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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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TABLE OF CONTENTS

ABSTRACT ............................................................................................................ ii
ACKNOWLEDGEMENTS .................................................................................... iii
TABLE OF CONTENTS ....................................................................................... iv
LIST OF TABLES .................................................................................................. ix
LIST OF FIGURES ............................................................................................... xii
LIST OF EQUATIONS ......................................................................................... xv

CHAPTER 1. INTRODUCTION

1.1 THE PROBLEM ............................................................................................. 1
1.2 THE OBJECTIVES OF THE STUDY ............................................................. 3

CHAPTER 2. BACKGROUND

2.1 INTRODUCTION ........................................................................................... 6
2.2 THE BOSCH LONG LATERAL IRRIGATION SYSTEM ..................................... 7
2.3 IRRIGATION RESEARCH IN THE WAIKATO ............................................... 8
   2.3.1 Irrigation and Pasture Growth ............................................................... 8
   2.3.2 Dairy Cow Production on Irrigated Pasture ......................................... 11
   2.3.3 Management of Dairy Farms Under Irrigation .................................... 15
   2.3.4 The Economic Returns from Irrigation .............................................. 17

CHAPTER 3. THE METHODOLOGY

3.1 INTRODUCTION .......................................................................................... 20
3.2 THE USE OF MODELS IN FARM MANAGEMENT ...................................... 21
3.3 OVERVIEW OF THE METHODOLOGY .................................................. 23
CHAPTER 4. THE PASTURE MODELS

4.1 INTRODUCTION ........................................... 39

4.2 IRRIGATED PASTURE ....................................... 40
  4.2.1 Pasture Growth Rates .................................. 40
  4.2.2 Optimal Water Requirements .......................... 42
  4.2.3 Irrigation Requirements .............................. 44

4.3 NON-IRRIGATED PASTURE ................................. 46

4.4 CONCLUSIONS .............................................. 51

CHAPTER 5. THE DAIRY FARM MODELS

5.1 INTRODUCTION ........................................... 54

5.2 LP MODEL INPUT DATA ..................................... 56
  5.2.1 Returns and Costs .................................... 56
  5.2.2 Pasture Data .......................................... 56
  5.2.3 Cow Data ............................................ 57

5.3 THE BASE STRATEGIES .................................... 62
  5.3.1 Irrigated Pasture ..................................... 63
  5.3.2 Non-Irrigated Pasture ................................. 66
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.3</td>
<td>Discussion</td>
<td>69</td>
</tr>
<tr>
<td>5.4</td>
<td>GROSS MARGINS FOR THE 1946/7 TO 1983/4 SEASONS</td>
<td>71</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Irrigated Pasture</td>
<td>71</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Non-Irrigated Pasture</td>
<td>74</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Summary of Results</td>
<td>75</td>
</tr>
<tr>
<td>5.4.4</td>
<td>Discussion</td>
<td>79</td>
</tr>
<tr>
<td>5.5</td>
<td>CONCLUSIONS</td>
<td>82</td>
</tr>
<tr>
<td>6.1</td>
<td>INTRODUCTION</td>
<td>83</td>
</tr>
<tr>
<td>6.2</td>
<td>DATA FOR THE ESTIMATION OF THE TIME TO PAYBACK</td>
<td>85</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Capital Costs of the Irrigation System</td>
<td>85</td>
</tr>
<tr>
<td>6.2.2</td>
<td>The Returns to Irrigation</td>
<td>86</td>
</tr>
<tr>
<td>6.2.3</td>
<td>The Discount Rate</td>
<td>87</td>
</tr>
<tr>
<td>6.3</td>
<td>PROBABILITY DISTRIBUTION OF THE TIME TO PAYBACK</td>
<td>87</td>
</tr>
<tr>
<td>6.4</td>
<td>SENSITIVITY ANALYSIS</td>
<td>90</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Milksolids Price</td>
<td>91</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Interest Rates</td>
<td>93</td>
</tr>
<tr>
<td>6.4.3</td>
<td>Electricity Costs</td>
<td>96</td>
</tr>
<tr>
<td>6.4.4</td>
<td>Capital Investment Cost</td>
<td>97</td>
</tr>
<tr>
<td>6.4.5</td>
<td>Upper and Lower Bounds for the Probability Distribution of the Time to Payback</td>
<td>98</td>
</tr>
<tr>
<td>6.5</td>
<td>THE TRANSITION TO AN IRRIGATED SYSTEM</td>
<td>101</td>
</tr>
<tr>
<td>6.6</td>
<td>CONCLUSIONS</td>
<td>104</td>
</tr>
</tbody>
</table>
# CHAPTER 7. CONCLUSIONS

7.1 INTRODUCTION .................................................................................. 105

7.2 THE OBJECTIVES OF THE STUDY ..................................................... 105

7.3 STRENGTHS AND WEAKNESSES OF THE METHODOLOGY ....... 107

7.3.1 Strengths .................................................................................. 107

7.3.1.1 Portability ........................................................................... 107

7.3.1.2 Flexibility ........................................................................... 108

7.3.2 Weaknesses ............................................................................. 110

7.3 FURTHER WORK ............................................................................ 110

7.4 MAIN CONCLUSIONS AND RECOMMENDATIONS .................... 111

## APPENDICES

### APPENDIX I. APPENDIX TO CHAPTER 4

AI.1 Irrigation Requirements between 1946 and 1984 ......................... 114

AI.2 Dryland Summer Pasture Growth Rates (1946 to 1984) ............... 115

### APPENDIX II. APPENDIX TO CHAPTER 5

AII.1 Dairy Production LP Model Input Data ....................................... 117

AII.2 Gross Margins for the Irrigated System .................................... 118

AII.3 Gross Margins for the Non-Irrigated System ............................ 119

### APPENDIX III. APPENDIX TO CHAPTER 6

AIII.1 Variation in the Milksolids Payout ........................................... 121

AIII.2 Variation in Interest Rates ..................................................... 123

AIII.3 Variation in Electricity Costs .................................................. 123

AIII.4 Variation in the Capital Investment Cost ................................. 124
Table of Contents

AIII.5 Different Combinations of Milksolids Payout, Interest Rate, and Capital Investment Cost ........................................... 125
AIII.6 Different Transition Pathways to an Irrigated System .......... 127

BIBLIOGRAPHY .................................................................................. 128
LIST OF TABLES

CHAPTER 4. THE PASTURE MODELS

Table 4.1 Average Pasture Growth Rates for Irrigated Pasture...........41
Table 4.2 Average Water Applications on Irrigated Pasture.............43
Table 4.3 Actual and Predicted Irrigation Applications (mm/ha)........45
Table 4.4 Average Pasture Growth Rates for Non-Irrigated Pasture....46
Table 4.5 The Regression Statistics - Fit of the Rukuhia Dryland Pasture Growth Data (January to March) to Equation 4.1...48
Table 4.6 Actual and Predicted Average Pasture Growth Rates (kgDM/ha/day) .................................................................51

CHAPTER 5. THE DAIRY FARM MODELS

Table 5.1 Herd Production Data and Energy Requirements for High and Low Milksolids Production per cow and Different Lactation Lengths...............................................................60
Table 5.2 Cull Herd Data for Alternative per cow Production and Lactation Length Scenarios ..................................................60
Table 5.3 The Base Strategy for Irrigated Pasture (100 hectares).......64
Table 5.4 The Base Strategy for Non-Irrigated Pasture (100 hectares) ..................................................................................67
Table 5.5 Maintenance Phosphorus Requirements for Irrigated and Non-Irrigated Systems .................................................72
List of Tables

Table 5.6  Irrigated and Non-Irrigated Gross Margins Between 1946 and 1984 .............................................................. 76
Table 5.7  Production Statistics for the Two Systems Across 37 Seasons ............................................................................ 78

CHAPTER 6. THE TIME TO PAYBACK

Table 6.1  Results of the Simulation of the Time to Payback .............. 89
Table 6.2  Average Milksolids Payouts (Nominal) from 1984/5 to 1994/5 ........................................................................ 91
Table 6.3  Variation in Rural Lending Rates between March 1988 and December 1995 .............................................................. 94
Table 6.4  Differing Scenarios for an Investment in Irrigation ........... 98
Table 6.5  Base Strategy Milksolids Production Levels and Gross Margins for an Irrigated System with a Three Year Transition Period .......................................................................................... 102

APPENDIX I. APPENDIX TO CHAPTER 4

Table AI.1  Predicted Irrigation Requirements .................................. 114
Table AI.2  Predicted Growth Rates on Non-Irrigated Pasture .......... 115

APPENDIX II. APPENDIX TO CHAPTER 5

Table AII.1  Fortnightly Data for the LP Model ................................ 117
Table AII.2  Cost Data and Gross Margins for Irrigated Pasture Across 37 Seasons ($) .......................................................... 118

Table AII.3  Milksolids Production and Gross Margins for Non-Irrigated Pasture Across 37 Seasons ............................................ 119

APPENDIX III. APPENDIX TO CHAPTER 6

Table AIII.1  The returns to Irrigation at Various Milksolids Prices ($/kg) Across 37 Seasons ............................................................. 121

Table AIII.2  The Cumulative Probability Distributions of the Time to Payback for Different Milksolids Prices ($/kg) ....................... 122

Table AIII.3  The Cumulative Probability Distributions of the Time to Payback for Different Interest Rates ........................................ 123

Table AIII.4  The Cumulative Probability Distributions of the Time to Payback for Different Pumping Costs ..................................... 124

Table AIII.5  The Cumulative Probability Distributions of the Time to Payback for Different Capital Investment Costs .................... 124

Table AIII.6  The Different Combinations of Milksolids Payout, Interest Rate and Capital Investment Cost ........................................ 125

Table AIII.7  The Cumulative Probability Distributions of the Time to Payback for Different Combinations of Milksolids Payout, Interest Rate and Capital Investment Cost ................................. 126

Table AIII.8  The Cumulative Probability Distributions of the Time to Payback for Different Methods of Achieving the Transition to an Irrigated System ...................................................... 127
LIST OF FIGURES

CHAPTER 3. THE METHODOLOGY

Figure 3.1  Schematic Presentation of the Methodology Used to Analyse Investment Decisions for Irrigation on Dairy Farms ................................................................. 24

CHAPTER 4. THE PASTURE MODELS

Figure 4.1  Actual and Predicted Pasture Growth Rates at Rukuhia for the Summer Months Between 1954 and 1964 .................. 50

CHAPTER 5. THE DAIRY FARM MODELS

Figure 5.1  Simulated Herd Average Milksolids Production Pattern for Two Levels of per cow Production ............................. 58

Figure 5.2  Herd Average Metabolisable Energy Requirements for Two Levels of per cow Milksolids Production ...................... 59

Figure 5.3  Milksolids Production for 270 & 300 Day Lactations for the Lower Producing Herd .................................................. 59

Figure 5.4  Maximum Intakes and Metabolisable Energy Requirements per cow for High and Low Level Producing Herds Grazed on Irrigated and Non-Irrigated Pasture ....... 62

Figure 5.5  Optimal Demand and Supply of Irrigated Pasture Dry Matter ............................................................................. 65
CHAPTER 6. THE TIME TO PAYBACK

Figure 6.1 The Expected Returns to Irrigation per Hectare in Order of Increasing Value Across 37 Different Seasons .................................................. 86

Figure 6.2 The Probability Distribution of the Time to Payback .......... 89

Figure 6.3 Probability Distributions of the Time to Payback for Varying Milksolids Prices ................................................................. 93

Figure 6.4 Probability Distributions of the Time to Payback for Varying Interest Rates ................................................................. 95

Figure 6.5 Probability Distributions of the Time to Payback for Varying Pumping Costs ................................................................. 96

Figure 6.6 Probability Distributions of the Time to Payback for Varying Capital Investment Costs ................................................................. 97

Figure 6.7 Probability Distributions of the Time to Payback for Different Milksolids Payout, Interest Rate, and Capital Cost Scenarios for an Investment in Irrigation ................................................................. 99
Figure 6.8 Probability Distributions of the Time to Payback for Different Methods of Achieving the Transition to an Irrigated System .......................................................... 103
LIST OF EQUATIONS

CHAPTER 3. THE METHODOLOGY

Equation 3.1  Grazed Pasture Dry Matter Constraint for Period t .......... 28
Equation 3.2  Silage Feeding Constraint ........................................... 28
Equation 3.3  Constraint to Divide Pasture Fed Between Dry and
Lactating Cows............................................................................... 31
Equation 3.4  Constraint to Divide Silage Fed Between Dry and
Lactating Cows ............................................................................... 32
Equation 3.5  Match of ME Demand and Supply for Lactating Cows
in Period t....................................................................................... 32
Equation 3.6  Match of ME Demand and Supply for Dry Cows in
Period t............................................................................................ 33
Equation 3.7  Potential Intake Constraint for Cows Lactating in
Period t............................................................................................ 33
Equation 3.8  Total Milksolids Produced ............................................. 34

CHAPTER 4. THE PASTURE MODELS

Equation 4.1  The Non-Irrigated Pasture Growth Model......................... 47

CHAPTER 6. THE TIME TO PAYBACK

Equation 6.1  The Time to Payback for an Investment in Irrigation........... 88