EverGraze – development of profitable and sustainable livestock systems for the high rainfall zone of Western Australia

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Abstract

Livestock production systems can address land degradation through the profitable use of perennial pastures. EverGraze is a project that aims to increase farm profit by 50% while reducing groundwater recharge by 50% in the high rainfall zone (>600 mm) of southern Australia. Whole farm models were used to identify livestock systems that met the EverGraze goal. For the Albany Eastern Hinterland in Western Australia the analysis suggested that the project aims could be met through a combination of a meat Merino enterprise, deep rooted perennials, increased winter pasture production and higher weaning percentages. These findings have been incorporated into EverGraze field research.

Keywords

Kikuyu, lucerne, tall fescue, profit, lamb, wool

Introduction

Traditional livestock systems in south west Australia based on annual plants have been shown to use insufficient water leading to excess leakage below the root zone, groundwater rise and eventually salinisation. Deep-rooted summer active perennial plants can significantly increase water use thus reducing the risk of salinisation if sown over large and in hydrologically-responsive areas. However adoption is also dependent on economic factors. EverGraze is an initiative of the CRC for Plant~Based Management of Salinity and Meat and Livestock Australia which aims to increase profit by 50% while reducing groundwater recharge by 50% in the high rainfall zone (>600 mm) of southern Australia. This paper reports on the use of modelling to explore solutions that meet the EverGraze goal in the Albany Eastern Hinterland Catchment in Western Australia.

Methods

A model of the farming system known as MIDAS was used to undertake this analysis (Morrison *et al.* 1986). The model was paramatised with a representative 2000 ha farm in the Albany Eastern Hinterland catchment receiving 600 mm annual rainfall and comprising of three soil types, deep sand, shallow sand over clay and deep sand over clay. Three different systems where analysed. 1. Traditional farm - 30% crop, 70% subterranean clover (*Trifolium subterraneum*)–based annual pasture. 2. Current best practice - 30% crop, 70% pasture with varying areas of subterranean-based annual pasture, lucerne monoculture (*Medicago sativa*) and kikuyu (*Pennisetum clandestinum*)-subterranean clover mixtures. 3. Future farm - 30% crop, 70% perennial pasture with either lucerne monoculture, kikuyu-subterranean clover mixtures or tall fescue (*Festuca arundinacea*)-subterranean clover mixtures. All farms ran a Merino enterprise. Groundwater recharge values were estimated using a farm scale hydrologic model (Beverly *et al.* 2003).

Results

A meat Merino enterprise was consistently more profitable than one based on wool for all the farms simulated (Table 1). The major production benefit of adopting perennials in the livestock system was an increased carrying capacity along with a reduction in supplementary feed (Table 1). While the future farm running a meat Merino enterprise was able to meet the target of reducing groundwater recharge by 50% in comparison to current best practice (46 mm reduced to 23 mm, Fig. 1) it was unable to meet the target

of increasing profit by 50% (profit increased from $69 to $76, Fig. 1). Simulations aimed at increasing profit further suggested the goal ($104/ha/yr) could be reached with the future farm by increasing weaning percentage from 92% to greater than 104% or increasing winter pasture production by 27% (Figure 1). These findings were used to direct the EverGraze field research program in the Albany Eastern Hinterland. The program consists of a 60 ha demonstration of a prime lamb production system aimed at a weaning percentage of between 130 and 150% based entirely on perennial pastures. Pastures include kikuyu, lucerne, tall fescue, chicory (*Chichorum intybus*), setaria (*Setaria sphacelata*) and green panic (*Panicum maximum* var. *trichoglume*) all combined with subterranean clover. Additional satellite trials are being used to investigate, pasture mixes that increase winter production and perennial pastures to increase reproductive performance in Merinos.

Table 1. Production parameters for the optimum management for two livestock enterprises and three farming systems in the Albany Eastern Hinterland

	Traditional	Current best	Future
Wool Merino enterprise			
Stocking rate (dse/WG ha)	8.1	10.7	10.1
Supplementary feed (kg/dse)	18.5	8.3	6.9
Lambing (%)	87	92	92
Pasture yield (t/ha)	6.6	7.0	7.2
Profit ($/ha/yr)	10	40	43
Meat Merino enterprise			
Stocking rate (dse/WG ha)	8.5	10.0	12.0
Supplementary feed (kg/dse)	33.0	8.3	8.4
Lambing (%)	89	92	92
Pasture yield (t/ha)	7.1	7.6	7.5
Profit ($/ha/yr)	32	69	82

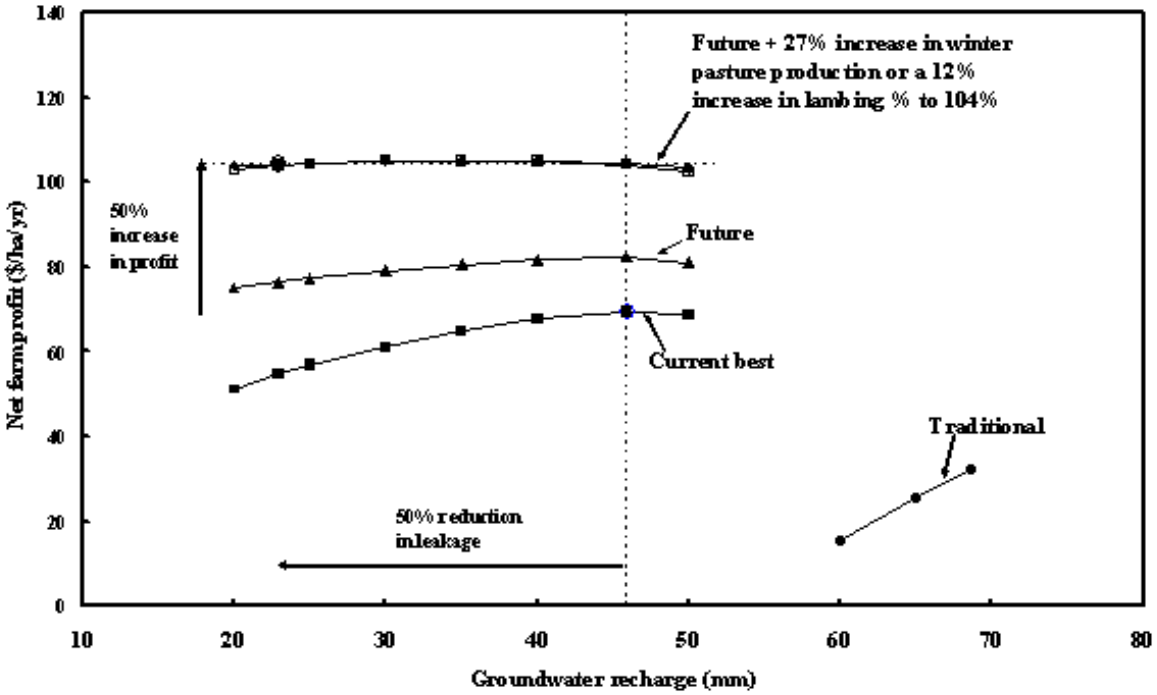

Figure 1. Trade-off between profit and leakage below the root zone of a range of farm systems based on a meat Merino enterprise in the Albany Eastern Hinterland. The targets of a 50% reduction in leakage and 50% increase in profit are identified alongside the respective axis.

Conclusion

Whole farm simulations suggested a meat Merino enterprise based on perennial pastures with higher lambing percentage or increased winter pasture production would meet the goal of increasing profit by 50% and reducing groundwater recharge by 50% in comparison to current best practise. EverGraze is field testing a similar livestock system and investigating ways to increase lambing percentage and winter pasture production.

References

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