ACHIEVING NET ZERO THROUGH FARM LEVEL AUDITS ON COMMERICAL FARMS

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CONCLUSION

Further ground measurements and analysis of carbon fluxes will explore potential hot spots and causes of variability. However, preliminary analysis on soil and grass samples at Hartpury Farm (HF) suggests that the overall soil organic carbon (SOC)/ Clay ratio is within 'moderate' to 'very good' condition for grassland and arable fields, which are very likely to become potential carbon sinks for sequestering carbon and reducing atmospheric carbon emissions.

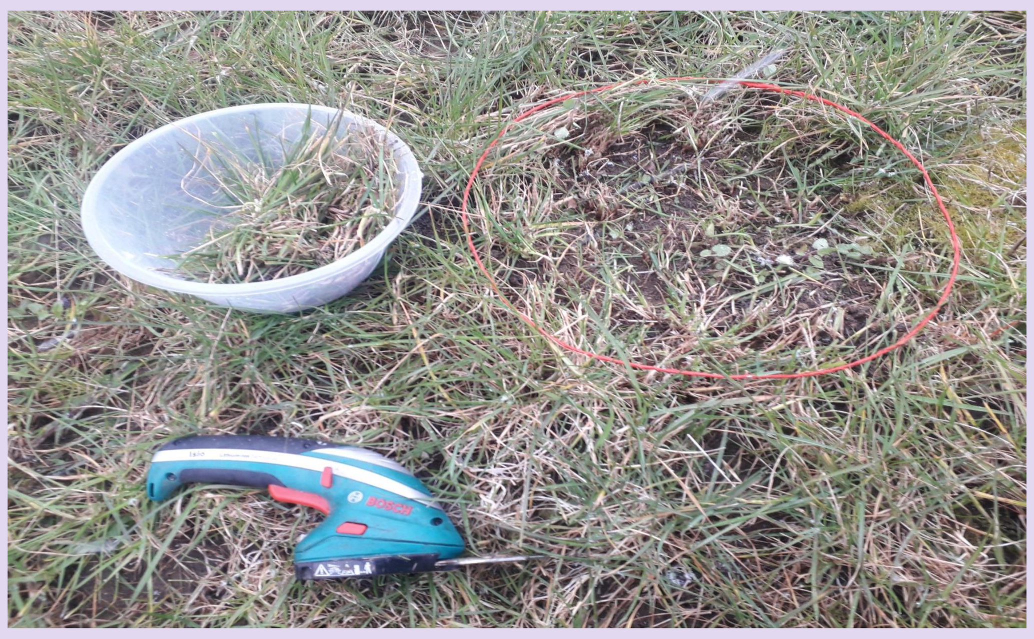

FIG.1: Field sampling site with required equipment and grass samples.

INTRODUCTION

- There has been limited use of real-time field analysis tools to measure, track and verify SOC levels on farms to assess variability (FIG.1). Doing so could aid farmers' agricultural management.
- Aim: Explore how available carbon accounting tools and measurements can be implemented on commercial farms to enhance carbon auditing and mitigation options.
- Objectives: (1) evaluate existing online carbon audit tools; (2) identify areas and strategies for refining on-farm measurements; (3) perform carbon audit on commercial farms, and (4) identify mitigation options to reduce carbon emissions.

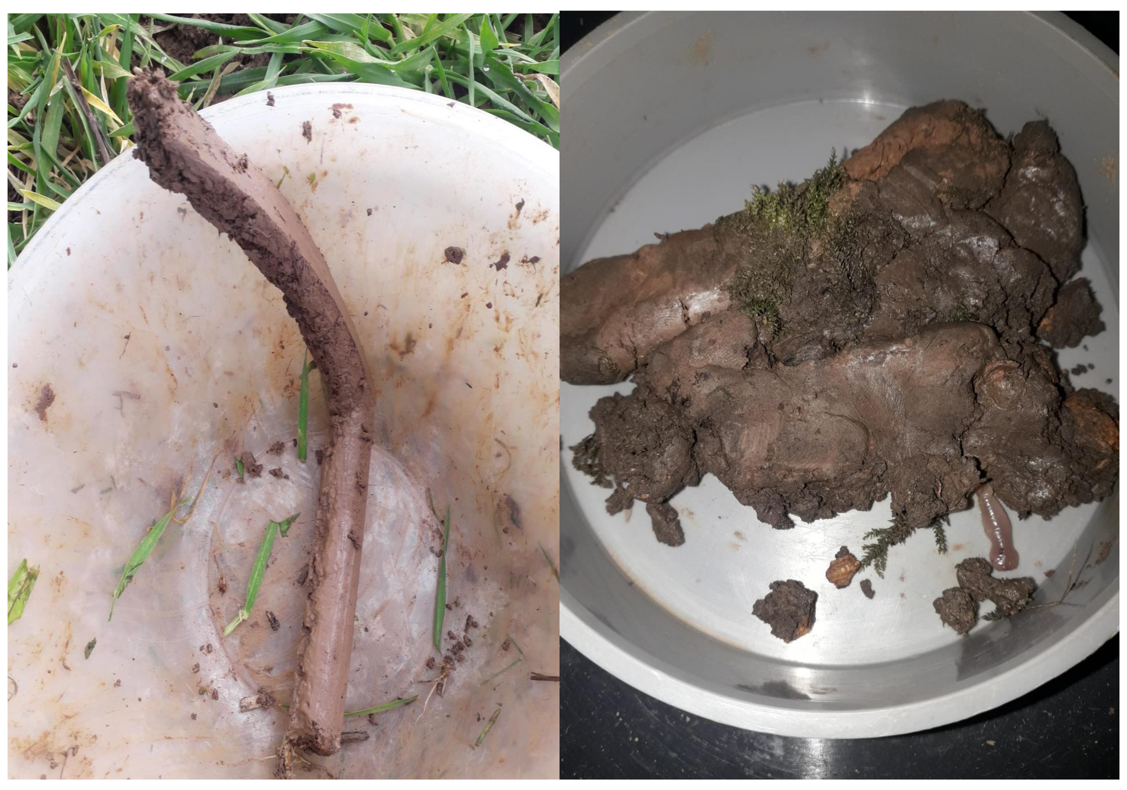

FIG.2: (a) left: brown soil sample during field sampling on HF; (b) right: a closer look on soil sample mixed with grass and insects.

METHOD

- Data: collecting 5 soil and 5 grass (FIG.2a-b) at random points walked in a 'W' pattern across each HF field. 150 samples were collected across 30 fields in mid-March 2023.
- Analysis: mobile near-infrared reflectance spectroscopy (NIRS) analysis was used for soil and grass nutrient analysis (FIG.3a-b).
- Data processing: using NIRS online cloud function to generate excel spreadsheets consisting critical organic matter contents of (1) SOC, (2) nitrogen (N), and (3) clay for further calculation.

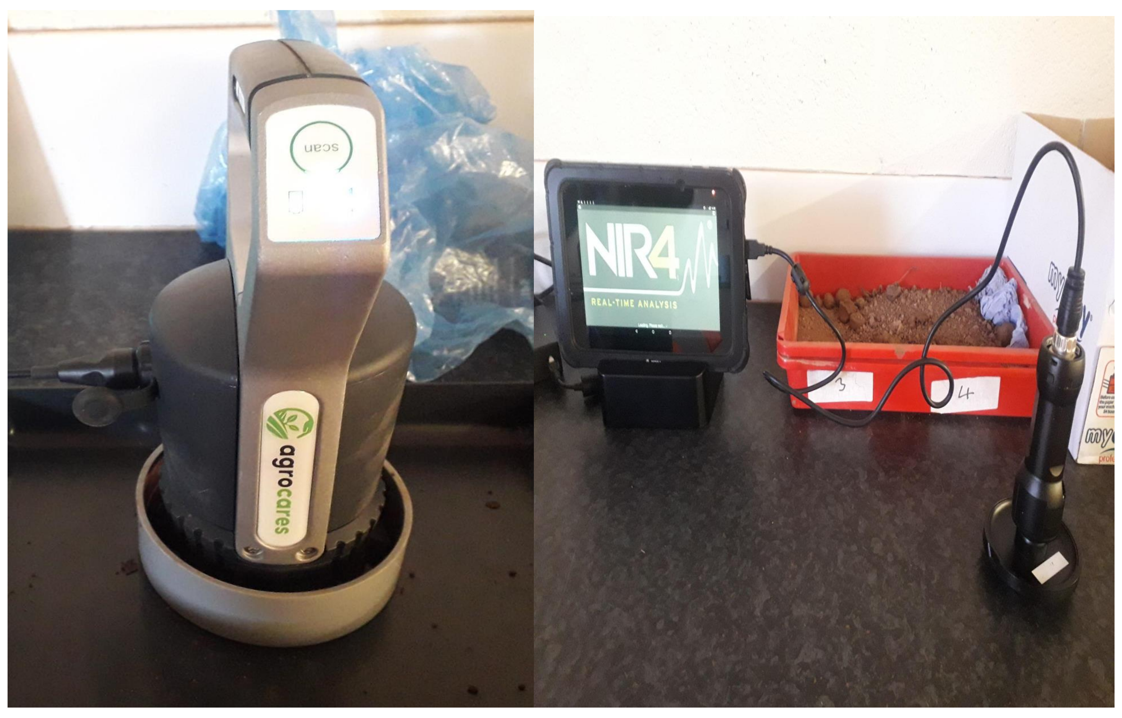

FIG.3: (a) left: Agrocares soil scanner for soil analysis; (b) right: NIR4 scanner for forage analysis.

RESULTS

- Thresholds of soil organic carbon (SOC)/ clay ratio of 1/8, 1/10 and 1/13 indicated the boundaries between 'very good', 'good', 'moderate' and 'degraded' levels of structural condition (TABLE 1).
- On this scale, a greater proportion of woodland, permanent grass and arable sites had SOC/clay ratio > 1/8 and a greater proportion of ley grass sites had SOC/clay ratio ≤ 1/10 > 1/13. Non of the sites were degraded (TABLE 1).

TABLE 1: % of sites above, above, below and between soil organic carbon (SOC)/ Clay thresholds of 1/8, 1/10 and 1/13 for each land-use.

		% of sites with indicated SOC/clay ratio			
	n	Very good (> 1/8)	Good (≤ 1/8 > 1/10)	Moderate (≤ 1/10 > 1/13)	Degraded (≤ 1/13)
Arable	15	53%	40%	7%	0%
Ley grass	40	35%	38%	27%	0%
Permanent grass	75	67%	20%	13%	0%
Woodland	20	70%	20%	10%	0%
All land use	150	57%	27%	16%	0%

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References

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