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Developing the Tara Hills farm in today's world: the risks and returns

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Abstract

The economics of the development transition from an average high country enterprise dependent to various extents on hay, to an all-grass wintering enterprise (involving further development of hill country) such as that at Tara Hills, was investigated with the assistance of the dynamic economic model RANGEPACK HerdEcon. Transitional options ranged from 'do nothing' through 18 development scenarios that included factorial combinations of the following variables: three different levels of hay-making costs ($30 000, $60 000 and $90 000 per year) for the average enterprise; failures in oversowing establishment (0, 1 or 2 years out of 5); and either maintaining or increasing by 13% stock numbers subsequent to development. Each transitional option was evaluated over a 20-year period involving real climate effects. Shifting from the $90 000 hay enterprise, and incurring zero establishment failures, allowed an economic position better than 'do nothing' to be achieved in 8-9 years. Where the average high country enterprise was less dependent on hay ($60 000 and $30 000 hay operations) the period required to achieve a cash position better than 'do nothing' took longer (12 to 20 years respectively). The economic leverage gained from the original enterprise with high hay costs compared to those with lower hay costs was far more influential than the other variables tested (establishment failures, climate and stocking rate).

Keywords: climate variability, dynamic modelling, economics, high country, pasture systems, transition

Introduction

Tara Hills has a long history of research and improvement (Pedofsky & Douglas 1985). The research station includes an independent 2770 ha hill enterprise fenced into 30 blocks according to aspect and altitude. An all-grass wintering system based on autumn-saved improved tussock country is used. This system does away with tractors and the yearly obligation of mechanised feed conservation. These factors result in a simple, well organised system with a low labour requirement. The quality of the Merino flock in terms of tine wool, good nutrition and high production rates has always allowed for good financial returns. By contrast, many other farming enterprises in the high country tend to rely, to varying extents, on some form of mechanised feed conservation to carry them through the winter.

The purpose of this study was to use the Tara Hills technical data and experience to evaluate, in today's world and costs, a transition from an average high country property dependent on hay and silage, to an all-grass winter system based on autumn-saved improved tussock country. A more in-depth report on this study is submitted elsewhere (Foran & Allan 1995).

Methods

The dynamic economic model RANGEPACK HerdEcon (Stafford-Smith & Foran 1988) was used to describe an 'average' high country run of 10 000 ha grazing 8500 Merino stock units (19 micron) (Kerr *et al.* 1979) with considerable dependence on winter feed conservation (20 000 conventional bales/year). Biological rates (births, deaths, wool and lamb production) were aligned to the Tara Hills hill farm achievements according to 'good', 'average' and 'poor' years. The output of this model in dollar terms was consistent with relevant farm monitoring information (MAF 1991). RANGEPACK HerdEcon was used to predict a 20-year economic outcome (accumulated cash surplus in today's dollars) from this 'average' high country model. This 'do nothing' approach, was modelled using the real 1971 to 199 1 climate data sequence from Tara Hills. Wool prices were assumed at $8.00 per kg, and a real interest rate (nominal minus inflation) of 10% was assumed for the overdraft account. Within this average model, three different mechanical feed conservation enterprises were described ($30 000, $60 000 and $90 000 per year) to allow sensitivity analysis according to the dependency on hay or silage.

In addition to the 'do nothing' approach, our analyses included various development scenarios allowing transition from hay dependence to an all-grass wintering operation. This development involved

oversowing 1000 ha of mid-altitude sunny country suitable for wintering stock (200 ha per year for 5 years), plus 30 km of fencing, and 5 km of tracking. The development scenarios included factorial combinations of the following variables: the three different levels of hay making costs for the original enterprise; development taking a period of 5, 6 or 7 years because of 0, 1 or 2 possible establishment failures; and either maintaining or increasing by 13% stock numbers subsequent to the 5-year development period (that is, retaining old ewes an extra year).

Biological rates and stock production per head were affected by climate but were assumed similar across all development scenarios. A basal long-term debt load of $260 000 at 14% interest was assumed for all scenarios.

The sensitivity of different wool prices ($2-16.00 per kilo), interest rates (2-20%) and various climate sequences (real, average every year, reversed sequence) were explored for six scenarios that showed promising economic returns. These included the $90 000 hay operation with 0 and 1 failure, and the $60 000 hay operation with 0 failures, for both static and additional stock numbers. Accumulated cash surplus after 10 years was used to examine wool prices and interest rate sensitivities because bankers and financiers tend towards a shorter time-frame than 20 years.

Results

The 'do nothing' scenario accumulated just $70 000 over 20 years. By contrast, trading from the high hay cost enterprise to the all-grass wintering operation with no establishment failures resulted in a $1.13 million cash surplus by year 20 (Figure 1). For the transition scenarios, the size of the original hay operation had a much greater influence on the economic outcome after 20 years than did the number of establishment failures. Trading from a relatively low hay cost ($30 000 per year) did not better the 'do nothing' accumulated cash surplus at 20 years, even at 0 establishment failure.

The 13% increase in stocking rate generally lifted the 20-year cash surpluses by 0.3 to 0.5 million dollars. This tended to reduce the pay-back periods (that is, the time taken to do better than the 'do nothing' option) by one year for the high hay cost enterprise, and 2 to 7 years for those enterprises with lower hay costs (Table 1). An example of the effects of changes in wool price and interest rates on one of the development scenarios (that is the $60 000 hay enterprise with no establishment failures, and no increase in stocking rates) is given (Figure 2). A change in interest rates did not affect profit greatly when wool prices were at or above $8 per kg, but did when wool prices fell below that level. When overdraft interest rates were greater than 14%, and wool prices below $6 per kg, the 'cash surface' for this development scenario becomes a rapid negative slide. Wool prices would have had to rise $2-2.50 per kg to accommodate the possible range of interest rates tested. When sensitivity outcomes from other development scenarios were compared, a rise of $0.5/ kg in wool prices was needed to (a) accommodate each progressive establishment failure, or (b) enable economic trading from an enterprise that had a lower original hay cost.

Figure 1 Accumulated cash surplus at year 20 for the basic pasture development scenario without stock increase, trading from a $30k, $60k or $90k hay enterprise with 0, 1, or 2 failures in pasture establishment,

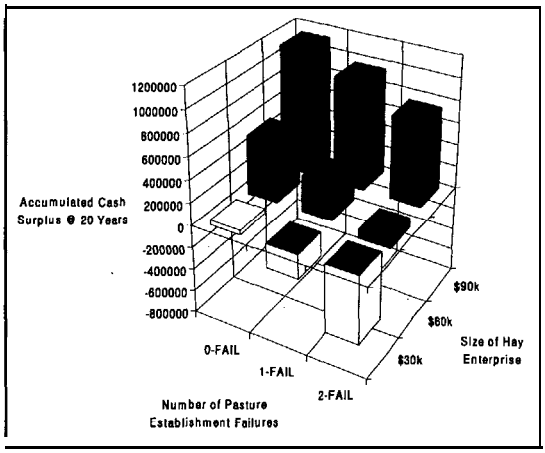
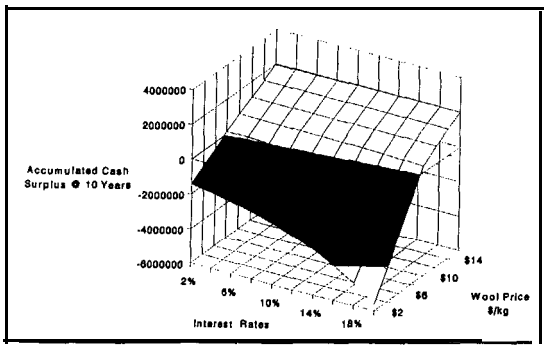


Table 1 The time (years) that the integrated development scenarios take to equal the accumulated cash position of the 'do nothing' option.

	Size of Hay Enterprise	No Failures	One Failure	Two Failures
No Stock Increase				
	$30k Hay	>20	never	never
	$60k Hay	12	16	>20
	$90k Hay	6	10	12
Stock Increase of 13%				
	$30k Hay	13	16	never
	$60k Hay	10	13	16
	$90k Hay	6	9	11

When all years were assumed to have an average climate, accumulated cash surpluses after 20 years were generally $40 000 superior to those generated from the real Tara Hills climate sequence. When the real sequence was reversed, accumulated cash surpluses were generally $40 000 inferior. While we did not examine the full array of climate sequences

Figure 2 A risk surface of the response of accumulated cash surplus (z axis) to changing interest rates (x axis) and wool price (y axis). Scenario displayed is the $60k hay with no pasture failure and no stock increase.



possible, these differences in accumulated cash surpluses are small compared with those arising from the various development scenarios.

Discussion

We note that traditional high country managers devote considerable time, physical labour, and cost to fodder conservation. An integrated system where animals do the work and the manager is given the opportunity to ponder on improvements and future enterprises seemed attractive. Thus we coined the Tara Hills all-grass example the 'Time to Think' system.

There are examples of successful transitions within the industry (Emerson 1980; Davis 1988), but in the absence of Government subsidies, the transition to our 'Time to Think' model would in today's economic terms be long and difficult. When we combine biological risks (climatic variability, establishment, failures) with business risk (product prices, interest rates) this study shows that economic leverage, that is the extent of the dependence of the existing enterprise on feed conservation, determines the success of our development transition, rather than the elegance or forethought associated with our transition pathway and Time to Think philosophy. This study suggests that farmers could gain considerable financial benefit by concentrating on ways of minimising feed conservation costs.

Wool prices are clearly very influential. Current prices for 19 micron Merino wool varies from $7-9 per kg. Our base assumption of $8 per kg is therefore reasonable and realistic, and any further increase in wool prices will make the outcomes of the transition to our technically attractive yet economically elusive 'Time to Think' management system more optimistic.

With the present emphasis for sustainability of pastoral farming, there is a need for greater use of systems models in our agricultural research. RANGEPACK has been used elsewhere in New Zealand to evaluate the impact of new technologies on whole-farm enterprises (Korte & Rhodes 1993), but examples such as this are rare. The effects of variable climate, market forces, and level of debt servicing must be included in decision support analysis. For example, if we had assumed no long-term debt then all scenarios tested would have appeared economically feasible. This study has highlighted the need for sound information on the impacts of management decisions, so dynamic tools such as RANGEPACK can be used with confidence. Continued monitoring of real enterprises will improve credibility of assumptions, particularly those relating to stocking rate and the sustainability of various management practices.

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