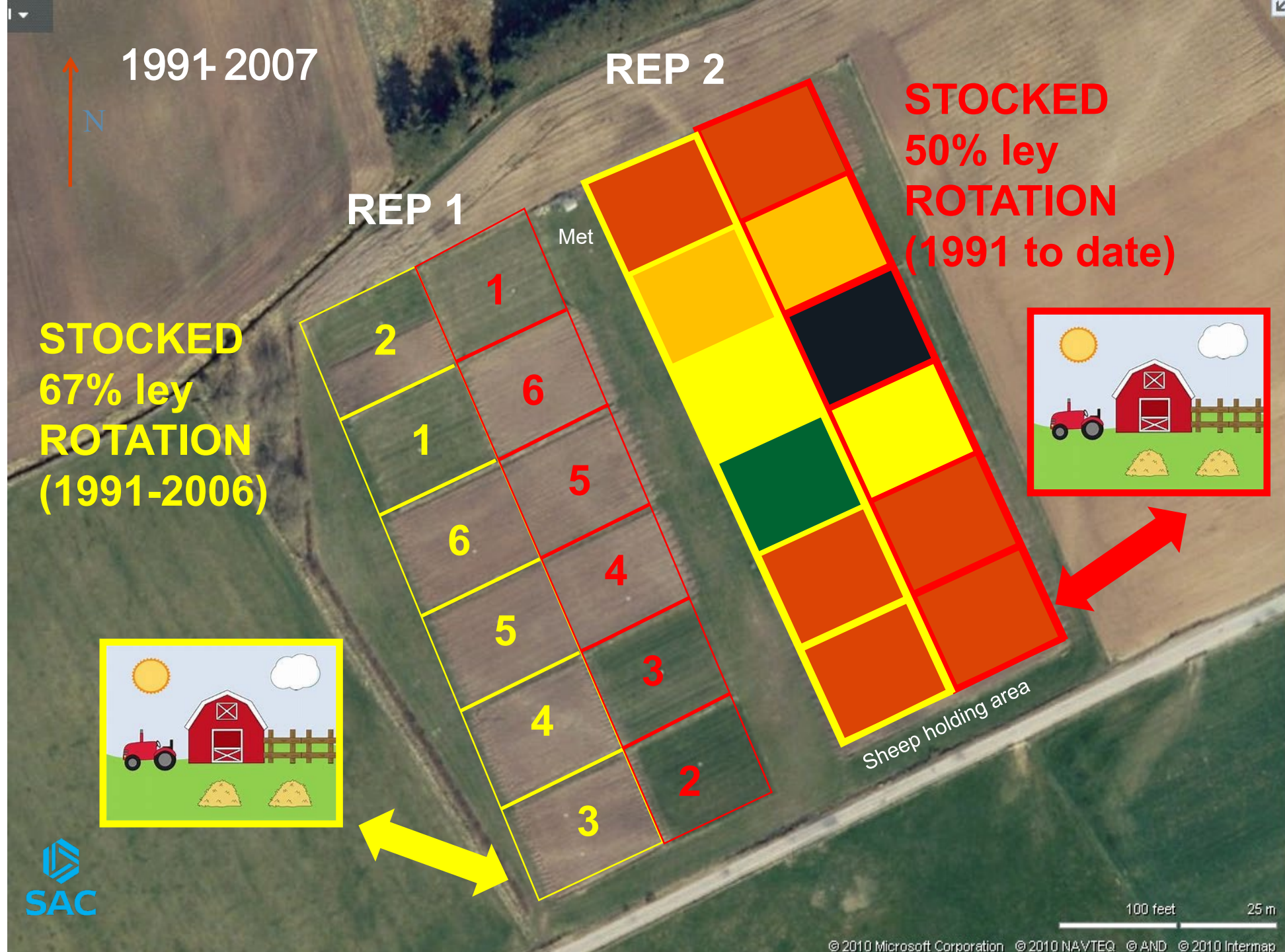




System or rotation?

Can an experiment be both?

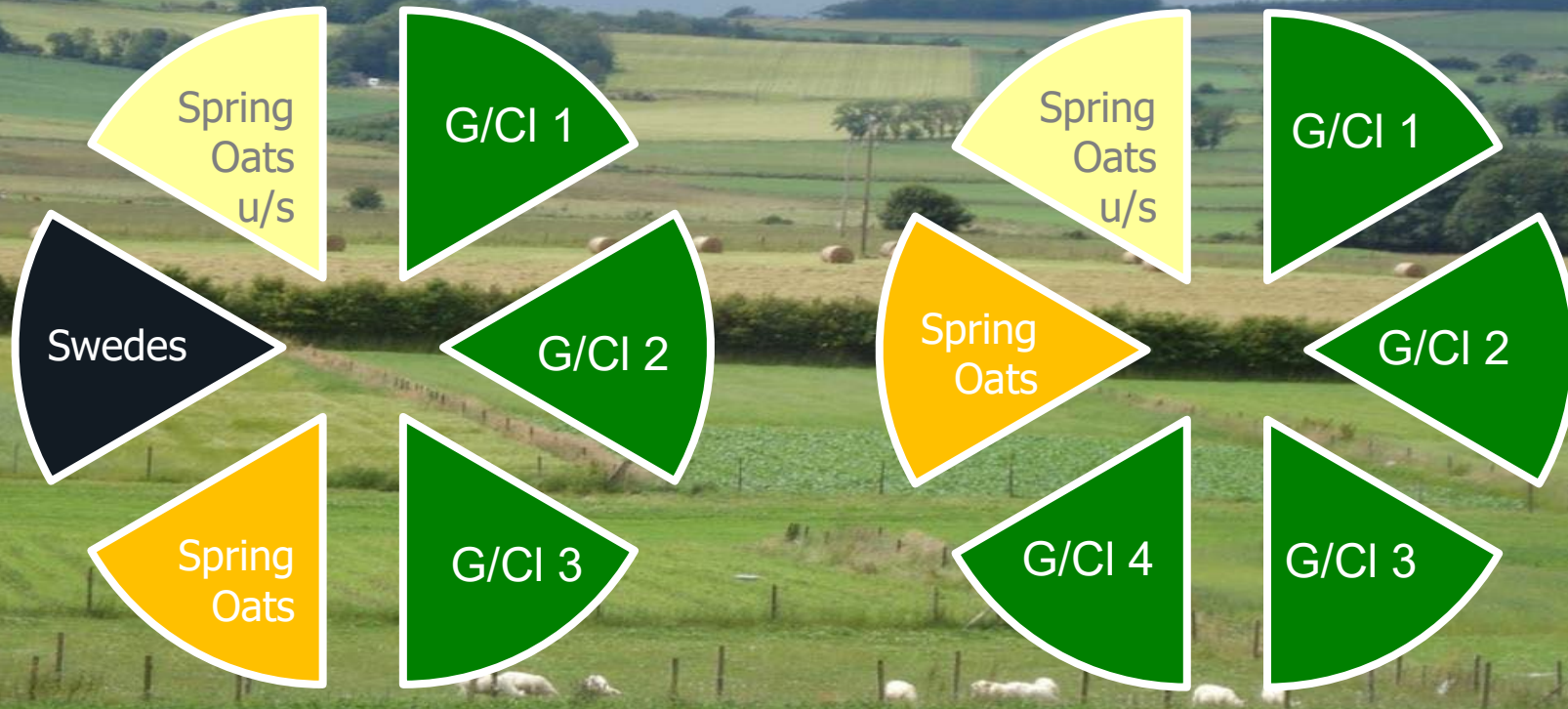
Strength – all courses present in every year  
Weakness – 2 reps and not randomised





T50

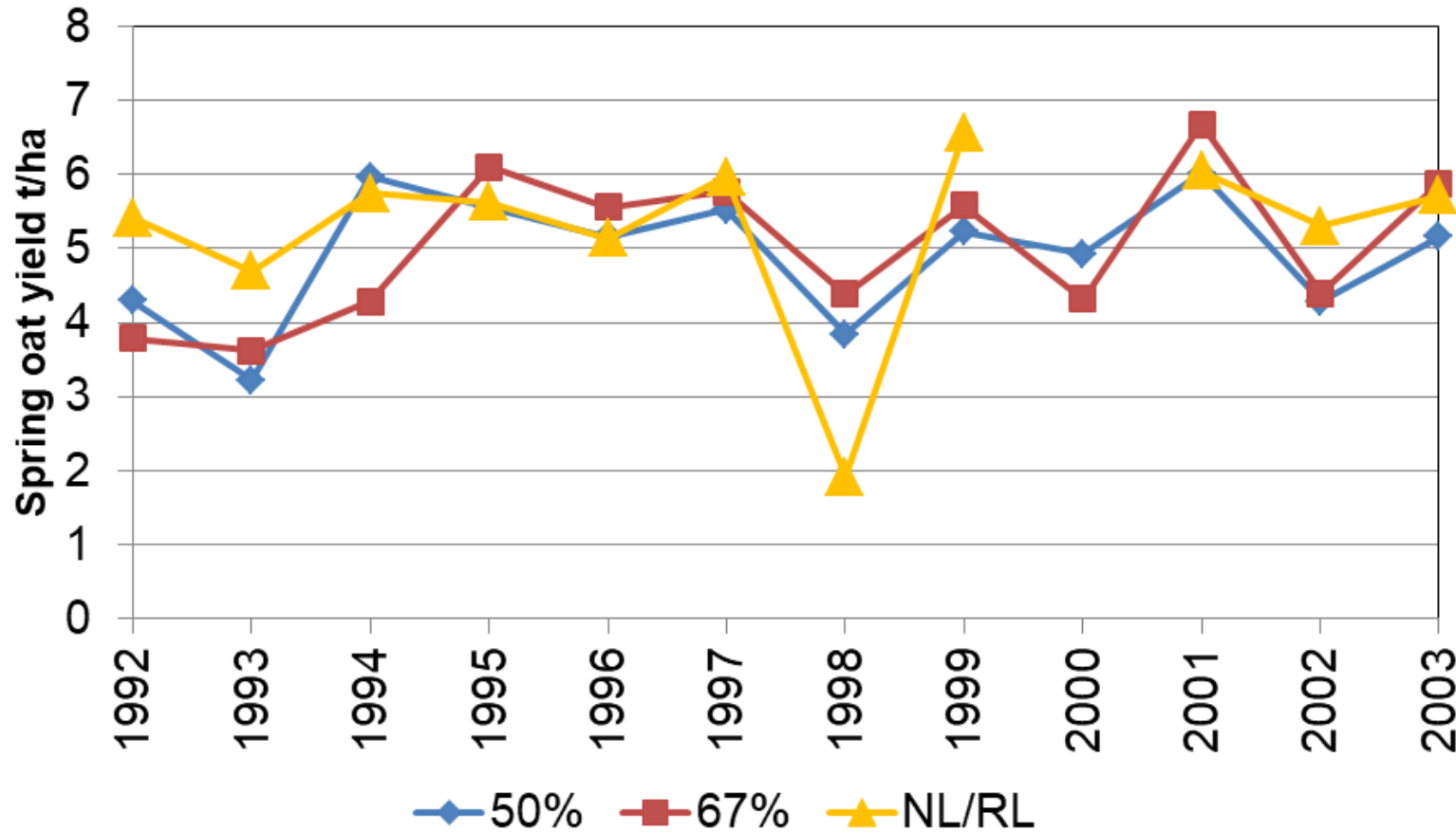
T67



Organic system Soil Association Standards  
pH 6, Lol 9%

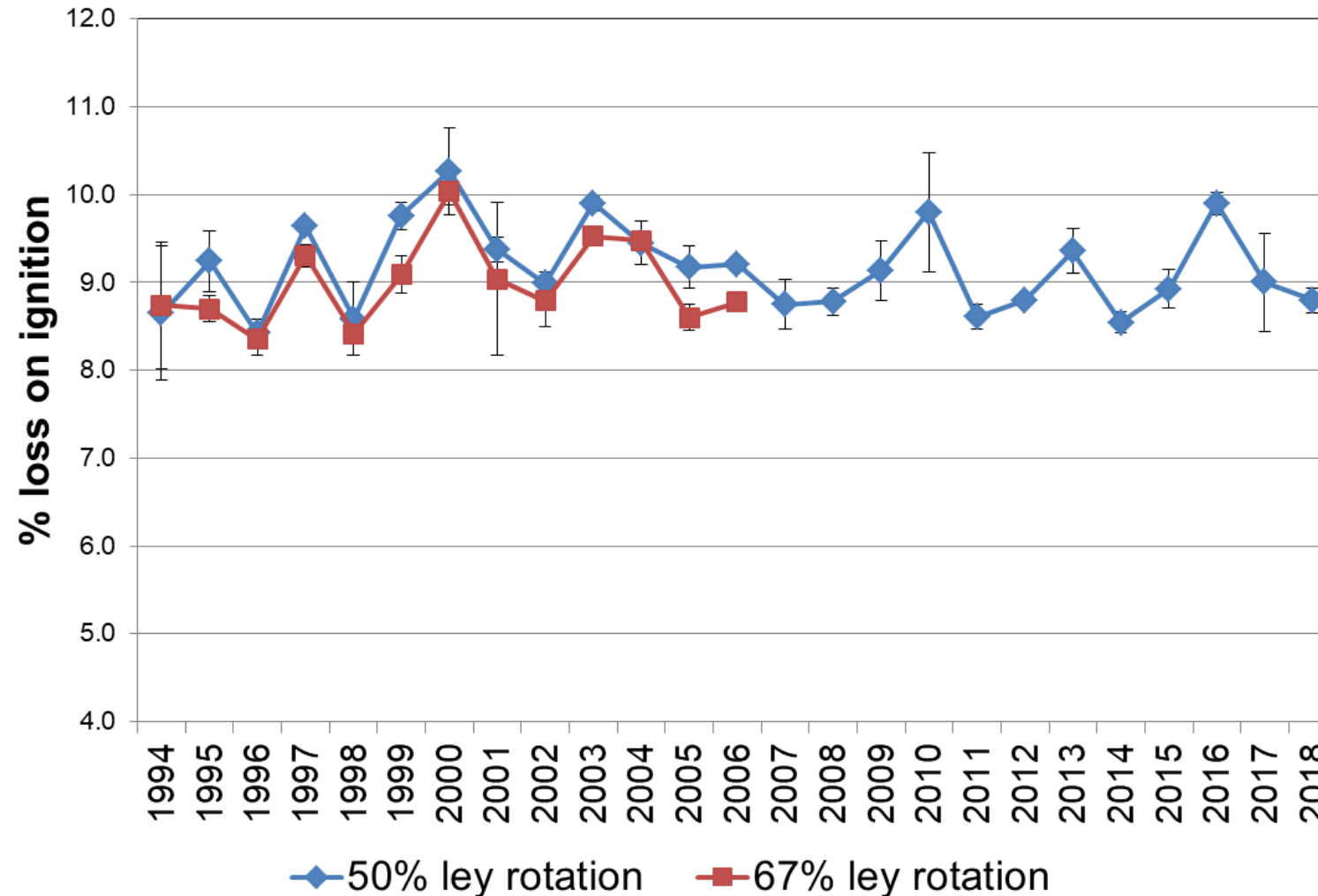


# Yields of spring oats (Phase 1)





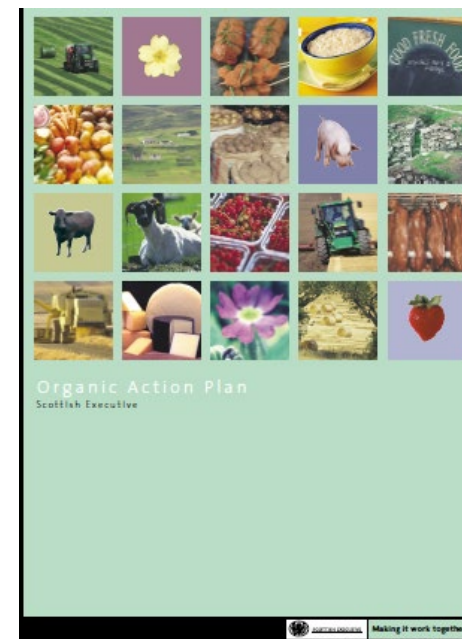
# % loss on ignition soil (Phase 1)



Time for a change ?

So, let's think about redesign and co-design

- 2006
- Scottish Organic Action Plan supporting more arable production
- Participatory approach with researchers, farmers, advisors and certification body to redesign trial.

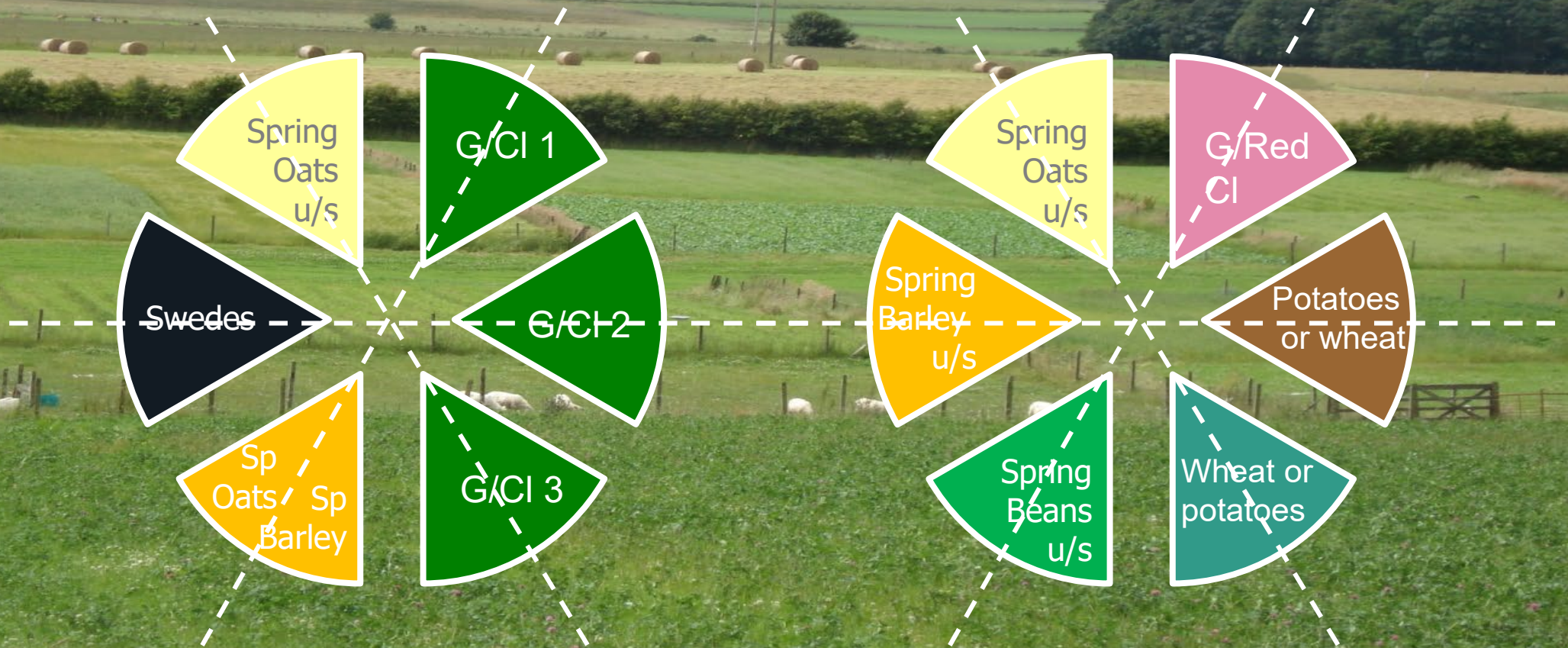




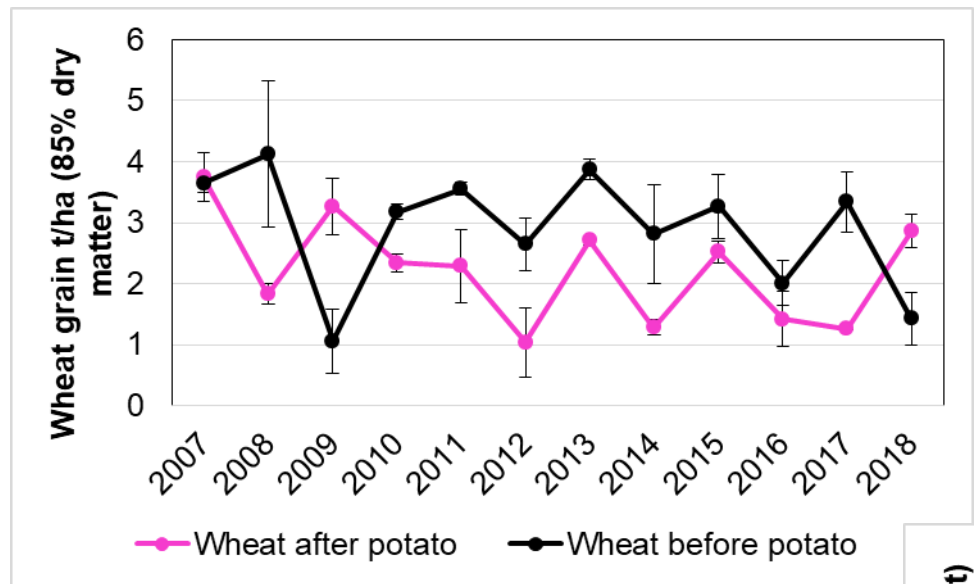
# Tulloch Organic Rotation Phase 2

T50  
1991 - date

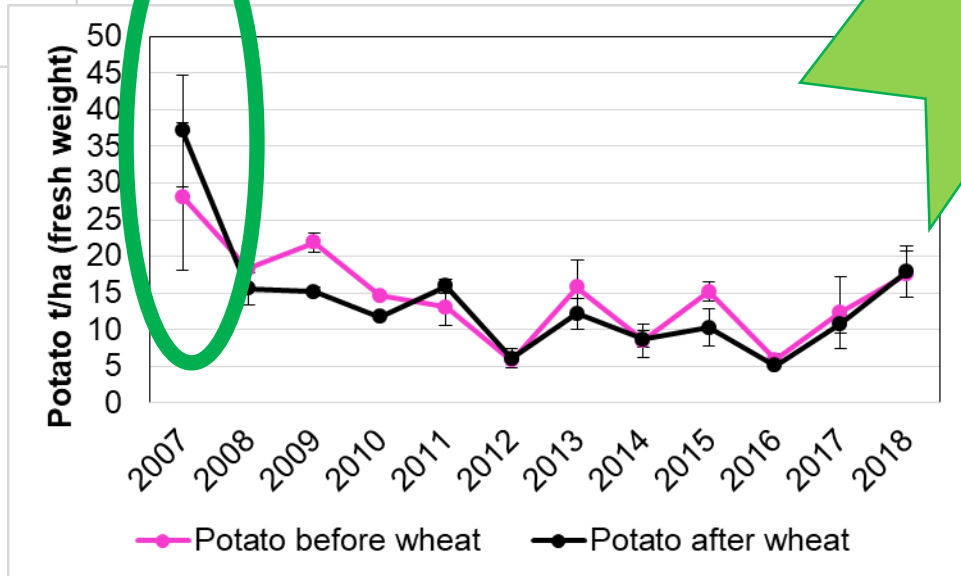
Stockless  
2007 - date



# Crop sequence effects on yield – Phase 2



**POTATOES > WHEAT**  
**WHEAT > POTATOES**

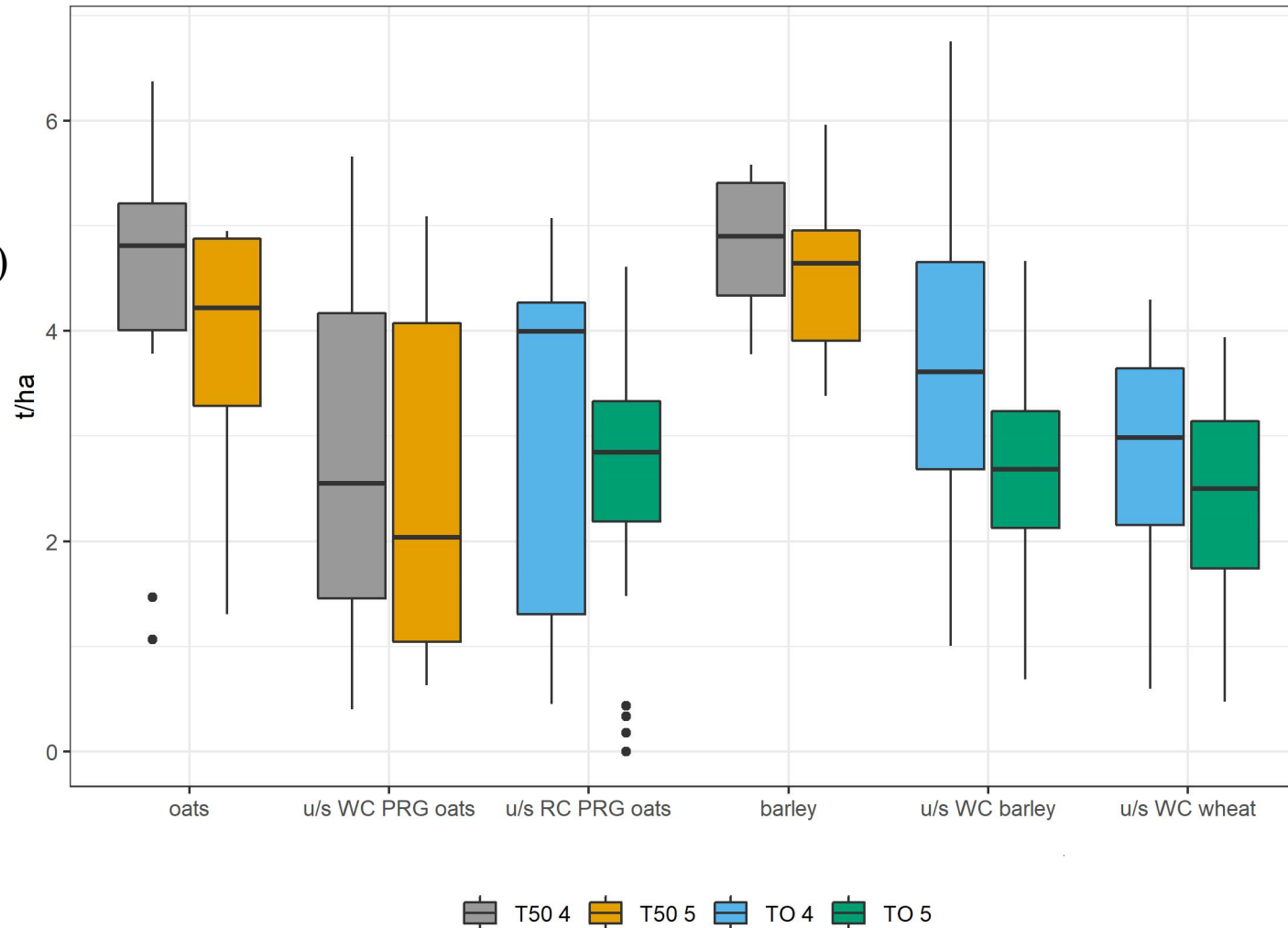


But beware legacy effects of making changes.....



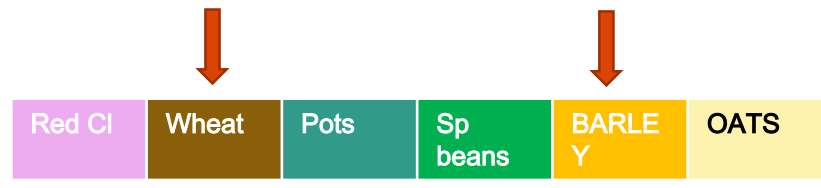
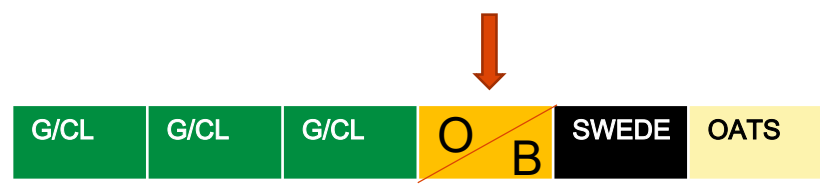
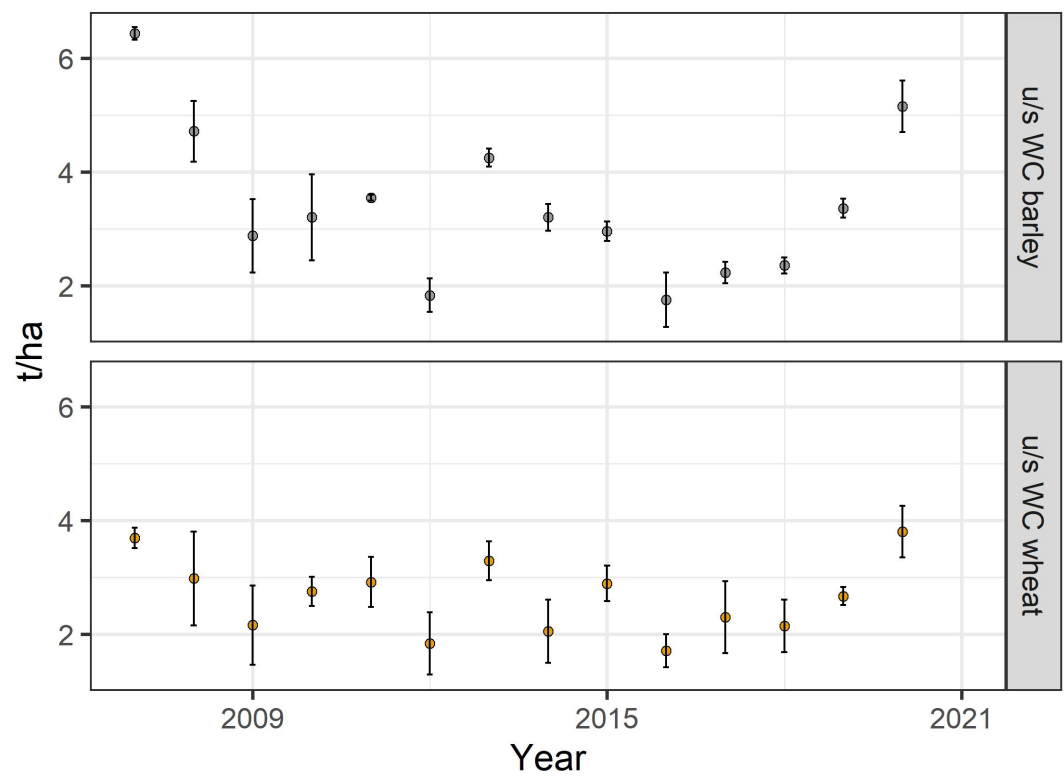
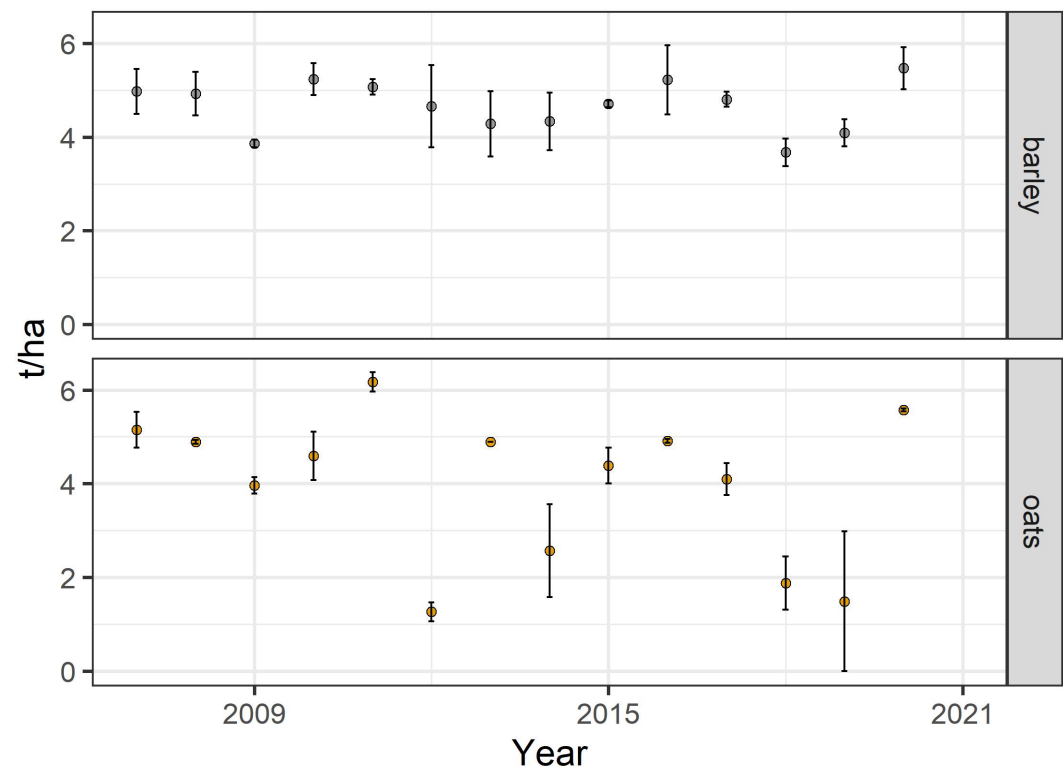
# Grain yield (t/ha) 15% MC – Phase 2

Cycle 4 (2008-2013)  
Cycle 5 (2014-2019)



Concern over yield decline in stockless

# Yields over time in the 2 rotations







Issues> Declining soil fertility and couch grass in the stockless system



Solutions? A hard reset on the stockless system but maintain the stocked (relevant, successful, continuity)



Current process to prioritise themes and scientific questions that can be addressed within the constraints of the design

# The future .....



SELF SUFFICIENCY?  
OPTIMISING RESIDUE  
RETURN?



LOCAL  
SUSTAINABLE  
INPUTS?



CROP DIVERSITY?



REGENERATIVE?

Policy questions  
Scot Gov want  
an evidence  
base

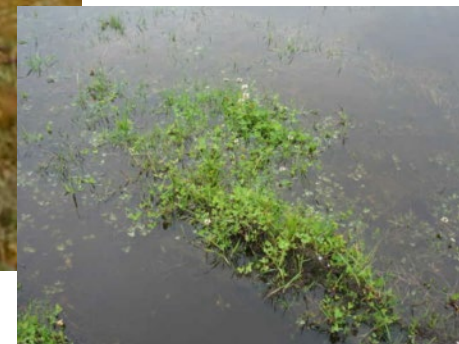
## So what is the scientific question?

Can we use crops/crop management to manipulate C:N of residues and therefore the organic matter balance?

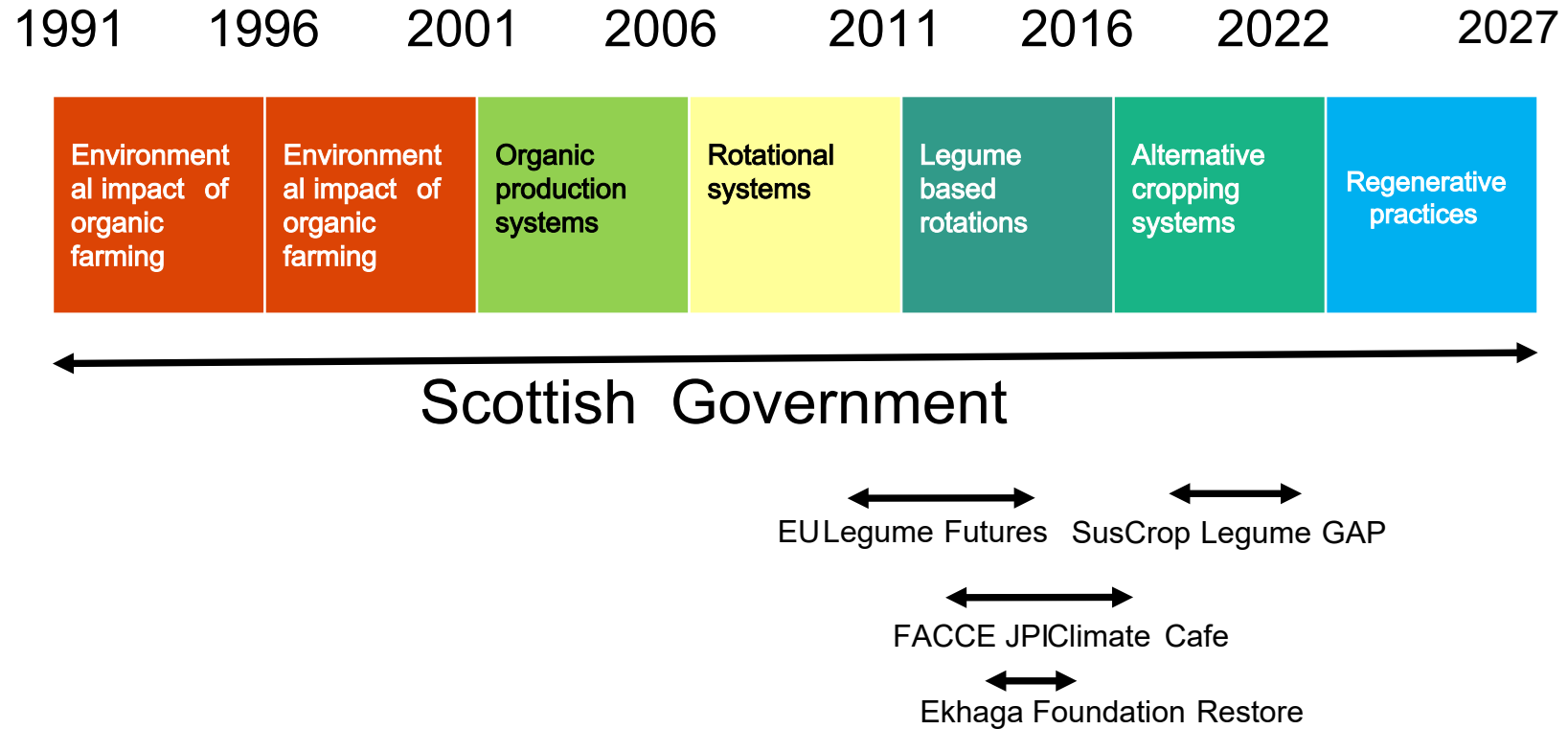


Expect the unexpected - Floods and plagues...  
But redesign is an opportunity to sort problems

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# Funding – a perennial headache.....





## What we got right....

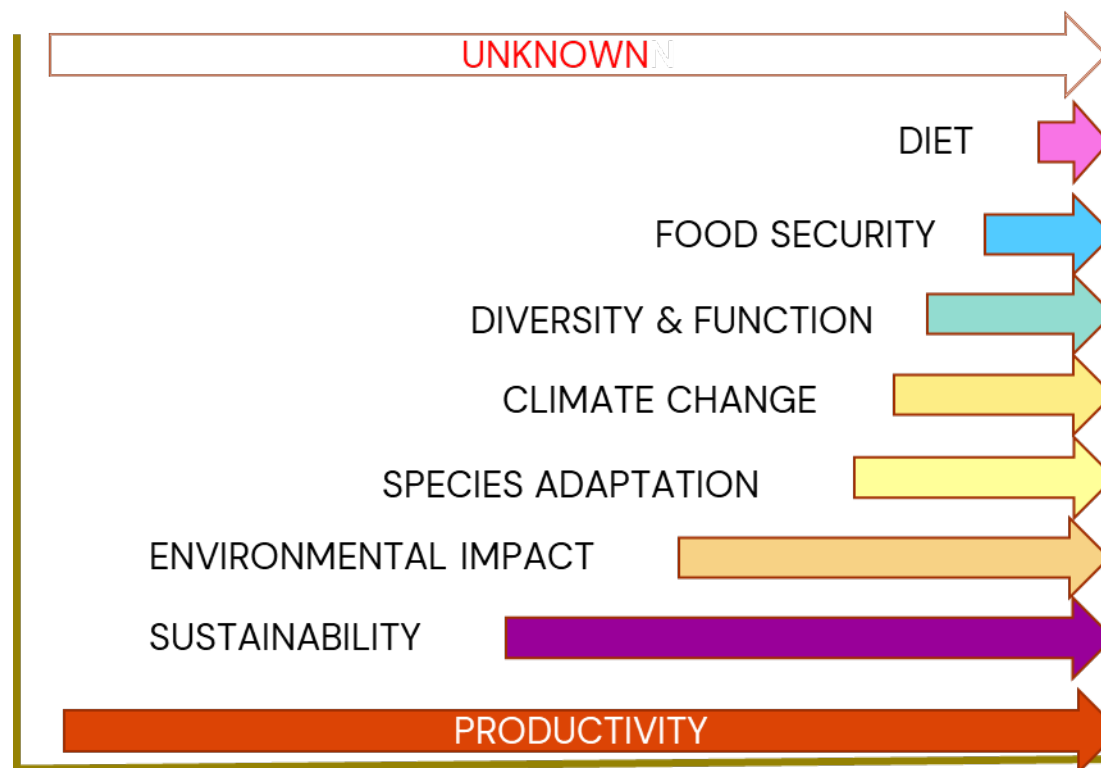
- Archiving of samples
- Stakeholder involvement
- Inclusion of grazing livestock
- Comparing different organic options (not organic vs conventional)
- All course of rotation in every year
- Large plots
- Maintained original treatments

## What we would do differently....

- Only 2 reps/no “controls”
- Database started retrospectively
- Changed manure application confounds results
- Design can confuse referees unfamiliar with context
- Not shouting loud enough/or publishing enough

## Opportunities....

- New ways of looking at trial
- Linking with other researchers and long - term trials e.g. GLTEN, SLU/SRUC/Rothamsted initiative
- PhD and MSc projects Stakeholder appreciation



# Epilogue: The “lift and shift”

## From Woodlands Field to the ACE platform



Dominion Troop visit May 1945



The lift July 2021



# Changes at Craibstone

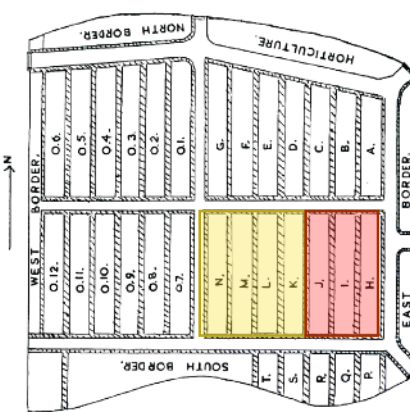


2010

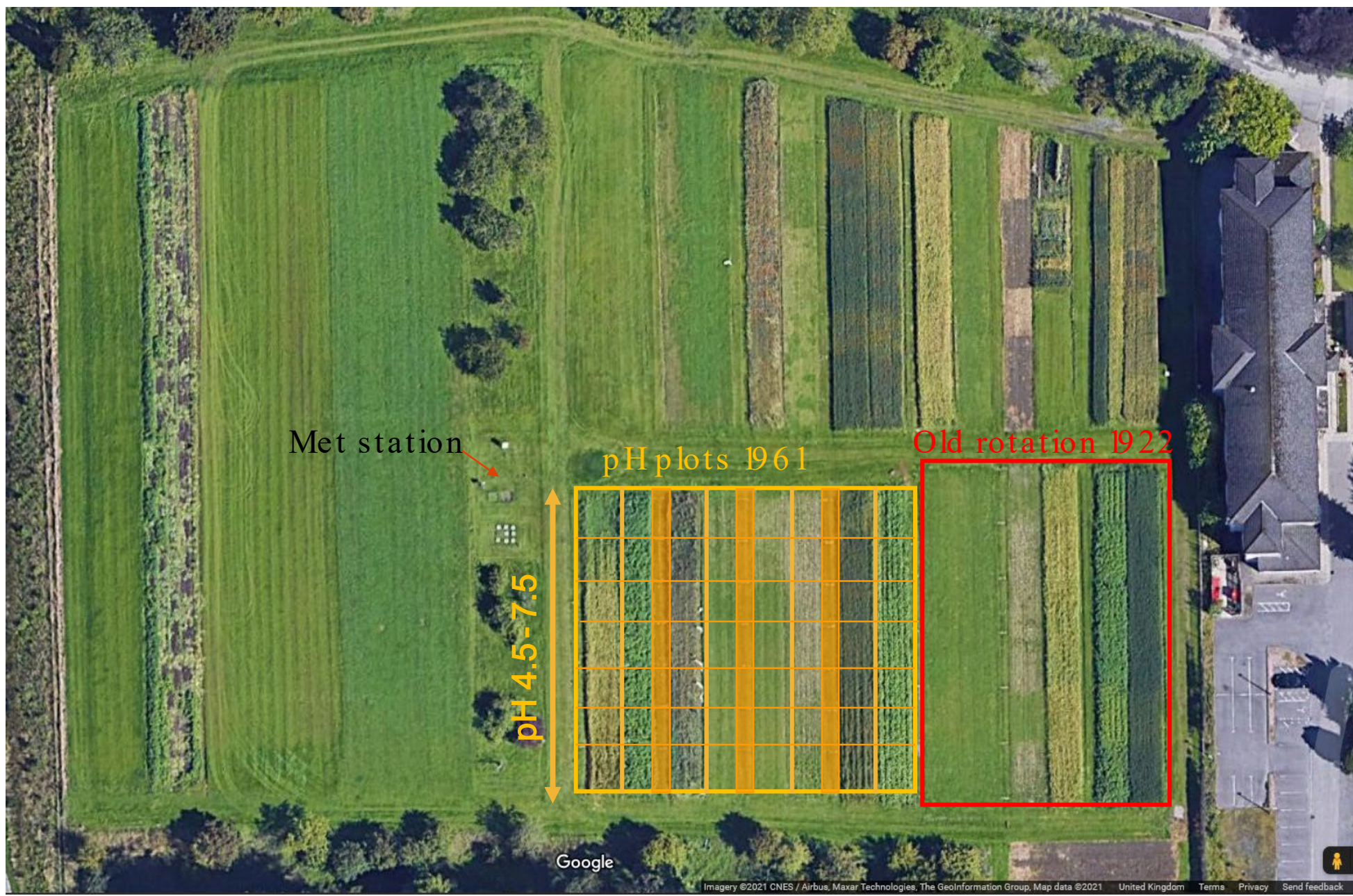


2020





Woodlands Field plan  
NOSCA 1957



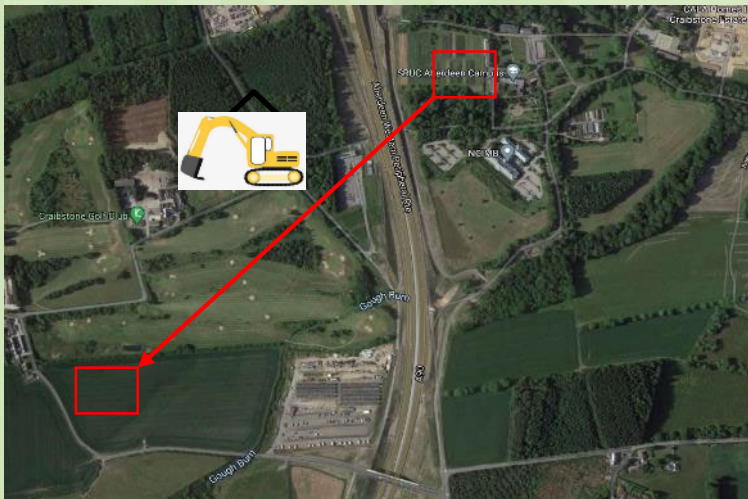




# Aberdeen Cropping Experimental (ACE) Platform



- a new platform for research, education and knowledge exchange in the North East



pHoenix experiment



# July 20 21– time to leave Woodlands Field behind for ACE!



21 July

26 July



What it looks like today...ideas welcome on this one too!

7.0	6.5	7.5	4.5	6.0	5.0	5.5	
7.0	6.5	7.5	4.5	6.0	5.0	5.5	
5.5	5.0	7.5	6.0	6.5	4.5	7.0	
5.5	5.0	7.5	6.0	6.5	4.5	7.0	
7.5	4.5	5.5	5.0	6.5	7.0	6.0	
7.5	4.5	5.5	5.0	6.5	7.0	6.0	
6.5	7.5	7.0	4.5	6.0	5.5	6.0	
6.5	7.5	7.0	4.5	6.0	5.5	6.0	
6.0	7.0	5.5	4.5	6.5	7.5	5.0	
6.0	7.0	5.5	4.5	6.5	7.5	5.0	
7.0	4.5	5.5	6.0	6.5	7.5	5.0	
7.0	4.5	5.5	6.0	6.5	7.5	5.0	
7.5	5.0	6.0	5.5	4.5	6.5	7.0	
7.5	5.0	6.0	5.5	4.5	6.5	7.0	
5.5	4.5	6.5	7.0	5.0	7.5	6.0	
5.5	4.5	6.5	7.0	5.0	7.5	6.0	





# Contributors & thanks to

Robin Walker

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