All-Party Parliamentary Group on
Science and Technology in Agriculture

The role of new agricultural technologies in tackling climate change

Tuesday 7 December 2010, 4.30 – 5.30pm,
Committee Room 18, Palace of Westminster

Present:

Members
George Freeman MP
Lord Haskins
Earl of Lindsay
Lord Grantchester
Lord Cameron of Dillington

Stakeholders
Chris Atkinson, East Malling Research; Neil Hipps, East Malling Research; Nick von Westenholz, NFU; Ian Crute, AHDB; David Evans, ex-Syngenta R&D; James Ruddock-Broyd, WFU; David Alvis, TSB; Calum Murray, TSB; Paul Rooke, AIC; Martin Savage, nabim; Catherine Lehane, nabim; Rosana Verza, Embassy of Brazil; Grace James, HoC Intern; Steve Knight, USDA; Daryl Brehm, USDA; Jennie Wilson, US Embassy; Jack Bobo, US State Dept; Daniel Pearsall, Group Co-ordinator

1. Welcome & Introduction
Introducing guest speaker Jack Bobo, senior biotechnology adviser at the US Department of State, George Freeman MP noted that both speakers at the Group's November meeting had emphasised the importance of agriculture to climate change both as a major contributor to greenhouse gas emissions and as a key factor in offsetting its effects, for example through soil carbon sequestration. GF also updated the Group on his appointment as PPS to the Minister for Climate Change, Gregory Barker MP, and highlighted the relevance of agricultural science and technology to the policy agenda on climate change.

Speaker biography:
Jack Bobo is Senior Advisor for Biotechnology in the Office of Agriculture, Biotechnology and Textile Trade Affairs in the Bureau of Economic, Energy and Business Affairs at the US Department of State.

He is responsible for developing and implementing US trade policy related to new technologies and working with foreign governments to address regulatory barriers to US agricultural exports. He also works closely with officials from developing countries to support the development of biosafety legislation and to facilitate technology transfer so as to increase agricultural productivity, improve food security and respond to climate change through mitigation and adaptation. He works on trade policy, food security, climate change and development issues related to agricultural science and technology, including agricultural biotechnology. He has global responsibilities and travels frequently to Asia, Africa and Europe.

Prior to serving as Senior Adviser, Mr Bobo was Deputy Chief of the Department's Biotechnology and Textile Trade Policy Division. And before joining the State Department, he practised law at the Washington DC firm of Crowell & Moring, LLP. He received a research fellowship in international law at Cambridge University and he has served as an advisor to the President's Information Technology Advisory Committee and taught science in Mekambo, Gabon as a Peace Corps volunteer.

He holds a degree in law, a Master of Science degree in environmental science and degrees in chemistry, biology and psychology.

2. Guest Speakers:

Jack Bobo, Senior Adviser in Biotechnology, US Department of State

[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]

Introducing his presentation, Jack Bobo (JB) noted that virtually every year for the past couple of decades a major agricultural issue had dominated the global headlines – BSE, GMOs, food vs. fuel, food safety scares, food security concerns and food price rises to name a few. The issue of climate change and agriculture was likely to follow suit.

Impact of Climate Change on Agriculture
JB noted that as CO_2 concentration in the atmosphere continued to climb, the resulting impact on global annual average temperatures and weather variability was predicted to result in a 27% decline in global agricultural productivity by 2050. According to the International Food Policy Research Institute, annual investments of $7 billion were needed for climate adaptation just to maintain current food production levels. Over that same period, however, the world's population was expected to increase from six to nine billion, with forecasts of increased food demand ranging from 70% to more than 100%. Agricultural productivity must not only increase to feed a larger, richer and more urban population, but it would also have to contend with the effects of climate change.

Agriculture's Contribution to Climate Change
JB noted that agriculture and forestry together accounted for some 32% of global greenhouse gas emissions, significantly more that the energy sector which contributed around 26% of emissions. He considered the different sources of GHG emissions from agriculture (primarily carbon dioxide, nitrous oxide and methane), including the effects of deforestation, fertiliser use, fossil fuel use and livestock emissions. But given the relative significance of agriculture and land use change to global GHG emissions, JB suggested that climate change mitigation efforts were too strongly focused on the energy sector, and that agricultural innovation such as biotechnology offered a powerful and cost-effective tool to boost food production and deal with the effects of climate change.

Agriculture's Impact on Climate Change
While the development of alternative low-carbon energy sources such as solar and wind should continue, JB cited World Bank and IPCC data to suggest that agriculture offered the potential to mitigate more greenhouse gas emissions than the energy sector and at lower costs – for example through the adoption of new technologies and increased investment in R&D.

A key feature in this process would be a transition from 'pull' to 'push' technologies. Farmers adopted new seeds or technologies because they reduced costs, saved time or made them

more money. But they also offered positive externalities, eg for climate change or the environment at no additional cost to consumers. Efficiency gains were certainly needed – today's food production levels were the result of 10,000 years of productivity gains, but the challenge was to double food production again over the next 40 years on the same amount of land. JB pointed to the productivity gains achieved in corn since the 1930s, when the introduction of new plant breeding and management techniques, such as the use of hybrid seed, had increased yields substantially. Progress in yield increases had been sustained with the introduction of GM insect resistant and herbicide tolerant crops.

Furthermore, the introduction of biotech crops had brought meaningful reductions in carbon emissions from the agriculture sector, amounting to some 1.14 billion kg of CO_2 in reduced fuel use and 13.1 billion kg of CO_2 through increased carbon sequestration (reduced tillage), equivalent to taking 6.3 million cars off the road. According to the IPCC, JB noted that some 89% of the climate change mitigation potential in agriculture is from soil carbon sequestration.

JB pointed to the relative impact on productivity of biotech crop adoption, highlighting the conclusions of a recent OECD/FAO outlook report which predicted that over the next decade crop yields in Brazil would increase by 40%, while yields in the US and the rest of South America were forecast to increase by up to 19%. In Europe, however, crop yields were expected to rise by just 4%, little better than sub-Saharan Africa.

JB also noted the potential for next generation biotech traits, such as drought tolerance and Nitrogen use efficiency, to further improve farmers' ability to address and mitigate the effects of climate change. In addition, he highlighted a range of crop, land and livestock management practices which would help reduce greenhouse gas emissions from agricultural systems, from improved livestock feeding regimes to reduced tillage and more precise use of inputs.

Feeding the R&D Pipeline

JB noted, however, that despite these emerging opportunities to mitigate greenhouse gas emissions through agricultural innovation, a major constraint was the reduction in R&D investment by the public sector. This was despite clear evidence of high returns on investment in agricultural R&D – averaging 43% across all global regions. This attractive rate of return was the main reason the private sector had stepped in to make up the shortfall, but the private sector alone could not be relied on to deliver wider public benefits in relation to climate change and food security. This was particularly the case in the developing world where effective public private partnerships would be needed to being new technology to market.

JB also highlighted the importance of intellectual property protection – through plant variety rights and patents – in stimulating new breeding work and investment, and in providing the platform for partnerships between public and private sector. Gene technologies in agriculture could not be 'given away' and differed from other sectors (eg medicine, pharmaceuticals) because genetic improvements needed to be adapted, through breeding programmes, to local conditions and varieties.

In conclusion, JB indicated that while climate change would significantly increase the challenge of securing food security for all, agriculture and land use change had the potential – through technological innovation – to mitigate more greenhouse gas emissions than the energy and transport sectors combined, and at lower cost since the return on investment in agricultural R&D was higher than the return on renewable energy generation. There was therefore an urgent need to focus more public sector resources and research effort on the agricultural sector in addressing the causes and effects of climate change.

3. Questions and Discussion

The following key issues were discussed:

In response to Lord Cameron, JB confirmed that the emissions data were sourced from IPCC, and that forestry and agriculture were combined because agriculture was responsible for much deforestation on a global basis.

Lord Cameron noted that the challenge of doubling agricultural productivity had already been achieved over the past 40-50 years as a result of the Green Revolution. The challenge now was to deliver a second Green Revolution using less land, fewer natural resources and with reduced environmental impact.

JB described the role of the National Institute of Food and Agriculture in supporting public sector agricultural R&D in the US, primarily through competitive grants awarded to regional, multi-disciplinary consortia of universities and research institutes.

JB confirmed that there was no difference in US biotech policy between a Republican and Democrat administration, and he did not see that changing. While the technical evaluation of GMO safety was essentially the same between FDA in the US and EFSA in the EU, the European process was complicated by a political process at the end. In JB's view, new agricultural technologies would be critical to addressing the global challenges ahead and at some point that would need to be recognised politically.

In relation to plant variety protection and patenting, Ian Crute noted that unlike Europe, Plant Breeders Rights (PBR) had not been widely adopted in the US, and there would certainly be a need to think creatively about how to license new genetic technologies in the future, including how patents and PBR would co-exist in the EU. A key challenge would be to ensure that patents did not prevent legitimate research and inquiry, particularly in the public sector.

Lord Haskins noted that very little was known about the latent productive capacity of existing agricultural systems and technologies which could respond given the right (price) signals, or the impact of regulation on farmers' ability to fully exploit the productive potential of new technology. How did the influence of regulation differ between different countries – eg Brazil, US, Europe? JB agreed that a range of other factors besides technological innovation would have a key influence on productivity increases – from storage and transport infrastructure to access to credit and waste reduction.

In response to Lord Lindsay, JB confirmed that the IPCC emissions data were based on net values, taking account of the positive and negative contributions of each sector.

In response to Lord Cameron, JB indicated that the GM approvals process in the US, overseen by Government scientists at EPA, FDA and APHIS, covered essentially the same requirements as the EU system in terms of human health, food and environmental safety.