PREDICTING GROWTH OF WHEAT FOLLOWING PASTURE

W.D. Bellotti[1,2], A.D. Moore[3], P.R. Grace[1], and I.R. Trigg[2]

[1]CRC for Soil and Land Management, Urrbae, SA 5064
[2]University of Adelaide, Roseworthy Campus, Roseworthy, SA 5371
[3]CSIRO, Division of Plant Industry, Urrbrae, SA 5064

The role of pastures in sustaining soil fertility and crop productivity is well recognised. However, the level of investment by farmers in ley pastures appears to be related to the relative profitability of crop and livestock commodities (1). A more comprehensive assessment of the profitability of pasture investment is needed in order to improve decisions concerning the choice of pasture-crop rotation sequence, and the level of investment directed towards achieving legume dominant pastures.

Three complementary approaches are being employed to achieve this overall aim:

1. *Simulation modelling* to predict the impact of crop/legume rotations on soil fertility, crop and livestock production, and whole farm profitability. Initial efforts have succeeded in linking existing models for pasture-animal production (GRASSGRO) with wheat (CW, APSIM) and soil water and nitrogen dynamics and have produced plausible outcomes. For example, over a 10 year period at Roseworthy, potential wheat grain yield was 30% higher following medic dominant pasture compared to wheat following grassy pasture. Future progress will be facilitated by new standards being developed for linking existing simulation modules within either the APSIM or AUSFARM agricultural production simulation shells. Additional simulation modules for barley and faba bean will be devloped to allow simulation of a greater range of crop sequences.

2. *Systems experimentation* has been established on Roseworthy Campus to collect comprehensive data sets on soil, plant, and animal components from a range of contrasting farming systems. The key aim of these experiments is to test and improve the simulation models. The experiments feature large plot size (0.5 ha) to allow realistic grazing pressure to be maintained during the growing season and over summer. Treatments include medic-dominant pasture, barley grass dominant pasture, faba bean harvested for grain and faba bean as a green manure. These treatments are followed by wheat, which in turn is followed by barley. Phase 1 commenced in 1994 with phase 11 established in 1995. Soil nitrate and soil water profiles are monitored over the duration of the rotation.

3. *On-farm monitoring* will allow comparison of model predictions with measured quantities under realistic farmer-managed demonstrations. These sites are located on similar soils and in a similar rainfall pattern to the main experiments based at Roseworthy. Co-operating farmers will evaluate the usefulness of model predictions for assisting in farm management decisions.

ACKNOWLEDGMENTS

This project is funded by the Grains Research and Development Corporation Project UA325SR.

REFERENCES

1. McGown, R.L. *et al*. 1988. In: Advances in Nitrogen Cycling in Agricultural Ecosystems. (Ed J.R. Wilson) (CAB). pp. 292-314.