An integrated decision support system for pasture improvement

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Pasture Improvement Adviser (PIA) is an integrated economic model/knowledge based system for use by agricultural advisers in their task of consulting beef producers who wish to invest in pasture improvement. At this stage the system is geographically limited to the North Coast Region of New South Wales. The knowledge base for this program was obtained by the senior author through interview sessions with one pasture agronomy researcher (PTM) with 37 years professional experience, and one agricultural economist (RJF) with 17 years professional experience.

The system architecture is based on a blackboard metaphor: two (or more) specialists working cooperatively to solve a problem. Data are written on the blackboard and the specialists apply their expertise towards a solution. When one has information that can be useful to the other the contribution is recorded on the blackboard allowing the other specialists to apply their expertise. This process continues until the problem is solved (1).

The first knowledge base delivers technical expertise in the area of pasture agronomy. The user is asked questions to determine the location, vegetation, soil type, and topography. This information is used to assess the ecological scope for improvement and the steps necessary to achieve the sustainable production potential of the land. Pasture improvement options that may be recommended include land clearing, cultivation, weed control, fertiliser (type and quantity), grass and legume species. This knowledge is used to determine a number of development options.

Data on costs and potential benefits that arc expected from each development option are posted to the blackboard and bio-economic spreadsheet models are activated for each development option proposed by the agronomic knowledge base. The bio-economic models read data from the blackboard and can also be modified by users to better reflect their specific situation. The models calculate numbers of various classes of livestock, cash flow, loan repayments, and benefit-cost ratios at three discounting rates. An agricultural economics knowledge base is then invoked to assist users in converting the results from the spreadsheet models into advice on which (if any) of the development options best fits their investment objectives.

References

1. Corkill. D. (1991). Blackboard systems. *AI Expert.* September 1991, 41-47.