

## **Challenges for grassland science: implications for training, research and Grassland Societies**

G. Lemaire

INRA, Unite d'Ecophysiologie des Plantes Fourragères, 86600, Lusignan, France;  
<sup>2</sup>Institute of Grassland and Environmental Research, North Wyke, Okehampton EX20  
2SB, England <sup>3</sup>Institute of Natural resources, Massey University, Palmerston North, New  
Zealand. e-mail: [lemaire@lusignan.inra.fr](mailto:lemaire@lusignan.inra.fr)

### **Background**

In most of the world the priority for production-oriented research has been succeeded by the need for grassland research to focus on systems which satisfy requirements relating to the stability and protection of land, water and atmospheric resources and biodiversity, in addition to production efficiency. This dictates not only a new approach to research, but also new approaches for the training and development of research scientists, the organisation of research and the activities of Grassland Societies and organisations.

### **Research approaches**

The concept of multi-functionality provides a new framework for all disciplines in agricultural research. Scientific objectives, methods of investigation and models have to be re-considered with the aim of an integrative approach at a range of scales where the different functions can be evaluated. The multiple functions of grassland demand a genuinely interdisciplinary approach to research. To achieve such objectives it is necessary to produce integrated knowledge, new concepts and new tools at the different levels of organisation of grassland agro-ecosystems: (i) the field plot, where the basic biogeochemical processes are acting, (ii) the farming system, where coherent management procedures are combined, (iii) the landscape where multi-functionality, interaction between different land uses and overall impact can be evaluated and (iv) the region/nation state where socio-economic and political factors become important. In particular we see a requirement for networks of long-term experiments with a wide range of grassland ecosystems and contrasting managements. The evolution of vegetation, soil, populations of organisms, biogeochemical cycles and environmental fluxes need to be assessed and the information developed through process-based models. This physical and biological research needs to be progressed together with socio-economic studies.

### **Implications for education and training**

The requirement for inter-disciplinary programmes comes at a time when most of the recent entrants into agricultural and land use research receive their initial training in one of the specialised physical or biological sciences and may have little appreciation of other disciplines. We need to consider how they can be developed to fully participate in and eventually lead wide inter-disciplinary projects. Should initial training emphasise 'content and awareness', rather than 'depth and detail'? There are requirements for higher degree students to carry out projects in inter-disciplinary teams and for young researchers to move out of their disciplinary comfort zones to participate in more broadly-based projects. Progress needs to be made in giving better recognition to scientists contributions to collaborative programmes.

### **Implications for research organisation and funding**

Programmes on integrated land use often span the responsibilities of different Government Departments, Research Councils and Institutes, making it a major challenge to achieve the timely initiation of appropriate programmes. One would expect there to be benefits from a research structure involving a single body responsible for scientific research, rather than strong sectoral research councils, as in the UK, but we do not see evidence that single bodies have made more rapid progress in this area. Good communication between the different funding bodies and scientists in the different disciplines is of crucial importance. A good model for the future may be the recently established Rural Economy and Land Use programme in the UK ([www.escri.ac.uk/relu/](http://www.escri.ac.uk/relu/)). This has committed funding from three Research Councils and two Government Departments and its own Programme Director. Funds are available both for capacity building and for inter-disciplinary research projects. The funding is, however, for projects of up to 4 year's duration. The timeframe required for the grassland research of the future is, however, more akin to that for ecological rather than agricultural research and more projects need secure funding for up to 10 years.

### **Implications for Grassland Societies and organisations**

There are responsibilities in this changed situation not only for research funding bodies, but also for professional organisations. National Grassland Societies can develop activities that are appropriate to the new requirements for multi-functional grassland. They can embrace scientists and practitioners from areas beyond their traditional base and form alliances and joint activities with bodies centrally involved in health, ecology and socio-economics. Inter-continental and continental bodies, such as the International Grassland Congress, the International Rangeland Congress and the European Grassland Federation could play key roles through the provision of a forum for the early exchange of views of scientists, the evolution of research networks and network experiments, assistance with their promotion through contact with international funding bodies and the subsequent dissemination of research results.