Monitoring Productivity of a UK Dairy System Aiming to Increase Soil Carbon, Based on Diverse Swards and Incorporating Mob Grazing

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INTRODUCTION

There is interest in increasing soil organic matter (SOM), both to improve plant productivity, and augment carbon sequestration. One practice that may contribute to increasing SOM is a “mob grazing” approach. This involves high stocking density for a short period of time, and often grazing more mature swards, leaving higher cover and longer recovery times between grazings than is typical in the UK. This approach is likely to be best suited to swards that include a wide variety of grass and herb species, giving greater resilience than a purely ryegrass sward. The performance of dairy herds on such swards under this type of management in the UK has not been documented. This project uses a participatory approach to gather sward and animal production data from a farm where diverse swards and a “mob grazing” system have been developed over seven years, with the aim of increasing the return of organic matter to the soil.

MATERIALS AND METHODS

A 220 ha organic dairy farm in the Cotswolds with 188 spring calving dairy cows (Shorthorn, Friesian and their crosses) is being used as a Case Study. Soils are Cotswold brash over limestone, and prone to drought. Soil organic matter levels measured at field scale in 2004 were 3.8 – 4.2%. Since then, mixed swards have been established including 10 grass species, six legumes, and chicory, ribwort plantain, sheeps’ burnett and yarrow. The grazing area for the milkers is 74 ha, with an additional 20 ha following first silage cut, which is grazed on a 40 day rotation. Cows are allocated a fresh area of approximately 0.8 to 1 ha twice a day (94 - 117.5 LU/ha/day). Beginning in March 2013, at 3 - 4 week intervals, dry matter per hectare and botanical composition of the sward available to the cows and remaining immediately post-grazing were measured by sampling 3 x1m^2 quadrats, cutting to approximately 6 cm. Metabolisable energy content of the sward available and rejected was evaluated by wet chemistry on two dates (27 May and 6 July) and used to estimate energy intake from grazing. Feed use and milk sales and composition were recorded. Soil organic matter will be assessed during the project.

RESULTS

Table 1 Characteristics of herbal sward ahead of the cows (NA – not available)

Month	Herbage available (t DM/ha)	Estimated residual herbage (above 6 cm) (t DM/ha)	Estimated energy intake from grass (MJ/cow/day)	Sward clover % (DM basis)	Sward broadleaf % (DM basis)
March	0.4	0	NA	NA	NA
April	0.7	0	87	12	9
May	1.7	0	206	14	9
June	1.8	0.5	141	27	8
July 1 July 21	3.4 2.3	1.3 0.8	190 174	13 17	22 38

Table 2 Cow performance

Month	Estimated grazed intake (kg DM/cow/day)	Supplementary feed/cow/day	Milk sales (l/cow/day)
March	4.25	Silage + 6 kg cake	18
April	7.45	Silage + 4 kg cake	22
May (14th onwards)	18.0	2 kg cake	22
June	14.0	1 kg cereal meal	21
July	18.0	1 kg cereal meal	16

DISCUSSION

Cold spring conditions restricted early herbage growth, requiring supplementary silage feeding and higher than expected concentrate feeding into May. Grazing allocations resulted in increasing amounts of residual herbage from June onwards. The proportion of broad leafed species increased through the year. By late July, cows were selectively grazing legumes and broadleaves, rejecting stalks of grasses, chicory and plantains. The estimation of herbage availability and intakes from such variable swards presents a large challenge. Monitoring is continuing to increase the availability of information.

ACKNOWLEDGEMENTS

Funded by the EC 7th Framework Programme (SOLID project). The publication reflects the views of the author(s) and not those of the European Community, which is not to be held liable for any use that may be made of the information contained.