APPG on Science & Technology in Agriculture

Notes of a meeting held on Tuesday 5 June 2018
Committee Room 18, Palace of Westminster

Grassland science and innovation – the key to a Green Brexit?

Present:

Members
Julian Sturdy MP (chair)
Earl of Selborne
Lord Cameron of Dillington
Bill Wiggin MP
Richard Benyon MP

Guest Speakers
Cledwyn Thomas, Stapledon Memorial Trust
Deborah Roberts, James Hutton Institute
Mariecia Fraser, Aberystwyth University
Sinclair Mayne, AFBI, Northern Ireland

Stakeholders
Elaine Jewkes, British Grassland Society; Chris Reynolds, University of Reading; Prof Nigel Scollan, Queens University Belfast; Tom Misselbrook, Rothamsted Research; Jamie McFadzean, Rothamsted Research; Anna Thomson, University of Reading; Alan Hopkins, Stapledon Memorial Trust; Yann Le Du, Farmer; Liam Sinclair, Harper Adams University; Mary Vickers, AHDB; Hugh Broom, NFU; Stuart Hammond, NFU; Paul Rooke, AIC; Paul Newell-Price, ADAS; Alice Carter-Champion, Defra; Mark Jacob, Defra; Orla Shortall, James Hutton Institute; Gareth Fulton, Elmley Estate; Ron Stobart, Sainsburys; Paul Muto, Natural England; Frank O'Mara, Teagasc; Margaret Gill, University of Aberdeen; Prof Chris Atkinson, NRI; Mike Steele, Stapledon Memorial Trust; Adam Dyster, National Trust; Prof Alistair Stott, SRUC; Prof Mike Gooding, Aberystwyth University; Daniel Pearsall, APPGSTA Group Co-ordinator

1. Welcome & Introduction

Julian Sturdy MP welcomed Members and stakeholders to the meeting and provided a brief introduction, noting that the session had been organised in collaboration with three key organisations involved in promoting UK grassland research and information – The Stapledon Memorial Trust, British Grassland Society and British Society of Animal Science – to explore the extent to which grassland science and innovation can help address the objectives set out in Defra's recent *Health and Harmony* consultation, from improvements in animal welfare, farmland biodiversity and soil health to supporting the productivity of grazing livestock systems and the sustainability of remote rural economies.

2. Guest speakers

[Guest speakers' slides are available to download via the meetings section of the All-Party Group web-site at www.appg-agscience.org.uk]

Cledwyn Thomas, Stapledon Memorial Trust

Setting the importance of UK grasslands in context, Cled Thomas (CT) noted that grassland accounts for 71% of the UK's total agricultural area of 17.5 million ha.

Of the UK's 12.4 million ha grassland area, 10% is temporary grassland (<5yrs) and 80% is permanent grassland – of which 60% is grassland over 5 years and 40% single owner rough grazing - with the remaining 10% comprised of common rough grazing.

Overall, grassland supports production from 10 million cattle, 35 million sheep, 2 million dairy cows. Grassland farms produce 36% of UK agricultural output (amounting to £8 billion), have the greatest number of holdings and employ the largest number involved in agriculture (eg 31% of agricultural workforce in England).

However, CT also observed that grassland farms are highly dependent on subsidies, with direct payments accounting for over 90% of income on non-dairy grassland farms, and 66% of grazing LFA farms and 75% of lowland grazing returning profits of less than £25k per annum. There is also a wide range in performance across grassland farms, with the output/input ratio between the top and bottom 25% varying by a factor of more than two.

CT noted that grasslands have strong potential to deliver public goods – not only in environmental terms by reducing pollution, mitigating GHG emissions, improving soil health and creating habitats for plants and wildlife, but also by providing amenity value, supporting landscapes and providing opportunities for tourism and recreation.

Through better targeted support, access to new technology and innovative practices, better integration of research and extension, CT suggested that grasslands offer significant potential to deliver a successful rural economy, a healthy natural environment and improved farm productivity.

Deborah Roberts, James Hutton Institute

Livelihoods:The contribution of grassland management and livestock farming to fragile rural economies

Deborah Roberts (DR) noted that rural areas are highly diverse in terms of their economic structure, with remote rural areas most dependent on agriculture with extensive livestock production (cattle and sheep) the dominant form of farming.

Livestock production in remote rural areas is highly dependent on farm subsidies with, for example, CAP subsidies accounting for 38-60% of Less Favoured Area (LFA) farm output in Scotland and 184-282% of Farm Business Income. But DR also observed that farming in remote rural areas is often based on High Nature Value systems which deliver multiple public goods and ecosystem services in addition to food production.

Livestock farming supports employment in remote rural areas, both on farms, in upstream and downstream businesses, and in diversified activities such as farm tourism. Studies suggest cattle enterprises give rise to the largest multiplier effects, and market concentration also influences the pattern of farm linkages within remote rural areas, highlighting the interdependence of farming and related businesses.

In addition to non-market, environmental benefits (e.g. biodiversity, climate change mitigation, natural flood management, water quality), DR suggested that livestock farming and grassland management also support landscapes which are highly valued by society and underpin other economic sectors such as tourism.

DR added that livestock farmers and their families also have a social and cultural importance in remote rural areas and are often guardians of distinctive dialects and/or rural traditions. They also contribute to the population base in sparsely populated areas, an important factor because there may be a "tipping point" in terms of population levels in remote rural areas, below which the economy is unable to function. For example, if current trends continue in remote areas of rural Scotland, the total population is predicted to decline by about a quarter by the year 2046, while the working age population would contract by about 30%.

Looking to the future, DR considered that alternative forms of land use and/or types of land managers could potentially substitute for livestock farming post-Brexit, but their contribution to wider economic, social and environmental goals would differ. She suggested that Brexit presented an opportunity to ensure livestock farming in remote areas continued to support local economies as well as delivering other societal goals.

Mariecia Fraser, Aberystwyth University
Environment: The potential to enhance the environment, reduce pollution, improve soils, and support landscapes, wildlife/flora and amenity value

Mariecia Fraser (MF) observed that while grassland management in the UK is crucial for food production, it also delivers a range of other public goods including climate change mitigation, water and carbon management, and habitat protection and restoration.

To meet what are often conflicting expectations, MF suggested that innovative approaches to land use were required to better integrate primary production with the simultaneous delivery of other ecosystem services.

Use of temporary grass pastures in arable production systems, for example, could help improve soil structure and composition and prevent disease and weed burdens compared with continuous arable cultivation.

DR considered that the diversity of grassland-based livestock systems in the UK presented key opportunities to maximise the range of services and increase resilience, particularly at a landscape level across more than one farm.

DR noted that upland farming, which accounts for 46% of agricultural land use in the UK, has been limited to extensive sheep and beef production due to poor growing conditions. But she suggested that meeting future demands for national and global food security would rely on greater agricultural productivity from these marginal lands.

DR highlighted recent progress in forage breeding, noting that modern grass varieties and legumes offer significant potential to improve productivity and resource use efficiency in lower input systems, not only through higher yielding varieties and more efficient fodder conversion for livestock, but also by delivering environmental benefits such as reduced fertiliser use and GHG emissions. Introducing new, multi-species swards in more marginal grassland could deliver a step change in outputs from these areas at the same time as reducing the environmental footprint of grassland-based livestock systems.

DR suggested that new research efforts to understand the myriad of soil/plant/animal interactions which influence plant dynamics within multi-species pastures would underpin the

development of best practice establishment and management advice to deliver production and environmental benefits. DR highlighted the benefits of mixed grazing combining cattle and sheep, which ranged from less wastage and reduced parasite burden to increased liveweight gain in growing livestock.

Production systems based on novel grazing livestock species could also offer alternatives to those dominated by sheep and cattle. This would enable the grazing habits of different animals to be exploited to deliver efficiency and environmental gains. Mixed grazing of animals with different dietary preferences can improve sward use efficiency, in turn improving productivity and reducing greenhouse gas emissions. Alternative grazers could also be used to control invasive plant species (eg purple moorgrass, rushes), improving habitat conditions and ecosystem function while delivering novel meat and fibre products.

In addition, new low-cost technologies based on the use of drones, electronic tags and satellite imaging were in development allowing pasture utilisation and related impacts to be defined at a much higher resolution, alongside DNA metabarcoding of faecal samples to quantify diet composition with greater accuracy. Such advances would enable better targeted management (eg localised stocking rates) for production and environmental gains.

DR added that under-utilised semi-natural grasslands at risk of agricultural abandonment could also offer potential as a renewable resource for bioenergy production. A conservative estimate suggests that 1 million tonnes of this type of biomass could be harvested in Wales alone each year, presenting a significant and largely untapped feedstock to support efforts to develop the bio-economy without jeopardising food security or the environment.

Sinclair Mayne, AFBI, Northern Ireland
Innovation and productivity: Sustainable practice and technology for improved productivity in grassland farming

Sinclair Mayne (SM) noted that grassland, including rough grazing, accounts for around 70% of agricultural land in the UK - grass leys less than five years old account for around 9% of the UK grassland area, with permanent grassland comprising 50% and the remaining 41% classified as rough grazing. Grass and forage contribute a high proportion of the diet in ruminant livestock (~50-60% in dairy cattle, 80-85% in beef cattle and 90-95% in sheep).

SM suggested that it was widely accepted that the full potential of grassland is rarely exploited in farming practice on the majority of UK livestock farms. Under experimental plot conditions, yields in excess of 20 t DM/ha could be achieved, but typical utilised yields were 7.5 t DM/ha for dairy farms and 4.1 t DM/ha for beef farms.

SM highlighted the findings of a recent research review which concluded that each additional tonne of grass DM utilised/ha could increase net margin by £334/ha/year (dairy farms) and £204/ha/year (beef farms).

Assuming an average increase in net margin of £269/ha (average of beef and dairy), SM noted that a relatively modest increase in utilisation of 1 t DM/ha across the UK permanent grassland area (6.1 m ha) would equate to an increase in net margin of £1.645 bn, equivalent to 53% of the current CAP subsidy support for UK agriculture.

Alongside these potential economic benefits, SM suggested that consumers have a strong preference for livestock products from grass-based systems, and he noted that milk and meat from grass-based systems have enhanced levels of healthy poly-unsaturated fatty acids in comparison to products from indoor systems.

SM pointed to a range of new and existing technologies which, if fully applied, offered significant potential to increase livestock production from grassland.

Grass growth on approximately 50% of UK grassland has been impaired by under use of lime with a potential yield reduction between 5-30%. Under and over application of potash and phosphorus fertiliser and under-use of sulphur are also significant constraints on grassland production. SM suggested that this is primarily due to lack of recognition of the importance of soil analysis, with less than 5% of UK grassland soils analysed every year.

New tools are becoming available to measure grass growth at farm level and these data are now being collated at a national level (eg Grass Check, Northern Ireland and Pasture Base Ireland). SM noted that significant progress has also been made in developing decision support tools (eg grass cultivar selection tools, grass growth prediction models and pasture budgeting systems) to assist grassland management for individual farms.

SM added that improvements in grassland production and utilisation can also deliver beneficial impacts for the environment – including increased carbon sequestration and reduced losses of nitrogen, phosphorus and ammonia.

In conclusion, SM suggested that significant under-utilisation of UK grassland was costing the UK ruminant sector in excess of £1.6 bn per annum, equivalent to approximately 50% of current subsidy support for UK agriculture.

A renewed focus on grassland management and utilisation and application of current technologies could significantly improve farm profitability whilst reducing nutrient loss to the environment and enhancing carbon sequestration from grassland.

Brexit presents a unique opportunity to develop policies which refocus attention on the productive potential of our grassland resource whilst enhancing the UK's natural capital, improving farm profitability and delivering wider environmental benefits.

3. **Questions and discussion**

The following key points were raised during discussion:

Renewing less productive upland grassland with multi-species swards would be more likely to enrich than harm the biodiversity of these areas, most of which would have last been re-seeded 30-40 years ago with a single species.

In developing future support policies for UK agriculture, the need to develop new ways of recognising the unique, non-productive contribution of disadvantaged upland areas, whose outputs must compete with lowland production yet cost more to produce.

The need for a more holistic approach to integrating the contribution of competing land interests – eg forestry, which can claim the same positive impacts on flood mitigation, water quality and carbon sequestration – allowing disadvantaged upland areas to tap into the economic potential of agroforestry to combine forestry, grassland and livestock production.

The urgent need for policies to connect and direct research and extension activities with a focused objective to better utilise the potential of the UK's grassland resource. Australia's Target 10 initiative, with an objective of raising farm-level forage grass production to 10t/ha DM, has demonstrated what can be achieved through a joined-up, government-led programme of advice and support. Brexit presents an opportunity to redirect CAP subsidies into a national programme of grassland research, benchmarking, improvement and utilisation.

The potential to apply new field-level mapping software developed by AgriMetrics – incorporating cropping history, soil and weather data - to provide the level of granularity required to measure and develop decision support tools to improve the production and environmental potential of grassland.

The need to ensure accurate food labelling informs consumers of the Omega-3 health benefits of grass-fed livestock products which are not replicated when grass is replaced by grain, in addition to an extended shelf life in grass-fed products as a result of the anti-oxidants contained in grass.

In relation to concerns raised over the climate change impact of methane emissions from ruminant livestock systems, there was a recognition that no single production system delivers universal public goods and inevitably involves trade-offs, highlighting the importance of a holistic approach.

It was noted that a great deal of research is taking place into mitigation strategies to reduce GHG emissions from ruminant livestock, which also requires a consistent approach to measurement – eg per unit of output, per animal, per unit of land etc.

Closing the meeting, Julian Sturdy MP thanked guest speakers and attendees for their contribution to a fascinating and informative session, which had highlighted above all the socio-economic and environmental importance of the UK's grassland, the significant opportunities to improve the performance and contribution of that national resource, and the critical role of agricultural science and technology in balancing future requirements of production, environmental protection and sustainable resource use.