GRAZING MANAGEMENT OF LOTUS IN EASTERN AUSTRALIA: A PARTICIPATORY APPROACH

M.J. Blumenthal[1] J.F. Ayres[2] ,and Z. Hochman[3]
[1]NSW Agriculture, Pasture Research Unit, PO Box 63, Berry NSW 2535
[2]NSW Agriculture, Agricultural Research and Advisory Station, PMB, Glen Innes NSW 2370
[3]NSW Agriculture, Agricultural Research Institute, PMB Wollongbar NSW 2477. Current address: CSIRO, Agricultural Production Systems Research Unit, PO Box 102 Toowoomba Qld 4350

ABSTRACT
Both *Lotus uliginosus* Schkukr and *L. corniculatus* L. require lenient grazing management for persistent production. However, grazing systems, where *Lotus* is adapted in eastern Australia are based on intermittent set stocking. Conflict between plant ecophysiology and the adverse influences of traditional grazing systems that limit the adoption of new grazing management technology have been addressed by a participatory (co-learning) research and development process.

The approach taken involved the use of a facilitator who ran an initial meeting to involve stakeholders and subsequently established "co-learning" groups and "co-learning" experimental sites. These sites are monitored, progress is reviewed, and knowledge is built and documented with the use of "ripple-down-rules". Concurrent with this, replicated "core" experiments have been established to examine the effects of grazing intensity and spelling time on yield and persistence of *Lotus* in relation to the physiology and phenology of the *Lotus* plant.

INTRODUCTION
The adaptation of Lotus to acid, low fertility soil (Blumenthal et al. 1994) and the presence of condensed tannins (Waghorn et al. 1990) in the foliage, providing bloat safety and by-pass protein, makes it a highly desirable genus for ruminant production systems in high rainfall eastern Australia. Since the release of an improved Greater Lotus cultivar (*L. uliginosus* Schkuhr cv. Grasslands Maku) in 1976 over 50,000 ha have been sown. However, producers and extensionists have identified the requirement for lenient grazing management as a barrier to increased adoption (Harris et al. 1993). Birdsfoot Trefoil (*L. corniculatus* L.) has yet to be used commercially in eastern Australia even though small plot work (Hill et al. 1996) suggests that it is well adapted to areas receiving > 600 mm average annual rainfall. Previous work in the USA (Alison and Hoveland 1989) suggests that Birdsfoot Trefoil also requires lenient grazing management for persistent production. However, current grazing systems over much of the potential area in Australia where Lotus can be sown are traditionally based on intermittent set stocking.

The objective of the project was to develop grazing management strategies for the persistent use of greater lotus and birdsfoot trefoil cultivars. The grazing management requirements of Lotus presents special challenges for its adoption, as year-round utilisation of pasture is most often the primary objective of producers. Because of the potential conflict between plant persistence and livestock feed requirements a participatory approach has been taken. A participatory or "co-learning" approach is a methodology where scientists, producers, seed and fertilizer company representatives and extensionists all take part in shared and active learning through research. We proposed that the involvement of producers in the research process means that research outcomes are more likely to be commercially realistic and be adopted by the producers as both the research and adoption process can take place concurrently.

METHODS
The participatory research approach taken involved the use of a facilitator who ran an initial planning meeting with stakeholders and subsequently a series of local meetings across the target high rainfall zone to establish "co-learning groups"(Fig.1). These "co-learning" groups established "co-learning" experimental sites. These sites are monitored, progress is reviewed and knowledge is built with the use of "ripple-down-rules" (Hochman et al 1996). The process is open ended so that additional "co-learning" sites can be progressively established. Concurrent with this, replicated "core" experiments have been established at four sites (Fig. 2) to examine the effects of grazing intensity and spelling time on yield and persistence of Lotus in relation to the physiology and phenology of the lotus plant.

RESULTS AND DISCUSSION
The facilitator ran a meeting with the research team, extensionists and industry stakeholders in May 1994 to secure their support. At this meeting those involved were given a clear definition of "participatory research" and how it contrasts with the traditional "linear research - extension model". How producers are already participating in the research - extension process was discussed as well as the risks and benefits of participatory research. Finally, the usefulness of the participatory research in the grazing management of lotus was discussed. There was a general commitment by all stakeholders to the participatory research process.

Once stake-holders had agreed on the approach, the second phase commenced where 11 extensionists invited producers to meet with the view to form "co-learning" groups. Groups were brought together in different ways: within existing Landcare (3 groups) or industry groups (1 group), by open (2 groups) or select (5 groups) invitation to the producer community. Between August and November 1994, 11 meetings (Eden, Bombala, Rylstone, Maitland, Taree, Grafton, Casino, Glen Innes and Inverell) were facilitated; a member of the research team and an extensionist were present at the meetings. At each meeting the following issues were covered: Does lotus have potential in your area? Is "ideal" grazing management practical? What is expected of you? Why are you involved? Who is responsible? Who else should be involved? Are lines of communication suitable? What are the costs and the benefits?

All groups (except one) agreed to establish a "co-learning" site on a paddock scale to compare "traditional" management with "strategic" management. The "traditional" treatment was defined by the "co-learning" group and was generally intermittent set stocking. All groups were willing to accept the "strategic" management as proposed by the researchers; this varied with Lotus cultivar, but generally involved lenient grazing with a short strategic spell depending on the physiology and phenology of the cultivar involved. Researchers involved in the "co-learning" groups measure pasture establishment and pasture composition and play a lead role in project implementation while producer members oversee conduct of the project.

The "co-learning" groups have been successfully established. The three groups based on Landcare groups are easy to manage and communicate with as they already have a defined structure and meet regularly. These Landcare groups can easily slot "lotus grazing management" into their activities. The other groups require greater commitment from either extensionists or the researchers in the team.

Most groups are dependent on the "co-learning" sites to provide a practical focus. Where "co-learning" sites were slow to establish, because of drought or non-availability of seed, the groups have largely disbanded and will need to be rebuilt.

A key component of the approach taken is the "monitor, review, knowledge building" process. The "review" process is an integral part of the project and takes place both formally and informally at least every 6 months. "Ripple-down" rules (Hochman et al 1996) are used to build knowledge on Lotus as it emerges through this process. A "ripple-down rule" knowledge base was constructed using an initial knowledge base of producers in a survey carried out in 1991 (Harris et al 1993). To this. the knowledge of 6 "local experts" has been added case by case. Each of the 11 "co-learning" groups has been provided a copy of the current "knowledge base" to which they can develop new "rules" for the use of lotus.

Already, information has been gained from the "co-learning" sites in relation to the establishment of Lotus pastures. Issues such as inoculation, fertilizer rates, companion species, sowing rates, sowing times and grazing management in the establishment year have been addressed by the groups. Producers are more willing to manage their pastures than first perceived by the researchers. Concepts developed in PROGRAZ (Allan 1994) and in cell grazing schools (Savory 1988) have had many producers already thinking about the benefits of grazing management. In this context it was timely to develop strategies for the use of legumes that require grazing management for productivity and persistence.

The participatory approach has changed the way producers, extensionists and researchers interact. Whilst the potential benefits are clear, each group has had to make difficult changes. Some producers were comfortable with the traditional "linear research-extension model" and were reluctant to take a more active role in the research process. Some extensionists felt threatened by researchers and producers becoming more active in their "domain". Researchers found the process more time consuming and feared that "good science" may be compromised by the needs of other stakeholders. To overcome these potential pitfalls it is important that clear communication channels are established early in the project and that all participants are open and honest about their concerns.

ACKNOWLEDGEMENTS
This work is funded by The Australian Meat Research Corporation.

REFERENCES

Alison, M.W. and Hoveland, C.S. 1989. Birdsfoot trefoil management. I. Root growth and carbohydrate storage. Agron. J. **81**: 739-45.

Allan , C. 1994. PROGRAZ: profitable, sustainable grazing. NSW Agriculture, Orange. 65 pp. Agdex 400/16.

Harris, C.A. Blumenthal, M.J. and Scott, J.M. 1993. Survey of use and management of Lotus pedunculatus cv. Grasslands Maku in eastern Australia. Aust. J. Exp. Agric. **33**: 41-7.

Hill , M.J., Mulcahy, C. and Rapp, G.G. 1996. Perennial legumes for the high rainfall zone of eastern Australia. 2. Persistence and potential adaptation zone. Aust. J. Exp. Agric. **36**: 165-75.

Hochman, Z., Compton, P., Blumenthal, M. and Preston, P. 1996. Ripple-down rules: a potential tool for documenting agricultural knowledge as it emerges. Proc. 8th Aust. Agron. Conf., Toowoomba, Qld. pp 313-6.

Savory, A. Holistic Resource Management. Island Press, Washington. 564 pp.

Waghorn G.C., Jones, W.T., Shelton, I.D. and McNabb, W.C. 1990. Condensed tannins and the nutritive value of herbage. Proc. N.Z. Grassld Assoc. **51**: 171-176.

Figure 1
Schema for participatory research approach taken in this project.

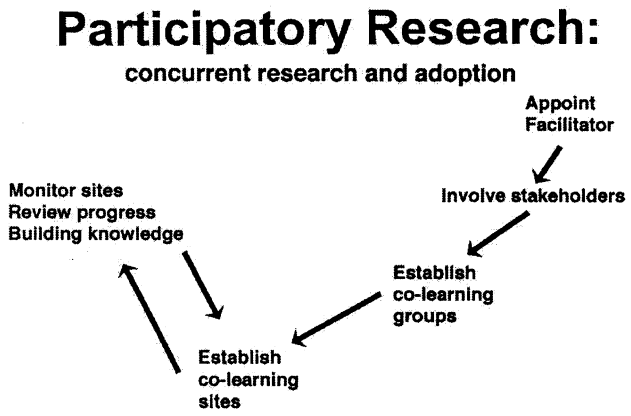

Figure 2
Location of "co-learning" and "core" sites.