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**AN INVESTMENT IN IRRIGATION BY DAIRY FARMERS
- THE PROBABILITY DISTRIBUTION OF
THE TIME TO PAYBACK**

A thesis presented in partial fulfilment of the requirements
for the degree of **Masters in Applied Science**
in **Agricultural Systems and Management** at
Massey University

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ABSTRACT

In recent years many dairy farmers, particularly in Northland, have expressed an interest in investing in irrigation. The main financial risk that dairy farmers face when considering such an investment arises from uncertainty about the stream of future returns to irrigation. This uncertainty primarily results from the variability of dryland pasture growth rates during the summer months. Obviously, the more prone an area is to drought or dry summer conditions the more profitable investment in irrigation is likely to be. Uncertainty as to the future values of the costs and returns associated with dairying is a second source of risk.

In this study a methodology has been developed to evaluate the economic benefits of an investment in irrigation which takes into account variation in climatic conditions during the summer, and which allows the effects of changes in other key variables to be assessed. Modelling techniques are used, in conjunction with historic meteorological data, to simulate pasture growth rates and derive the resultant farm gross margins, for both a dryland and an irrigated system, over a number of seasons. A Monte Carlo style simulation is then used to obtain the probability distribution of the time to payback.

The methodology was applied to a case dairy farm, based at Rukuhia in the Waikato, in order to illustrate the process. At current (1995/6) prices a \$325,000 investment in irrigation at Rukuhia is estimated to take somewhere between three and ten years to repay its cost, with a 97% probability that payback will occur in the next four to seven seasons. Sensitivity analysis showed that, whilst interest rates, capital investment costs, and the manner in which the transition to an irrigated production system is achieved are important, the milksolids payout is the most significant factor in determining the likely time to payback.

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