

CONGRESS HIGHLIGHTS FROM PERSPECTIVE OF TEMPERATE REGIONS

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This paper commences with brief reference to points made in the concluding paper at the XVI International Grassland Congress in Nice in 1989 (Wilkins, 1989) and then gives consideration in turn to technical advances reported in the Congress and to the future socio-economic situation and its impact on research priorities. This is inevitably a personal view which does not give justice to the 800 or so papers presented at the Congress.

DEVELOPMENTS IN CONTEXT OF XVI CONGRESS

In the concluding paper on that occasion I drew attention to the increasingly multi-national and multi-disciplinary nature of grassland research as reflected in the papers presented at the Congress. This trend to increase collaborative research has increased with some 51% of the poster papers having authors from more than one address and 12% involving international collaboration. One paper has 21 authors from 20 organisations in 18 countries (Sackville-Hamilton et al., 1997)!

The XVI Congress had very little consideration of climate change and few papers involving biotechnology and molecular science (Wilkins, 1989). These areas have, however, been fully covered within the present Congress. A full session was held on Climate Change with the invited papers and 15 posters reporting major progress in understanding likely effects of climate change on grasslands. Advances from molecular science featured strongly in the session on Plant Improvement with Spangenberg (1997) reviewing a wide array of novel technologies. Whilst it will still be some years before there is a major contribution from transgenic forages, there appear now to be major opportunities for the use of marker-assisted selection to increase the efficiency of conventional breeding programmes (Humphreys, 1997). There were, however, few contributions indicating contributions from molecular science in the manipulation of processes in the silo, rumen or soil.

TECHNICAL ADVANCES

There were many contributions from main papers, and particularly from poster papers, with potential impact on grassland systems in temperate regions. Many can be allied with two themes - firstly, increase in precision in management and use of inputs, and secondly increase in quality and ability to rely on grassland feeds in animal production. These themes are evident in the brief resumé of progress in specific areas made below.

Soils and plant nutrition. Greater understanding of factors controlling nutrient transformations was highlighted in the paper by Scholefield and Oenema (1997). Poster papers (e.g. Moron, 1997) indicated progress in diagnosing requirements for nutrients by foliar analysis. Combination of models and diagnosis for plant or soil analysis promises to facilitate increased precision of fertiliser applications, with advantages both in production efficiency and, possibly of even greater consequence, reductions in losses to the environment in water and to the atmosphere.

Forage quality. Speakers in the Farmers Forum made repeated pleas for increases in forage quality, both to avoid risks to animal health and to improve animal performance. The issue was also featured in the address to the Congress by the Minister of Agriculture, who drew attention to the recent release of a variety of alfalfa with low bloating propensity which had been bred in Saskatchewan.

The session on tannins was outstanding, indicating opportunities for manipulating tannins to improve protein value in legumes (Larkin, 1997; Waghorn, 1997). Montossi et al. (1997) reported on variation in tannins in temperate grasses, with potential to exploit this variation to improve nitrogen utilisation. The effective collaboration between molecular biologists, nutritionists, chemists and plant breeders should ensure good progress in this area. The discussion, however, indicated that the production of no-bloat white clover, through incorporation of tannins, was still a prospect for the future rather than being an imminent achievement.

Poppi (1997) provided an excellent review of the limitations to nutritive value of temperate (and tropical) forages. He outlined a simple model which calculated the responses in animal production which would result from changes in intake, digestibility, rumen microbial protein synthesis and the quantity of protein protected from rumen degradation. Whilst all these factors can be important, he stressed the particular influence of intake in limiting performance. Casler (1997) reviewed papers which had indicated improvements in *in vitro* dry matter digestibility through breeding of 0.7 to over 2% per year. Sustained progress at this rate would have a major impact on forage production potential and rival the progress that has been made by animal breeding in improving animal production potential. I do have some doubts, however, as to whether progress at that rate can be sustained over a substantial period for a range of forage grasses. A further problem in realising the potential is the small attention given to quality characteristics in the Official Testing of grasses in most countries, at least in Europe (Beerepoot and Agnew, 1997). This unfortunately provides little incentive for breeders to apply strong selection pressure to improve quality characteristics.

Grazing utilisation. The sessions on 'Animal Intake and Grazing' and 'Foraging Strategy' demonstrated substantial progress in the last decade in understanding the relationships between plants and animals at grazing and the factors determining intake rate and daily intake. The importance of animal behavioural constraints to intake were emphasised. There is now a major challenge to exploit this new knowledge to devise systems to give high intakes and high animal production rates from grazing through either improving plants or animals or their management.

Grassland systems. Contributions in sessions on Technology Transfer and in Grazing Systems Ecology indicated marked progress in terms of the development of decision support systems and other models to provide aids to farmers to improve the precision and profitability of grassland systems in reflecting a major theme of the Congress mentioned earlier reinforcing the use of quantitative approaches in grassland management. The papers also reflect increased use of participating R and D models and new approaches such as the punctuated arena model (MacLeod and Shulman, 1997).

SOCIO-ECONOMIC SITUATION

The presentations and discussions at the Congress stimulated consideration and reappraisal of future requirements and the appropriate direction for grassland R and D. Over the last decade the major emphasis in grassland research in Western Europe has been on environmental issues, with emphasis, as depicted by Peeters (1997), on the prevention of pollution and the enhancement of landscape and biodiversity, with little support forthcoming for work

on agricultural production efficiency. I leave the Congress wondering whether there is need to change this emphasis somewhat. The opening paper by Pinstrup-Anderson (1997) projected increases in import demand for food, including livestock products, particularly into Asia. This will arise not only from increased population, but also from increase in power to purchase on world markets. Papers in the session on Alternative Uses of Forages by McLaughlin (1997) and Pahkala (1997) indicated potential development of a large demand of land for bioenergy fuels, pulp and paper. Possibilities for breeding reed canary grass for energy and fibre were outlined by Lindvall (1997). The prospect of increased demand for land may signal the need for more attention to overall output and to production efficiency in our grassland systems. There is certainly a need to 'clean-up' some of our existing intensive systems to reduce the risks of pollution and a need, in some areas, to take action to prevent soil and land degradation. The justification for research on extensification *per se* and for increases, for aesthetic reasons, in biodiversity and landscape values may, however, be less strong. Questions on the rationale for research in temperate regions on extensification and on agroforestry were raised in the discussion sessions.

Researchers may argue that a broad-based research effort should be made to provide answers for a range of possible scenarios, but this argument is unlikely to be received sympathetically by research funding bodies, who are themselves likely to be under increased pressure. The discussion in the sessions on Extensification and on Integration of Environmental and Agricultural Policy both highlighted the importance of involving various stakeholders in debates on land use policies and planning, with important contributions being made by social scientists, physical scientists, economists and representatives of Society at large. It is likely to be increasingly important to involve this wide range of interests in delivering the future research agenda.

In concluding, may I express my gratitude to our Canadian hosts and organisers of the XVIII Congress. This built on innovations in previous Congresses and provided an excellent framework for presentation and formal and informal discussion of key issues for grassland on a world basis, many of which were particularly relevant to the temperate region.

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