

BOOK REVIEW

Forage Legumes for Energy-Efficient Animal Production. Proceedings of a Trilateral Workshop, Palmerston North, New Zealand, April 30–May 4 1984. R. F. Barnes, P. R. Ball, R. W. Brougham, G. C. Marten, and D. J. Minson (Editors), United States Department of Agriculture, Agricultural Research Service, 1985, 340 pp. A\$16.

This book reports on a workshop held to review the underlying research principles and philosophies concerning the adaptation, production, utilization, and improvement of forage legumes in energy-efficient livestock production systems, and to identify research priorities. The trilateral workshop included delegates from Australia, New Zealand and the United States of America. The importance of the subject matter is well defined in the preface where it is noted that about one sixth of the fossil fuel and electrical energy used on farms in the three countries is used to manufacture nitrogenous fertilizers. However, whilst forage legumes can reduce the need for fertilizer-N, they are more difficult to grow and maintain than grasses.

The Proceedings are divided into five distinct subject areas covering the use of legumes, why they are not used, nitrogen fixation, feeding value and genetic improvement. Papers within a subject group follow different writing styles and vary from straight forward reviews to an analysis of production systems. Nevertheless they inter-relate well in that they examine more or less the same subject matter from quite different points of view.

Many papers, especially the introductory ones, are structured on a nation by nation basis. Such papers serve to illustrate not only the diversity of the grazing systems within a country but also highlight important differences between countries. For instance, the larger land masses of Australia and the United States encompass a much wider climatic range than New Zealand and this reflected in the range of species which are used. Authors from Australia and the United States partitioned their countries into climatic zones for which it was possible to make some general statements on the species used. In marked contrast, it was noted that white clover alone accounted for more than 80 percent of seed sales of forage legumes in New Zealand.

Again, there are strong national differences in the relative use of legumes in pasture systems, ranging from restricted use in the United States, declining but still important use in Australia, to almost universal use in New Zealand. Why the difference? White clover grows particularly well in New Zealand and as a consequence 300–600 kg/ha/yr of fertilizer-N is required to obtain similar yields to clover-grass pasture. Less fertilizer-N (200 kg/ha/yr) will give similar production to legumes in the United States where the grazing industry largely relies on fertilizer-N. Equivalent values were not quoted for Australia, but the declining use of legumes was attributed to problems with persistence under grazing.

Differences in emphasis between papers which consider factors which limit legume growth, relate more to the author's perspective than to agronomy. Whereas there is some consistency in the earlier papers as to the relative merits of legumes versus fertilizer-N systems (although adoption rates vary), there was no equivalent agreement in the "limitations" papers. Undoubtedly the processes are complex and multi-faceted, but the lack of unifying principles is apparent, e.g. what constitutes persistence.

Subsequent papers on nitrogen fixation, nutritive value, and genetic improvement provide comprehensive reviews of current knowledge in each area. Whilst new concepts are discussed and some attempts made to formulate general systems, it is apparent that there are still major gaps in our knowledge. This is reflected in the suggested research needs which concentrate on specific problems rather than integrative studies.

Taken as a whole, the Proceedings provide a valuable collection of contemporary knowledge on legumes in pastoral systems. As such the scope is wide, but specialists could also find useful reading in the relevant section for their interest.

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