

# ECONOMICS - THE NEGLECTED DIMENSION OF PASTURE DISEASE R&D.

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## ABSTRACT

Pasture utilisation underpins a significant contribution of livestock industries to Australia's economic well-being. Pasture disease represents a direct threat to these enterprises but the economic magnitude of this threat remains largely unknown as the contribution of agricultural economics to pasture disease R&D, management and policy making has been minimal to date. Some insights to explain this apparent neglect are highlighted and a suggestion is made for a multiple disciplinary approach to R&D.

## KEYWORDS

Pasture disease, economic evaluation, multi-disciplinary R,D&E.

## INTRODUCTION

In Australia, pastoral enterprises centred on continuous grazing of extensive grasslands and cleared woodlands are the dominant land use. These enterprises annually contribute around \$A11 billion to the GDP and \$A8 billion to export income. Therefore, pastures are a major resource whose continual productivity and protection are of vital economic importance.

To the extent that pasture diseases, in fact or in threat, place constraints on these vital enterprises it would be expected that a widespread interest would be evident in conducting research into their economic impact. However, while there has been a significant body of research conducted into the physical aspects of diseases, economic research and assessment has been minimal. For example, a review of the economic literature (MacLeod and Norton 1996) found almost nothing of note and no real evidence of significant work dating beyond the mid 1980's. To provide an insight into methods that might be applied to assessing the economic losses attributed to pasture diseases and benefits from control strategies, parallels had to be drawn from the pasture weed and pest literature and crop disease and weed literature. That literature was only marginally richer with pasture weed and pest research and almost exclusively centred on two pasture weed species, Paterson's Curse (*Echium plantagineum*) and Serrated Tussock (*Nasella trichotoma*) and the European Rabbit (*Oryctolagus cuniculus*). The crop disease economic literature is focussed largely on a limited range of cereal diseases, notably those of wheat.

Pasture pathologists are concerned that their share of already scarce R&D resources is shrinking and that their work remains both undervalued and undersupported. For example, this was a recurrent theme of a recent three nation forum of pasture and forage crop pathologists (Trilateral Workshop - Australia, New Zealand and United States, Mississippi State University, April 1995). A consensus was reached on the need to highlight the benefits of pasture disease R&D in hard currency terms. Such benefits can indeed be substantial if their enumeration were only to be more widely attempted. For example, an analysis of the national *Stylosanthes* breeding program, which seeks to promote resistance to the pathogenic fungus *Colletotrichum gloeosporoides*, identified net social benefits in the range of \$A245 million to \$A411 million (MacLeod and Norton 1996). This paper questions the unattractiveness of pasture disease issues to economic analysts and suggests a need to rethink our approach to research within this domain.

Pasture diseases as an economic evaluation problem.

Limited economic scrutiny of pasture disease impacts cannot be blamed on a lack of evaluation methods. Drawing on the insights of both economic theory and even the limited crop and pasture weed and pest literature, there is a broad array of potential evaluation methods available ranging from simple opportunity expenditure approaches through to more complex simulation modelling and assessments of shifts in aggregate social welfare functions (eg. Auld *et al.* 1987, Norton and Mumford 1995, MacLeod and Norton 1996). According to circumstances, these methods can be tailored to fit in with the evaluation problem at hand.

A significant problem for evaluating the economic impact of pasture diseases relates to the *context* within which the analysis is to apply. For example, is the impact to be assessed at the individual enterprise or the industry level? How do losses due to pasture disease manifest themselves and what is their incidence or potential to create economic harm? These are more than simple scaling exercises. Scale shifts from, for example, paddock to industry, can involve complex spillover effects and economies of scale and scope. Rates and patterns of spread of individual diseases or disease complexes and associated yield losses are complex and hard to predict or quantify. Data scarcity to underpin production functions and yield-loss relationships remains chronic. Central to addressing these issues, however, is the fundamental question of what is the evaluation being conducted for in either a management or policy-making sense. Resolution of this question, tempered by the more pragmatic issue of data availability and its collection cost, will influence the methodological choice and effort committed to the task (MacLeod and Norton 1996).

Examining context at a more basic level, a differentiating characteristic of crop and pasture-livestock production systems that may explain the slightly more generous treatment afforded crop disease, weed and pest issues in an economic evaluation sense is the more complex characteristic of the latter. That is, in the sense that the economic value of grazed pastures is expressed through the performance of animals and both their management and that of the pastures, rather than through direct harvest and consumption as in the case of crops. Production cycles in cropping are usually shorter (eg. annual) and growth conditions more homogeneous and amenable to management manipulation. This makes their economic assessment more amenable to relatively simplistic economic evaluation procedures, such as those involving gross margin analyses and risk assessment centred on cumulative probability distributions whose moments are determined by a narrow range of parameters such as prices and yield. (see Figure 1)

When specific account is taken of the impact of disease on system performance, the notion of complexity becomes even more manifest. An influence diagram for a hypothetical grazed-pasture enterprise is presented in Figure 1. This depiction, itself an acknowledged simplification, attempts to highlight the complexity of the relationship between pasture disease, the environment (physical and economic), enterprise management, income and cash flows. There are clearly many forces at play which promote or constrain the short term performance (eg. cash flow, net income) and longer term viability (capital maintenance and growth) of individual enterprises, as well as to the larger industries to which they belong. Disease impact

through its effect on pasture yield, quality and sward persistence is only one of many and unravelling the influence of these forces would seem to represent a worthy challenge to the agricultural economics profession. To do this effectively would seem to require a partnership with the other branches of science engaged with pasture disease R&D issues.

**DISCUSSION**

A number of factors have been identified that need to be taken into account if R&D is to fully appreciate and diagnose the contextual relevance of pasture disease problems, develop effective technologies or to make appropriate recommendations on their control or management. Economics can, and should, make a significant contribution to this task but will be better placed to do so as a committed member of a multiple disciplinary systems approach that

can both appreciate, quantify and evaluate the impact of disease in terms of both processes and decision-making context. Compartmentalisation of pasture R&D and its funding along narrow disciplinary lines, remains a barrier to achieving this ideal.

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**Figure 1**

Flow diagram for a hypothetical grazed pasture enterprise showing the relationship between pasture disease, management and enterprise profitability.

