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Pasture improvement: Optimal strategies for the New England

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Pasture improvement is a well established technology to increase production in extensive livestock grazing industries in higher rainfall zones (Vere et al., 2001). Interactions between the rate of response to inputs, the cost of inputs and capital, and the value of livestock products determine the economic attractiveness of the different pasture improvement options and their rate of implementation. The success and profitability of pasture improvement is influenced by the risk of the pasture establishing, the persistence of the pasture and its utilisation by livestock enterprises to increase whole farm production and profit over the long term. With the estimated rates of pasture improvement in high rainfall zones being less than 2% per annum (Ward et al., 1992), this paper aims to provide a preliminary investigation into defining optimal rates of pasture improvement in the New England region under different livestock production systems.

Pasture establishment, time to first grazing and subsequent expected livestock production over subsequent consecutive years were modelled using GrassGro (Moore et al., 1997) for the period of 1958 to 2005. The modelled livestock production system, base pasture, and sown/fertilised pastures were calibrated using the data being generated from the Cicerone Project trial site at Chiswick, Armidale (Gaden et al., 2004). The rates of pasture improvement tested ranged from 2% to 20% of the farm area being sown per annum on a typical sheep enterprise based property in the high rainfall-tablelands zone of NSW. Monte Carlo simulation and discounted cash flow budgets at the whole farm level were used to calculate the long-term returns from variations in the rate of pasture improvement, its time to first grazing, and interactions with post-establishment stocking rates across different livestock production systems.

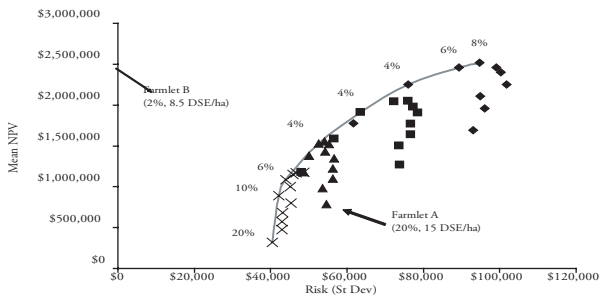

Fig. 1. Risk efficient frontier for a self replacing merino ewe flock with respect to a range of post-establishment stocking rates (× 8.5 DSE/ha, ▲ 15 DSE/ha, ■ 20 DSE/ha, ♦ 25 DSE/ha) and rates of pasture establishment (0 to 20% in 2% increments). Estimated optimal rates of pasture improvement as defined by risk efficient frontiers for a self replacing merino ewe flock (SRME), merino wethers (MW) and a second cross lamb producing flock (SC), under different post-establishment stocking rates (Dry Sheep Equivalents per hectare or DSE/ha) on sown/fertilised pastures.

A risk-efficient frontier was identified given the range of potential outcomes from the two experimental treatments of post-establishment stocking rate and rate of pasture establishment. The risk-efficient frontier shows the optimal range of management strategies from which a producer may choose their desired level of profit and risk they are willing to accept (Cacho et al., 1999). Risk averse producers running merino flocks would optimally operate at stocking rates similar to that being run on base pastures (8 DSE/ha) with rates of pasture improvement at 10 or 20% per annum (Figure 1). The optimal choice for a risk-neutral producer would be running a post-establishment stocking rate of 25 DSE/ha and establishing 8% of improved pastures per annum. Further analysis is required to take into greater consideration capital limitations, alternative investments (grazing management & fertiliser), tactical responses to seasonal variability, and the long term interactions between post-pasture establishment stocking rates and pasture persistence.

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