August 2006

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Irrigation at all costs? Defining the parameters of viable irrigation in the high country.

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This study was carried out by Graeme Ogle, Ogle Consulting in conjunction with the Merino Monitoring Group. This is a business group forum comprising 23 merino properties from Marlborough to Otago. It was funded by Merino Inc.

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This is a research summary. The original report can be obtained from Allison Brook at Merino Inc. or downloaded from the Merino Inc. web site: www.merinoinc.co.nz

Executive summary

This paper investigates the financial costs and benefits of developing irrigation on a 10,000 SU merino property in a dry environment and provides high country merino farmers with tools to estimate whether or not irrigation would add value to their business. Figures are based on two models developed for the farm: one unirrigated and the other with 220ha developed into irrigation and more associated debt. The project considered the viability of a relatively expensive proposal based on development costs of $6,600/ha (irrigation equipment, water reticulation and fencing) and running costs of $480/ha (energy and labour).

Key findings

- Development and running costs will decide whether irrigation improves wealth. If these costs are high, irrigation will only be profitable if it is brought into production quickly and can produce an extra 10 to 11 tDM/ha/year of pasture.
- If pasture production is lifted by 7 to 8 tDM/ha/year, development costs need to be below $6,000/ha or alternatively running costs below $360/ha/year. Any combination in between is viable.
- If pasture production can only be lifted by 4 to 5 tDM/ha, irrigation will not be viable unless development costs are under $5,000/ha and running costs less than $200/ha/year.

Approach

This study assessed final pasture productivities of 9, 12 and 15 tDM/ha/year from a starting value of 4.4tDM/ha. These equate to increases in pasture production of 10.6, 7.6 and 4.6 tDM/ha. It considered the value of the increased productivity as well as the value of decreasing variability in cashflow and the further benefit of adding to the business' capital value (at a value of $360 per additional stock unit). The measure of value used was Net worth (the value of the owner's equity in the business).

The second part of the analysis considered how changes to the key assumptions affected financial outcomes. These included:

- time taken to gain full production
- changes in pasture production from irrigation
- cost of development
- irrigation running costs.

Developing irrigation on the model farm was relatively expensive at $6,600/ha and running costs (to pump water and supply extra labour) were also high at $480/ha/year. Therefore care was taken to include all possible benefits.

The graphs below will provide high country farmers with an indication of whether irrigation provides an opportunity to add wealth to their business. To calculate this they need to have some estimate of capital development costs, added annual operating costs and the likely productivity of pastures once established.

Results and discussion

Timeframes for return on investment

The high capital and operating costs for the model farm meant that Net worth after 10 years only improved if pasture production could be lifted to 15tDM/ha/year and all development could be achieved in the first year. Dragging development out to two years meant a payback was not achieved in this timeframe. With a quick transition, the 12tDM/ha scenario would catch up to "doing nothing" within 12 years (see Figure 1).

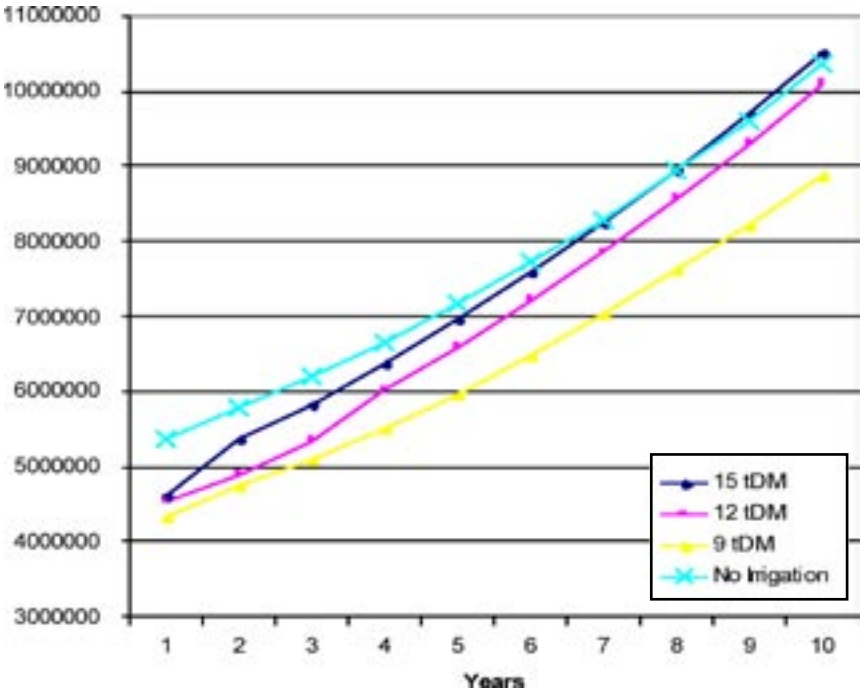

Figure 1. Profit when drought years are included at 1 in each 5 years

Estimating viability

Impact of development costs and productivity

Figure 2 shows the range of outcomes for different costs of capital development ($6600, $4950, $3300, $1650/ha) and different pasture productivities (9, 12 and 15tDM/ha). To interpret this graph, determine what pasture productivity you would expect after irrigation has been established, then your likely capital development cost. The colour of the zone where these points meet indicates how much better or worse the proposal might be when compared to not irrigating.

The unprofitable combinations of high development costs and low pasture production show up as the black and dark areas at the top left of the graph. Below that, the white and paler grey areas reflect the better returns made possible by lower development costs and higher pasture production.

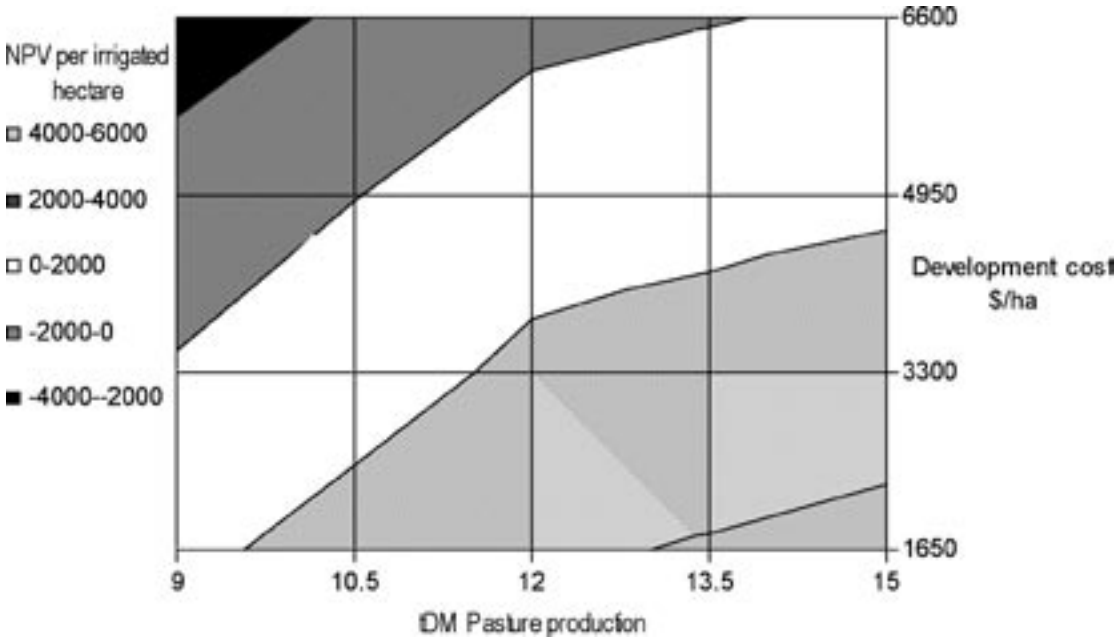

Figure 2. The Net Present Value (NPV) over 10 years from developing irrigation at $6,600/ha and a running cost of $480/ha and achieving a range of annual pasture production levels of 9, 10.5, 12.0, 13.5 and 15.0 tonnes of dry matter.

Impact of running costs

The graphs below repeat the analysis using the same range of capital costs with a range of annual running costs $120, $240, $360 and $480/ha/year. These would represent the total extra cost of labour, repairs and maintenance and costs of water supply. Each graph is calculated at a different final pasture productivity of 9tDM/ha/year, 12tDM/ha/year and 15tDM/ha/year. These represent lifts in pasture productivity above the existing non-irrigated production of 4.6, 7.6 and 10.6 tDM/ha respectively.

These graphs therefore represent the value of establishing a significant area (220 ha) of irrigation on a typical 10,000 SU high country merino farm. Once you have an estimate of the development cost, extra annual running costs and the final pasture productivity of an irrigation proposal, the graphs can be used to calculate whether Net worth increases or decreases.

Pasture productivity 15tDM/ha

The absence of black and dark grey areas in Figure 3 indicates that at 15tDM/ha/year all annual and development cost combinations are profitable.

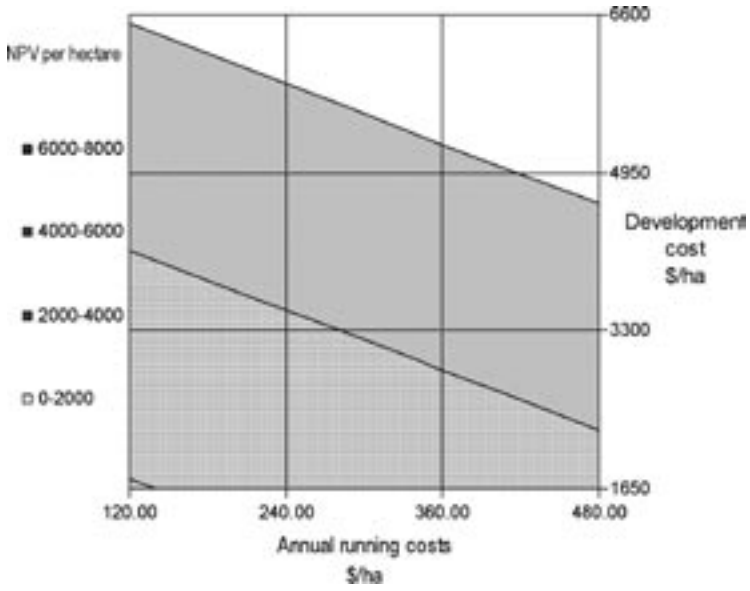

Figure 3. The Net Present Value (NPV) per irrigated hectare over 10 years from developing irrigation at a range of development costs ($1,650, $3,300, $4,950 and $6,600/ha) and running costs varying from $120, $240, $360 and $480/ha at an annual pasture production of 15.0 tonnes of dry matter.

Pasture productivity 12tDM/ha

Figure 4 shows the economics of increasing pasture production to 12t/DM/ha. To increase wealth at this level of production, development costs must remain below $6,600/ha and running costs below $360/ha/year.

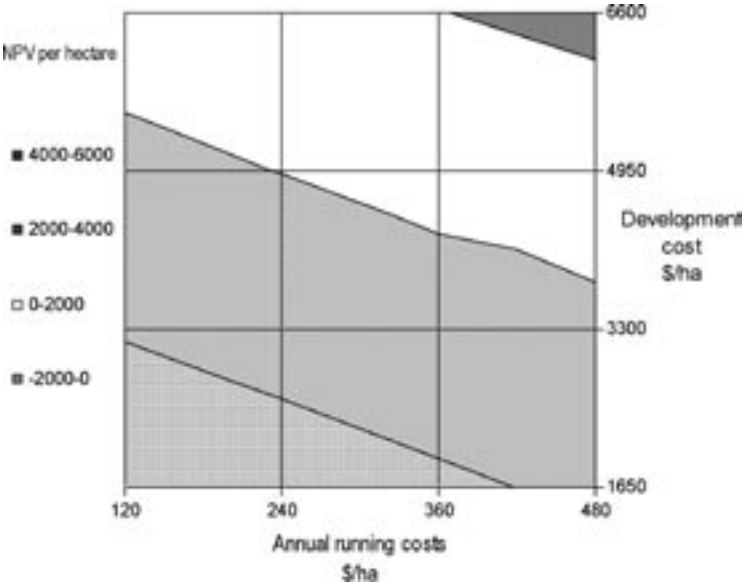

Figure 4. The Net Present Value (NPV) per irrigated hectare over 10 years from developing irrigation at a range of development costs ($1,650, $3,300, $4,950 and $6,600/ha) and running costs varying from $120, $240, $360 and $480/ha at an annual pasture production of 12.0 tonnes of dry matter.

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Pasture productivity 9tDM/ha

Figure 5 shows that at 9tDM/ha/year the only way to do better than not irrigating is to keep development costs very low and/or keep annual running costs low. The best outcomes are restricted to the lightly shaded or white zones at the bottom left of the graph which have a value of $0 to $1.5 million better than no development.

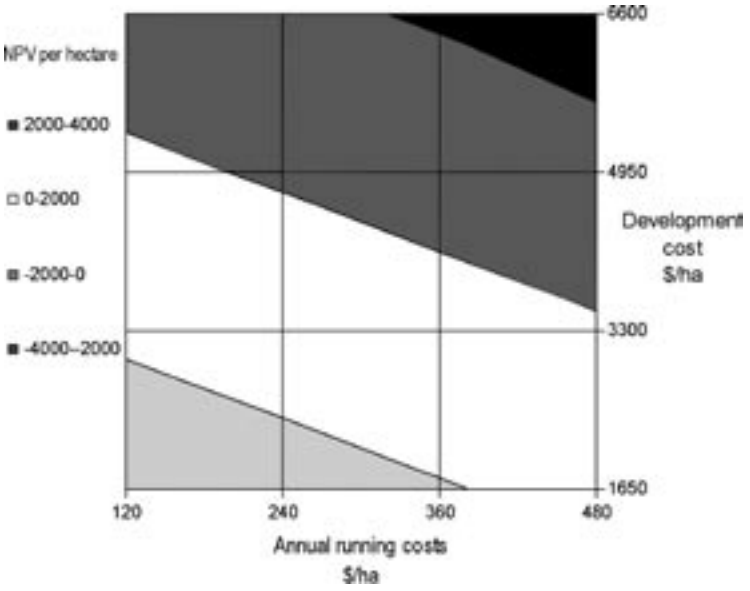

Figure 5. The Net Present Value (NPV) per irrigated hectare over 10 years from developing irrigation at a range of development costs ($1,650, $3,300, $4,950 and $6,600/ha) and running costs varying from $120, $240, $360 and $480/ha at an annual pasture production of 9.0 tonnes of dry matter.