Intensive pastoral beef production: impact & value

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Introduction

Understanding the environmental impact of intensive pastoral beef production systems is an important factor in establishing and improving their sustainability and efficiency. Potentially, pastoral systems can provide a high level of production of higher value product, in terms of fatty acid and vitamin composition [1, 2]. Well managed grassland systems have the potential to store more carbon (C) in the soil [3, 4], however the C fluxes from the system are poorly understood, and this is a weakness when evaluating the carbon footprint of beef.

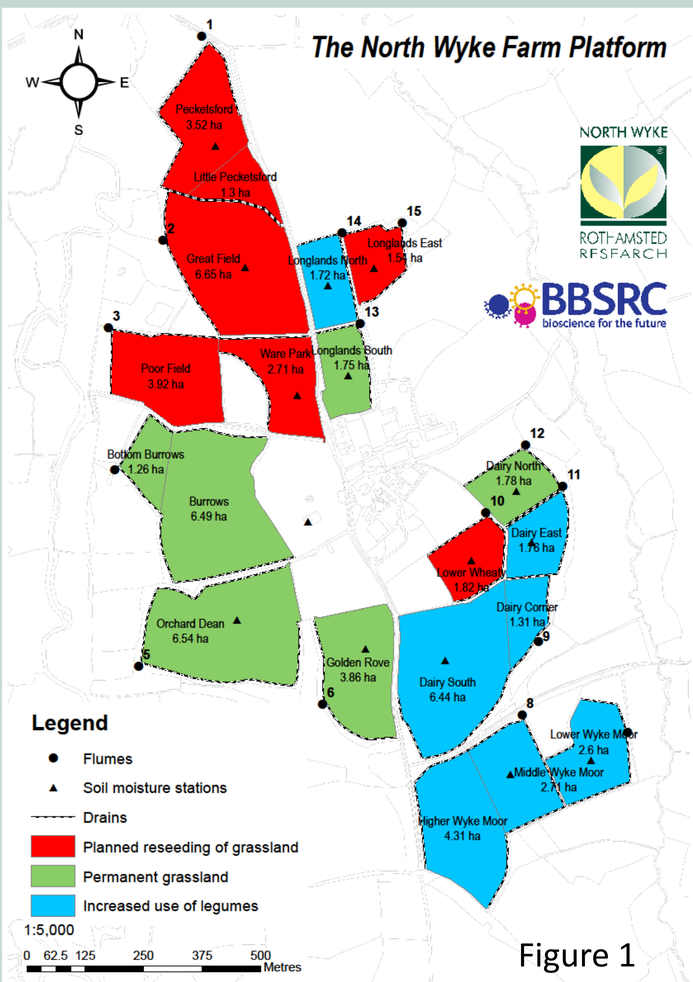


Figure 1

The North Wyke Farm Platform (Figure 1 & 2) has been implemented to deepen the understanding of sustainable grassland management systems for ruminant production. Using this facility, three management systems will be compared:

1) Planned reseeding of grassland
2) Permanent grassland
3) Increased use of legumes

Figure 2: Surface and subsurface water flow channelled to flumes

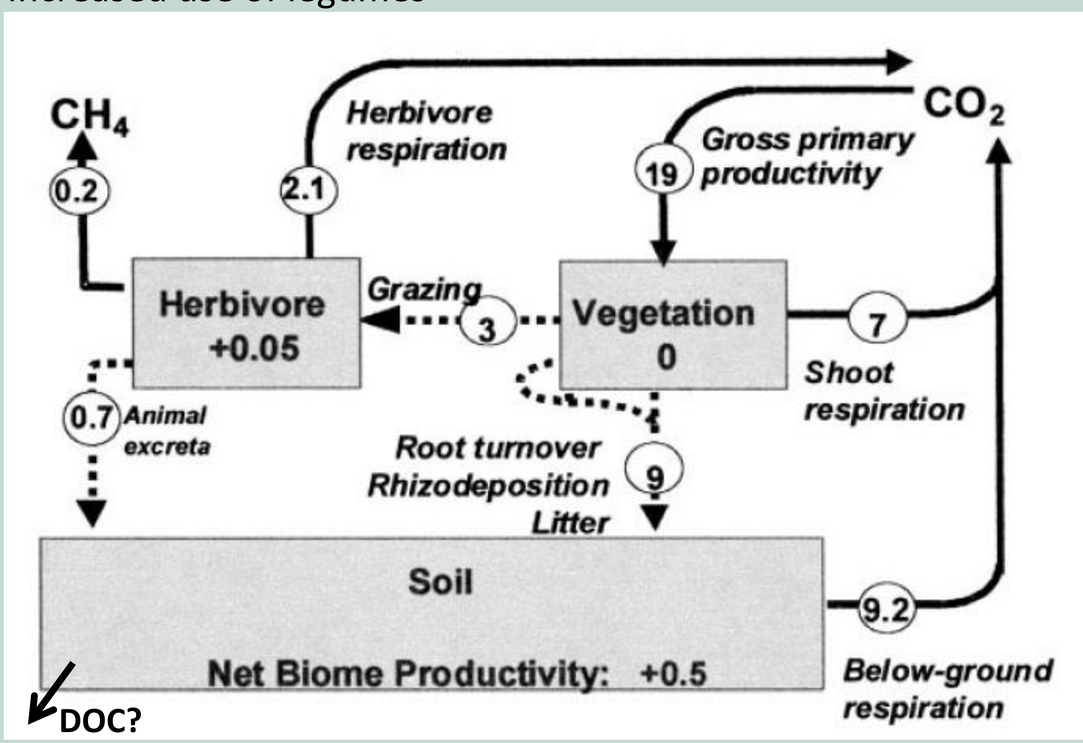
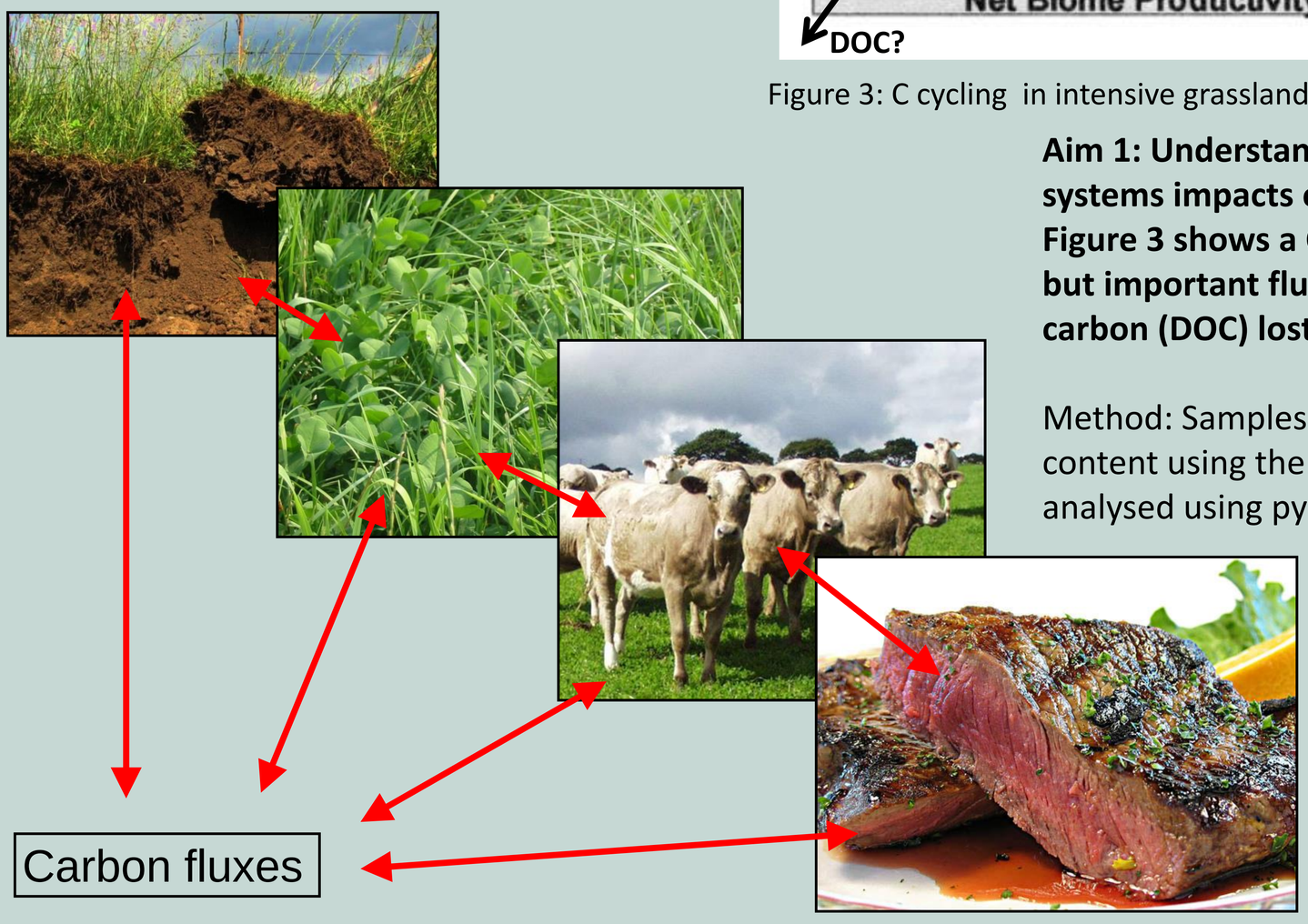


Figure 3: C cycling in intensive grassland system, main carbon fluxes illustrated (t C ha/yr) [5]



Aim 1: Understand how changing the management of beef production systems impacts on the amount and composition of C fluxes in the system. Figure 3 shows a C cycle for an intensive grassland beef production system, but important fluxes are not considered, for example dissolved organic carbon (DOC) lost in surface and subsurface water runoff.

Method: Samples of water, soil, herbage and dung will be analysed for DOC content using the laboratory analyser and the C profile of each sample will be analysed using pyrolysis-gas chromatography mass spectrometry.

Aim 2: Evaluate the nutrient value and shelf life potential of meat from each management system.

Method: Samples of meat from cattle that have been reared on each management system will be analysed for fatty acid profile and vitamin E content.

Aim 3: Establish the carbon footprint of beef production under each management system.

Method: A detailed life cycle analysis of each beef production system will be carried out using the comprehensive livestock and management records from the farm platform and the C data collected.

References

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4. Soussana, J.F., *et al.* (2009). Mitigating the greenhouse gas balance of ruminant production systems through carbon sequestration in grasslands. Animal. **4:**(3) 334-350.
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