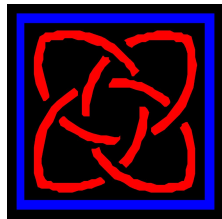


Catch the Rain

Designing on-farm trials

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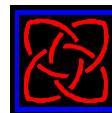
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Why on-farm trials?

- Test possible **new** management systems/practices *in your context*

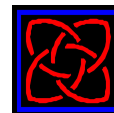
Or

- Observe differences between **existing** different management systems/practices
- Can also simply monitor representative paddocks to understand how your farm performs as a whole (is there a problem/opportunity?)



Designing on-farm trials

1. What is the question you are wanting answered?
2. How am I going to do my trial?
3. What am I going to measure?
4. Murphy's Law - what can go wrong?
5. What will it cost?



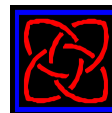
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1. What is the question you are wanting answered?

The most important thing to get right!

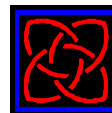
- A clear question is the foundation for your trial / monitoring
- Also known as a hypothesis



1. What is the question you are wanting answered?

Start with a general concept/question or something your interested in, e.g.

- I'd like to know if biofertiliser will increase my pasture growth?
- What happens if I increase pasture diversity?
- What is my soil like compared with my neighbours?



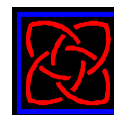
1. What is the question you are wanting answered?

Then refine into a hypothesis:

If x is done, then, y will result

For example:

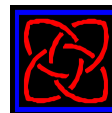
- If I defer half of a paddock and graze in January with ~50% utilisation and the rest trampled, this will increase infiltration rates, earthworm numbers and pasture growth by more than 25% for the following 12 months.



1. What is the question you are wanting answered?

or:

- If I sow a new permanent pasture with Cocksfoot 2 kg/ha, Plantain 0.25 kg/ha, Chicory 0.5 kg/ha, Timothy 1 kg/ha, White clover 0.25 kg/ha, Alsike clover 0.5 kg/ha, Red clover 0.5 kg/ha, Smooth meadow-grass 0.5 kg/ha, Lucerne 0.5 kg/ha, Birdsfoot Trefoil 0.25 kg/ha, Sheep's Burnett 0.2 kg/ha, Yarrow 0.15 kg/ha, Tall Fescue 2 kg/ha, Red Fescue 2 kg/ha, Meadow Fescue 2 kg/ha, it will improve infiltration rates, rooting depth and soil aggregation by at least 50% after two years, compared with new ryegrass and white clover.



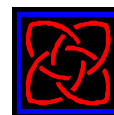
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1. What is the question you are wanting answered?

or:

- What are the differences in soil properties including nutrient levels, organic matter, microbial biomass, infiltration rate, and aggregate stability, between my farm that has been using high intensity long residual grazing for seven years and my neighbour who uses standard grazing techniques?



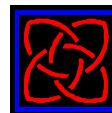
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2. How am I going to do my trial?

Turning your precise question (hypothesis) into a trial that will answer the question is an art

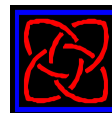
- A trial can be as complex as day-to-day farming
- Needs a good clear, detailed written plan
 - This will save you a lot of agro later
- Next are some key things to decide



2. How am I going to do my trial?

2.1 How long will my trial run for?

- It can often take some time – several months to a couple of years to see a response from pasture and stock.
- Don't short change yourself on how long it will take



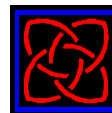
2. How am I going to do my trial?

2.2 Where am I going to put my trial?

A good site is vital to make your trial a success.

Consider:

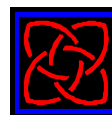
- Easy access and close to main tracks (visible)
- Reasonably even (slope, soil type, pasture etc)
- Similar management history (fert, grazing etc)



2. How am I going to do my trial?

2.3 What are my treatment(s) and controls going to be?

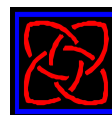
- Will you have one treatment or multiple?
- Multiple treatments give you the chance to test multiple ideas at once, but is also more work to set up and monitor
- The answer may depend on your hypothesis?



2. How am I going to do my trial?

2.3 What are my treatment(s) and controls going to be?

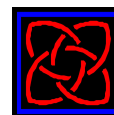
- A 'control' is your status quo that you use to compare your treatment with.
- In many cases your control will just be an area with your BAU farming practice, but it could be your neighbour!



2. How am I going to do my trial?

2.3 What are my treatment(s) and controls going to be?

- There are lots of variables to consider when selecting controls.
- i.e. if you are establishing new pasture/crop species in your treatment it may be best to also re-establish your current species in your control as pasture establishment is a big disturbance
- or paddock size may be a factor, where animals might behave differently in a small trial paddock vs. a big control paddock



2. How am I going to do my trial?

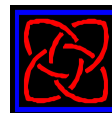
2.4 How am I going to replicate?

Replication (reps) creates statistical 'power' – increasing confidence that differences are not just chance.

- Typically four reps are used, six if small differences need to be detected

However, it's not always possible or practical to properly replicate

- Results from such trials need to be taken with a pinch of salt, or more...

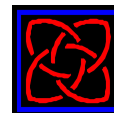


2. How am I going to do my trial?

2.4 How am I going to replicate?

Replication options:

- A) Splitting a paddock in half or doing a strip down the paddock (for product application trials)
- Neither replicated or randomised – can't show statistical significance
 - Lots of samples can give an indication of variability of each treatment
 - Can be considered to be one rep in a multi-farm trial, many farms doing the same trial



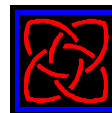
2. How am I going to do my trial?

2.4 How am I going to replicate?

Replication options:

B) Doing multiple strips down the paddock

- This is randomised or replicated – can show statistical significance
- Convenient as layout matches application equipment such as sprayers and break fencing



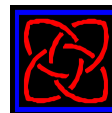
2. How am I going to do my trial?

2.4 How am I going to replicate?

Replication options:

C) Replicate over time

- A common method in ecology
- Starts with a baseline measurement before any changes are made
- Apply treatment(s) – once or multiple times
- Make repeated measurements – looking for trends



2. How am I going to do my trial?

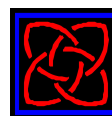
2.4 How am I going to replicate?

Replication options

D) Randomised complete block.

- Is the gold standard for field trials

	Treatments			
Block 1	d	a	c	b
Block 2	d	c	a	b
Block 3	a	d	b	c
Block 4	a	c	b	d

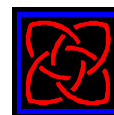


3. What am I going to measure?

To get information out of a trial something has to be measured!

Measurement often takes a lot of time

- Keep measurements to the minimum
- Only measure important stuff



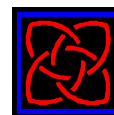
3. What am I going to measure?

As the focus of 'Catch the Rain' is infiltration this is a required measurement.

Ring infiltrometers + soil moisture on flat land

And/or

Overland flow collectors and rain gauges on sloping land



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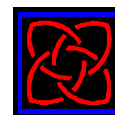
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3. What am I going to measure?

Other recommended measures:

Basic Soil / Plant

VSA Structure	
VSA Porosity	VSA Surface Relief
VSA Mottles	Sward Stick (DM/ha)
VSA Colour	Basal ground cover transect
Earthworms	Soil Temperature - 25mm
VSA Smell	Soil Temperature - 100mm
Rooting depth 80% (cm)	Slake test
Rooting depth total (cm)	Grazing Impact Score



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3. What am I going to measure?

Optional measures (funding dependent):

Advanced Soil / Plant

Aggregate stability

Measured soil moisture (top 15cm)

Penetrometer (PSI)

Water Drop Penetration Test

Lab tests

Bulk density (0-30cm) g/cm³

Soil organic carbon (0-15cm)

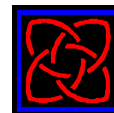
Soil organic carbon (0-30cm) %

Macroporosity

Soil Microbial Biomass - HWEC (0-15cm)

Soil Microbial Biomass - HWEC (0-30cm)

You may come up with others specific to your trial/hypothesis...



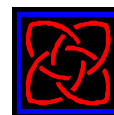
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4. Murphy's Law

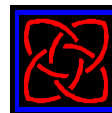
Murphy's law reigns supreme in field trials, there are a lot of things that can and do go wrong

- Think of things that could go wrong
- Make a plan to minimise them
 - E.g., making sure all fences are stock proof



5. What will it cost me?

Just the same as the farm, doing a detailed budget, especially for your / staff time, will help ensure that you know what your up for and have the resources to complete



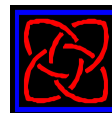
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Next Steps

Let's start designing some trials... for both new and/or existing different management systems/practices.

If you aren't able to develop a new or existing trial, you're welcome to focus on monitoring representative sites on your farm. However please join a trial group and support someone else with their trial design.



Thank you

Questions and discussion

