

Sustainable grass farming

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Grass & Forage Farmer (BGS Publication) No.114 (Autumn 2013) p. 4.

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Introduction

“Sustainable grassland farming” suggests a stable, productive system, with limited dependence on external inputs, which is economically viable. Effects on the wider environment, particularly air, water and wildlife, also need to be considered. The balance required is outlined in Table 1. Many principles contributing to sustainability are incorporated in organic, “LEAF” style, low input and agro-ecological systems, although these approaches address specific issues in different ways. It is impossible to cover all aspects and options in such a short article; here we concentrate on “healthy soil” and “plant species diversity” as two key components that can contribute to many aspects of sustainability.

Soil considerations

Sustainable grassland systems need to be based on healthy and resilient soil. Important considerations are avoiding compaction, maintaining soil fertility and organic matter, and supporting and increasing the soil fauna, to ensure that productivity of grassland is not restricted. To achieve sustainability we need to consider “feeding the soil” using a variety of resources, including manures, plant residues, and naturally fixed nitrogen, and promoting physical conditions in which the soil microbes can work effectively to make nutrients available to plants, and water is effectively supplied. Earthworms (often referred to as ‘nature’s plough’) are an essential component of a healthy soil, mixing the soil, and improving its structure, stability and water-holding capacity. Farmers should consider the impact of grassland management on the ‘livestock’ beneath their feet, which can exceed in weight the livestock above ground. A recent Natural England report¹ includes practical examples of approaches farmers have taken to enhance “soil biological health”, including composting manure and including deep rooting plants such as chicory.

Plant considerations

Introducing more plant diversity will increase the resilience of a system. Legumes are an obvious example, providing nitrogen and a protein source for livestock without reliance on external inputs. More unusual in modern times is the idea of including a wider variety of grasses and herbs in the ley. Such diverse swards offer many benefits including the ability to withstand more extreme physical conditions (e.g. drought or wet), a potentially wider window of optimum digestibility, and specific medicinal and dietary components of particular plants. Research from Austria has confirmed the high mineral status of mixed swards and studies of Mongolian nomadic herds suggests plant diversity provides mineral status benefits for grazing animals. There is also some evidence of reduced methane emissions per kg liveweight gain of cattle on diverse swards but this is a complex topic. The Defra-funded LegumeLINK project² has produced information on the performance of a wide mixture of legumes under a variety of conditions; a highly diverse grass-legume species mixture was more productive than simpler leys, with additional benefits to key pollinators such as bumblebees.

Ongoing research

Some grazing enthusiasts have reservations about the productivity of diverse swards; this is being investigated in projects such as Multisward (www.multisward.eu) and SOLID (www.solidairy.eu) and

it is good to see a forthcoming Teagasc PhD study on ensiling mixed swards. In the Welsh Government's Prosoil project, farmers are studying the outcomes of management changes to improve soil, whether in its physical, chemical or biological aspect. Possible alternative grassland management approaches currently under investigation by the Organic Research Centre are mob grazing (based on the natural grazing habits of wild herds of cattle) and agroforestry (the integration of trees into crop or livestock systems). These practices are less well researched in UK conditions than in other countries but have potential to contribute to several environmental aspects of sustainability. However, there is little information on the economic performance. The message for developing ideas on sustainability is "think beyond grass". We suggest that future sustainable grassland systems will pay more attention to soil properties and use a wider range of species of grasses, legumes and herbs. There will be less reliance on external inputs and farmers will need to consider some less conventional management practices based on "old fashioned" approaches or "natural" processes.

Table 1 The balance needed for sustainable grassland farming

Environmentally sustainable		Economically sustainable	
Enhancing	Minimising	Maintaining	Minimising
Soil properties for water holding capacity in dry weather and drainage in wet conditions	Greenhouse gas emissions Nutrient losses	Animal production and other outputs at economically viable levels	Costs of production relative to value of output
Biodiversity	Water pollution		
Carbon sequestration	Detrimental effects on wildlife including soil biota		

References

- ¹ <http://publications.naturalengland.org.uk/publication/2748107>
- ² www.organicadvice.org.uk/LegLink_abstract_feb2010.doc