

## Book reviews

### The Evolving Science of Grassland Improvement

By L.R. HUMPHREYS. Published by Cambridge University Press, UK, 1997. 261 pp. Price A\$99. ISBN 0 521 49567 9

In this book, his eighth on grassland science, Professor Humphreys has taken a different and interesting approach. Using the proceedings of the International Grassland Congresses since 1937 as an underlying structure, the author has selected a number of major themes and has outlined how emphasis within these themes has changed over time. The text, and the tables and figures reproduced from elsewhere, are more or less equally divided between tropical and temperate grasslands.

In the preface, the author describes how he has selected 7 major themes. He acknowledges that some important areas, particularly relating to forage nutritive value, ruminant nutrition and forage processing have not been considered.

The theme and title of the first chapter is "Grassland improvement and environmental science". The greater part of this chapter discusses the role of grasslands in atmospheric pollution and global warming, with emphasis on carbon flux. The role of management (deforestation, plant species, fertiliser, defoliation and ruminants) in affecting carbon flux is described. The review certainly highlights the many uncertainties associated with global warming. However, some points come through clearly, such as the value of increasing diet quality on reducing methane emissions and the role that productive pastures may play in reducing C flux to the atmosphere in contrast to the effect of annual cropping systems.

The second chapter relates to "The plant genetic base for grassland improvement". This chapter has 3 sections. The first deals with the main factors that can be regarded as criteria of merit in pasture plants, such as forage quality and ecological success. The second deals with conservation of germplasm and plant introduction and includes a short section on the controversial topic of weed potential of pasture plants. The third section deals with plant breeding, beginning with the traditional approaches of hybridisation and ending with molecular biology and a short discussion about the role of plant variety protection.

The third chapter deals with "The nitrogen economy of grasslands". There is an interesting

historical thread running through the chapter. It commences with extracts from the 1937 conference when legumes were regarded as THE source of nitrogen, even though early papers on responses to nitrogen fertiliser were presented. By 1952, the emphasis had changed and inorganic nitrogen fertiliser had become the main source of N. In recent years, the emphasis has changed to controlling pollution through reduced and strategic applications of N and the development of N sources which deliver N in "greater synchrony" with grass demand. The author notes that the trend to using lower rates of N in many intensive systems is driven by 2 factors; firstly, the increasing reluctance to subsidise high production systems; and, secondly, concerns about environmental pollution. The role of legume-derived N is also considered and examples given of the use of fertiliser N or legumes in different pasture systems.

The fourth chapter discusses "Growth and defoliation". This chapter also has an interesting historical thread commencing with the early emphasis on carbohydrate reserves, progressing through frequency and height of cutting and LAI, through to recent studies emphasising carbon balance and the dynamics of leaf surface and growing points. The practical application of these studies through using sward height as a measure of grazing intensity is followed through in a subsequent chapter.

The fifth chapter is on "Grassland ecology". This again has an historical thread, commencing with a description of "Clementsian succession", a discussion of its limitations and then an outline of "state-and-transition" with examples from different continents. A section on demography is followed by consideration of ways of assessing land condition and it emphasises that animal production is not as closely linked to pasture condition as earlier texts would have us believe.

The sixth chapter is on "Grazing management". This chapter covers the effects of stocking rate, stocking method and forage allowance with several pages dealing with the use of sward surface height as a management tool in temperate pastures. The author's conclusion is the same as in his earlier books, namely that there are immense differences in animal productivity and

sward condition as affected by stocking rate, forage allowance or sward surface height — but minimal effects of stocking method.

The final chapter is titled “Innovation, optimization and the realization of change”. This rather awkward heading does not really describe the contents of the chapter. It commences with a discussion of the role of modelling and reductionist science and then moves to consideration of Decision Support Systems. It concludes by considering the traditional ‘linear’ concept of technology transfer, farming systems research and participatory rural action.

By now the pattern of the chapters should be clear. Historical trends are described but each chapter ends with subjects of current interest and debate. There is a short conclusion at the end of each chapter where the author usually makes some personal assessment of current research and comments on the direction of future research.

In an Appendix, the author gives a lot of statistical information about International Grassland Congresses. One interesting point is that the proportion of papers devoted to different themes (using the word in the sense it has been used

previously) has remained relatively constant between 1937 and 1993 — even though the emphasis given to different topics within each theme has changed markedly, as illustrated in the earlier comments.

One minor criticism of the book is that the author has a tendency to use some words which, I suspect, would be unknown to many readers whose mother tongue is English, and would probably cause even greater difficulty to other readers. I can see no need for using such words as “refractile”, “explication”, “obverse” and “egregious”. Apart from this minor irritation, the book is well written with good type size, clear print and many tables and figures which break the text as well as illustrating key points.

This book is strongly recommended for all libraries and could be a valuable addition to the personal library of grassland scientists. Senior undergraduate or postgraduate students should find it particularly useful as a historical perspective of the key themes of grassland science.

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