All-Party Parliamentary Group on Science & Technology in Agriculture

Producing more from less – new metrics for sustainable agriculture

Tuesday 26 June, 4.45 - 6.00pm

Committee Room 17, Palace of Westminster

Present:

Members
Lord Haskins (Chair)
Roger Williams MP
Neil Parish MP

Keynote Speaker
Fred Luckey, Chair, Field to Market: Keystone Alliance for Sustainable Agriculture

Guest Panellists
Professor Tim Benton, UK Champion for Global Food Security
Guy Gagen, NFU Chief Arable Adviser & Chair, Defra Green Food Project Wheat Sub-Group

Stakeholders
Anthony Keeling, Elsoms Seeds; Kirsty Wright, Stockbridge Technology Centre; Robin Upton, Farmer; Calum Murray, Technology Strategy Board; Graham Jellis, Folia Partners; Jonathan Wentworth, Parliamentary Office of Science & Technology; Rachel Moody, USDA; Ruth West, CRF; Adam Stevens, Defra; Pete Riley, GM Freeze; David Leaver, BIAC; Angela Gibson, AIC; Paul Rooke, AIC; Caroline O'Leary, nabim; Alex Waugh, nabim; Alex Stevenson, New Statesman; Clive Rainbird, BCPC; Colin Merritt, CMCL; Wendy Gray, CPA; Mark Buckingham, Monsanto; Mike Bevan, JIC; Molly Hurley, EuropaBio; Chris Warkup, Biosciences KTN; Chris Atkinson, East Malling Research; John Young, BASF; Helen Hicks, Parliamentary Office of Science & Technology; Jennifer Wilson, USDA; Andy Mayer, BASF; Clare Wenner, British Sugar; Daniel Pearsall, Group Co-ordinator.

1. Welcome and introduction

Opening the meeting, Lord Haskins welcomed Members, guest speakers and stakeholders to the meeting, and conveyed apologies on behalf of the All-Party Group's chair George Freeman MP.

Lord Haskins noted that the concept of 'sustainable intensification' in agriculture was now widely established and accepted as the required response to the combined challenges of population growth, climate change and increasing pressure on the planet's finite resources of land, energy and water. However, progress in defining what sustainable intensification meant in practice, or how to measure it, had so far proved more elusive.

This was therefore a timely opportunity to hear about the latest progress on this issue within Defra's Green Food Project, but just as importantly to learn from the experiences of the Field to Market programme in the United States.

2. Guest speakers

[Please note that full copies of speakers' slide presentations are available to download via the Meetings section of the All-Party Group web-site at www.appg-agscience.org.uk]

Fred Luckey, Chair, Field to Market: Keystone Alliance for Sustainable Agriculture

Fred Luckey (FL) introduced *Field to Market* (FtM) as a collaborative US response to the need to deliver sustainable gains in food production efficiency to address the combined global challenges of population growth, climate change and environmental protection.

FL explained that FtM involved a wide range of stakeholders, from farmers and agribusiness through to food processors and retailers, conservation groups, academics and the US Government through the USDA's Natural Resources Conservation Service. According to FL, the broad and diverse scope of stakeholder engagement within FtM helped focus on common goals and overcome adversarial debate.

Established six years ago, FtM's core objective was to identify supply chain strategies to define, measure and promote continuous improvements in sustainable, efficient agriculture. Outputs to date included the FtM Fieldprint Calculator, a free, on-line tool to help individual growers analyse their farming operations and to help the supply chain explain how food is produced and seek improvements, as well as a national indicators report, benchmarking the sustainability performance and trends over time for US commodity crops.

FtM was focused on a whole supply chain approach to driving improvements in the sustainable efficiency of commodity crop production as opposed to niche crop production. FL emphasised the science- and outcomes based approach within FtM in identifying the key indicators for sustainability, initially focusing on field-level metrics such as land use, soil quality, soil carbon, water use, energy use and GHG emissions and now working to develop wider environmental and socio-economic indicators such as water quality and biodiversity.

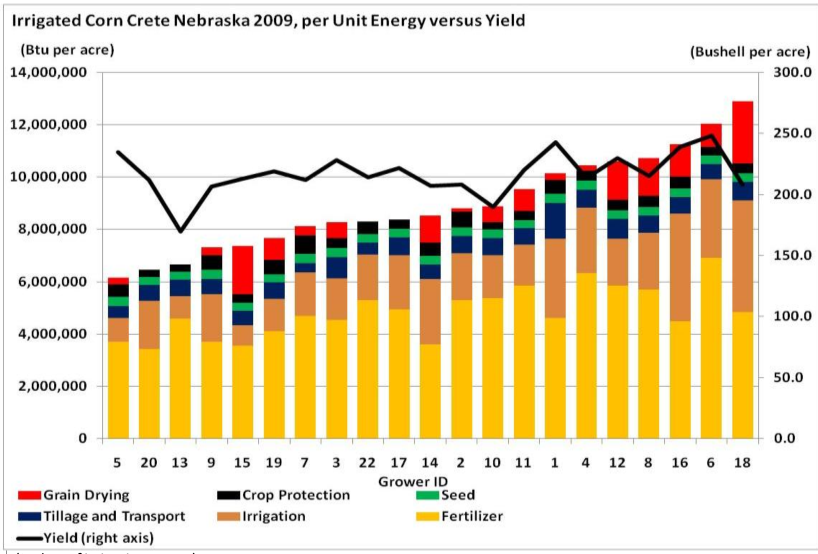
FL demonstrated the Fieldprint Calculator on-line tool, which enabled individual growers to index their agronomic practices and impacts into a spidergraph 'fieldprint', which could be used to benchmark their performance over time and to compare their outcomes against country, state and national averages.

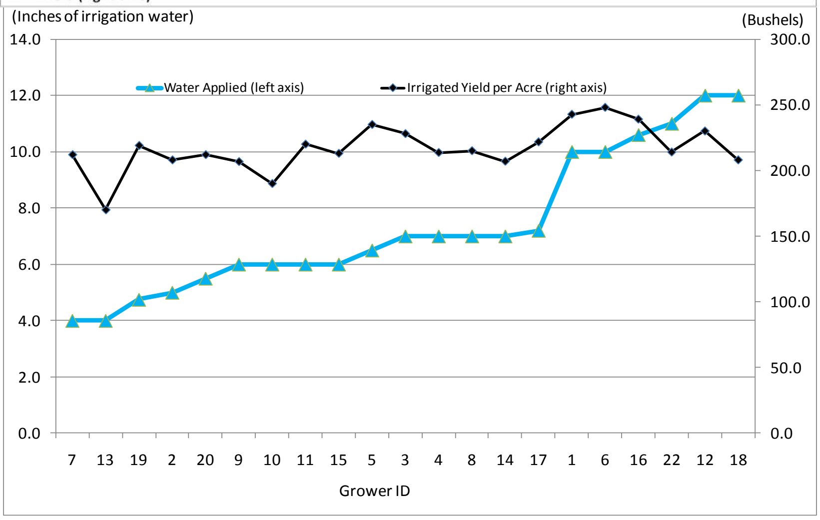
FL stressed that although FtM offered a comparative tool this was intended to help index and evaluate performance, not to foster competitiveness or to be prescriptive in terms of farming practice. An assurance of anonymity to growers was critical in securing engagement, transparency and accuracy from the Fieldprint Calculator, whose value would continue to increase as information from more individual growers representing a range of farm types and cropping practices was included.

To that end, FL explained that FtM was currently engaged in six member-led pilot projects involving around 300 farmers across different geographies, crops and supply chains.

One such pilot, in Nebraska, involving Bunge, Kellogg's and 22 growers representing 40,000 acres of corn production (35-40% of raw material supply to the local mill), was focused on using FtM tools to collect and analyse on-farm corn production data to complete the carbon and water footprints for Kellogg's Frosted Flakes. This pilot also involved the USDA Natural Resource and Conservation Service, that National Corn Growers' Association, the Nebraska Corn Board and the University of Nebraska Extension Service.

FL presented the summarised findings of the pilot study (see graphs below), which showed a wide variation in energy and water use efficiency across the 22 growers involved. This indicated that the most efficient growers were using half as much energy, and a third of the water consumed by the least efficient growers, at a similar level of yield output.



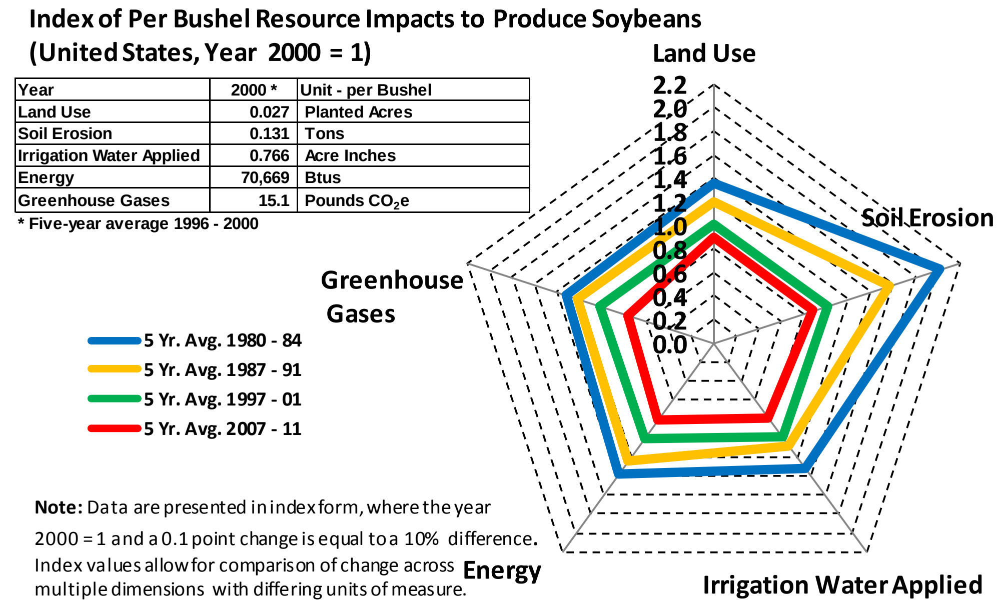


This data was then assimilated to provide a whole supply chain breakdown of water use and greenhouse gas emissions in the on-farm production, transport, primary and secondary processing operations required to supply Kellogg's Frosted Flakes.

FL noted that this methodology allowed for continuous improvement and reporting on the sustainability performance of entire supply chains, and could be applied to a range of crops and production chains as more pilot projects were developed.

Turning to the National Indicators Report, FL explained that this provided a transparent, technology-neutral and peer-reviewed analysis of national performance on key sustainability indicators for six major US crops: corn, cotton, potatoes, rice, soybeans and rice. Preliminary results from the 2012 report indicated that across all five environmental indicators – land use, soil use, irrigation water, energy use and GHG emissions – progress was reported in all six crops in terms of resource use and environment impact per unit of production. Efficiency improvements per unit of production were largely driven by yield increases, and while this metric was important in tracking resource use against production and demand concerns, absolute resource use and impact was critical, and the 2012 report indicated that this had increased for some crops on some indicators. Furthermore, FL emphasised that total use did not necessarily equate to total impact, which was often influenced at a local level and scale.

FL also noted that the improvements in the sustainability performance of US agriculture in recent years were generally consistent with longer term trends. Presenting a spidergraph analysis of soybean resource use and impact per bushel over the 30 year period 1980-2011 (see below), FL emphasised that the sustainability footprint had improved consistently across all indicators.



Historically, each sector of the food production and supply chain had operated in isolation, and this had resulted in a wide range of independent and overlapping initiatives to define, measure and promote improvements in terms of environmental impact and sustainability. Looking to the future, FL considered that the only way forward was through collaboration towards common objectives.

FtM provided such a mechanism which was also attracting international interest in markets such as Canada, Brazil, Argentina and Spain.

In conclusion, FL suggested that US producers had a positive story to tell, with the efficiency gains and increased production over time now identified and tracked by FtM providing opportunities to communicate progress and identify opportunities for continued improvement.

The prospect of continued increases in demand for food meant urgent collaboration to produce more while conserving available resources was imperative. Without such action, supply shocks and food shortages leading to political, economic and civil instability would be inevitable. Industry-led programmes such as FtM had an important contribution to make beyond Government intervention to imbed sustainability factors deeply into the supply chain's commercial and strategic thinking.

Professor Tim Benton, UK Champion for Global Food Security

Professor Tim Benton (TB) considered that the concept of 'sustainable agriculture' was often misconstrued because the impacts of land management were complex, inter-connected and potentially wide-ranging.

Highlighting the many different currencies for measuring the impacts of land use management, ranging from carbon, water and biodiversity impacts to wider socio-economic effects, TB suggested that there were often trade-offs between these currencies. For example, lower carbon often implied reduced yield; producing the same amount of food would therefore require a greater land area potentially impacting on biodiversity and other environmental indicators.

Furthermore, the management of a piece of land could have potentially distant effects, for example in terms of diffuse pollution, displacement of habitat, climate change or transferring environmental costs elsewhere. For example, the widespread adoption of organic or more extensive farming systems in Europe would lead to reduced productivity, potentially shifting and amplifying the environmental impacts of global food production outside Europe.

In TB's view, it was therefore essential to assess system-wide impacts; it was not possible to evaluate the sustainability of food production systems by examining field-level impacts alone.

TB suggested that sustainable agriculture required two key components: (i) improvements in resource use efficiency, in terms of environmental benefits per unit of production; (ii) management of the land to maintain and deliver other eco-system services, eg water quality, carbon storage, pollination, biodiversity, recreation etc.

At a local level, sustainable agriculture therefore required a landscape scale perspective. While some advocated a 'land share' approach, with all land managed extensively to deliver food and eco-system outputs, TB considered that a 'land spare' approach, with some land managed intensively for food production and some used to specialise in ecological goods was often the key to more sustainable production.

But consideration of multiple spatial scales was also important, taking account of the need to identify and manage indirect, distant and trans-national impacts.

TB concluded by suggesting that the route to sustainability was a journey of continuous improvement, and that a systems-based approach was needed taking account of the interconnected nature of land management and its direct and indirect effects. While the overall objective was to produce more food, with less resource and reduced impact, this should include an assessment of the production and environmental costs, benefits and trade-offs at a local, regional and trans-national level.

Guy Gagen, NFU Chief Arable Adviser & Chair, Defra Green Food Project Wheat Sub-Group

Guy Gagen (GG) introduced the Green Food Project as Defra's response to the 2011 Natural Environment White Paper and the UK Government's Foresight report into the future of food and farming in trying to reconcile the twin challenges of increasing food production and enhancing the natural environment.

GG explained that wheat and dairy were selected as case studies for the project as major sectors of UK farm production for which good data was available and for which there was significant scope to improve performance. The project's central aim was to reconcile the needs of production and the environment, and to identify what needed to change now.

The group reporting on wheat involved a wide range of stakeholders active in the sector, including Defra, NFU, AHDB-HGCA, RSPB, Natural England, agricultural research organisations, ag-chem manufacturers, retailers and Agrii, representing AIC.

An early and valuable output of the project was that moving the timescale out to 15 years overcame immediate commercial lobbying positions, enabling participants to collaborate more freely and constructively in addressing the challenges identified.

GG indicated that the project had identified a range of tensions and outstanding questions – UK average farm wheat yields had plateaued since 1995 but it was not clear why; how much land would be required for effective environmental mitigation; what would happen with higher output – eg in terms of soil quality, or water availability drained from arable soils?

In the case of wheat, research was urgently needed to identify why yields were not increasing on a national basis. Yield mapping identified areas in some fields producing 15t/ha, while other parts were yielding just 3t/ha – what was holding back the genetics?

The Green Food project had also identified a need to connect technology research and development with the delivery of environmental benefits – there were some great ideas about to achieve high-biodiversity, low-impact cropping systems, but the complexity, cost and risks were currently far too high to make them appealing to enough farmers to take up on a wide scale.

Better knowledge transfer alongside developing the UK's agri-science research base was key to pushing forward the frontier of better performance.

Years of over-regulation of plant protection products was also taking its toll, both through restrictive new requirements for active ingredient registration and when products were removed when identified in water at the practical limit of detection. Control of blackgrass was a particular problem for UK growers, with winter wheat losing its place in the rotation in some areas, amid calls for a return to stubble burning as an alternative cultural control.

But GG emphasised that there were Win-Wins to be had in exploiting the UK's natural production advantages and well-equipped, professional arable sector. Increased emphasis on applied or 'use-inspired' research with development and exchange of new knowledge to agronomists and farmers would support enhanced productivity and competitiveness, delivered in parallel with progressive improvements in biodiversity and resource protection.

3. Questions and Discussion

Lord Haskins noted the distinct difference in tone and approach between the US experience of continuous improvement in productivity and environmental performance when compared with the more cautious and reserved UK perspective. He asked what was the reason for this difference.

GG suggested that the UK had lacked the investment in production-related R&D in recent decades, and that public sector funding had been progressively withdrawn from more applied research activities, such as plant breeding.

FL considered that progress in the US was underpinned by the widespread adoption of technological innovation in agriculture – from more sophisticated farm machinery and irrigation equipment to the rapid progress in the development and introduction of yield-enhancing crop genetics. The acceptance and uptake of biotech crops in particular had made a significant difference to agricultural production in the US, where issues of debate were more focused on immediate economic concerns such as the tension between land use and resource demand for biofuels versus food.

David Leaver noted that while sustainable agriculture had long been a topic of debate in the UK and EU, social and economic sustainability were frequently over-looked at the expense of environmental considerations, and this was reflected in a risk-averse approach to the regulation of agricultural technology and innovation.

Clare Wenner agreed that the UK and Europe were culturally different in seeking 100% assurances of safety or perfection before moving forward while the US had a more progressive and open-minded approach to the benefits and opportunities of new agricultural and food production technologies.

Given the global nature of modern trade in foodstuffs, Chris Warkup expressed support for the concept of an internationally relevant sustainability metric, and asked whether there was scope for a single global comparator to be developed.

FL indicated that an internationally applicable sustainability metric was certainly feasible, but emphasised that its success would depend on collaboration and emphasis on shared objectives, not on its use as a basis for competition or market advantage. A key underpinning principle of the FtM approach was the agreement and commitment of all stakeholders that driving continuous improvements in the sustainable efficiency of agricultural production should be a non-competitive issue.