All Party Parliamentary Group on Food and Agriculture for Development

Parliamentary Inquiry into the UK's Role in Tackling the Challenge of Global Food Security until 2050

ESRC Innogen Centre Submission

Executive Summary

1 *The Food and Agriculture Organization reported in late 2008 that in a matter of time, for the first time, one billion people would be classified as 'food insecure' or 'undernourished' (FAO, 2008). For the preceding 30 years this figure has remained fairly static at around 800 million (Cf. FAO, 2004; 2006). This very recent, very large increase in the number of people who cannot gain access to sufficient food has largely been attributed to massive increases in the prices of staples, which have risen more than 140 percent between 2003 and 2008 (Gallagher, 2008; World Bank, 2008).*

2 *This submission draws on the ESRC Innogen Centre's expertise in studying the relationship between agricultural science, innovation and development to underline the need for the UK to support effective, reflexive and innovative agricultural research at a range of levels and across a variety of technologies if we are to able to feed 9 billion people sustainably and equitably by 2050. We argue that understanding the complex dynamics and contexts of food production, consumption and the role new knowledge and technology can play is improving food production and access to food is essential in avoiding potential crisis. We believe a systematic, innovation systems approach to understanding these relationships and applied to agricultural research and technological development are central in this. Consequently, our submission focuses on key issues in this regard, highlighting opportunities, weaknesses, examples of good practices and risks, drawn from our own research.*

How can 9 billion people be fed equitably, healthily, safely and sustainably by 2050?

3. Globally, science has been battling food security in a concerted way since at least the 1940s and while one can argue that the Green Revolution made some inroads into increasing aggregate food supply, science has not had the hoped-for and predicted broad impact on the rural, or urban, poor (Conway, 1987). Indeed, the unfortunate billion-person 'milestone' can partially be attributed to the science and technology of liquid biofuel production, or more specifically the policies that have promoted their production over the production of crop staples (World Bank, 2008).

4. The recent *International Assessment of Agricultural Knowledge, Science and Technology for Development* report (IAASTD, 2008) begins by highlighting the fact that while science and technology has been relatively successful in increasing agricultural productivity, it has been much less successful in

dealing with the complex social and environmental problems, and sometimes consequences, that new technologies may raise. Given that agriculture has increasingly been recognised as a socially and environmentally embedded activity (Cf. Richards, 1985; Pretty, 2002), rather than as the simple production of food, it is vitally important that we develop policies that promote the development of context-bound agricultural technologies. This means two things if we are to be able to feed 9 billion people by 2050: firstly, that technologies must be developed appropriate to specific social, environmental and economic contexts and, secondly, that technologies must be developed – insofar as it is possible – from within local science and technological systems if they are to appropriate and sustainable. We need a stronger, more reflexive and reflective network of institutions that are better able to weld together the potentials of leading-edge agricultural science with the deep local knowledge to ensure that food production, and consumption, is above all equitable, sustainable and appropriate. The UK has, and must continue to play, a central role in driving a global 'agricultural research for development' agenda.

Food insecurity represents a significant threat

5. Food insecurity represents a significant blockage to sustainable development. Food insecurity is at the same time an indicator of underdevelopment, a result of underdevelopment and a root cause of underdevelopment. It affects both urban and rural populations and we need to think carefully about both local and global food production and the forces, policies and processes that stimulate it if we are to deal effectively with inequitable consumption patterns and limited entitlements to food.

What is being done to address the international risks associated with food insecurity?

6. We would argue that not enough is being done. There needs to be a systemic, panoptic approach and there is not. Investments in agricultural research, new technologies, multi-level governance, trade rules, production subsidies and local capabilities all serve to cut across each other in a complex set of relationships to limit impact. Vested political interests, often embedded in agricultural subsidies, must be overcome globally if interventions are to be sustainable and effective. The UK can play a bigger role in this, particularly in affecting change in the EU.

How is the UK part of the global problem and/or solution?

7. Similarly to above the UK is part – indeed a central part – of the both the problem and the solution. Northern agricultural policies, consumption patterns and climatic and environmental impacts are inordinately driven and caused by the developing world. Alongside this the UK has shown global leadership in international development and must continue to do so. The complex relationships betweens problems and solutions serve as a call for a broader and more nuanced look at the drivers of food insecurity globally, nationally and locally.

Is there a coherent cross-government food strategy in the UK?

8. Cross-government strategy coherence within the UK aimed at global food insecurity could be improved. This is to be expected given the complex set of drivers and interrelationships that shape global food insecurity. In particular, stronger inter-departmental thinking between international development, trade and environmental issues could be key to improving coherence, strategy and impact.

Does *UK Plc* have a global responsibility to share its appropriate science, skills and technology to help those in developing and emerging markets face the ongoing challenges presented by food security?

9. Yes, in the 1960s, the Green Revolution highlighted both the promise and the limitations of technological innovation as a means to ameliorate food security and promote development. The Green Revolution was conceived of as a (mostly public) package of technologies; high yielding hybrid varieties of cereal crops that would respond well to intensive management and would significantly improve yields no matter the context in which they were applied. The Green Revolution has been criticised in retrospect for failures of implementation and conceptualisation of the problem but it serves to highlight the potential of drawing together resources, science and knowledge at a global level to tackle what are becoming increasingly global problems.

10. If we are able to learn from mistakes of the past and build policies, institutions and networks that can deliver innovative new agricultural technologies the UK, alongside other developed countries, must share its appropriate science, skills and technologies. Only in doing so and understanding and adapting science and technologies to local contexts and needs can we hope to meet such multidimensional global challenges.

What roles do, and should, UK private industry; civil society; academia and research institutions play in addressing issues of global food security?

11. All these actors have important roles to play. The most important single factor is not to conceive of their role or contribution in isolation but understand what is the relationships between, for example, the private sector and academia, or research institutions and civil society, that will drive appropriate science, technology, policy and other interventions that will address global food security. Our research shows that it is in the strength of the relationships and the learning that exists between diverse actors that shapes the most appropriate technologies and policies that deal with food insecurity. These multi-sectoral relationships must be stimulated and encouraged wherever possible in order to meet these challenges.

What are the global challenges faced, if any, in relation to the following aspects of the global food system?

12. It is almost impossible to single out specific aspects of the global food system that need addressing. The long list of issues serves to underline the complexity of relationships within individual food systems. There is no unitary global food system, there are multitudes of fluid, diverse, sensitive and ephemeral

system that serve different markets, are based on different agro-ecological conditions and are beholden on complex sets of policies, markets and other external stimuli.

13. We need more research to understand the relationships between these factors, the most fundamental and compelling challenges lie in the relationship between factors such as energy security and climate change not within one or the other alone. We need to understand these relationships in order to understand how influencing one factor shapes and influences others. Only in understanding multiple food systems as systems will we be able to influence change in a positive, planned and foreseen manner.

How do you think the food security situation/debate will change over the next 40 years?

14. The recent shift in opinion of biofuels indicates the increasingly uncertainty and unforeseen impacts of new technologies, and new, more globalised environmental, climatic, development and economic problems. What is very likely, however, is that science and technology be increasingly be called upon to solve these problems, as ultimately there is little political will to deal with the root inequities and processes that drive underdevelopment, globalisation, climate change, production and consumption. Technology will be increasingly seen as offering 'quick fixes' to complex structural problems, and this will place greater emphasis and importance on understanding the process of generating new technologies through science, and developing the sort of stimuli that create an appropriate mix of new technologies, political will and lifestyle changes that will be necessary if we are to address these problems in a meaningful, sustainable way.

What are other countries (developed or developing) doing to combat issues of food security both nationally and internationally, and with what success?

15. We think on the whole the UK plays as important a role as other developed countries in tackling global food security. That is not to say that much more could not be done. Dealing with the full portfolio of policies that shape inequity in food production and consumption is vital (in trade, intellectual property etc). The UK's role should be as a political leader of global commitments to change and a leader in development policy and practice that supports national and local level food security activities in developing countries.

What examples of best and worst practice exist in tackling issues of food security (in both public and private sectors) and what should the UK do to replicate the successful projects and assist those who require it?

16. Our collective research underlines that we need to place the sharing of knowledge at the centre of our thinking, as it is through knowledge that actors effectively interact in any system. This may mean relatively simple interventions such as assisting farmers in the purchase of mobile phones to allow them to discern market prices before they decide which market to take their produce to, or how best to price it, as has been the case with perishable fruit producers in Tanzania or grain producers in Niger. In Peru, Bolivia and

Ecuador an award-winning project called *Papa Andina* links up all members of potato value chains in fora in order to build trust between producers, processors and distributors and share ideas about what potato-derived products should be developed for faraway urban markets. Sharing information and learning has allowed 1000s of small-scale potato producers to diversify their livelihoods, more effectively link with markets and increase their incomes (Chataway and Smith, 2007).

17. Innovation systems approaches for developing country agriculture also allow farmers to articulate their technological needs in ways that may not have been possible in the past. For example, the private sector often cannot or will not respond to farmers' demands for new technologies as farmers cannot articulate their need through markets or there is simply no likely profit to stimulate their engagement. We can think through ways to bridge these knowledge gaps in the system, perhaps via new forms of organisation or partnership. For example a public-private partnership might bridge such a gap in the system, the public sector partner may better understand what farmers want and provide some sort of financial stimulus to encourage the private sector to become involved.

18. Innovation by its very nature is complicated. International Development Enterprises (IDE), an NGO based in South Asia, has spent almost two decades supporting the innovation of treadle pump technologies for small-scale technologies. These simple foot-operated water pumps offered many advantages to farmers in Bangladesh but had not caught on. IDE recognised this was due to gaps in the system and sought to develop a complete value-chain. After initially developing and selling the pumps themselves, IDE withdrew from production and offered technical support to small start-up companies to fabricate the pumps and subsequently promotes the use of the pumps through training and facilitation. Since 1984 over 1.5 million treadle pumps have been developed, fabricated and sold (Smith, 2009).

19. As technology becomes increasingly complex, so does the innovation system and so does the effort needed to engage with farmers. VITAA, a project to promote the development and widespread planting of carotene-enriched sweet potatoes across Africa, is an example of a learning network that links together researchers in Latin America with NGOs in Africa and village-level farmers' groups. This network includes international scientists, home economists, development workers, female farmers and market traders all sharing knowledge and working to develop and grow new varieties of vitamin A enriched sweet potato and new products that be derived from them and sold for profit. So-called 'Golden Rice', a genetically engineered bio-fortified variety of rice, has been developed through a partnership that spans seven countries, almost twenty organisations and the accumulation of decades of scientific (and legal) expertise (Chataway and Smith, 2007).

20. Innovation systems thinking has also underlined the pressing need for scientists to communicate directly with farmers. Projects such as PETRRA (Poverty Eradication Through Rice Research Assistance) where research was only funded if scientists could demonstrate partnerships with farmers and farmers groups, and methodologies such as 'mother-baby trials' where new agricultural practices and technologies are developed and tested through trials

and re-trials conducted in farmers' fields in partnership between scientists and the farmers themselves, underline the need to develop new ways to build partnerships, share knowledge and learn in order to promote pro-poor agricultural innovations

21. As the case studies show, in order to shape agricultural research for development we must recognise multiple knowledge bases, the complex contexts and practices of agriculture and the multiple needs of the farmer, and in doing so foreground the role of collaboration and communication within research. Innovation involves utilising new ideas, new technologies and new ways of doing things in places or by people where they have not been used before and ultimately for innovation to flourish we must enable and support farmers to interact and learn as part of complex systems and networks. Through supporting farmers, building developing country research capacity, stimulating local private sectors and implementing policies, practices and mechanisms to support these actors to interrelate, share and learn, agricultural technologies will be developed that are embedded within local agricultural, social, economic and environmental contexts rather than developed as abstractions of externally perceived problems.

22. We believe that the UK can make particular and specific contributions to the kinds of initiatives described above. The UK Department for International Development makes significant contributions to global agricultural research agendas and is therefore in a position where effective agricultural science and research policy aimed at alleviating food insecurity can be shaped. We would encourage the UK to reflect on 'best practice' case studies from a range of levels, of scale, scope, technological complexity, nature of actor, and nature of partnership in order to promote effective, locally-nuanced, low-impact and sustainable approaches to dealing with food insecurity from household to nation state.

23. For maximum impact this must be done in a political climate in which meaningful engagement with the inequities and constraints that global agricultural and trade policies drive. We need to better understand the relationships between global and local and act on drivers of inequity, constraint and food insecurity. This shift, coupled with effective support of agricultural research and development can be a first step towards meeting the target of meeting 9 billion people by 2050.

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Innogen is the ESRC Centre for Social and Economic Research on Innovation in Genomics. Formed in October 2002, it is part of the ESRC Genomics Network studying the evolution of genomics and life sciences and their far-reaching social and economic implications.

The life sciences have the potential to transform health care and food production systems in developed and developing countries and to provide one of the main platforms of economic growth and global competitiveness in the 21st century. Rapid developments in life sciences also challenge our existing regulatory systems and raise new ethical and social issues. Innogen's research will provide a sound base for decision-making in science, industry, policy and public arenas and will improve our understanding of each of these groups and their interactions.

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