



**PASTURE
FOR LIFE**



Biotechnology and
Biological Sciences
Research Council

The UK dairy sector: understanding animal welfare and environmental outcomes across a diverse farming landscape.

Sara Hall
sara.hall@bristol.ac.uk
University of Bristol.

MY MOTIVATION

The Amazing Ruminant

Able to digest plant biomass and organic material that is inedible to humans.

For their own and calves' growth and maintenance

To produce high quality and nutritionally valuable milk (and meat) for human consumption

Natural fertiliser, fifth quarter, biofuels

Ecosystem Services

GHG emissions (CO_2 , N_2O and CH_4)

Loss of biodiversity, Water pollution

Animal welfare constraints



Holistic Approach

A common language to assess the impact of different dairy production systems in the UK.

Collaborated with the Global Farm Metric trials team

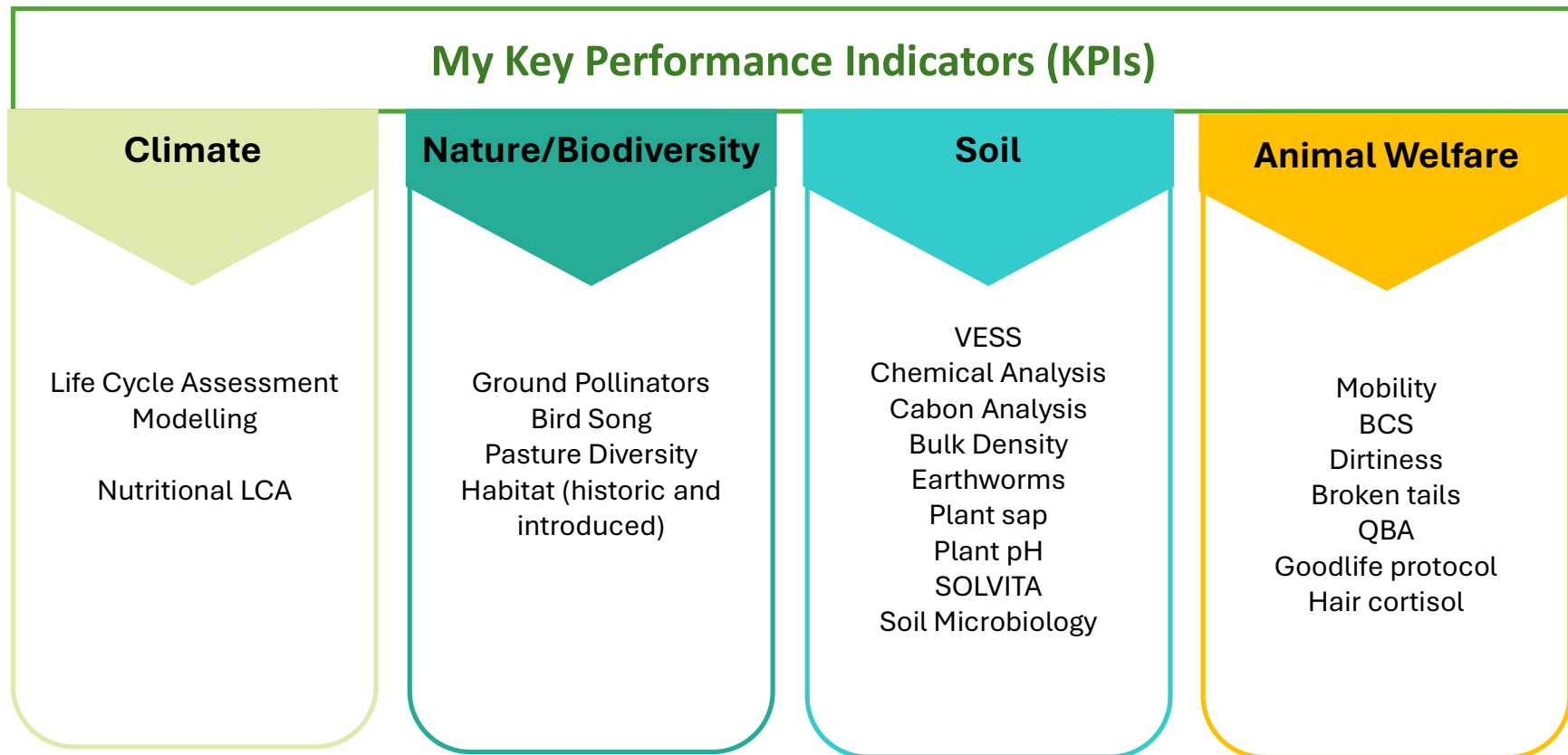
University of Bristol focus on:

- Soil and pasture health
- Animal Welfare
- Biodiversity
- Greenhouse Gases



ON FARM

My Focus

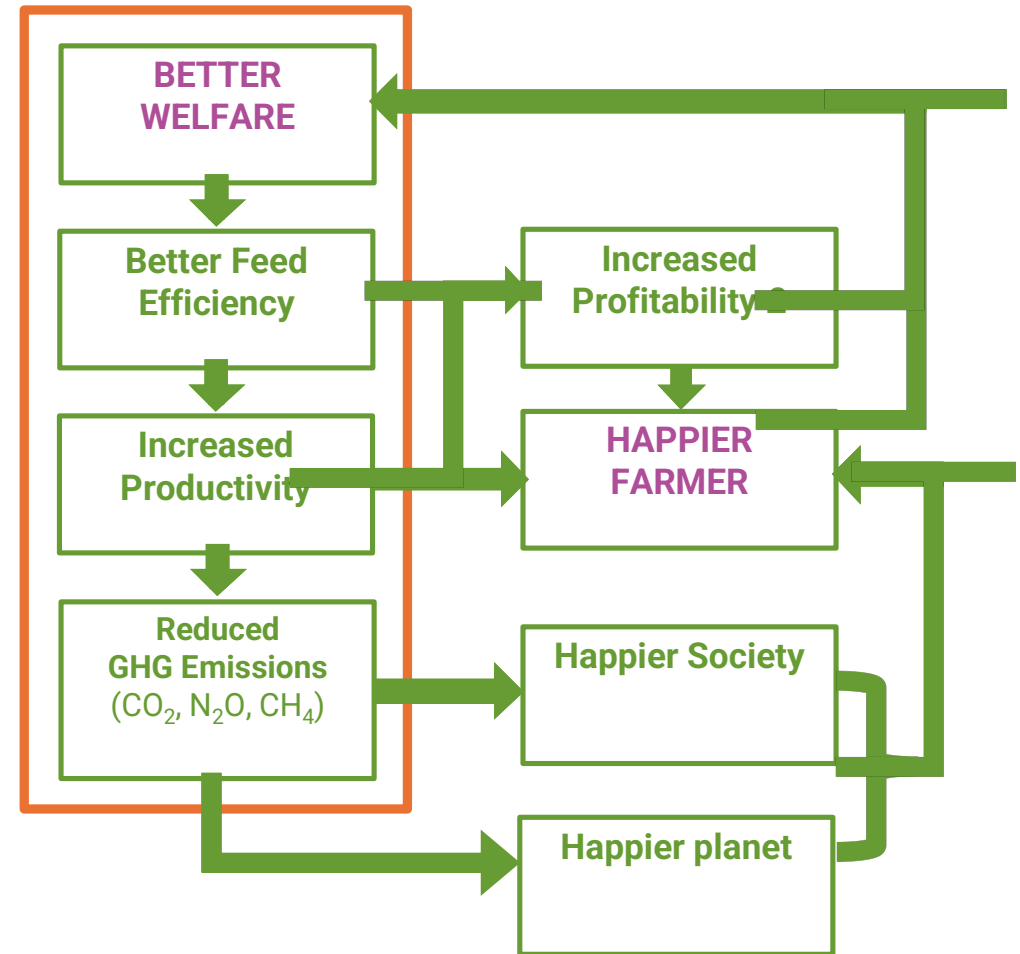


WHY IT MATTERS

Systems Thinking

Critical for all stakeholders

- farmers
- nature
- society
- animal
- policy makers

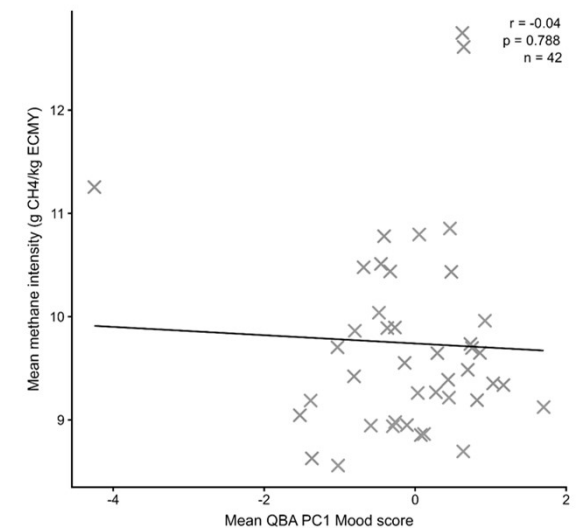
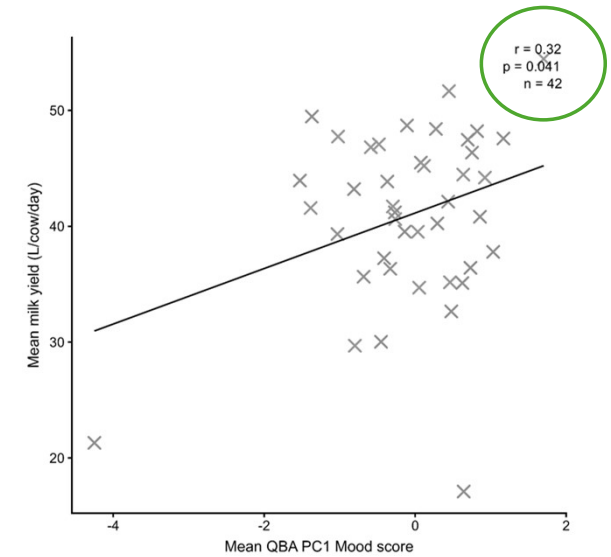


CORRELATION EXAMPLE

Happiness, milk yield and methane.

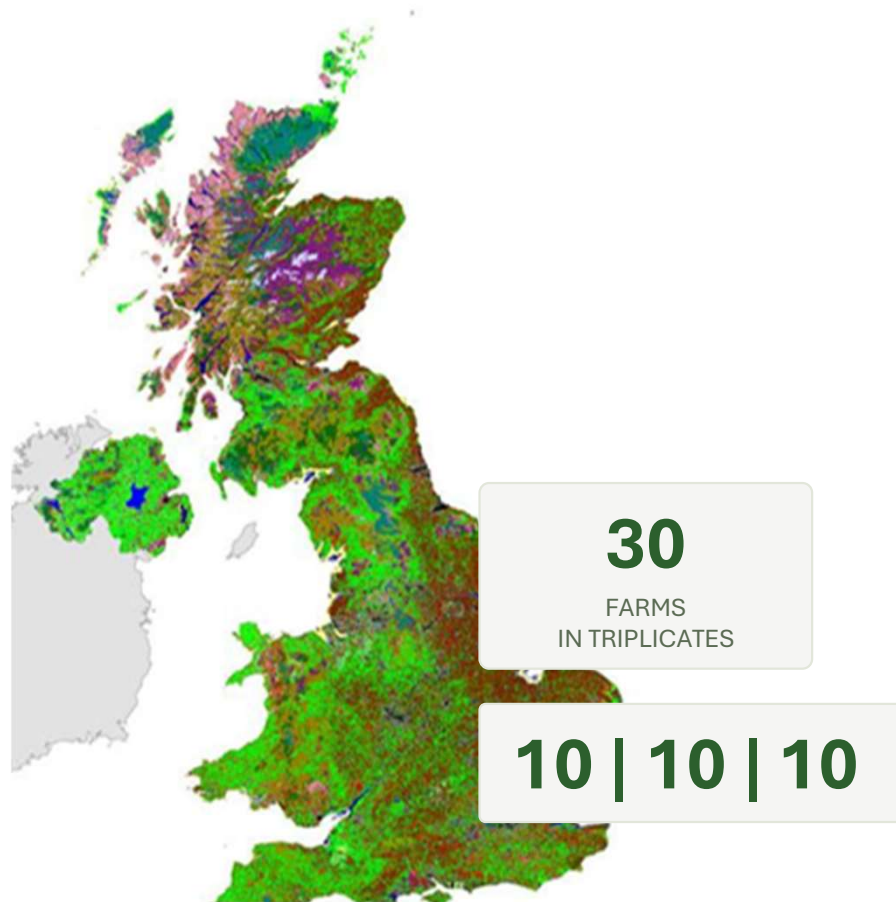
- An indoor, all-year-round, Holstein herd (> 11 000 l per cow)
- 1 year trial
- Monthly QBA assessments
- IPCC Tier 3 approach methane emissions calculated.
- The higher the positive affect/“mood” of a cow, the more milk she produces, the more methane she produces, but methane intensity remains largely unchanged

Cheerful cows produce more milk without increasing their methane intensity?



THE UK DAIRY SECTOR/MY RESEARCH

A Diverse Landscape



Regenerative
Agriculture
(RA)



Conventional
(CON)



Sustainable
Intensification
(SI)



ONBOARDING SURVEY FOR FARMERS

Defining Dairy Systems

Sustainable Intensification

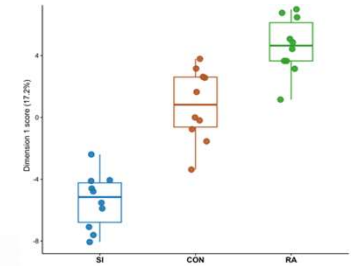
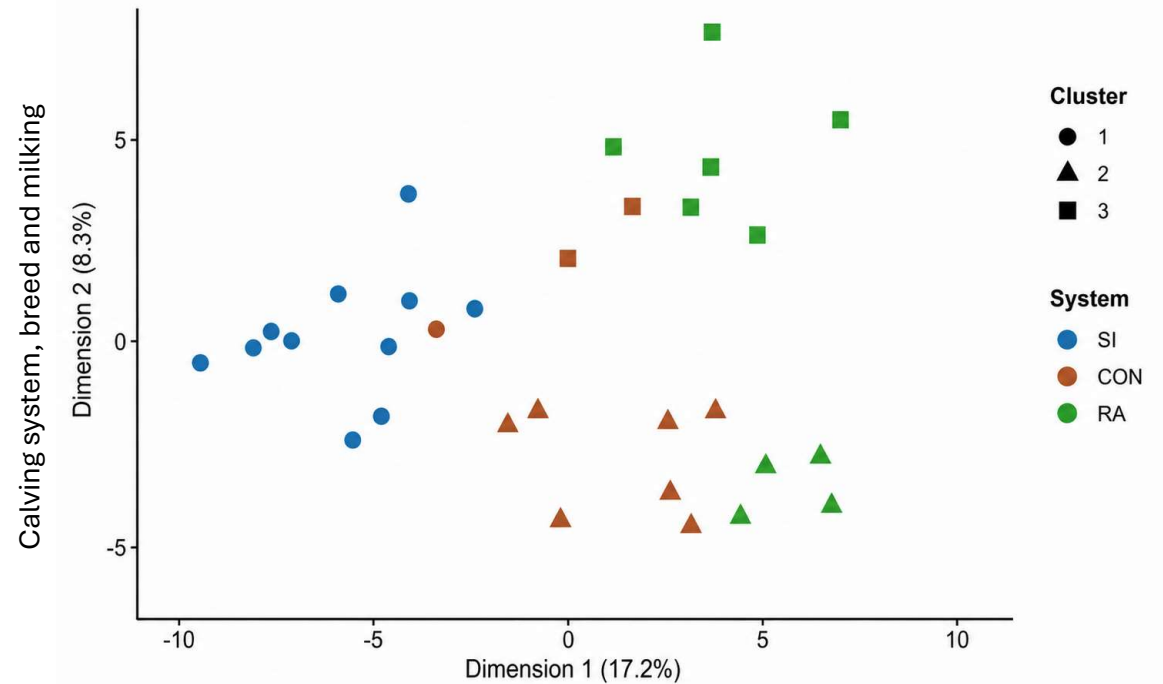
High yielding, indoor, year-round calving, predominately Holsteins, TMR diet, employing innovative waste management and PLT. High inputs but reducing.

Conventional

Housed and grazing, often employing some regenerative practice. Mixed calving patterns. Mid yielding, mixed breeds. Relatively high inputs.

Low Input Regenerative

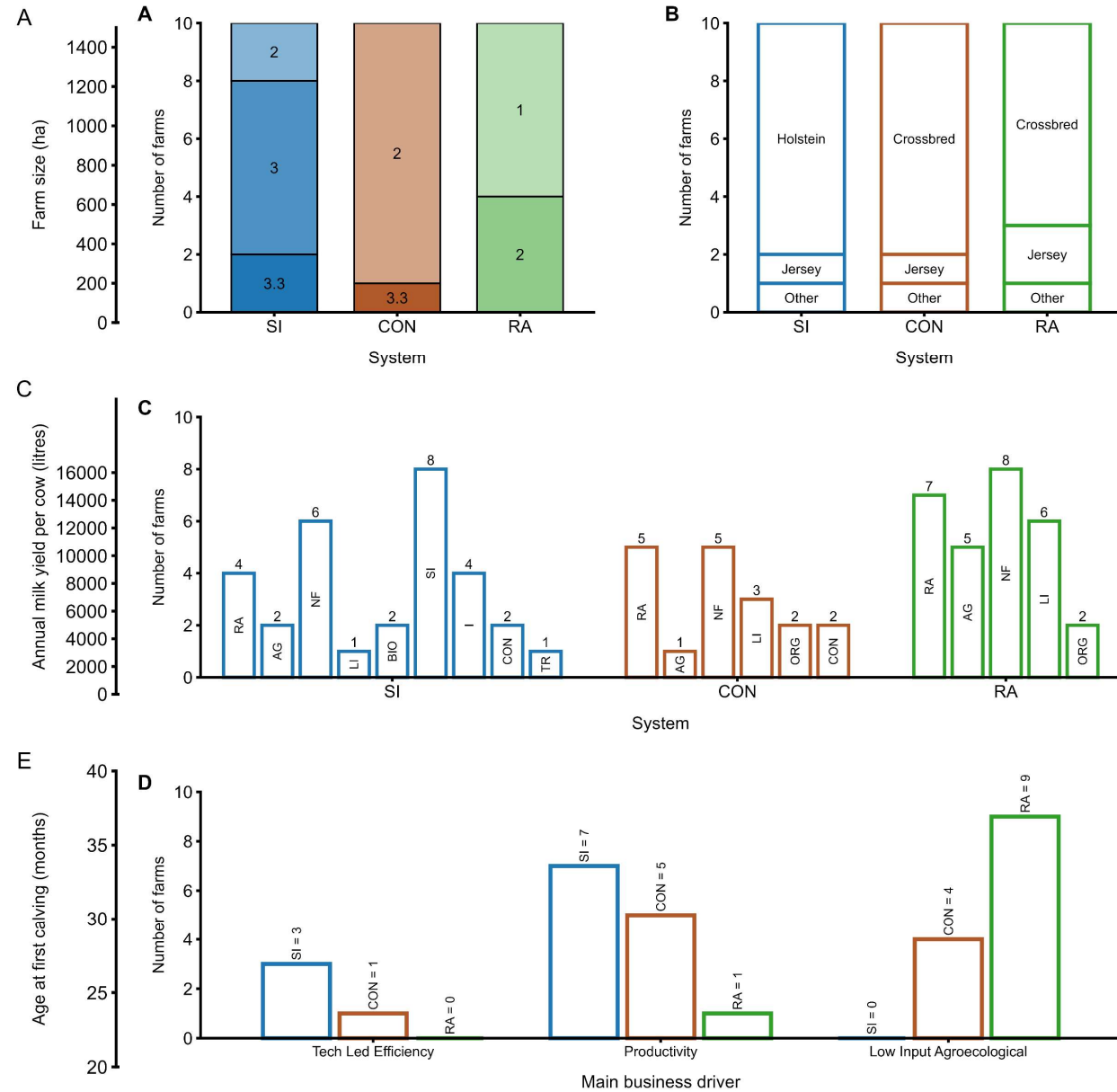
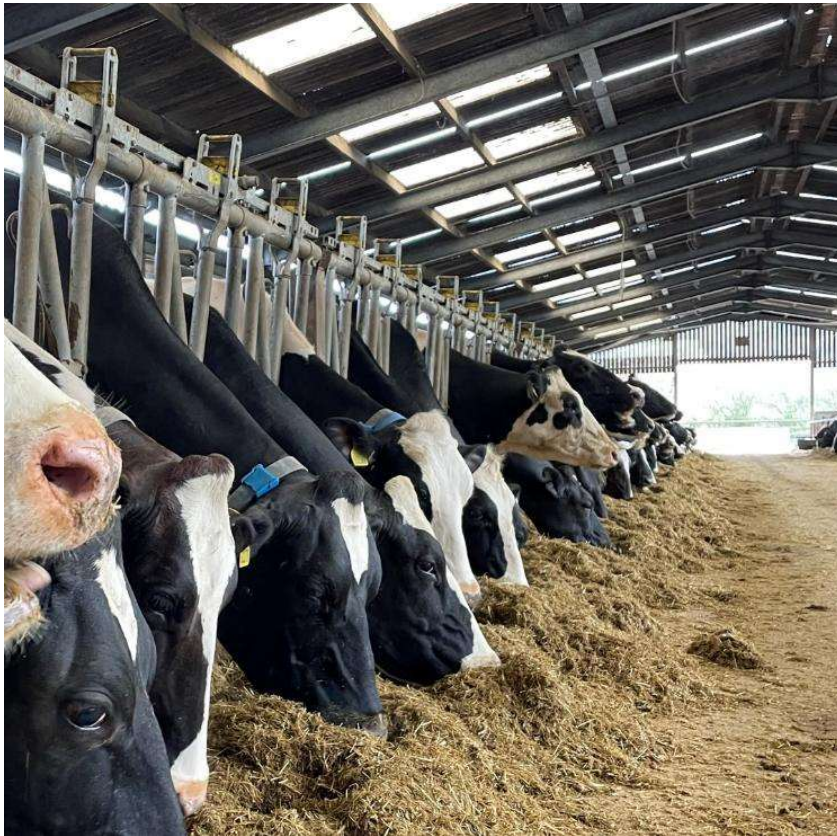
Low yielding, many prioritise outdoor grazing year-round, some extended CCC, predominantly Spring block calving and pasture fed. Low yield. Low Input .



- Highlights within and between variability
- Context for my own interpretation
- Very Stable
- RA = LIRA
- policy implications?

Dairy Systems

IN MORE DETAIL





THE FOUNDATIONS Soil & Pasture

30

FARMS IN SOIL TYPE
TRIPPLICATES

104

VARIABLES

60

TYPICAL GRASSLAND
FIELDS

PHYSICAL ASSESSMENTS (VESS)

EARTHWORMS

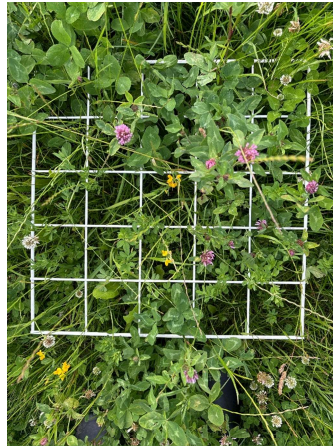
ANIMAL HEALTH MICRO & MACRO NUTRIENT ANALYSIS

CARBON ANALYSIS

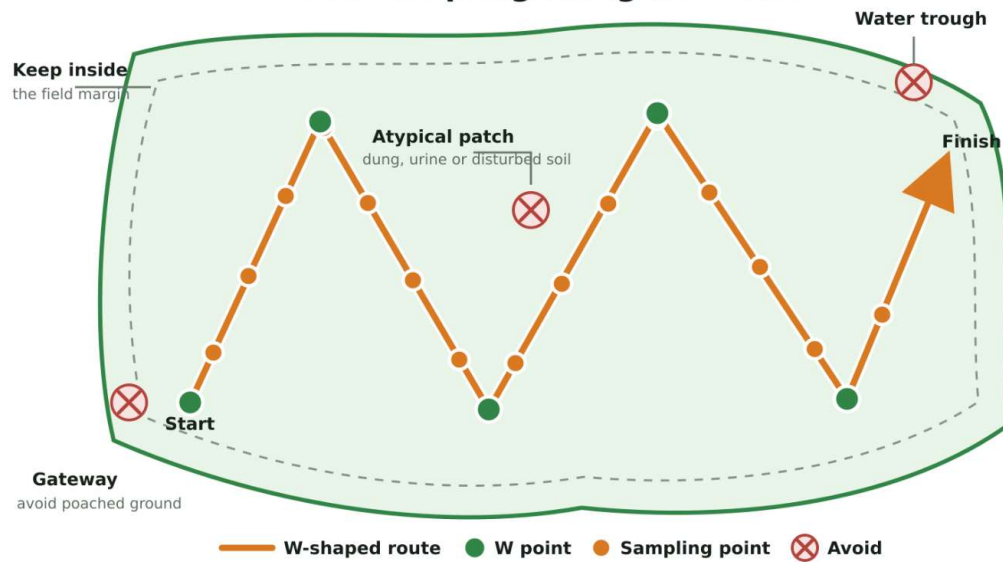
SOLVITA

MICROBIOLOGICAL ANALYSIS

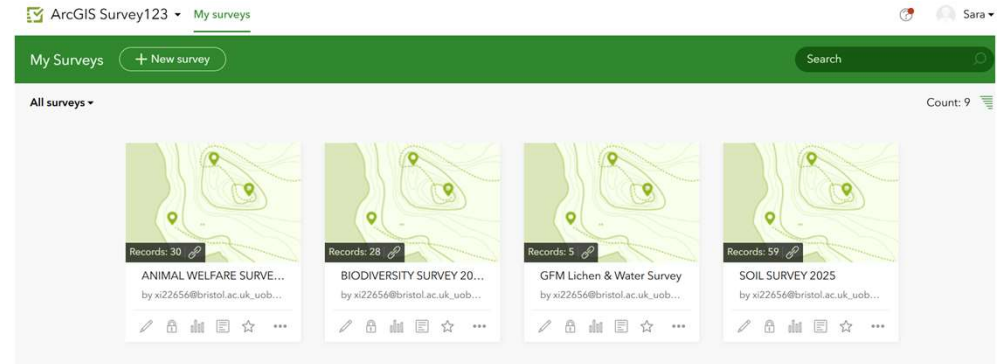
PASTURE DIVERSITY & COVERAGE



Soil sampling using a W walk



THE FOUNDATIONS Soil & Pasture



THE FOUNDATIONS Soil & Pasture

30

FARMS IN SOIL TYPE
TRIPLICATES

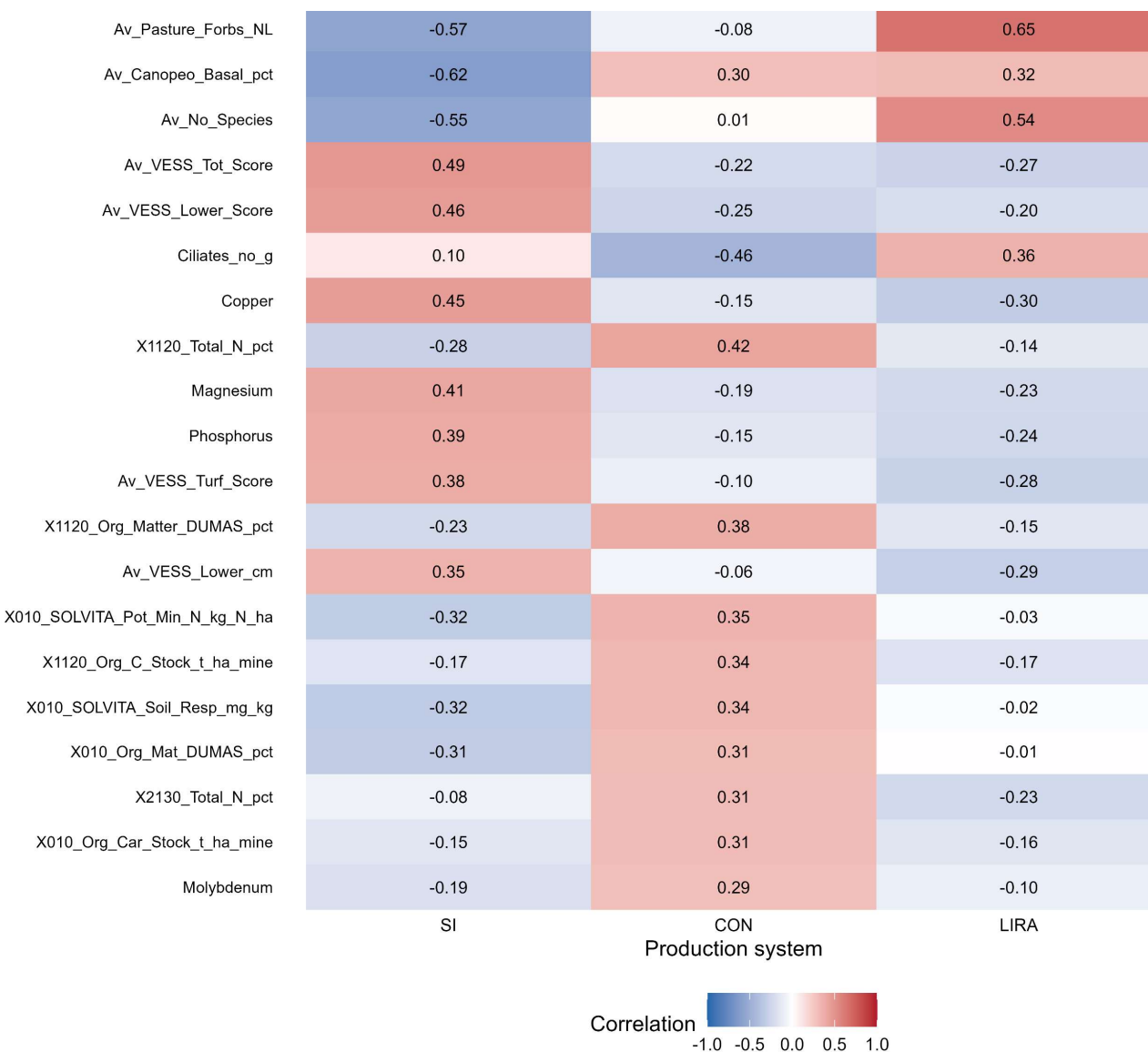
104

VARIABLES

60

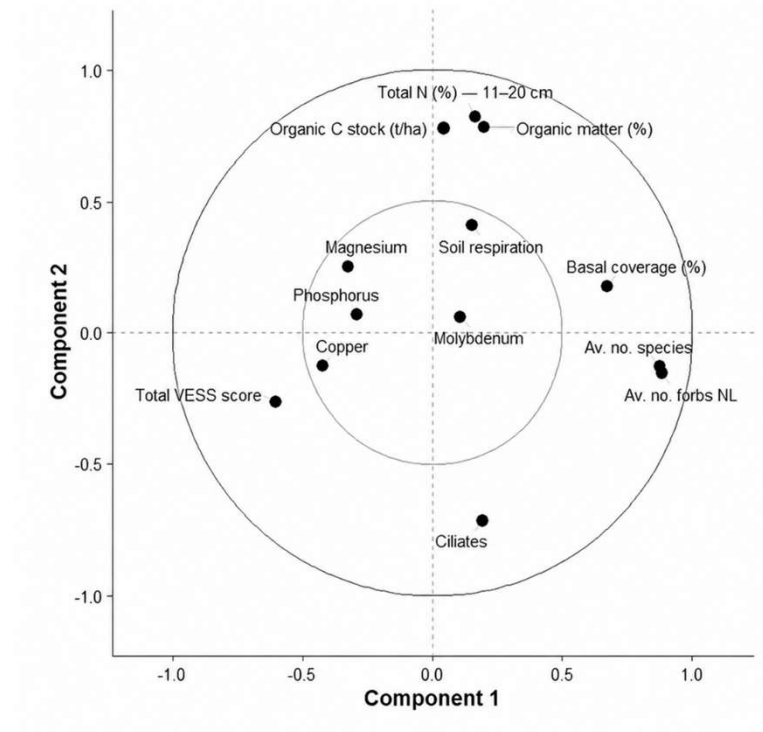
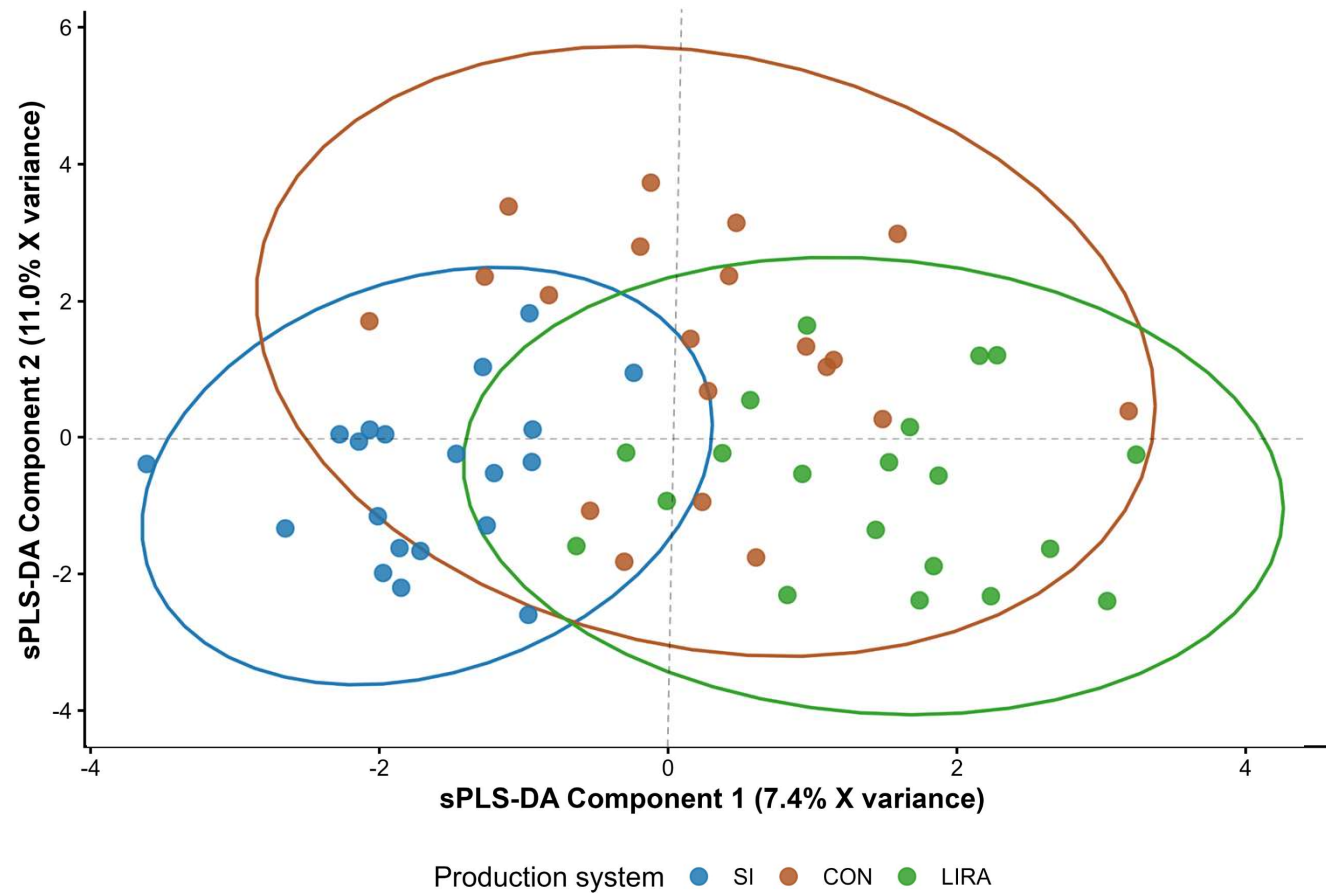
TYPICAL GRASSLAND
FIELDS

Across all of my soil and pasture
variables identify those that best
separate the three dairy production
systems.

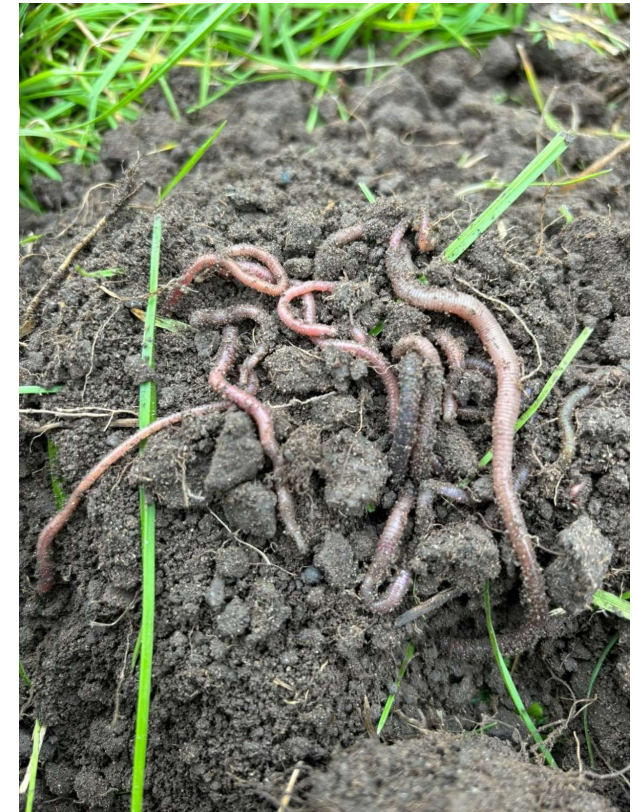
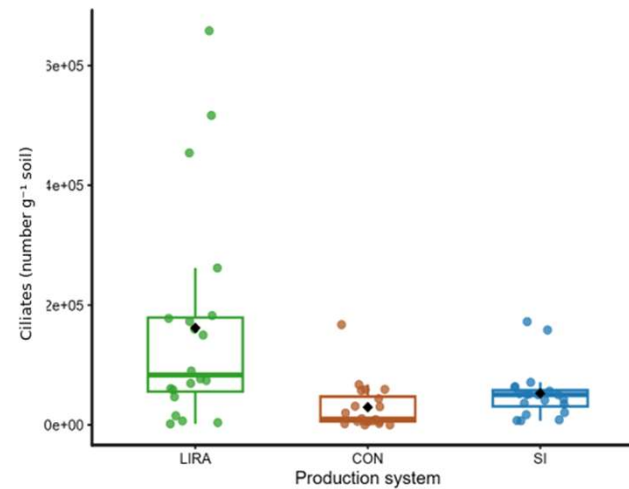
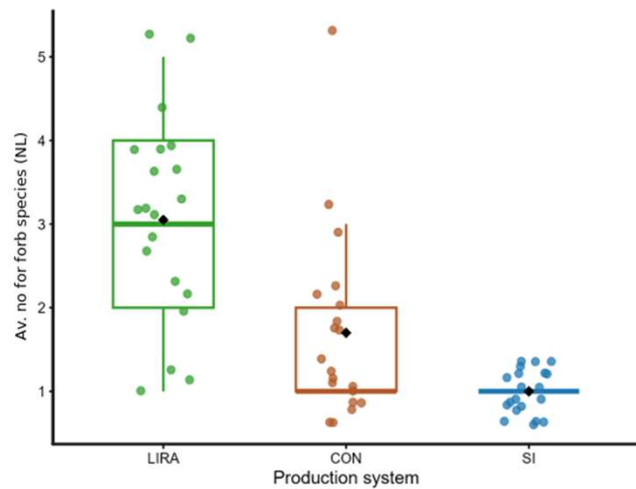
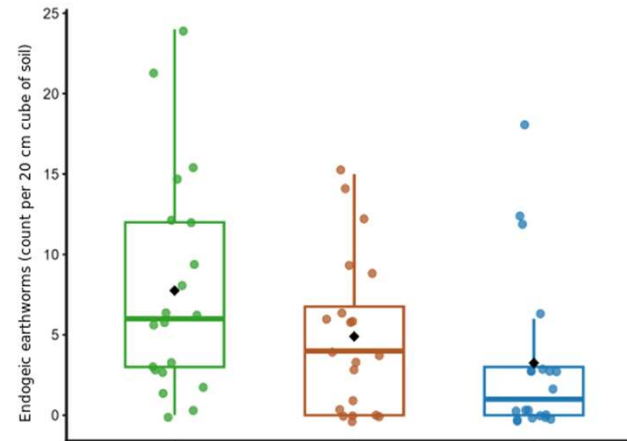
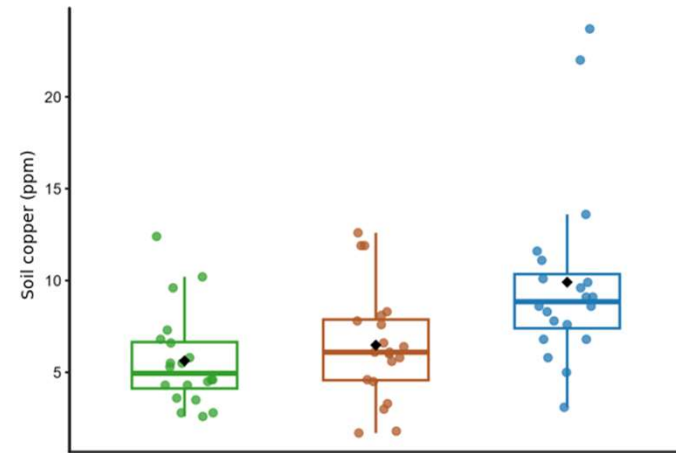


THE FOUNDATIONS

Soil & Pasture



THE FOUNDATIONS Soil & Pasture



THE KEY STAKEHOLDER

Animal Welfare

30

HERDS

12643

COWS

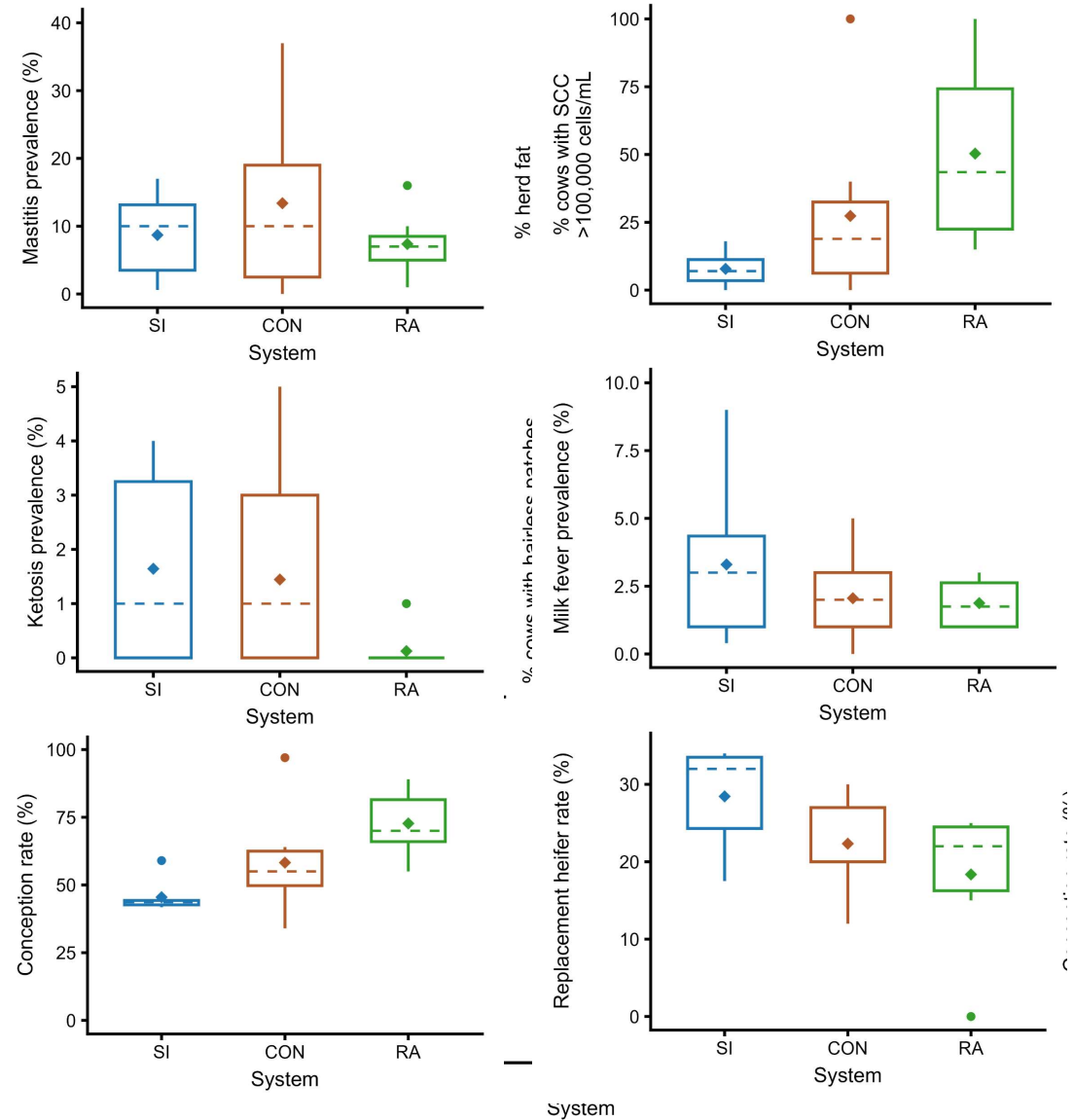
2025

APRIL - AUGUST

48

VARIABLES

- PHYSICAL ASSESSMENTS (ASSUREWEL)
- FARM RECORDS
- HERD LEVEL QBA
- GOODLIFE PROTOCOL
- HAIR CORTISOL



THE KEY STAKEHOLDER

Animal Welfare

30

HERDS

12643

COWS

2025

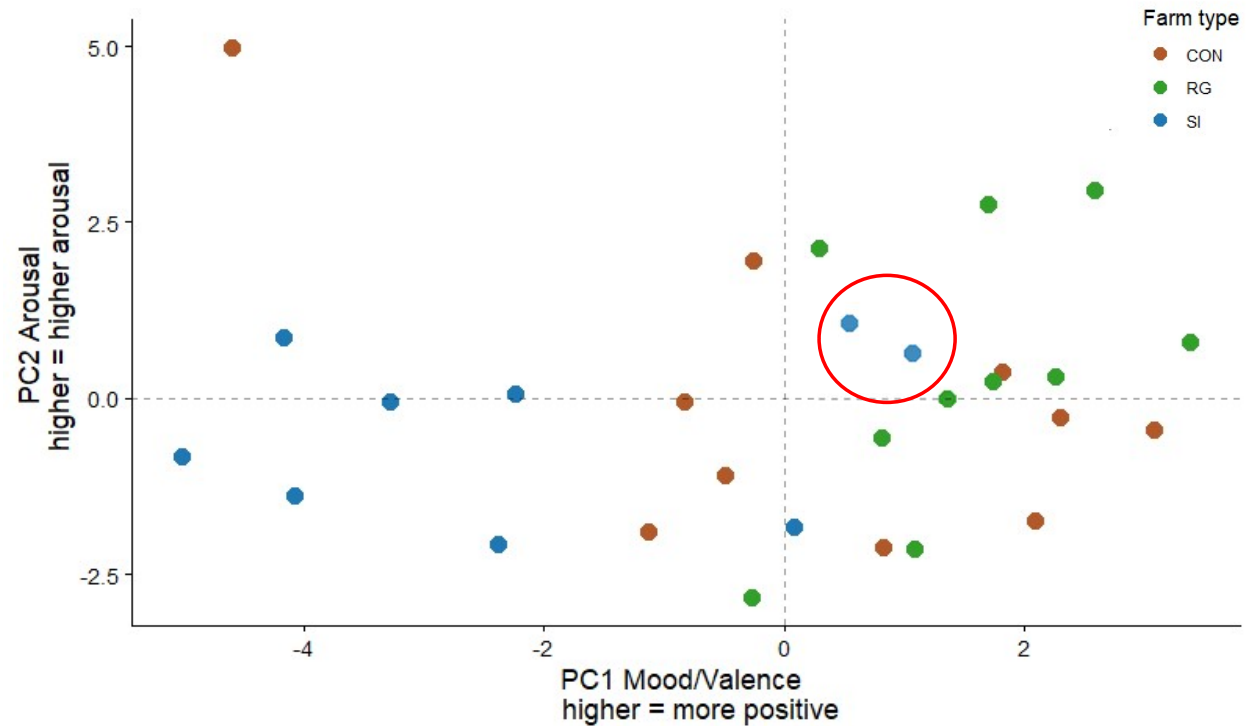
APRIL - AUGUST

48

VARIABLES

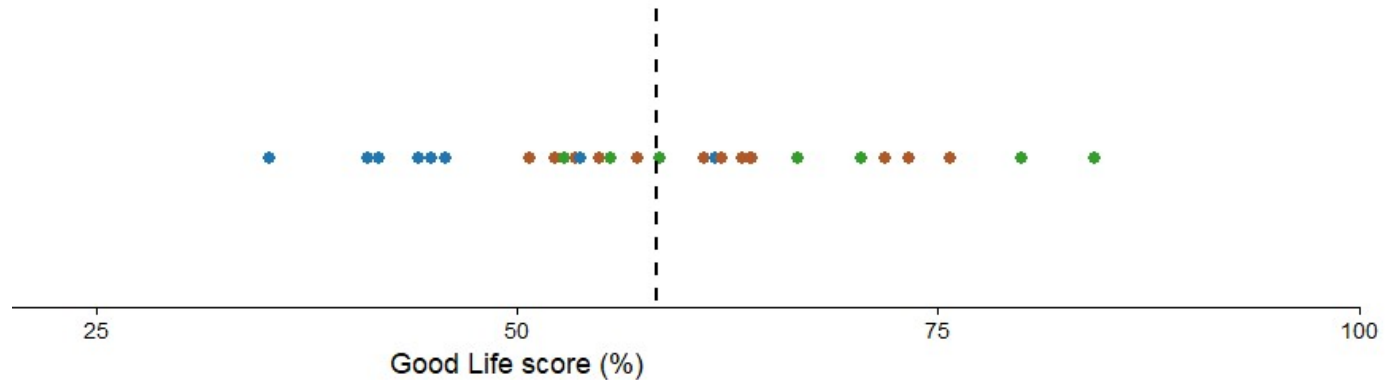
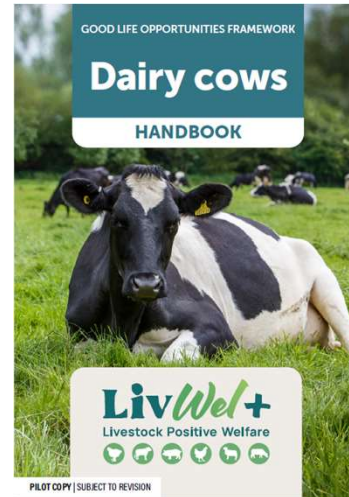
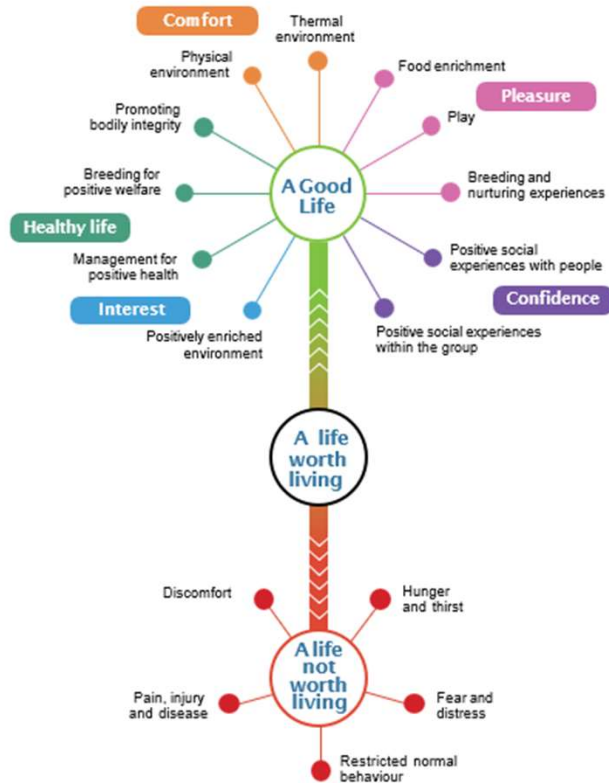
- PHYSICAL ASSESSMENTS (ASSUREWEL)
- FARM RECORDS
- HERD LEVEL QBA
- GOODLIFE PROTOCOL
- HAIR CORTISOL

HERD LEVEL QBA



THE KEY STAKEHOLDER

Animal Welfare





What's next....

OTHER DATA COLLECTED

Biodiversity (pollinators & bird surveys)

Hair cortisol

Life Cycle Assessments (GHGs)

Milk & forage nutritional analysis

Socio-economic data

OUTCOMES

System ceilings identification

Synergies and trade-offs

Identify “bright stars”/ outliers

Share sector wide challenges

Highlight Policy implications

THE CONTEXT

Anecdotal Evidence

Uncaptured evidence

- Pan traps vs flowers
- Smell of soil
- Thin but fit?
- Sawdust and hock burns
- Out all year and causing compaction
- Context of farm and the people involved



Thank you.

sara.hall@bristol.ac.uk



Biotechnology and
Biological Sciences
Research Council

