

A photograph of a muddy field with a path leading to a green field in the background. The path is muddy and has some grass growing through it. The background shows a green field with some trees and a fence line.

Working with sentient beings

***Some issues arising for the
creation of certain knowledge***

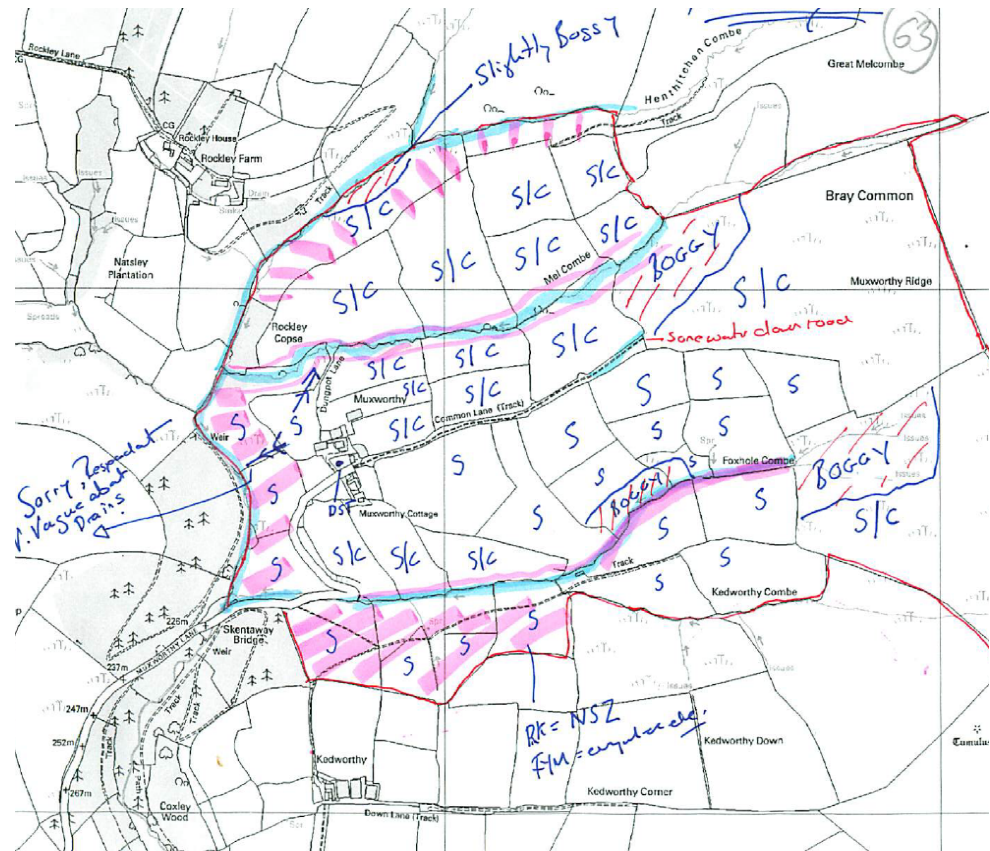
20th March

Robert Fish, Exeter University

Farmer survey...

135 questions + map based information

77 Farmer interviews
Attitudes and practices



Premise....

“Most microbial systems are large and complex and operate at scales that are difficult to observe and, almost certainly, defy intuition alone, which is why we need to seek and quantitatively express those rules...[we need a]... consistent and calibrated set of rules to describe and predict the behaviour of the microbial world as a system”.

Tom Curtis (2007, page 1)

Three thoughts.....

1. Microbial world as a “system”...in our case incorporating the “cultural” and “natural” world.
2. In this system social processes and structures are also “invisible and defy intuition alone”.
3. Our aspiration... “a consilient and calibrated set of ‘rules’”?

Uncertainty raises questions of....

- Premise raises the issue of uncertainty and “ontology” (I think!)
- i.e. it carries with it some kind of theory of ‘existence’ or ‘what is knowable’
- Thus, the ontology we perhaps accept is that the world is a system which can be revealed and expressed as a series of rules.
- In other words it believes that uncertainty can be overcome

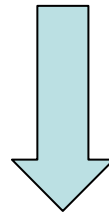
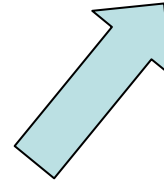
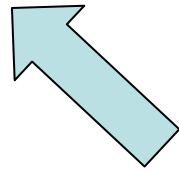
This claim leads to three responses

Reductionism?

Indeterminacy?

Uncertainty

Emergence?



Running alongside this....

Uncertainty also (I think!) raises questions of:

- **Epistemology** (i.e. the techniques and methods by which we come to create 'knowledge' about this knowable 'thing')
- While we may debate whether the processes we observe are open to certainty, so too can we debate whether our tools for data collection are themselves up to the task of creating certainty

Epistemology and uncertainty in the farmer survey

A survey tends to assume that interviewees:

1. understand what you mean when you speak with them;
2. speak when they are spoken to;
3. say what they mean when they speak with you;
4. say what they believe when they speak with you;
5. respond in the terms that you expect them to;
6. answer the questions that you ask of them

Epistemology and uncertainty in the farmer survey

It also assumes that:

1. interviewers understand what people are saying to them;
2. interviews take place in circumstances where completion is guaranteed.

On this basis it is argued that a survey questionnaire is amenable to “standardized” knowledge leading to consistent, comparable results from which one can begin to generalise

Survey distribution

Distribution of the 77 Farms surveyed in the Taw catchment

They represent a total of 5.6% and 6.7% of the total land area and total agricultural land, respectively

Sample size constrained by time

But 1 survey cut short! ←

18 dairy
8 beef
11 sheep
11 mixed
3 arable
21 beef & sheep
2 beef & dairy
3 poultry



Sample size

The impact of having only 2 'Beef and Dairy' farms:

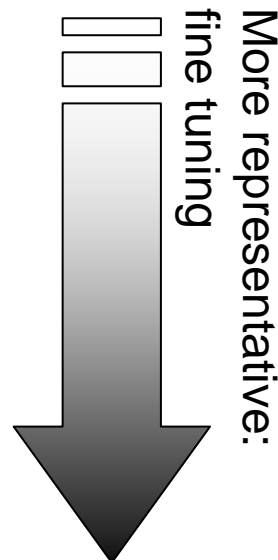
% likelihood of having no manure management plan	50
% likelihood of not inspecting storage	0
% likelihood animals allowed to ford watercourse	50
% likelihood of no consideration given to stocking density	50
% likelihood not a member of national fallen stock scheme	100
% likelihood cattle access to stream for drinking	0
% likelihood of FYM being stored uncovered in field	50
% likelihood of FYM being stored uncovered on farmyard	50

Result can only be 1 of 3 possibilities

Compare with sample size of 20 'Sheep and beef' farms

% likelihood of having no manure management plan	30
% likelihood of not inspecting storage	35
% likelihood animals allowed to ford watercourse	45
% likelihood of no consideration given to stocking density	0
% likelihood not a member of national fallen stock scheme	35
% likelihood cattle access to stream for drinking	80
% likelihood of FYM being stored uncovered in field	45
% likelihood of FYM being stored uncovered on farmyard	25

Result can be 1 of 21 possibilities



Participation

But representativeness is not just about 'farm types'

...it is also underpinned by an interest in accessing different 'farmer types'.....

Not just those engaging in 'clean practices' and displaying 'model' values... the "preaching to the converted" problem

Engaging with the research "problem" surely carries with it the desire to identify "dirty" practices and explore the reasoning behind them.

Participation

Some would argue that the issue at hand carries with it an important problem of participation:

...So called “dirty” farmers will not volunteer themselves..

...and if they do, they may wilfully camouflage their responses so that there is no ostensible problem (i.e. uncertainty linked to ‘honesty’)

Participation

But perhaps this concern is misplaced...

1. We have to be careful of assuming that practices are always linked to particular sense of “self identity”. No such thing as a dirty farmer *per se*
2. In any case, farmers who have not been “converted to the discourse” may have contrary worldviews that they wish to share...

Encouraging the idea of an “open-debate” was an important tactic for recruitment... “knowledge exchange”

Conversations with Computers

Computers help overcome data entry problems because they overwrite problems

But people rarely follow standardized “scripts” when they get going and tend to “start running away” with the issue at hand.....

..computers tend to magnify this general problem of standardized questionnaires in terms of efficient data entry....i.e. missing/misled data.

Missing Data.....

But data “blanks” are not just an “inputting” problem....

1. Computers can be a terrible “third party” in a conversation...
2. Small number of surveys are simply not finished or indeed barely started because the interviewee has to leave.
3. More importantly, though, missing data can reflect underlying problems in the way ‘we’ think knowledge should be expressed in terms of calculations and measurement.
For instance 32 farmers unable to answer annual manure generation – should we be surprised about this?
....can do crude calculation via livestock head to estimate

Are farmer responses reliable?

The technique implies 'yes', but the insights imply perhaps 'no'

Dairy farm generating 30499 t slurry per annum (cattle head = 300 dairy)

Dairy farm generating 24500 t slurry per annum (cattle head = 160 dairy)

Way too much! (~10 X TOO MUCH)

....Can fix by crude calculations via excretion x cattle head

Distance to nearest watercourse? Farmer answer = 50 miles!
(actually < 50 metres) :

Again: Why the error? Perhaps different understandings of 'watercourse'. More likely: human error in data input

Are farmer responses reliable?

FYM application rates from survey: 20.6 T / ha

Slurry application rates from survey: 24.8 m³/ ha

This is below the upper limits of 50 m³/ ha and 50 T / ha specified in the Codes of Good Agricultural practice

Only 3 farmers gave application rates that exceeded CoGAP rates.

Are farmer responses reliable?

FYM application rates from survey: 20.6 T / ha (+/- 2.9)

Slurry application rates from survey: 24.8 m³/ ha (+/- 6.5)

We do have a measure of error from our sample, and we can reduce this error through increasing our sample size....

But again we are assuming that rates given to us are correct

Are farmer responses reliable?

We also encountered the issue of “contradiction....”

63% of all sheep farmers in the Taw knew location of their drains, yet 82 % of all sheep farmers knew they functioned efficiently?

One beef farmer doesn't store or compost FYM.....but he stores FYM for 5 months.....(??!!)

But contradictions also surfaced between survey information and later observations...

Big 10: Farmer A

Farmer A: Perhaps answered Qs in way he thought we wanted him to when we first met him?:

‘.....of course I leave a strip next to the stream when I’m spreading.....’

As the relationship developed:

‘.....I get a thrill out of hearing muck splash into water....’

Big 10: Farmer A

Farmer A

also told us (when we first met him) that as a dairy farm he needs to spread on all fields to distribute his slurry.....

.....as we got to know him he explained that he had bought up land so that on paper it looked like he had sufficient land to spread all the manure produced, but in fact he only ever spreads on land close to the farmyard.....

Big 10: Farmer B

Farmer B

Was proud of his clean water drainage that allowed for clean roof water to drain directly to the stream via the clean farmyard area.....dirty water collects and drains separately.....But...

Routine farm walks and visits identified on every occasion large farm machinery covered in FYM being washed down with a high pressure hose directly above the clean water drain that connects directly to the stream

Why don't these farmers tell a straight story?

It's easy to moralise about "honesty" but it doesn't give us the whole picture....

We have to recognise that contradictions appear to arise partly because there are limits to the technique (i.e. its theory of humans is weak...nature of human reasoning..identity positions)

Building relationships = very important in reducing the uncertainty associated with farmer surveys

Raises issues of quality rather than quantity? (the Big 10 vs total 77)... 'certainty' may go 'up' in one sense, but 'down' in others.

Ontology and uncertainty in the farmer survey

Having said all this...

The insights we derive from a Farmer survey is perhaps uncertain not only because of failings of technique, but because farmer data is in some cases “inherently” uncertain.

In other words, insights may still be uncertain even if our technique is ‘reliable’.

Given these two issues....

and speaking from the perspective of social science...

- i) Should our insights aspire to be 'soft' assessments: i.e. assessments based on 'working principles' not 'rules'
- ii) empirical insight such as that derived from a farmer survey can set certain parameters around issues of risk but no amount of data can finally pin risks down?