



University  
of Exeter

Exeter Food

# Exeter Food Industry Research Forum

*Sustainable Agri-Nutrition Systems  
and Healthy Microbiomes Workshop*



## Programme for the day

**10:30-10:45** Welcome, outline of the day - Harry G West, Professor of Anthropology, Lead of Exeter Food

**10:45-12:00** Five research challenges of relevance to industry partners

- The hidden gatekeepers: how the soil microbiome controls carbon storage and soil health - Harry Child, Postdoctoral Research Fellow, Geography
- Evidencing linkages between farm systems, soil microbiome, crop health and nutritional value in order to enhance crop resilience to extreme weather events - Hannah Croft, Agronomist, Riverford
- Antimicrobial resistance and microbiomes in food producing environments - Will Gaze, Professor of Microbiology, University of Exeter
- Making the case for agroecological farming as a solution to the climate, nature and health crises - Fay Cooke, Chief Impact and Financial Officer, Yeo Valley
- Microbes and society: how people engage with microbiomes - Steve Hinchliffe, Professor of Human Geography, University of Exeter

**12:00-12:15** Relevant research capabilities and facilities at the University of Exeter for the study of agricultural practices, soil and human gut microbiome - Luciana Torquati, Senior Lecturer in Nutrition, University of Exeter; and Craig Willis, Senior Research Data Scientist, University of Exeter

**12:15-12:30** How collaborative research might be funded - Gemma Mendham, Business Development Manager, Health and Wellness, University of Exeter

**12:30-12:45** Microbiome One Health Innovation in the UK: from soil to human nutrition and health - Andrew Morgan, Honorary Professor in Business Engagement and Innovation, Faculty of Health and Life Sciences, University of Exeter

**12:45-13:45** Buffet lunch

**13:45-15:00** Breakout groups for each of the themes above

**15:00-15:30** Report back

**15:30-16:00** Next steps

Exeter Food

RESEARCH NETWORKS



# Exeter Food

A University of Exeter  
Research Network

Network lead:  
**Professor Harry G. West**

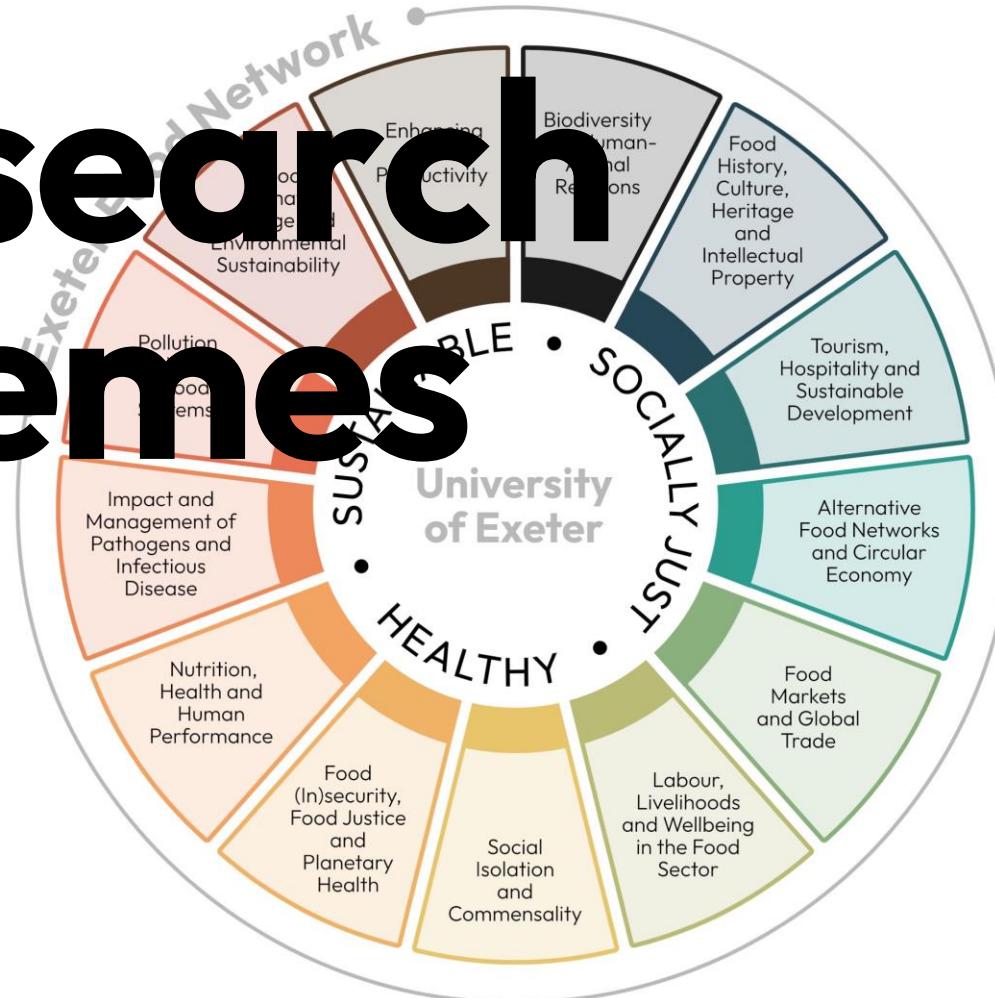
# Mission

Connecting researchers  
and stakeholders

- Improving understanding of the significance of food in society
- Addressing global food challenges



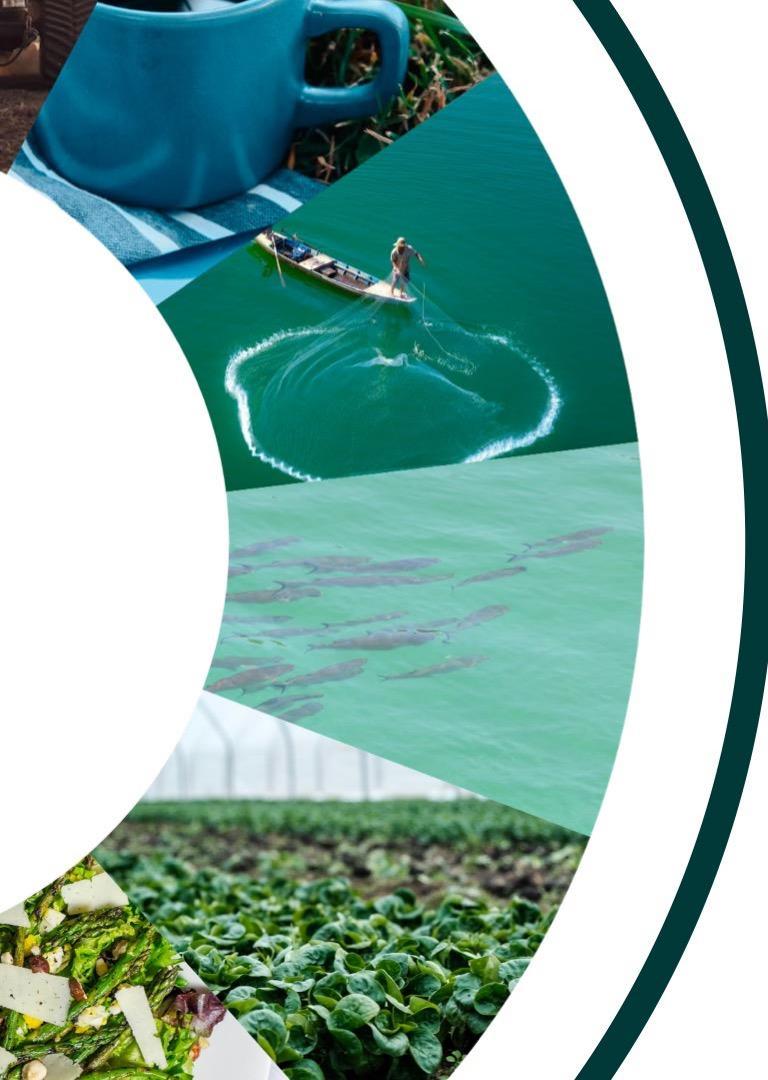
# Research Themes



# Stakeholders

Our partnerships are facilitated by working groups focused on:





# Events & activities

Seminars  
Workshops and symposia  
Conferences

- Sandpits and hustings
- Stakeholder forums
- Public lectures and events
- Food on Film Series with Exeter Phoenix

# Teaching

- Doctoral research supervision
- Degree programs including MA Food Studies
- Continuing professional development courses
- A MOOC on *Future Food: Sustainable Food Systems for the 21st Century*



# Member

Academic staff (more than 425) in  
most departments in all three of  
our faculties and on each of our  
campuses

- **Students** in bachelors, masters & doctoral programmes
- **Alumni**
- **Partners** in teaching and research



# Connecti

Webpage: [www.exeter.ac.uk/food/](http://www.exeter.ac.uk/food/)

Subscribe to

newsletter:



Email:  
[exeterfood@exeter.ac.uk](mailto:exeterfood@exeter.ac.uk)

# Exeter Food





University  
of Exeter

# Harnessing Environmental Genomics for Soil Health and Climate mitigation

Sustainable Agri-Nutrition Systems and Healthy Microbiomes  
20/06/2025

**Dr. Harry Child**

Geography Department, University of Exeter

[H.Child@exeter.ac.uk](mailto:H.Child@exeter.ac.uk)

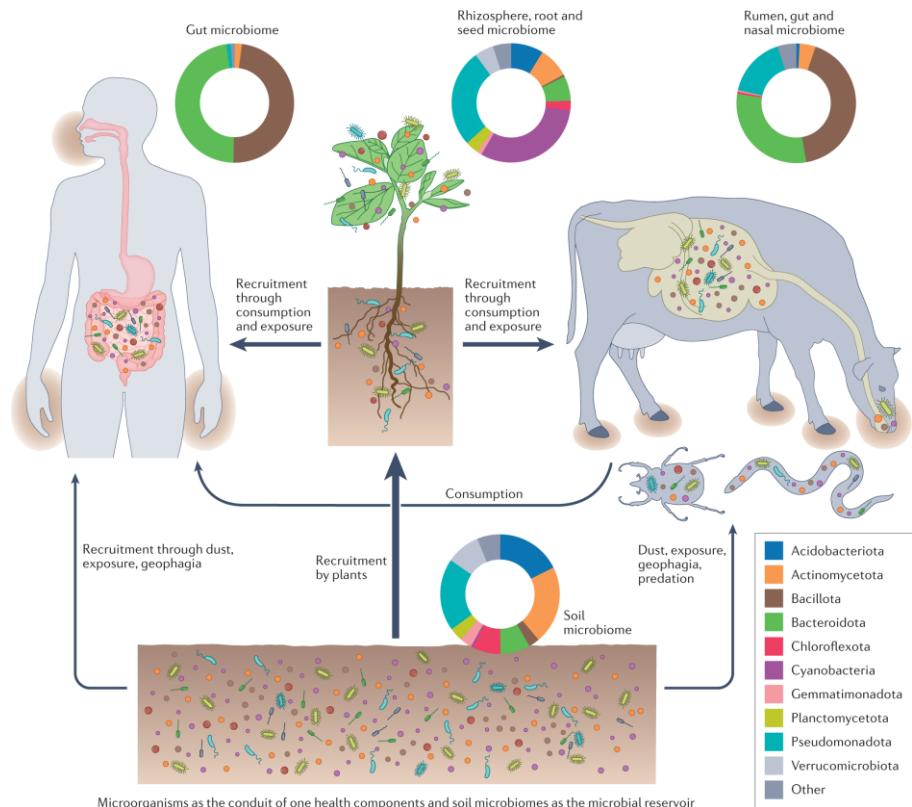


# Soil microbiome in One Health



University  
of Exeter

- Soil microbes are essential for plant health
- Soil microbes are transferred to animals/humans both directly and indirectly
- Healthy soil = healthy plants = healthy humans?
- How can we measure microbial contribution to soil health?



# The Soil Microbiome



University  
of Exeter

- One gram of soil can contain more than 10,000,000,000 bacteria of >50,000 species and 200m of fungal hyphae.
- Many of these microbes are **unculturable** and are **poorly understood**



# The Soil Microbiome



University  
of Exeter

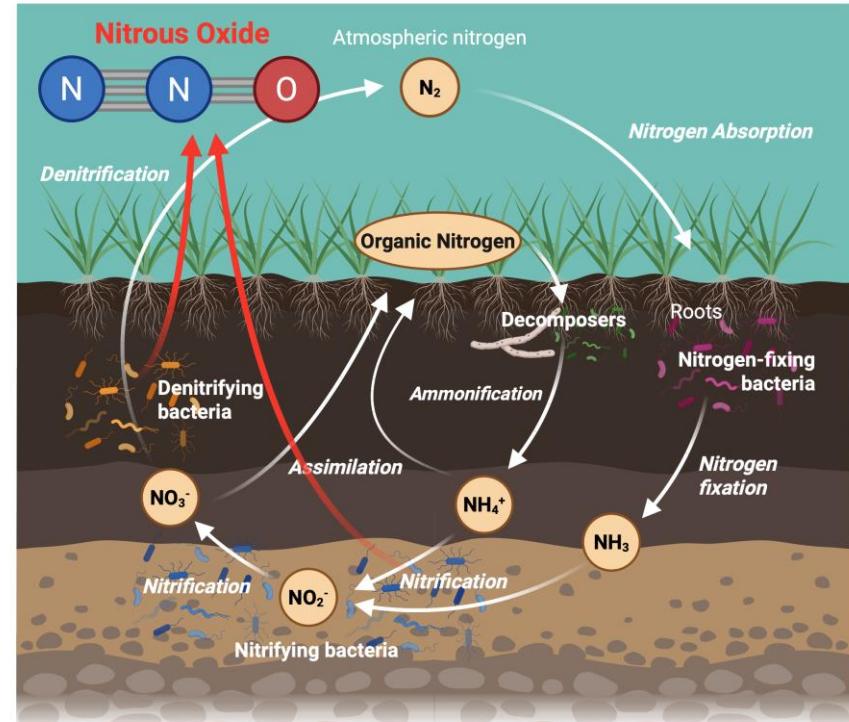
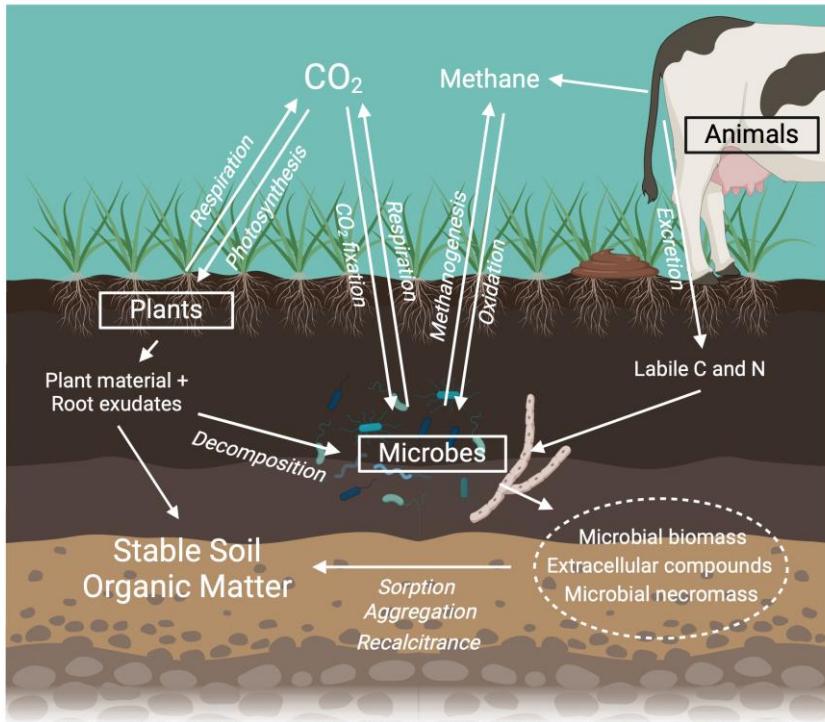
- Microbes play a **central role** in regulating **soil nutrient cycling, organic matter dynamics** and **plant health**.
- The complexity of soil makes it **challenging to understand how microbes mediate these processes** and respond to amendments or agricultural management practices.



# Microbes control nutrient cycling



University  
of Exeter



Carbon cycle

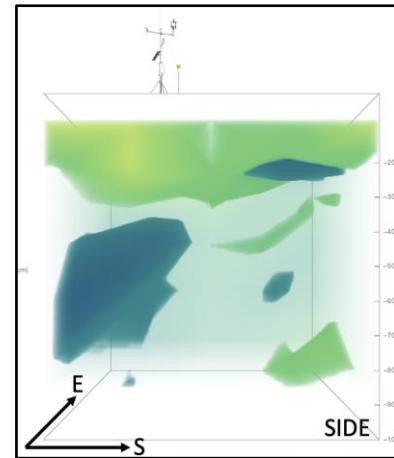
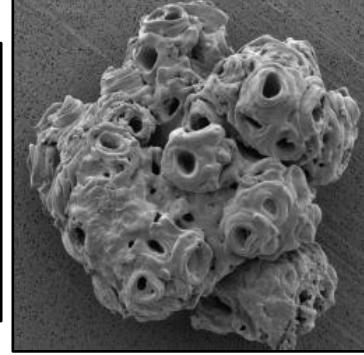
+ P, Fe, S etc.

Nitrogen cycle

**Environmental genomics** is the study of genetic material recovered directly from environmental samples, without the need to isolate or culture individual species.



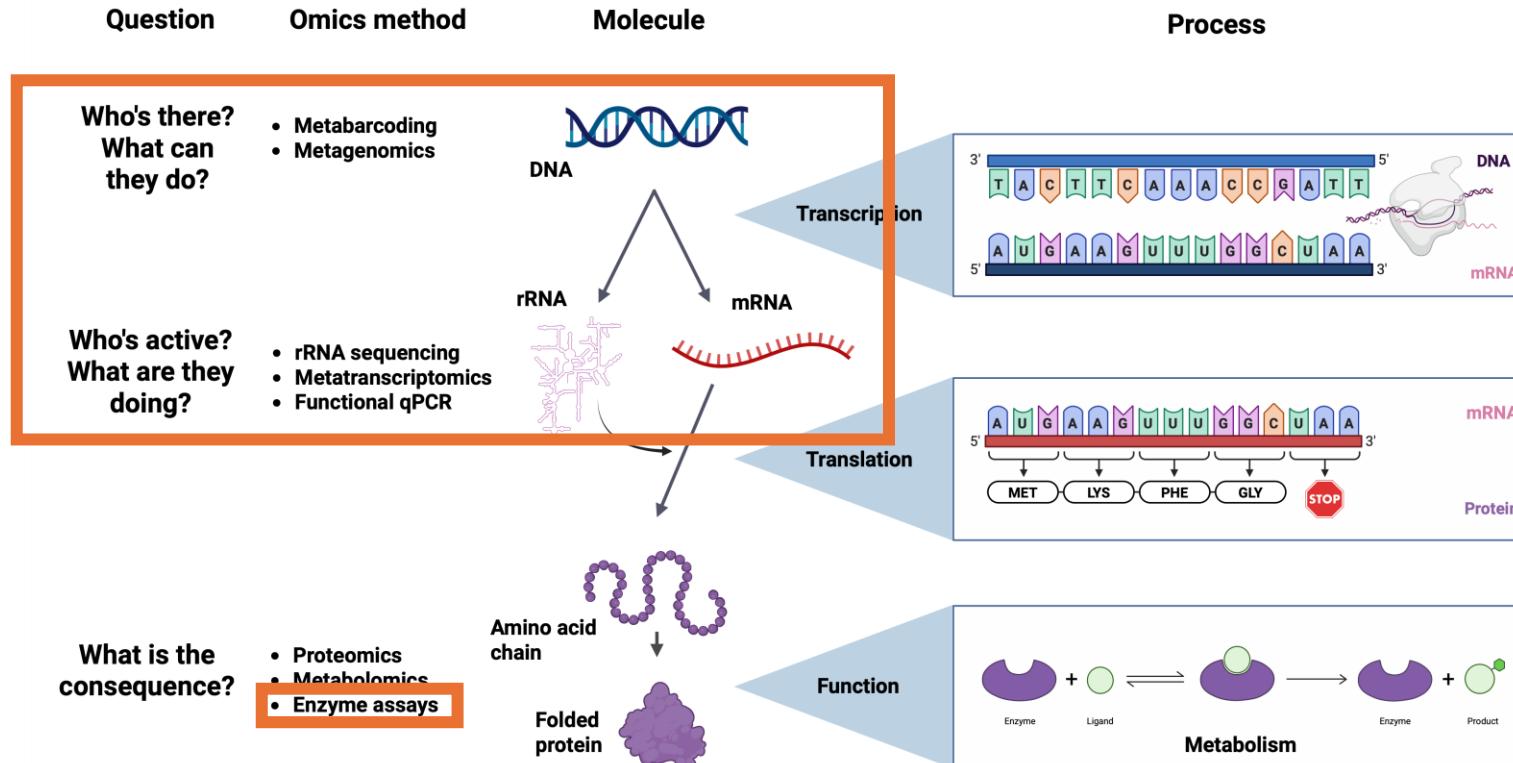
University  
of Exeter



# Uncovering the soil microbiome

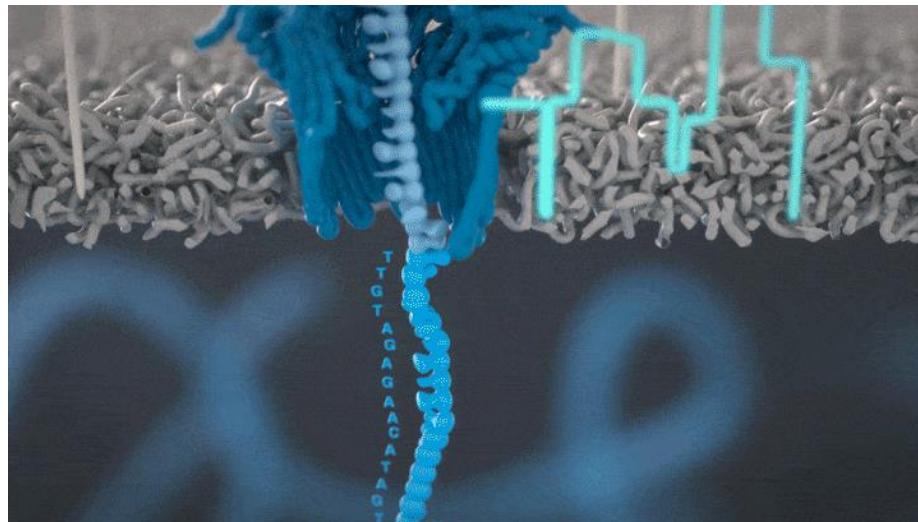


University  
of Exeter



# Oxford Nanopore Sequencing

- No technical limit on length of DNA or RNA molecule that can be sequenced using ONT sequencing.
- Low capital cost, portable and accessible.
- Allows **direct** sequencing of the DNA in your sample



# End-to-end environmental sequencing



University  
of Exeter

## Extraction



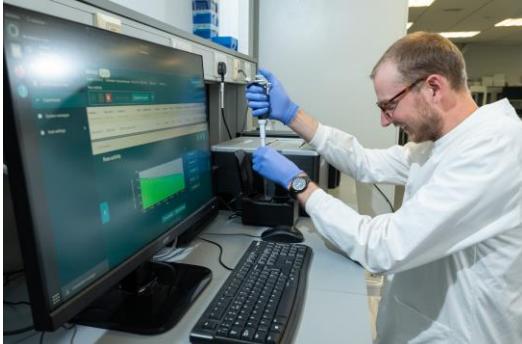
## Sample QC



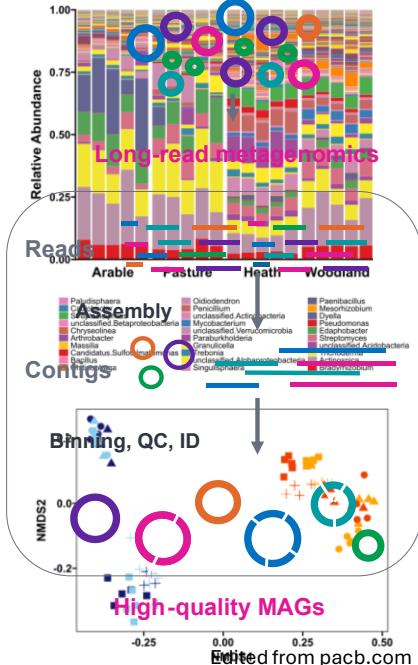
## ...in the field



## Library prep + Sequencing



## Bioinformatics and analysis

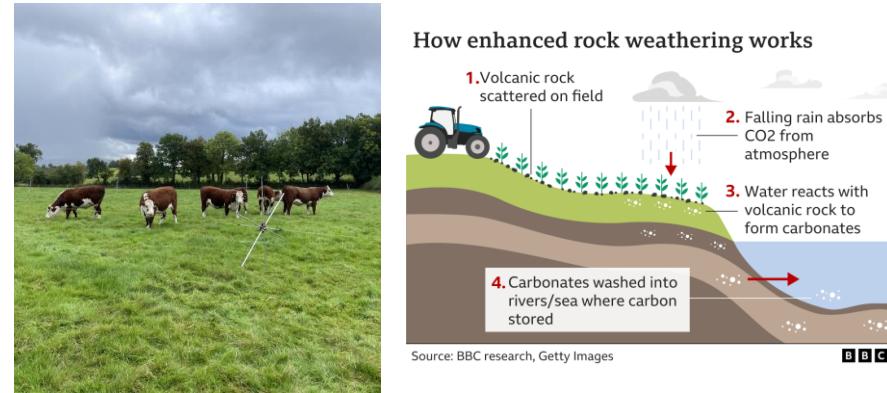


# Research interests

- Efficacy and mechanisms of agricultural climate change mitigation strategies
- Carbon sequestration through **soil amendments**
- **Grazing management** strategies
  - Adaptive vs conventional grazing
- How are microbial processes impacted by these management practices?



University  
of Exeter



# Experimental systems



University  
of Exeter

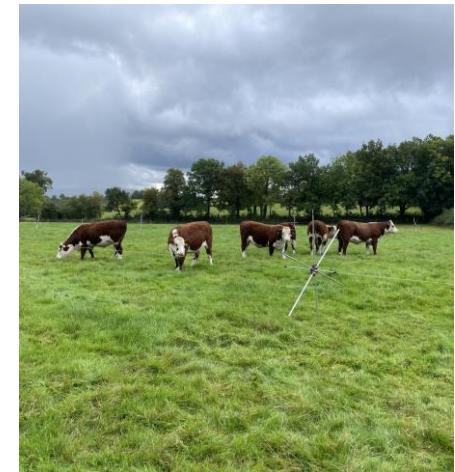
Soil-only pot experiments



Plant-soil chamber experiments



Field studies



# Thank you!

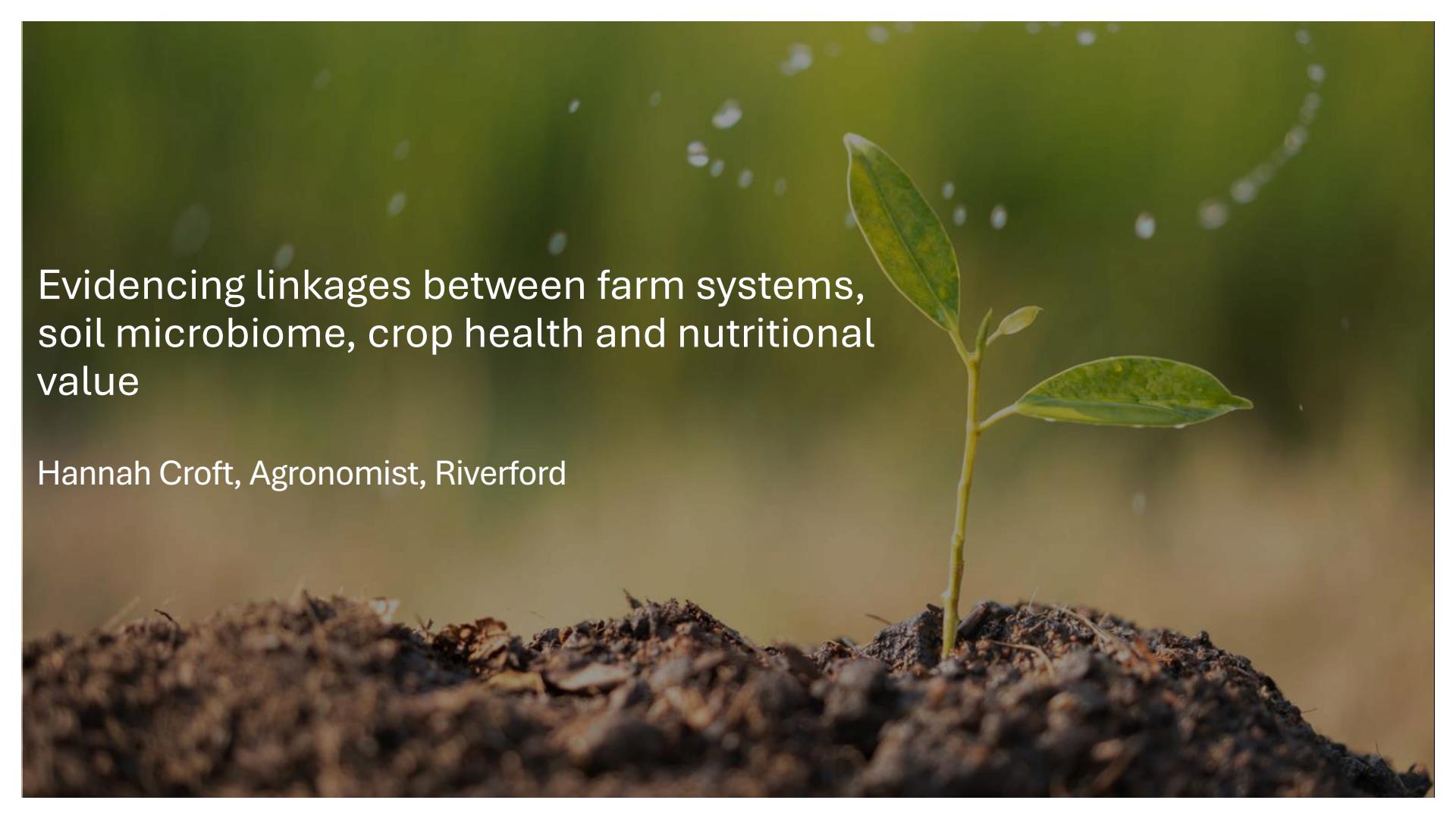
## Dr Richard Tennant lab

- Dr Shayma Alathari
- Dan Barber
- Lucy Wierzbicki
- Gabrielle Joslin

## Prof Iain Hartley lab

- Dr Nina Lindstrom-Friggens
- Dr Ezekiel Bore





Evidencing linkages between farm systems,  
soil microbiome, crop health and nutritional  
value

Hannah Croft, Agronomist, Riverford



# Are we intensive farmers?

We are committed to producing 4.2 million tonnes and 2.2 million heads of vegetables for our box scheme from our Devon and Cornwall suppliers. This includes

- 2.2 million tonnes of potatoes
- 300 tonnes of leeks
- 50 tonnes of salad leaves

This is grown on 900 hectares of land.



**In 2022 we experienced one of the driest Summers since 1890. Rivers and reservoirs ran dry, unable to irrigate crops we saw significant losses in many crops.**

As a result, our trials stopped being about maximizing yield and instead focused on making our **soil and plants more resilient to extreme weather conditions**. Trials include:

- Does planting new potatoes in 3 row unridged retain better moisture on un-irrigated land?
- Vermicompost: Will applying compost provide more nutrient availability compared to synthetic bio fertilisers?



Pre drought...

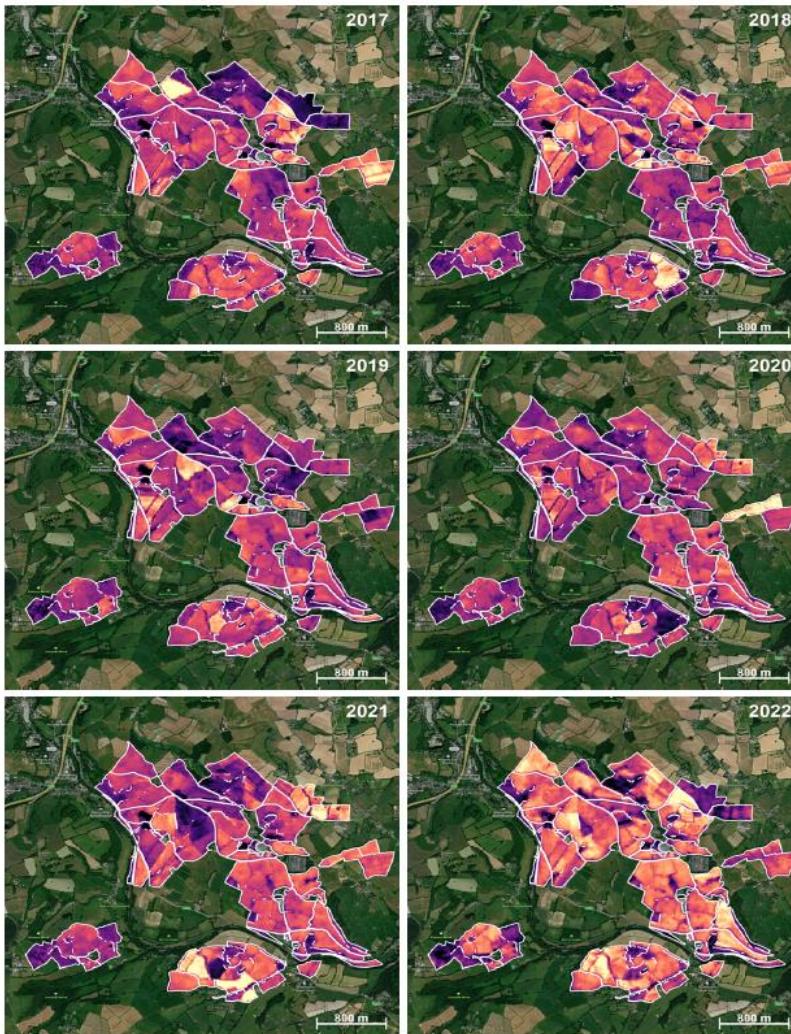


Post drought...



**Figure 1**

Annual Average  
SOC (%) maps from  
January 2017 to  
December 2022



# Downforce Technologies: Riverford Organic Farm Soil Organic Carbon Report 2023



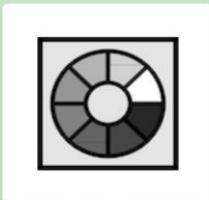
# Trials post 2023

Due to significant changes in plant & soil health and a 40% drop in yields across many crops we decided we would start collecting data on **microbial levels** in soil. We also included **compaction psi, soil temperature and soil moisture** readings from all our trials. 2025-2026 season we are currently running 37 trials within our supply group.

Priority trials we would also take soil and tissue samples.

## Edit sample details

Unassigned



Soil Results

2030 ug C / g  
F:B = 1.8 : 1  
F 64 %  
B 36 %

Map



Sample Name Farley Vitabella 1



Soil Properties :



Depth 10.0 cm



pH 6 scale



Soil Moisture 10 percent



Soil Temperature 17 Celsius



Field ID: 17 ACRES

1 Ha

CROP SOWN:

No Crop Given

An Ideal soil structure (Bd)

1.4

Soil test is assumed to be carried out for soil at

General plough depth

Active pH 6.10

Priority;

consider liming.

A slightly acidic soil.

Good crop responses.

Buffer pH 6.80

Active Carbon mg &amp; % 647 2.50%

Organic Matter Min &gt;3% 4.70

Organic Carbon(LOI) Ideal 3% 2.76

Min required OM for structural integrity 3

Total Exchangable

Capacity (TEC)

6 = small, 30 = large.  
15 viewed as average

Result

9.64

Sand % 50  
Silt % 31  
Clay % 19

Clay Loam

Stone content % if known

Dry BD 1.153

Field Bulk density if known 1.47

Estimated NR 55 kg of NR from OM

T/C/ha Target 110 Found 61 T/C/Ha

Co2 Burst 0

Total Carbon (Dum) 1.94

Total N (Dum) 0.189

Clay:SOC 9.8

C:N ratio 10.26

Guide 12

Min required OM for structural integrity 3

Reported as kilograms/hectare - elemental (kg/ha)

Major Elements in Elemental form

CROP AVAILABLE NUTRIENTS

TOTAL IN SOIL Reserves

% Base Cation Saturation Ratios (BCSR)

kg/ha DESIRED Found Difference ELEMENTAL kg/ha DESIRED FOUND

Calcium Ca ++ 2869 2805 -64 4064 67.50 66.00

Magnesium Mg ++ 319 243 -76 1534 12.50 9.52

Potassium K + 331 398 67 1752 3.99 4.80

Sodium Na + 44 48 4 108 0.89 0.98

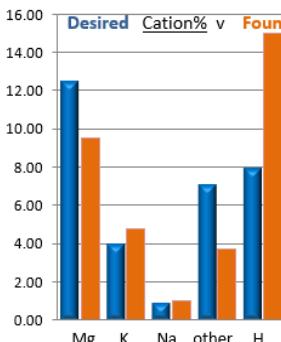
Other elements 7% 3.70 . Minor Importance 7.12 3.70

Hydrogen 8% 8 8 15

Sulphate (SO3) 76 186.65 110 746

Phosphate (P2O5) 109 435 326 1886

Excessive Total P reserves for the soils holding capacity



Mg SP 9.52 (&lt;15)

General comment on Structure

Total Element Ratios RATIO : 1 Target level Found Structural comments

Calcium Ca : Mg 5.40 2.6

Magnesium Mg : K 3.13 0.88

Potassium K : Mg 0.32 1.14

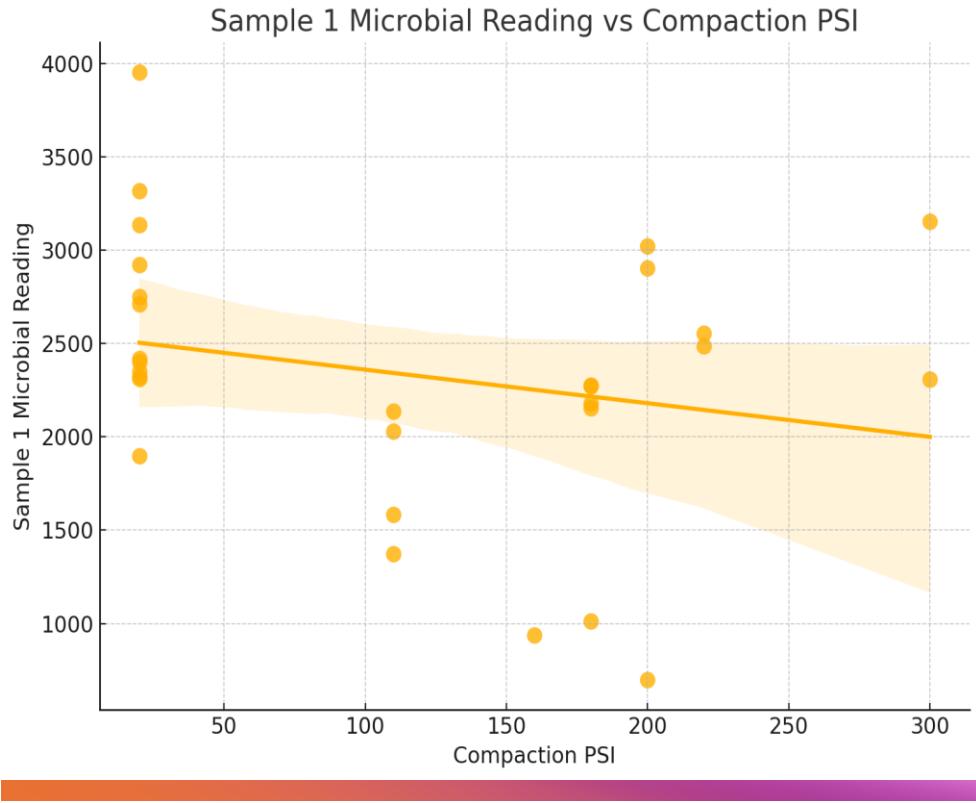
Potassium K : Na 4.48 16.27

Plant health comments

# Microbial vs Compaction PSI

Microbial data from a 2024-2025 trial: Does the spacing between cauliflower seedlings affect plant health?"

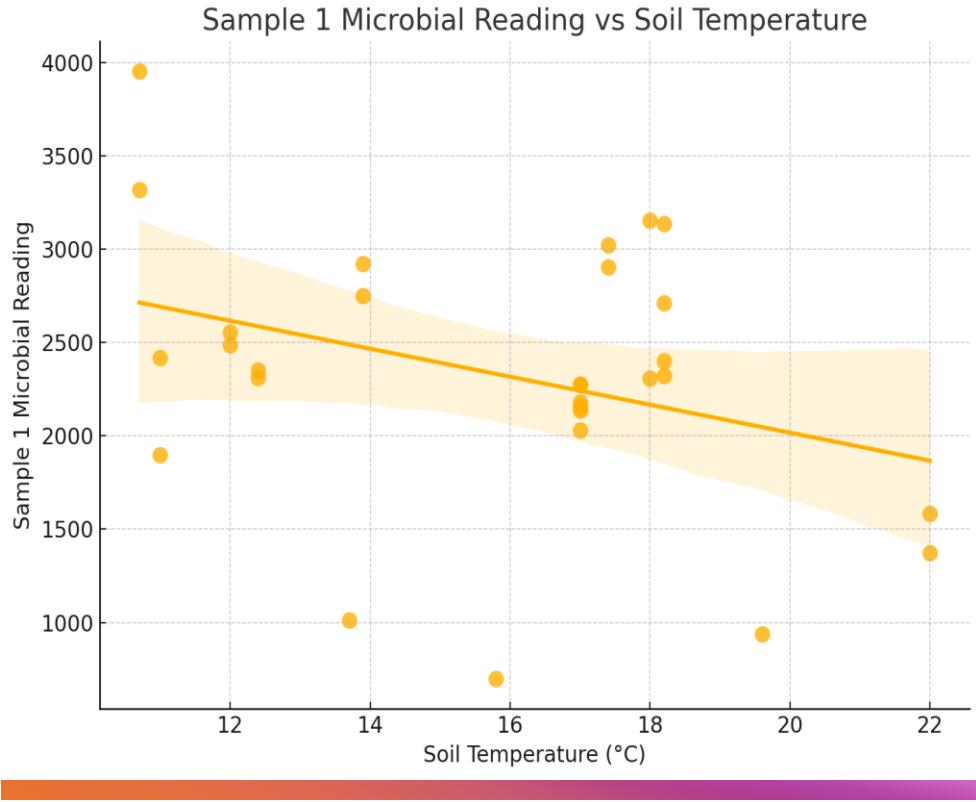
Results: As soil compaction increases, microbial levels decrease. Compacted soils inhibit microbial levels due to reduced air and water, possibly restricting root growth.



# Microbial vs Soil Temperature

Microbial data from a 2024-2025 trial: Does the spacing between cauliflower seedlings affect plant health?"

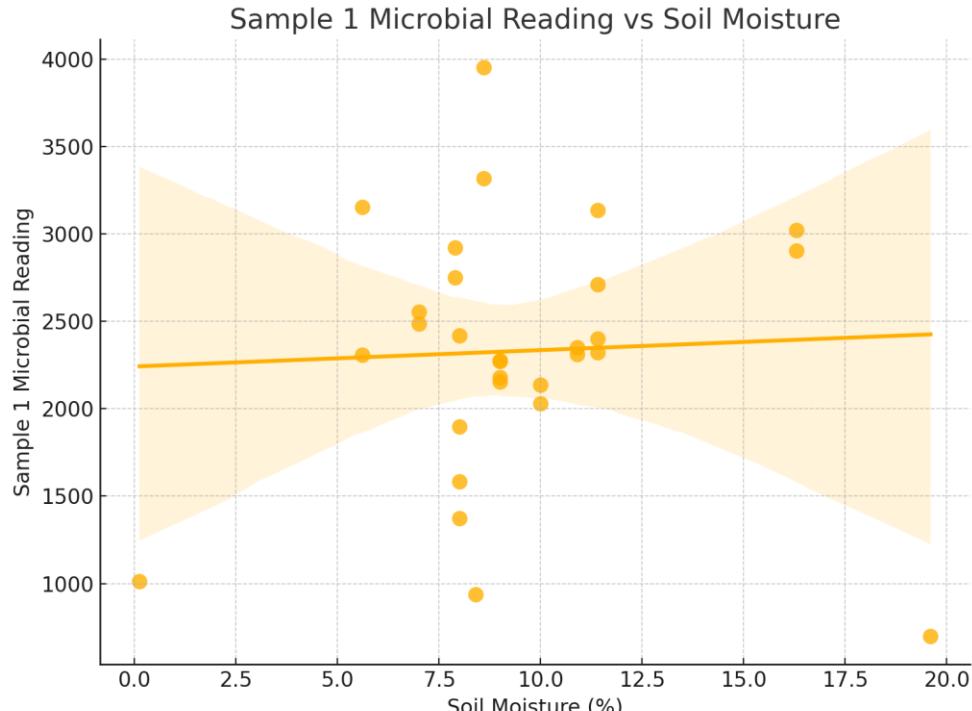
Results: A slight increase in microbial activity with rising temperatures, microbes are sensitive to temperature **changes**, warmer soils enhance enzymatic activity **BUT** only up to a certain threshold.



# Microbial vs Soil Moisture

Microbial data from a 2024-2025 trial: Does the spacing between cauliflower seedlings affect plant health?"

Results: As soil moisture increases, microbial activity also increases.



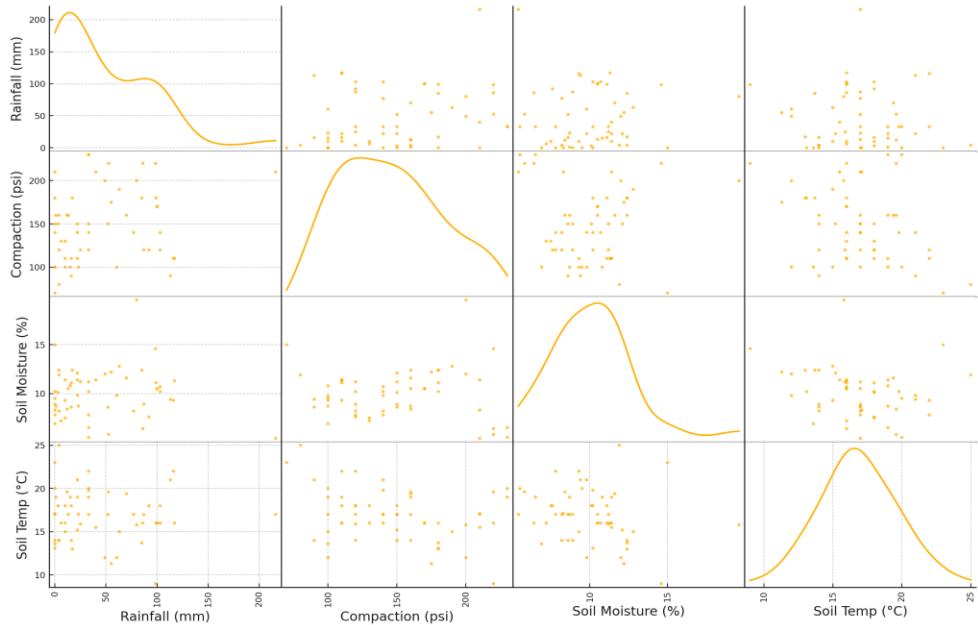
# Rainfall and its influence

Microbial data taken from 2024-2025 trials (17 trials across Devon and Cornwall supply base)

## Results

- Compaction was the most negatively contributing factor towards poor crop health.

Scatter Matrix of Soil Conditions (Aligned New Data)





# Compaction: tillage vs weeds

We know that repeated ploughing, power harrowing, rotavating breaks down soil structure and reduces biological activity in soil.

## How do we ensure crops stay clean?

In 2022-2024 we trailed strip-till planting, **it failed due to our inability to keep the crop clean**. We also saw an increase in plant stress, primarily from lack of moisture and lack of root growth.

We believe **cover crops are vital** for plant nutrition and an important weed suppressant, we have invested time into finding the appropriate Winter leys for our soil type (clay loam) chicory, radish, phacelia.

The strip-till trial is continuing at 3 sites across our supply base.

# Are we asking the right questions?



How does mycorrhizal response to bacteria vary under extreme weather, and what are the implications for crop health and nutrition over time?



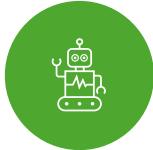
How much water is too much (or too little)?



Can sustainable animal feeds, like black soldier fly reduce our dependence on intensive cereal crops?



Is temperature a background influence or a trigger?



The future of farming? Can AI and robotics support a holistic organic farming system?



Are we favouring beneficial microbes or just general biomass?



We are starting  
research into nutrition



Nutritional composition of organic produce

One health

Heritage varieties

Polyphenols

Diversity of diet

Nutritional density

Soil health = human's health?

Freshness of produce at consumption

Where do we begin?!?

Nutritional quality

Link between climate resilience and nutritional value

Plant stress = higher polyphenols ?

Ergothioneine



# We want to start research into the nutrition of our produce

**Brand team:** “We want to be Veg Nerds!”

**Sustainability team:** Plotting the association between the health of the farm ecosystem, nutritional density and quality of product

**Guy:** Surely organic production results in produce with a better nutritional composition than those grown in conventional systems or without soil?

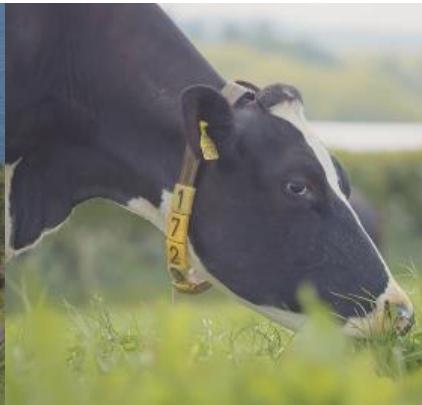


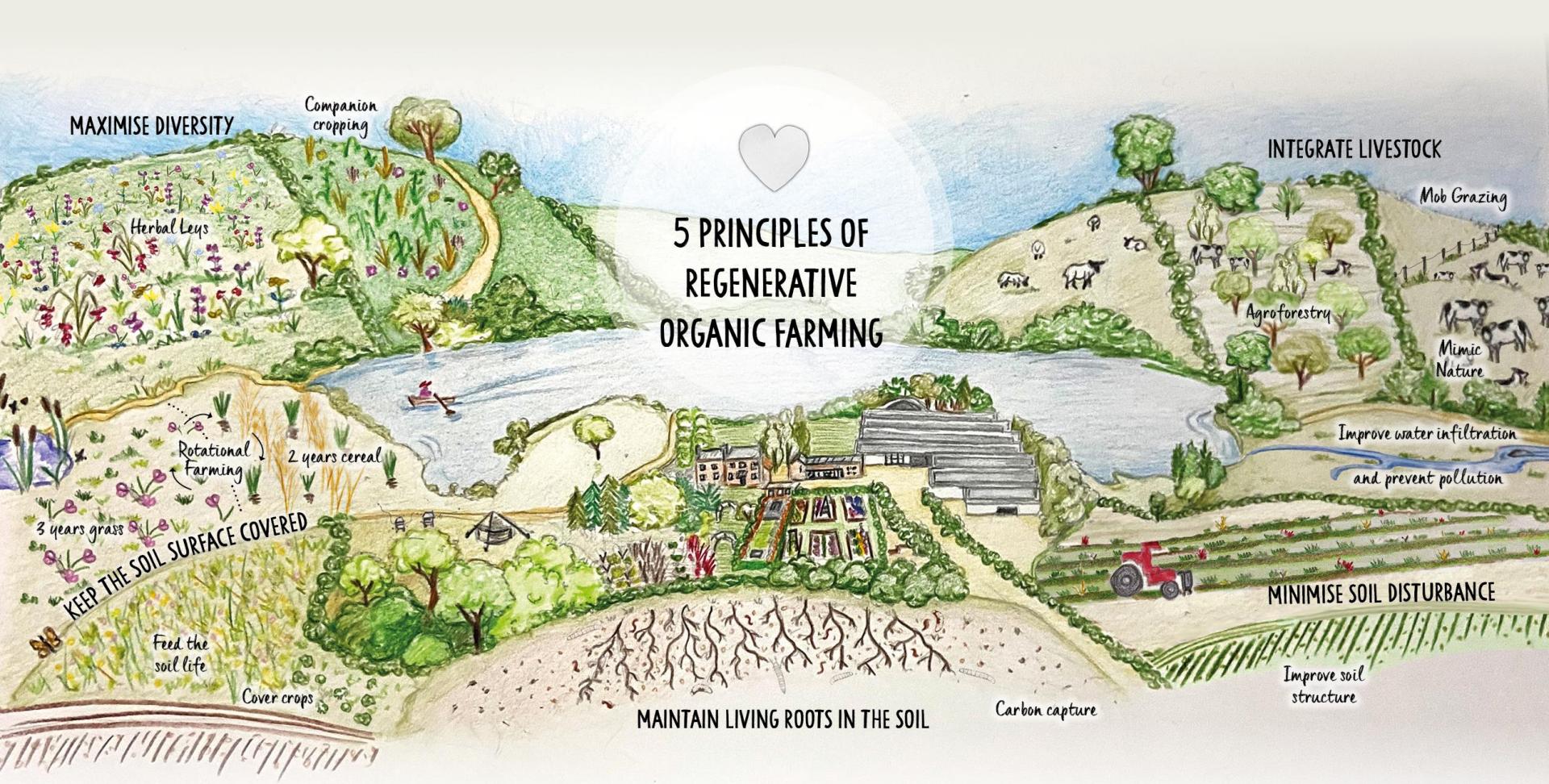
# MAKING THE CASE FOR AGROECOLOGICAL FARMING AS A SOLUTION TO THE CLIMATE, NATURE & HEALTH CRISES

DR FAY COOKE, CHIEF IMPACT & FINANCIAL OFFICER

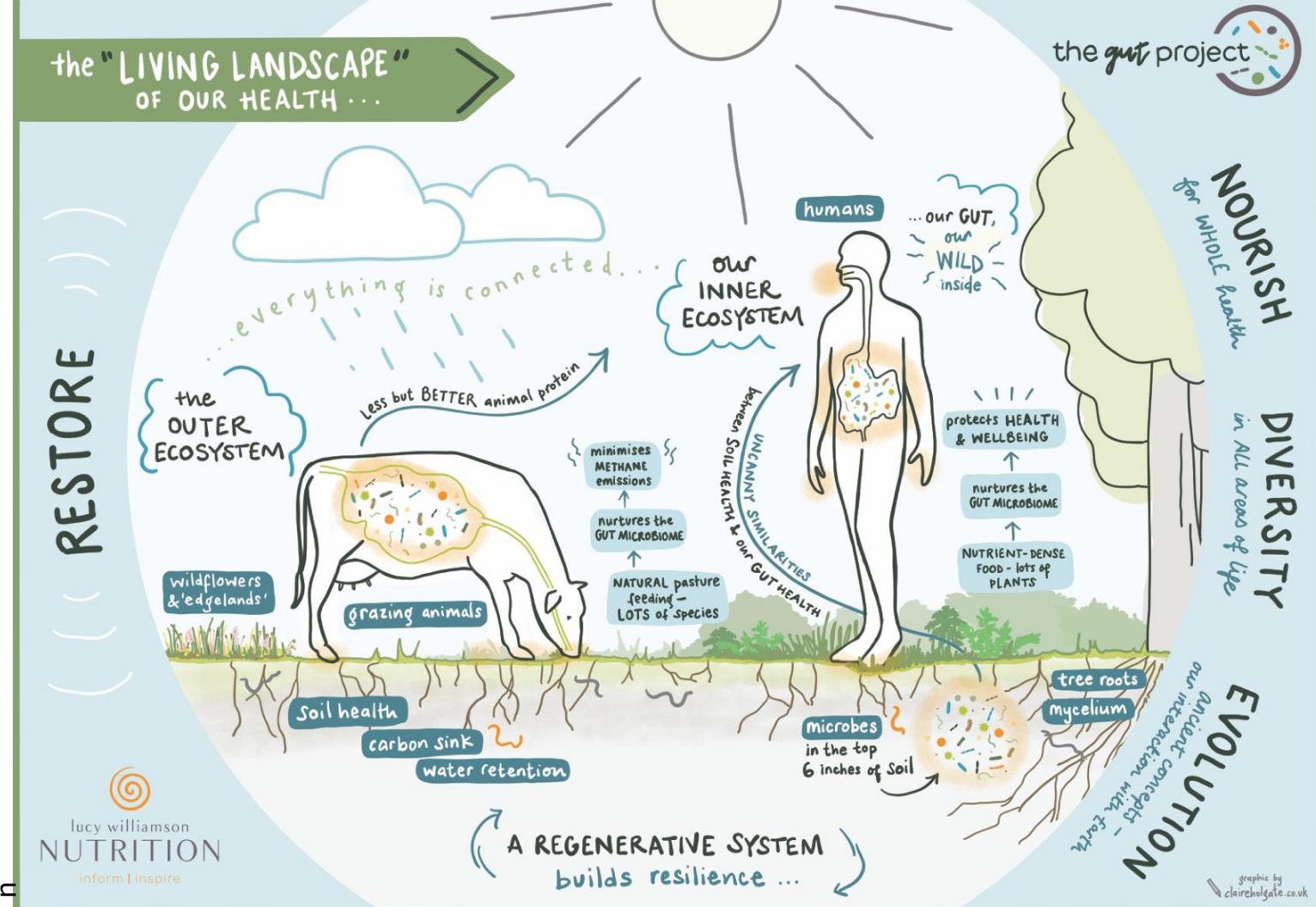
# WHAT IS AGROECOLOGY?

An affordable and scalable way to produce natural healthy food that sustains and values life whilst helping to reverse climate change.





(AND THE IMPORTANCE OF CONTEXT...)



# THE OPPORTUNITY...



## HOLISTIC, MULTIFACETED BENEFITS



- Affordable
- Nutrient dense, healthy food
- Improved resilience (disease, weather, profitability)
- Lower carbon emissions
- Increased carbon removals
- Improved soil health & structure
- Ecosystem regulating services
- Increased biodiversity & bioabundance
- Better social impact
- Improved animal health & welfare...

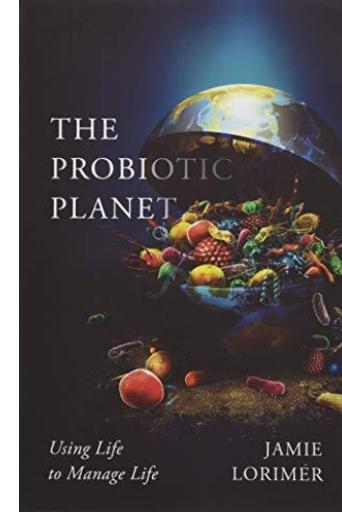
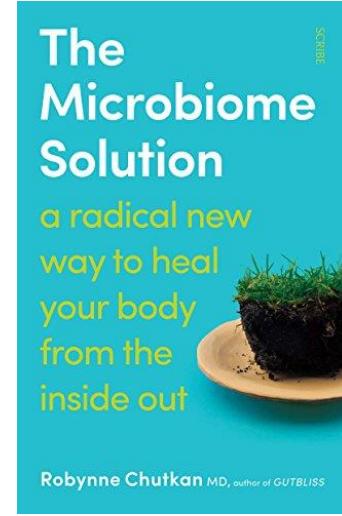
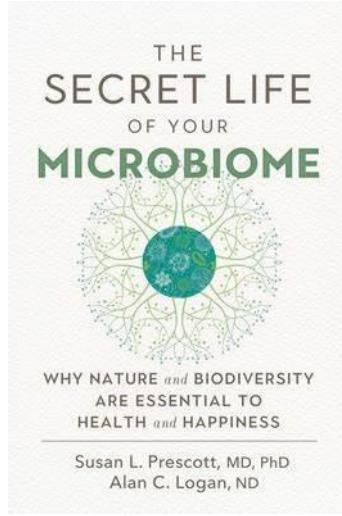
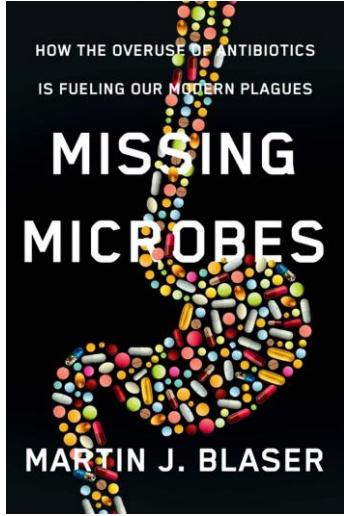


# THE CHALLENGE

# UNDERSTANDING A SYSTEMS-BASED APPROACH IS COMPLICATED



- For academia – how can the best minds come together with creative thinking to find multidisciplinary approaches to demonstrate the multifaceted outcomes of systems-wide ecological approaches?
- For industry – how can we come together to support research into understanding nature-based solutions that benefit all and promote a healthy, sustainable agri-food system?
  - Can we reimagine how we come together pre-competitively?
  - Can we be imaginative about how we construct business cases that look at value beyond commercial IP?



# Microbiomania

Microbes, society and culture

Steve Hinchliffe

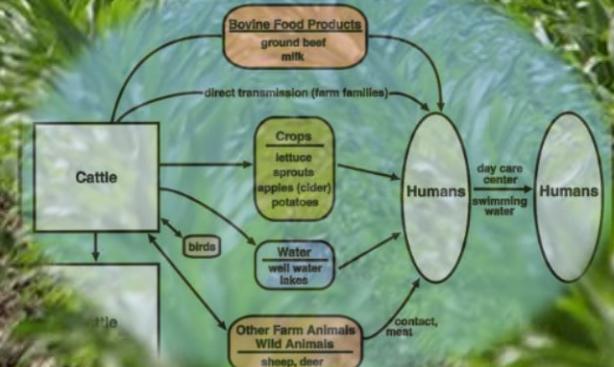
Geography, Exeter

# Glyphosate assemblages



Elanco  
Rumensin®

Feeding Gain for



# Glyphosate

An Agroindustrial Chemical on the Move

&

the

Vincanne Adams

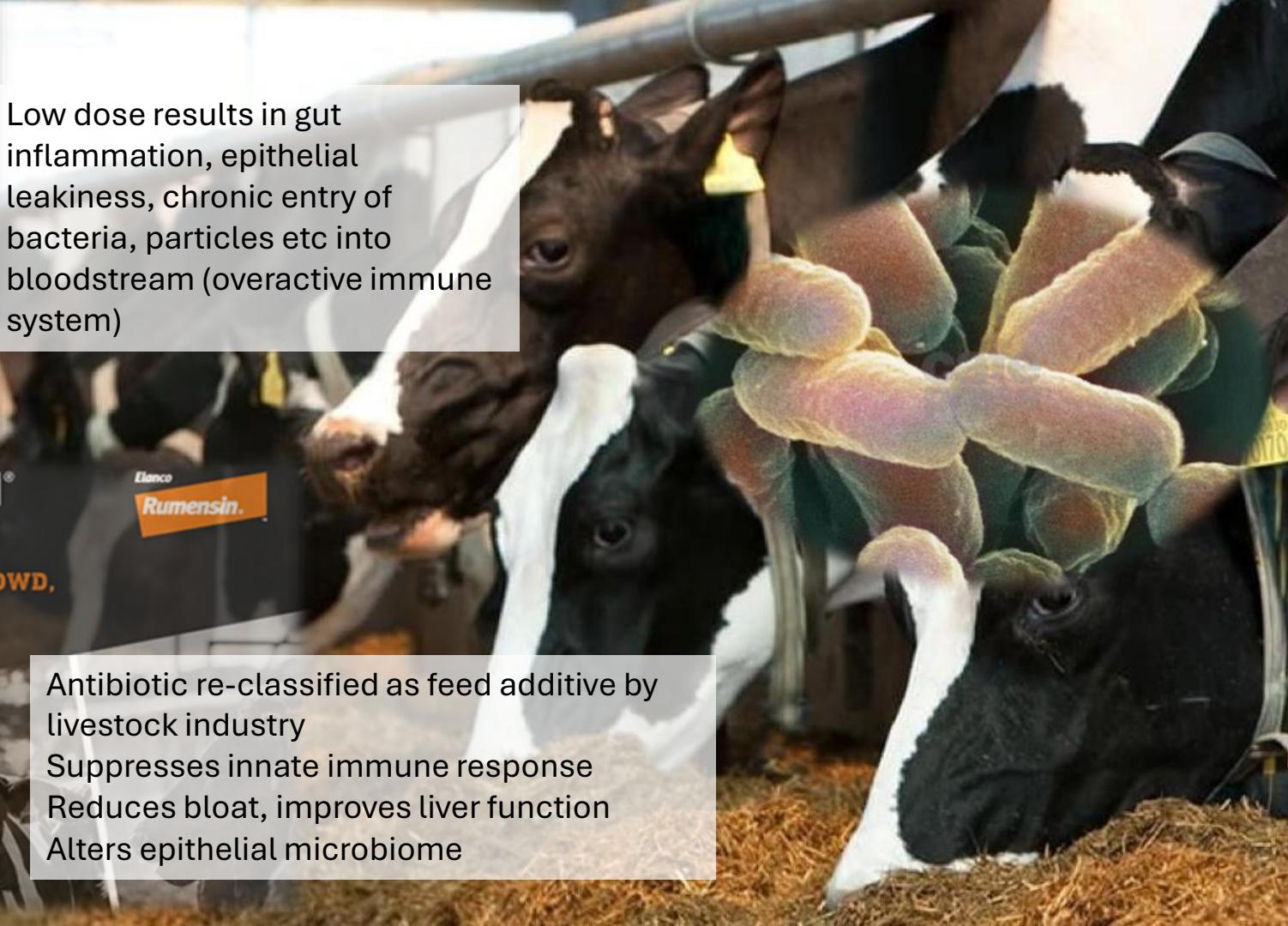
Swirl

## THE RUMENSIN® ADVANTAGE

STANDING OUT IN THE CROWD,  
COMMITTED TO QUALITY

Low dose results in gut inflammation, epithelial leakiness, chronic entry of bacteria, particles etc into bloodstream (overactive immune system)

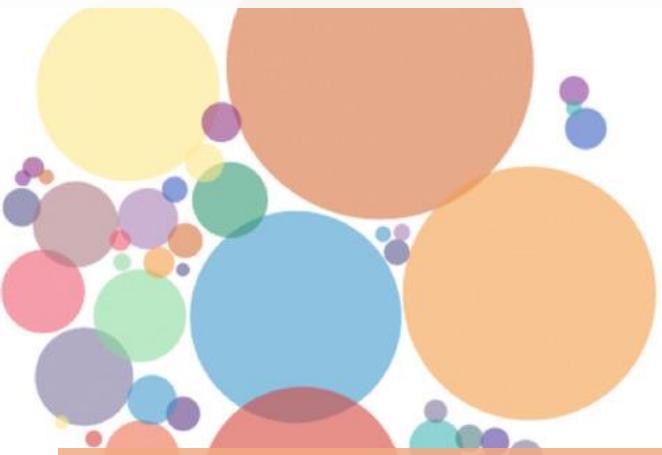
Antibiotic re-classified as feed additive by livestock industry  
Suppresses innate immune response  
Reduces bloat, improves liver function  
Alters epithelial microbiome



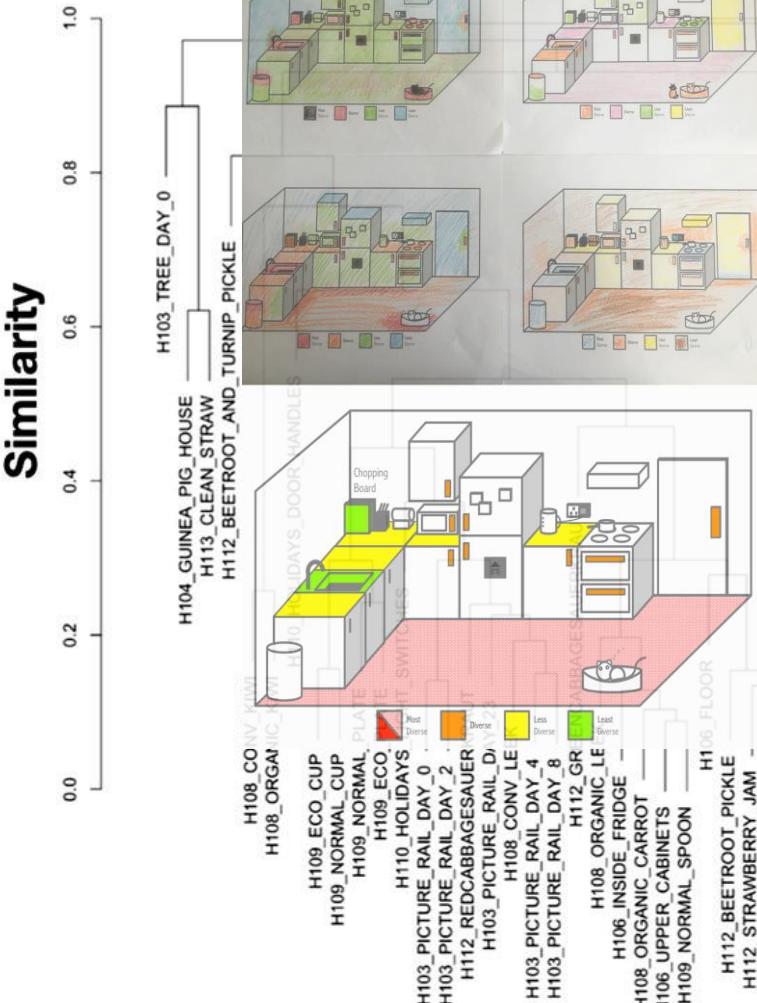
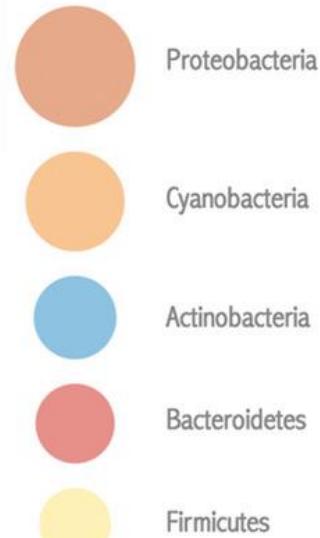
## Making the microbiome public: Participatory experiments with DNA sequencing in domestic kitchens

Jamie Lorimer , Timothy Hodgetts, Richard Grenyer, Beth Greenhough, Carmen McLeod, Andrew Dwyer

First published: 03 March 2019 | <https://doi.org/10.1111/tran.12289> | Citations: 23



Remember there was the blob one time when none of us could seem to understand it at all [laughter]. There was this kind of desperate long explanation of it and then at the end of it we all looked at each other and said, 'Nah, I still don't get it.' [laughter] (Exit Interview 104, July 2017)



# Micro-Publics





From:  
Universal standards  
Bio-imperialism



Participatory rural appraisal, Bangladesh - photo Stephen Hinchliffe

To:  
Adaptive governance  
Bio-diplomacy



**Biossci**  
Biosocial Security

# Research stages

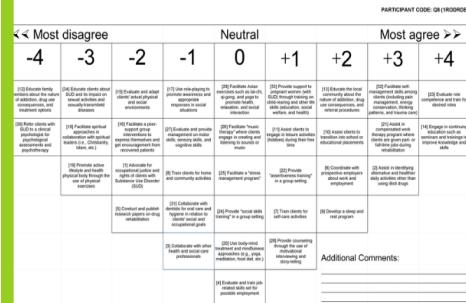
## How is life made safe?



1

Ethnographic fieldwork  
Farm surveys  
Participatory rural appraisal  
Work shadowing

## Can we co-exist?



2

## Concourse development

### Q sorting

### Factor analysis

## Can we change?



3

# Interviews Workshops Mapping power dynamics

# Key Questions

1. **Public engagement** – what **frames** that engagement (self-treatment or improvement; child development, pro- and anti- science, food worlds...). How are healthy environments incorporated into these life worlds?
2. How are multiple forms and types of **evidence** for healthy biomes produced and communicated? With what effects (do people believe claims, trust producers, retailers, assurance agencies, how does regulatory oversight work in terms of building trust?)
3. What are the regulatory, economic and cultural **barriers** to change?



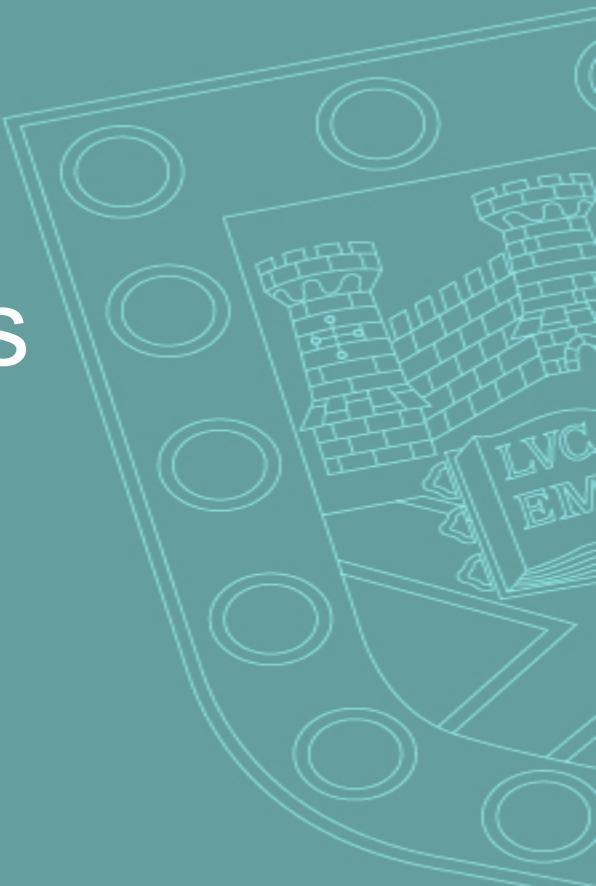


University  
of Exeter

# Research capabilities and facilities at the University of Exeter (microbiome)

**Dr Luciana Torquati, RNutr**

Senior Lecturer in Nutrition,  
Public Health and Sport Sciences



# Research at Exeter

- Microbes and Society, Exeter Food Network
- **Food microbiome** – Kombucha/ fermented foods.
- **Human microbiome** work/themes:
  1. Inulin (prebiotic) supplementation effects
    - **Gut barrier**, immune markers
    - **Vascular** health (+/-nitrates, *Prof Anni Vanhatalo*)
  2. Gut microbiome and **nutrient bioavailability**, *Prof Geoff Nash, UQ, Quadram Institute*)
  3. Gut microbiome manipulation and disease/infection
    - **Cancer** treatment outcomes (meta-analysis, *Dr Revuelta Iniesta*)
    - **Antibiotic use** and urinary tract infections (*Prof Emma Pitchford*)
  4. Gut microbiome and **exercise** (*UQ, and Prof Jo Bowtell*)
  5. **Plant-based diets** effects on gut microbiome
    - Physical and **mental health** (*Prof Natalia Lawrence*)
    - **Fertility** outcomes (*Dr Joanne Wilson, NHS Heavitree*)



University Hospital  
of Exeter

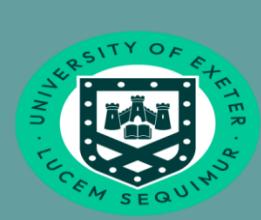


QUEX INSTITUTE



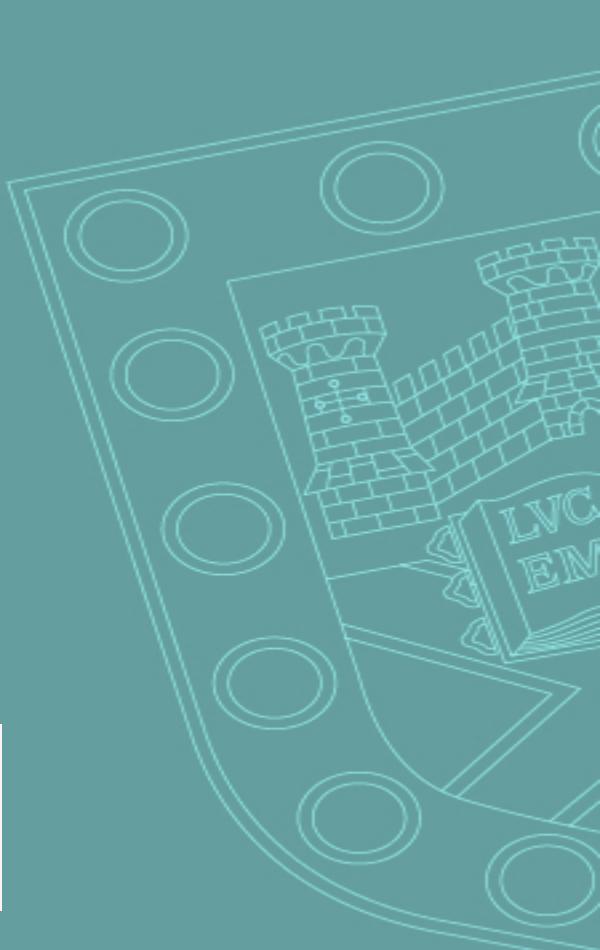
NIHR | School for Public  
Health Research



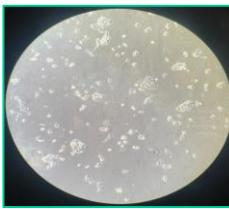
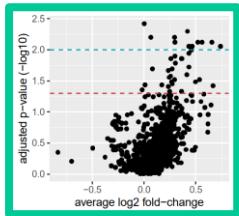


# University of Exeter

## Research capabilities and facilities



# Methods and techniques



## Molecular techniques



Genes/Proteins



## Cell/tissue culture



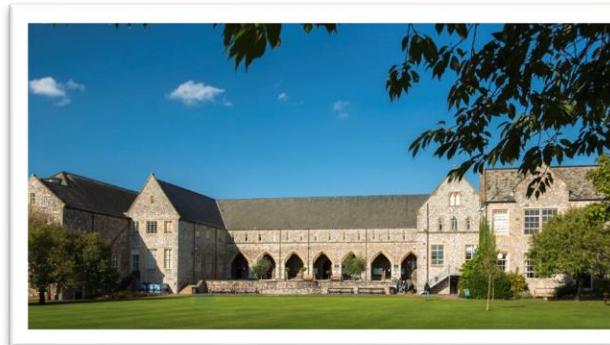
Prof Jo Bowtell  
Dr Mary O'Leary  
Dr Luciana Torquati

## A team of molecular biologists and bioinformaticians



University  
of Exeter

Exeter Sequencing  
Facility

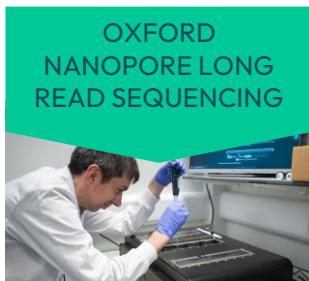


**Dr Aaron Jeffries**

Dr Bryony Williams  
Paul O'Neil

Zoonii Kayler

Audrey Farbos  
Gina Murray



# Illumina short read technology

## NextSeq 1000: low output



- testing libraries
- metagenomics or other targeted sequencing projects.
- Max read length 2 x 300 bp

## NovaSeq X: High output

- Genome sequencing
  - Metagenomics
  - Transcriptomics
- ~max 16000 Gb per flow cell
- Max read length 2 x150 bp



Biotechnology and  
Biological Sciences  
Research Council

Upgraded September 2024  
**CHEAPER**  
**FASTER**  
**MORE ACCURATE**  
**MORE ENVIRONMENTALLY FRIENDLY**



University  
of Exeter

# Oxford nanopore long read technology



## Minion/flongle: low output

- Small genomes
- modest amplicon projects
- ~typical 10 Gb per flow cell



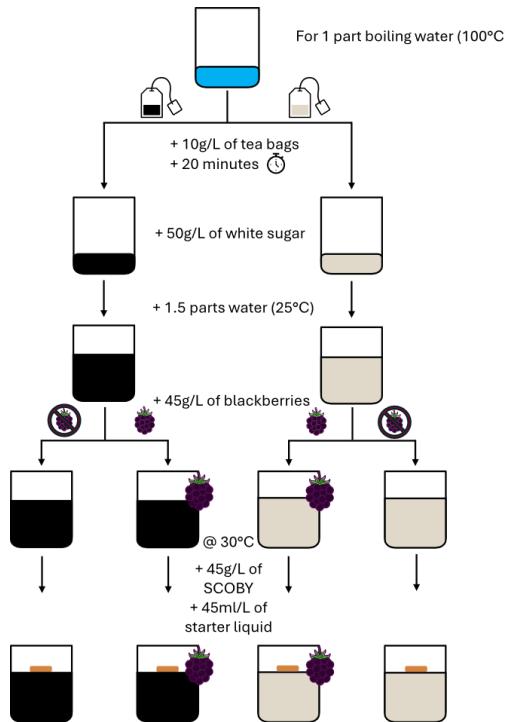
## PromethION: High output

- Larger genomes
- Direct RNA sequencing
- Methylation studies
- ~typical 60-100 Gb per flow cell



University  
of Exeter

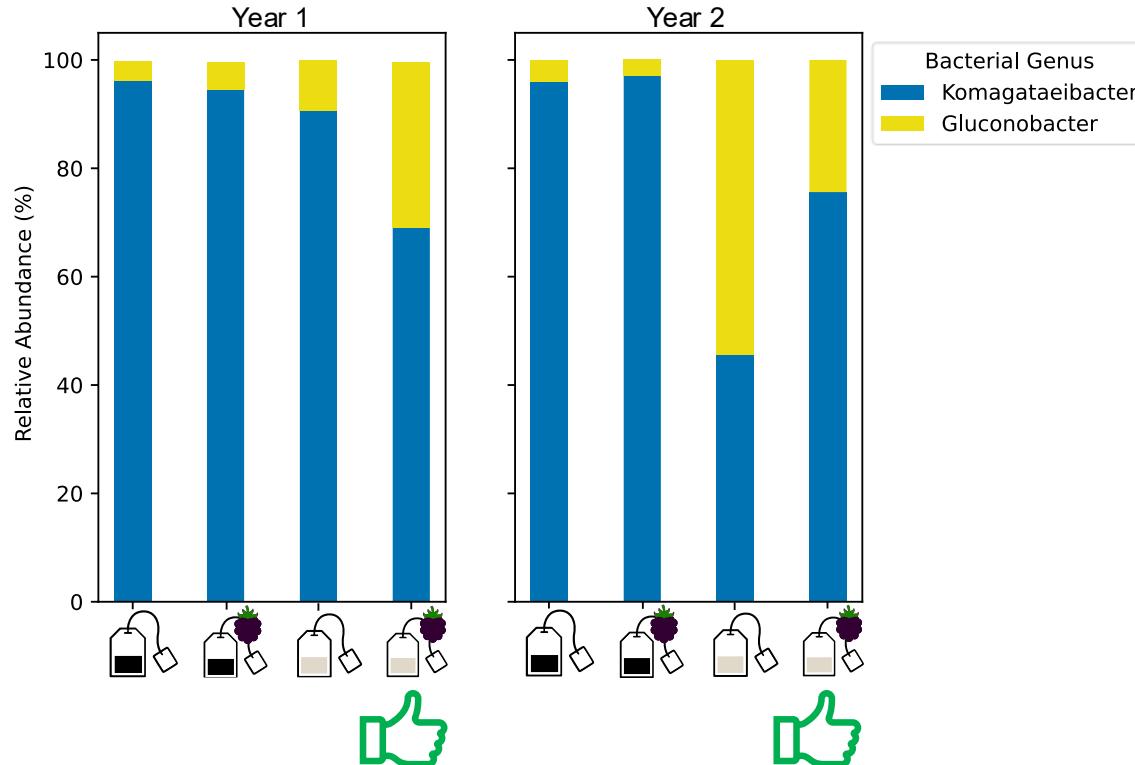
# Kombucha study



University of Exeter

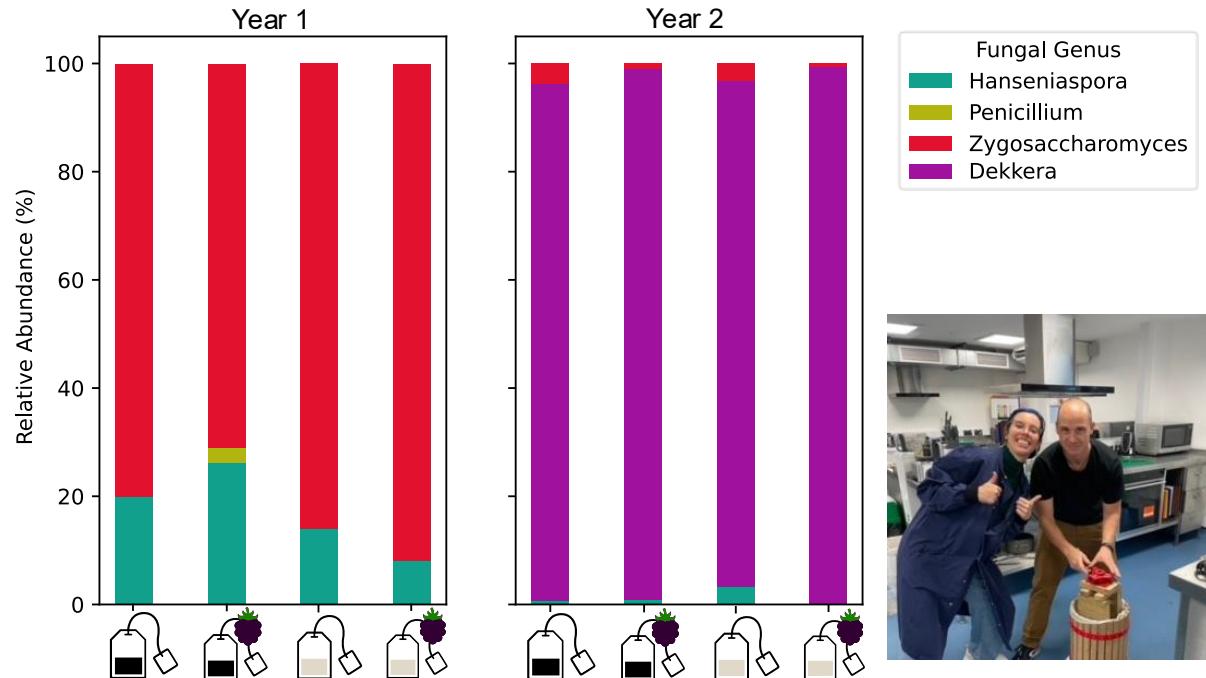
# Kombucha bacterial composition

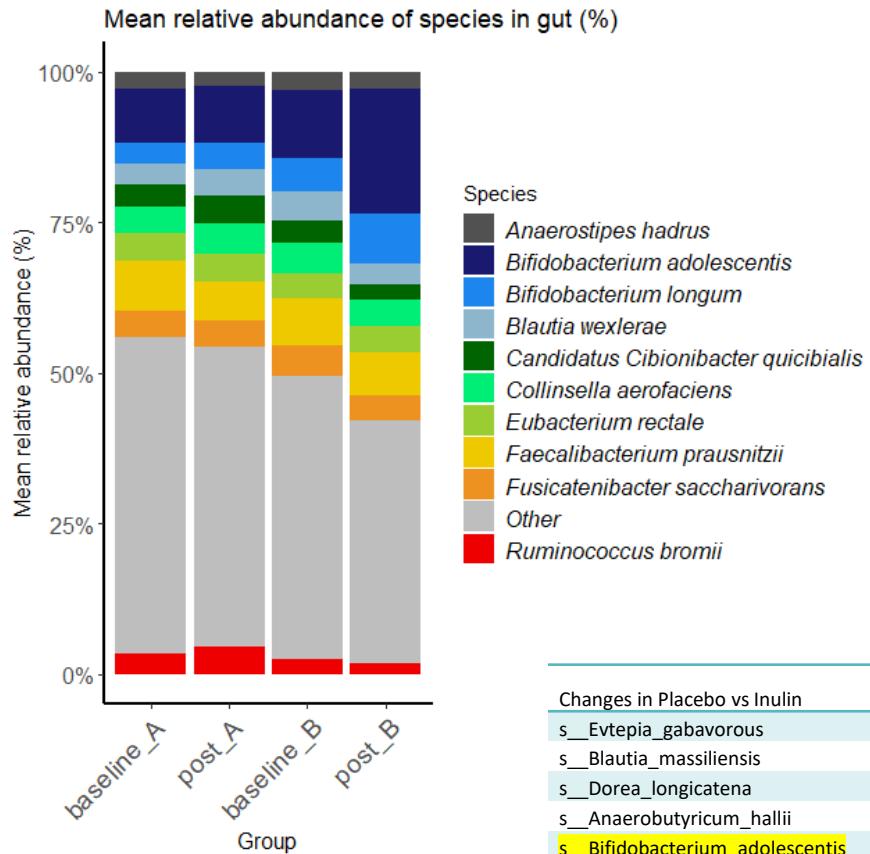
- Composition similar to SCOPY, but no 'probiotic' strains



# Kombucha fungal composition

- Composition in SCOBY much more diverse sign higher in white tea/black berry





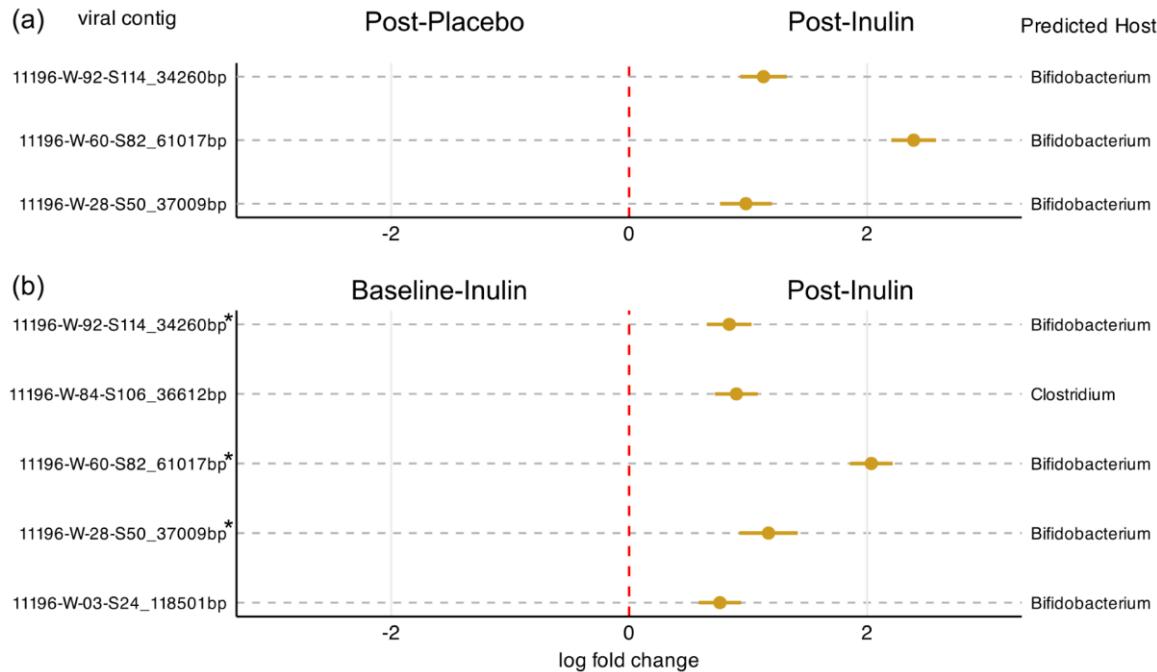
University  
of Exeter



A = Placebo  
B = inulin

Changes in Placebo vs Inulin	P-value	Change in Pla	Change in Inu
s_Evtebia_gabavorous	0.01	0.17	-0.10
s_Blautia_massiliensis	0.01	0.02	-0.67
s_Dorea_longicatena	0.01	0.36	-0.68
s_Anaerobutyricum_hallii	0.02	0.15	-0.32
s_Bifidobacterium_adolescentis	0.02	0.34	8.69
s_Blautia_wexlerae	0.02	0.74	-0.99
s_Blautia_glucerasea	0.03	0.17	-0.01
s_Blautia_faecis	0.03	0.47	-0.28
s_Blautia_SGB4815	0.03	0.15	-0.13
s_Clostridiales_Family_XIII_bacterium	0.04	0.09	-0.04
s_Clostridiales_bacterium_KLE1615	0.05	0.22	-0.31

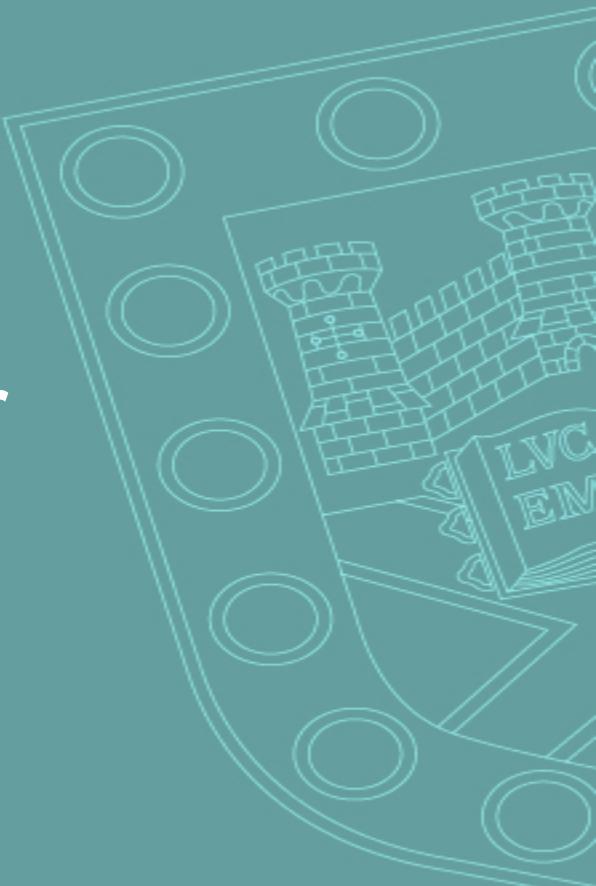
# Virome changes





University  
of Exeter

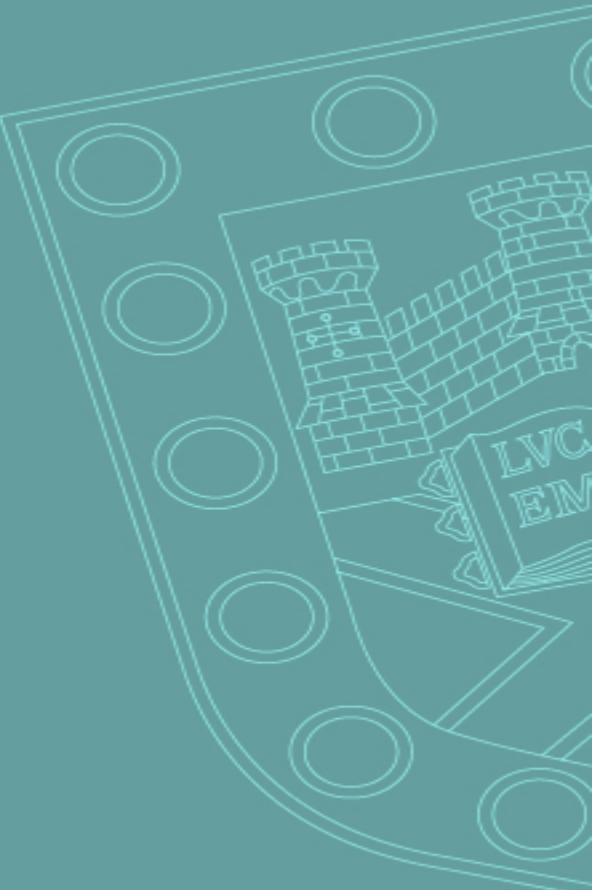
Thank you for your  
attention !!!





# University of Exeter

## Extra slides

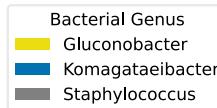
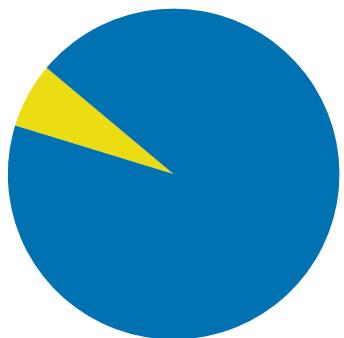


# Research questions/themes

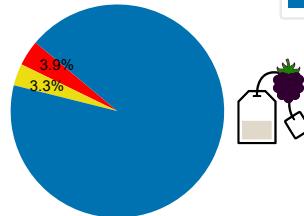
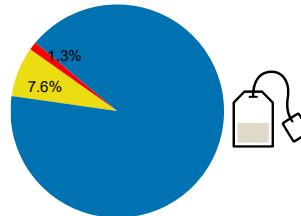
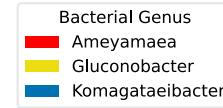
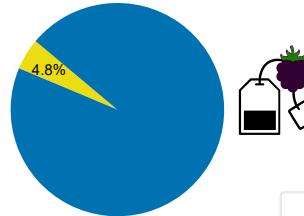
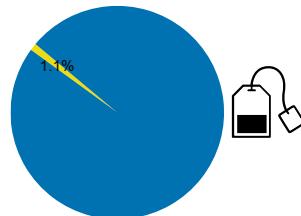
- Measuring and understanding the role of gut microbiome on nutrient extraction/bioavailability and absorption
- Understanding composition of fermented foods (microbes and metabolites) and their effects on human physiology
  - Colonization vs transient effects
  - Dose/duration needed for clinical outcome
- Integrating bioinformatics and metabolomics expertise
  - Systems biology approach: virus/bacteria/fungal interactions
- Combining in vitro/in vivo (human) studies using nutrients in isolation (supplements) and/or whole foods.
  - Linking to external partners for in-vitro digestion (UK, Australia, Spain)



# Kombucha fermentation with/without polyphenol source (bacteria)

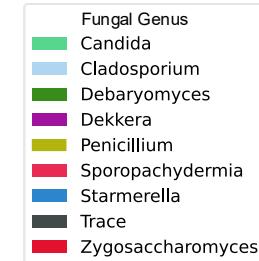
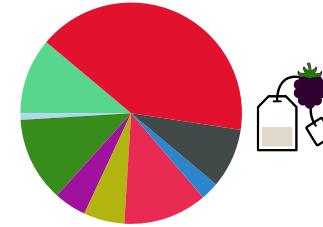
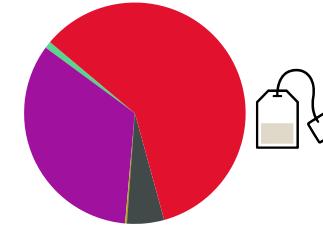
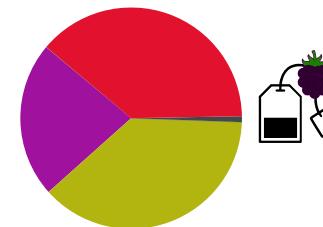
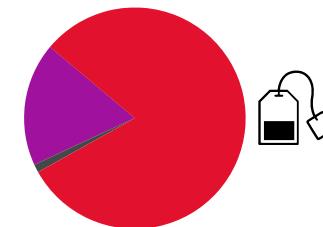
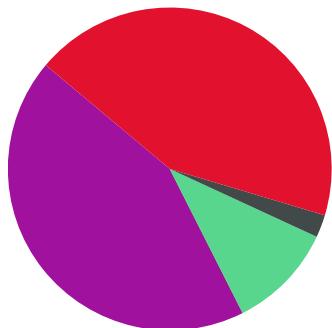


21-days

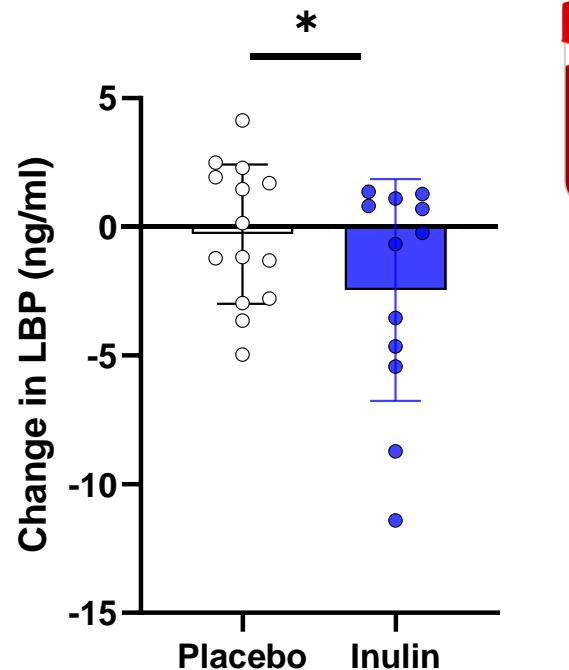
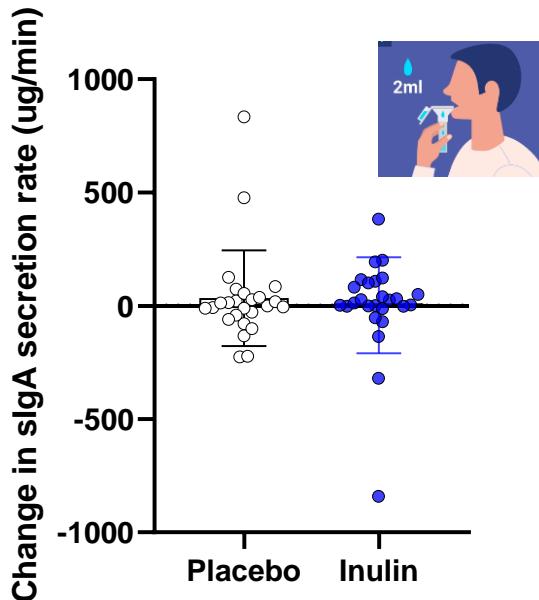


University  
of Exeter

# Kombucha fermentation with/without polyphenol source (fungi)

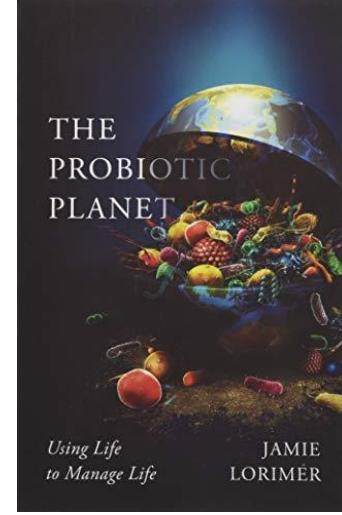
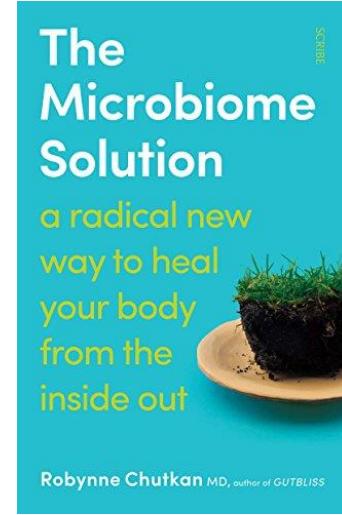
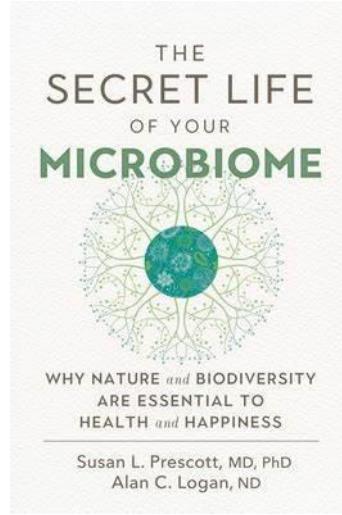
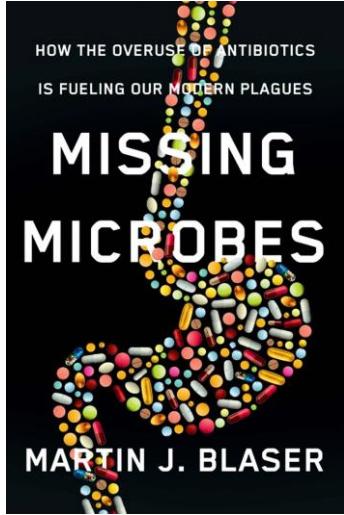


# Inulin supplementation



- 90% Easy to follow
- 95% adherence
- +35% mild bloating reported in Inulin





# Microbiomania

Microbes, society and culture

Steve Hinchliffe

Geography, Exeter

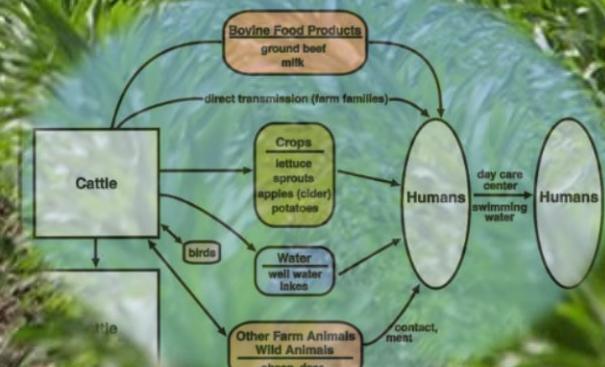
# Glyphosate assemblages



Elanco

Rumensin®

Feeding Gain for



# Glyphosate

An Agroindustrial Chemical on the Move

&

the

Vincanne Adams

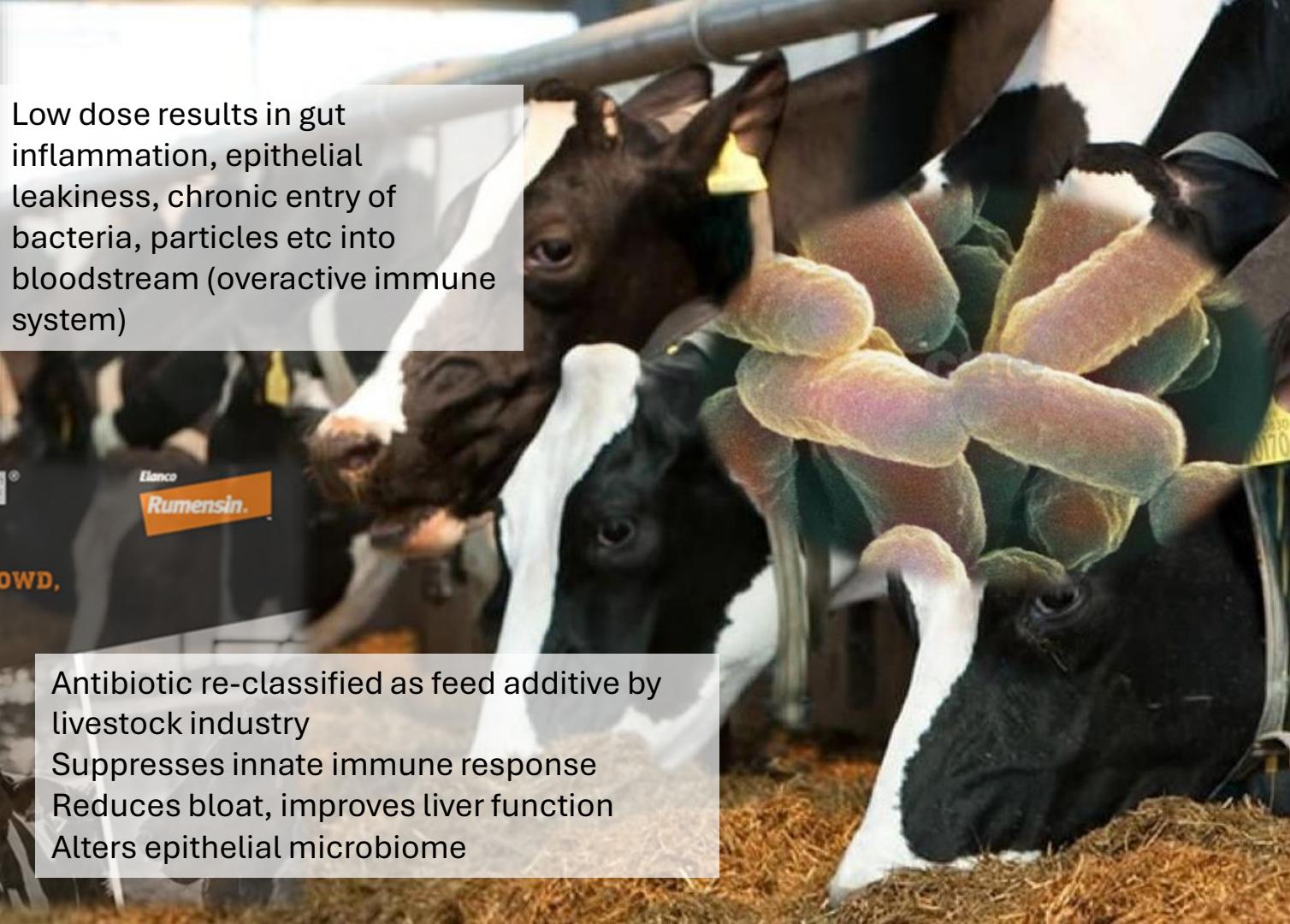
Swirl

## THE RUMENSIN® ADVANTAGE

STANDING OUT IN THE CROWD,  
COMMITTED TO QUALITY

Low dose results in gut inflammation, epithelial leakiness, chronic entry of bacteria, particles etc into bloodstream (overactive immune system)

Antibiotic re-classified as feed additive by livestock industry  
Suppresses innate immune response  
Reduces bloat, improves liver function  
Alters epithelial microbiome



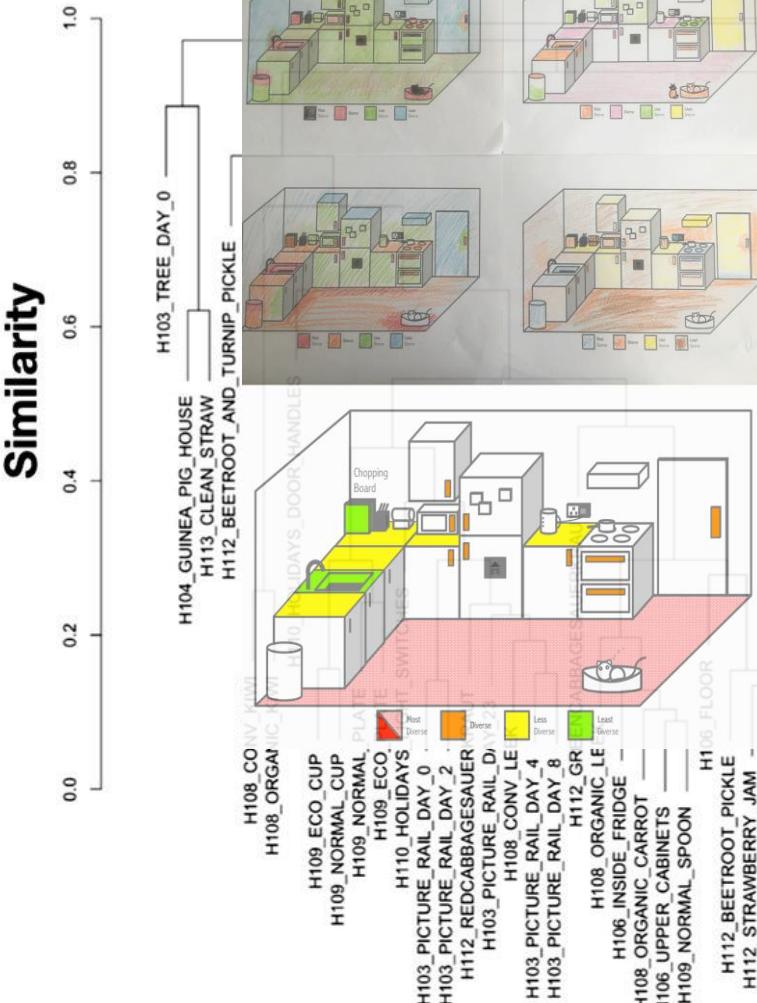
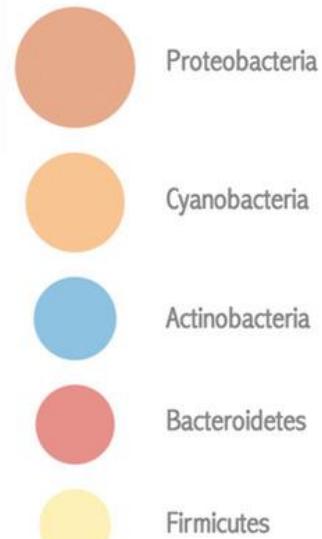
## Making the microbiome public: Participatory experiments with DNA sequencing in domestic kitchens

Jamie Lorimer , Timothy Hodgetts, Richard Grenyer, Beth Greenhough, Carmen McLeod, Andrew Dwyer

First published: 03 March 2019 | <https://doi.org/10.1111/tran.12289> | Citations: 23



Remember there was the blob one time when none of us could seem to understand it at all [laughter]. There was this kind of desperate long explanation of it and then at the end of it we all looked at each other and said, 'Nah, I still don't get it.' [laughter] (Exit Interview 104, July 2017)



# Micro-Publics





From:  
Universal standards  
Bio-imperialism



Participatory rural appraisal, Bangladesh - photo Stephen Hinchliffe

To:  
Adaptive governance  
Bio-diplomacy



**Biossci**  
Biosocial Security

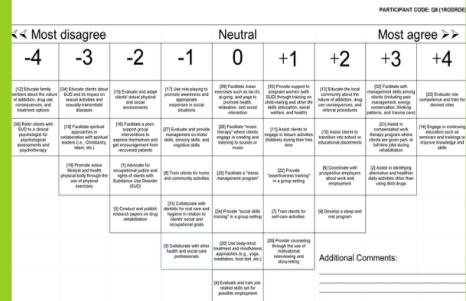
# Research stages

## How is life made safe?



Ethnographic fieldwork  
Farm surveys  
Participatory rural appraisal  
Work shadowing

## Can we co-exist?



## Concourse development

### Q sorting

### Factor analysis

## Can we change?



Interviews  
Workshops  
Mapping power dynamics

## Key Questions

1. **Public engagement** – what **frames** that engagement (self-treatment or improvement; child development, pro- and anti- science, food worlds...). How are healthy environments incorporated into these life worlds?
2. How are multiple forms and types of **evidence** for healthy biomes produced and communicated? With what effects (do people believe claims, trust producers, retailers, assurance agencies, how does regulatory oversight work in terms of building trust?)
3. What are the regulatory, economic and cultural **barriers** to change?





University  
of Exeter

# Research Software and Analytics Group

Craig Willis, PhD, FHEA  
Senior Research Data Scientist  
Research Software and Analytics

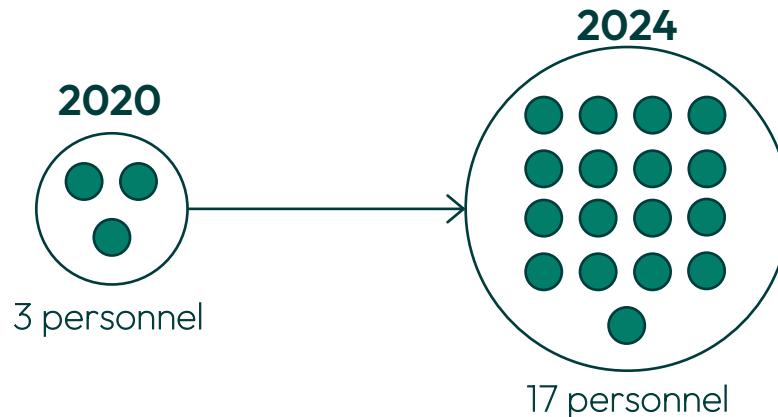
# Research Software and Analytics



University  
of Exeter

## History:

- Headed by Katie Finch
- Began in 2020 as the Research Software Engineering (RSE) group



# Research Software and Analytics



## Project ADA:

- “Accelerating Data Science and Artificial Intelligence”
- £50 million investment by UoE to develop its data science and AI capabilities
- Appointment of new academics, **including centralised research data scientists**

# Research Software and Analytics



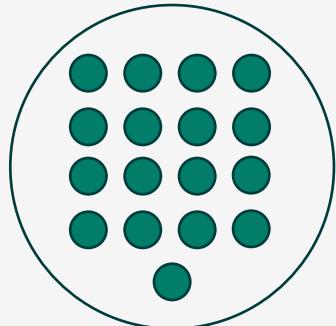
University  
of Exeter

## Group expansion and rebrand:

- Now the Research Software and Analytics (RSA) group

### Research Software and Analytics (headed by Katie Finch)

Research  
Software  
Engineers



17 personnel  
(Led by Fliss Guest)



Research  
Data  
Scientists



3 personnel



Research  
Data  
Stewards



2 personnel

(Led by Craig Willis)

# Research Software and Analytics



## The Research Software Engineering (RSE) team:

### Role of an RSE

Create and extend  
software for research

- Reusable frameworks and libraries
- Optimised code to run on HPC
- Web/mobile apps and other interfaces

# Research Software and Analytics



University  
of Exeter

## RSE case study:

### ADD-TREES (PI: Daniel Williamson)



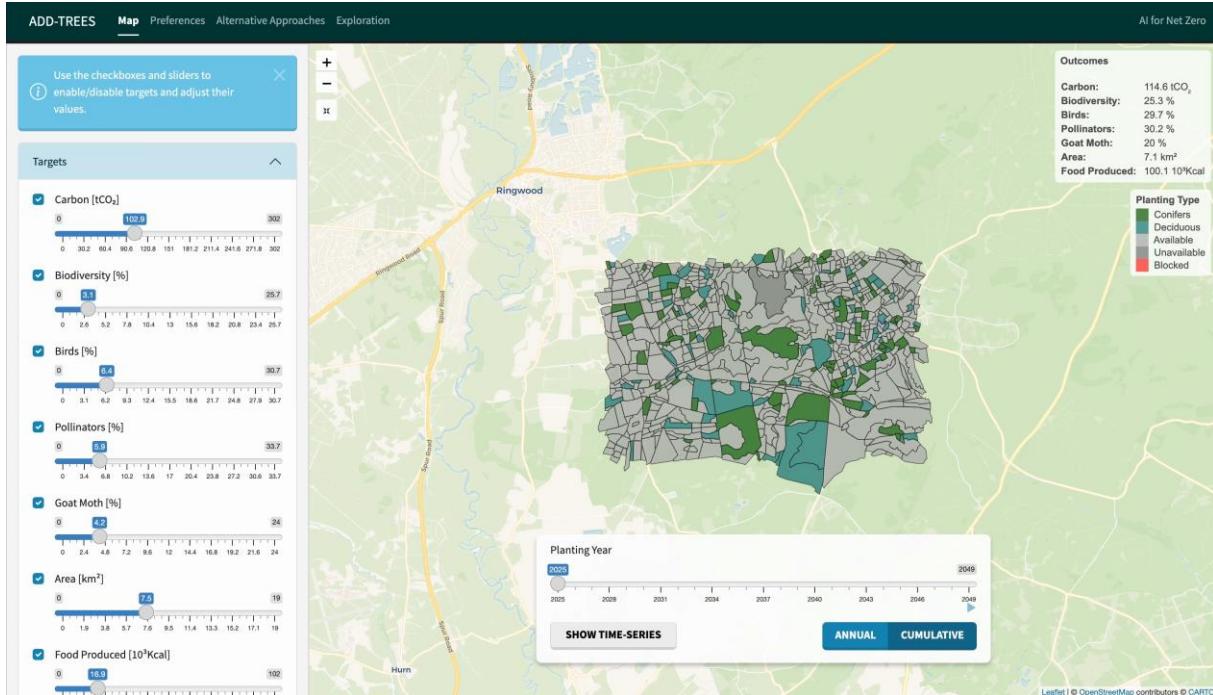
Paul Wright



Ricky Olivier

AI-elevated Decision-support via  
Digital Twins for Restoring and  
Enhancing Ecosystem Services

R Shiny web app helps decision  
makers identify tree planting  
strategies to meet targets



# Research Software and Analytics



University  
of Exeter

## The Research Data Science (RDS) team:

### Role of an RDS

Extract knowledge and  
insight from research data

- Data analysis and visualisation
- Computational statistics
- Data science and ML/AI approaches

# Research Software and Analytics



University  
of Exeter

## Meet the RDS team:



### **Craig Willis – Senior Research Data Scientist**

- Bioinformatics
- Omics data science



### **Finley Gibson – Research Data Scientist**

- Machine Learning & optimisation
- Automated & quantitative image analysis



### **Conor Crilly – Research Data Scientist**

- Mathematical modelling & simulations
- Interactive data visualisation



Adaptable and  
flexible expertise

+

Capacity to upskill and  
grow size of team

=

Meet the needs of  
researchers across  
disciplines/faculties

# Research Software and Analytics



University  
of Exeter

## How the RSA team can support you:

- 1 Cost time onto funded projects (live or proposed)
- 2 Pump-priming of new research
- 3 Ad-hoc advice on research software and data science queries
- 4 Coding for Reproducible Research training programme

# Research Software and Analytics



University  
of Exeter

## Coding for Reproducible Research (CfRR):

- Bespoke training for staff and students
- Workshops on version control, software best practices, introductory programming, HPC and parallel computing, UNIX, machine learning, etc
- Largely delivered by RSEs and RDSs
- 31 iterations of 15 workshops delivered in past 2 years
- 28 iterations of 19 workshops planned for this year



Eilis  
Hannon



Fliss  
Guest



Liam  
Berrisford



Anne  
Bell

# Research Software and Analytics



## Finding further info on the RSA:

- RSA website: <https://www.exeter.ac.uk/research/research-software-and-analytics/>
- Contact Fliss ([f.l.quest@exeter.ac.uk](mailto:f.l.quest@exeter.ac.uk)) for RSE or myself ([c.willis2@exeter.ac.uk](mailto:c.willis2@exeter.ac.uk)) for RDS
- CfRR website: [https://coding-for-reproducible-research.github.io/CfRR\\_Courses/home\\_page.html](https://coding-for-reproducible-research.github.io/CfRR_Courses/home_page.html)

# Thank you



## Any questions?





Exeter  
**INNOVATION**

# Funding for research and development

- Collaborative and commissioned research
- Knowledge Transfer Partnerships
- Industrial Studentships



# Collaborative and Commissioned Research



## Collaborative Research

Work in partnership to drive societal impact and maximise economic growth



## Contract research

Collaborate to answer your industry and product challenges



## Consultancy

Commission expert advice to guide decisions

# Collaborative grant opportunities



Diet and Health OIRC (Open Innovation Research Club)



Biotechnology and  
Biological Sciences  
Research Council

- In association with the British Nutrition Foundation, funded by UKRI - BBSRC
- Specifically for Industry / Academia collaboration
- **Six themed hubs** with annual funds available
- Smaller funding pots like Business Interaction Vouchers (up to £50k), Feasibility Studies (Up to £100K)
- Successful applications are eligible for larger UKRI follow on funds

# Collaborative grant opportunities



## Horizon Europe 2025 work programme Cluster 6:

Food, Bioeconomy, Natural Resources,  
Agriculture and Environment



- **Sign up to Innovate UK Business Connect** to hear the latest funding opportunities to support business collaborations.
- Horizon Europe 2025 cluster 6 any organisation can apply for funding through Horizon Europe, you will need to form a consortium
- EU funding contributions for most projects in this cluster ranges from €3m to €12m
- Deadline 16<sup>th</sup> Sept.

# KE Opportunities



## Knowledge Transfer Partnerships

- 50-75% funded by Innovate UK
- 95% funding success
- Award-winning programme

## Industrial Studentships

- Collaborative partnership between an industry partner, the University of Exeter and a Postgraduate Research (PhD) student
- 3 to 4 years

# Work with us – Scan QR Code



**Business Engagement**

Opportunities to engage and collaborate with the University of Exeter



Also...

- Upskill your workforce with Degree Apprenticeships and Executive Education
- Recruit talent through fairs and work placements
- Hire world-class research facilities to drive innovation and utilise technical expertise

Contact directly for further information or questions

Thank you  
Gemma Mendham  
[g.mendham@exeter.ac.uk](mailto:g.mendham@exeter.ac.uk)

# MICROBIOME ONE HEALTH INNOVATION IN THE UK

EXETER FOOD NETWORK RESEARCH WORKSHOP, 20 JUNE 2025

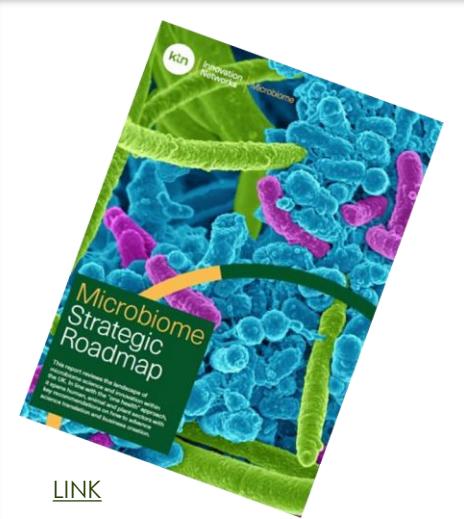
***Andrew Morgan, DPhil***

*Honorary Professor in Business Engagement & Innovation*

*Faculty of Health & Life Sciences, University of Exeter*

*and*

*Chair of the Innovate UK Business Connect  
Microbiome Innovation Advisory Group*



# UK MICROBIOME ONE HEALTH INNOVATION COMMUNITY

***Bringing academia and industry together to solve global challenges***

***Innovate UK Business Connect\* Microbiome Innovation Advisory Group has been instrumental in establishing this network and community***

**\* IUK Business Connect is the former KTN**

# Microbiome Strategic Roadmap

## Key Recommendations



# UK MICROBIOME ONE HEALTH INNOVATION COMMUNITY – WHAT'S NEXT?

**Microbiome Innovation One Health Conference 2025 in Oxford**

Date: 15-16/09/2025 (Monday & Tuesday)  
Venue: Mathematical Institute, University of Oxford, Andrew Wiles Building, Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG

**Programme Highlights**

Day 1	Day 2
• Keynote Talks - Day 1	• Addressing EDI in the Microbiome Sector
• Industry Exhibitor Pitches	• Keynote Talks - Day 2
• Driving Microbiome Innovations	• Building UK Microbiome Capacity
• Translation & Innovation	• Leveraging the Data Landscape
• Showcasing Success	• Microbiome Innovation and Learning Workshops
• One Health and the exposome	• Microbiome Networks and Organizations
• Networking and Drinks Reception	• Microbiome and AMR: A global challenge

The conference brings together academia, industry, funders, and entrepreneurs to highlight and advance the UK's strengths in microbiome science and to identify new translational opportunities. We invite you to join us in Oxford for a two-day programme of exciting microbiome science which spans human and animal health, plant biology, and environmental research. We look forward to welcoming you!  
For event registration related questions, please email [midhc@kennedy.ox.ac.uk](mailto:midhc@kennedy.ox.ac.uk).

Event weblink: <https://event.mz/Xcoz2a?RefId=link>

The conference is organised by OCMS with the support of OMIM & IUKBC.


**MICROBIOME-NET**

*We are almost there!*



University  
of Exeter

Exeter Food

# Buffet Lunch

Exeter Food

RESEARCH  
NETWORKS



University  
of Exeter

Exeter Food

# Breakout groups for five research themes:

1. The hidden gatekeepers: how the soil microbiome controls carbon storage and soil
2. Evidencing linkages between farm systems, soil microbiome, crop health and nutritional value in order to enhance crop resilience to extreme weather events
3. Antimicrobial resistance and microbiomes in food producing
4. Making the case for agroecological farming as a solution to the climate, nature and health crises
5. Microbes and society: how people engage with microbiomes

Exeter Food

RESEARCH  
NETWORKS



University  
of Exeter

Exeter Food

