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PHYSICAL AND FINANCIAL EVALUATION
OF A GROUP OF HIGH PRODUCING
DAIRY FARMS IN NEW ZEALAND

A thesis presented in partial fulfilment
of the requirements for the degree of

Master of Applied Science (MApplSc)

in
Pastoral Science

Institute of Natural Resources
Massey University
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Patricia Viviane Salles
2002
This thesis is dedicated to my parents

José Eduardo Salles and Teresinha V. Regasso Salles

Traditionally, New Zealand dairy production has been based on high pasture utilisation at high stocking rates, which resulted in low animal performance. Recently, a group of farmers (AGMARDT – Dairy Farm Monitoring Programme) gradually changed their production policy to a high production per hectare system achieved through high animal performance. The system is based on pre and post grazing herbage mass targets, strategic use of supplements to overcome pasture deficit and moderate stocking rates (2.7 cows/ha). This project evaluated the physical and financial characteristics of nine case study farms in the Southern North Island of New Zealand, involved in these changes. A one-year system study was conducted (2000/2001) in which physical and financial data were obtained to identify factors affecting farm production, efficiency and profitability. The results showed that the systems were effective and profitable, under the conditions in the 2000/2001 year. Average annual milksolids production per cow (411 kg MS/cow/year) and per hectare (1,100 kg MS/ha/year) for the case study farms were 33% higher than the national average. Average annual total intake for all farms was 5,257 kg DM/cow, 14,035 kg DM/ha, 59,656 MJ ME/cow and 159,232 MJ ME/ha. Mean economic farm surplus per ha for all case study farms (NZ$ 3,077/ha) was higher than regional averages (by 62% to 84%) and comparable to the industry's top 10% farms. Milksolids production per cow ($R^2 = 0.71$) and per hectare ($R^2 = 0.74$) were closely correlated with pasture intake. Supplements (24% of total annual ME intake) were used to overcome pasture deficits, so their effects were related to long term influences on maintaining both pasture and animal potentials. Differences between pasture intakes from farmer's visual assessment and plate meter readings (adjusted data) in summer, suggested that farmers were underestimating intake and/or the adjusted data, relying on standardised national equations, were overestimated. The measured ME intakes were higher than the theoretical requirements for all farms, suggesting measured intake overestimation and/or feed waste. Feed conversion efficiencies (6.0 to 7.4 g MS/MJ ME intake) increased with decreases in intakes, not with increases in milk yields. On-farm techniques used to measure feed intake, particularly from pasture, should be improved; and farmers’ skill in increasing feed efficiency should be optimised, mainly in the systems achieving higher animal performance. Since the milk payment of NZ$5.00/kg MS will probably not remain in the future, control of production costs should receive more emphasis, particularly supplement costs.

Keywords: dairy system, pasture management, feed quality, pasture intake, supplement intake, animal performance, stocking rate, feed conversion efficiency, cost of milksolids production, profitability.
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# TABLE OF CONTENTS

Abstract .......................................................................................................................... ii
Acknowledgements ........................................................................................................ iii
Table of Contents ........................................................................................................... vi
List of Tables .................................................................................................................. x
List of Figures ................................................................................................................ xiii
List of Plates .................................................................................................................. xvii
List of Appendices ........................................................................................................ xviii

**CHAPTER 1 GENERAL INTRODUCTION** ..................................................................... 1

**CHAPTER 2 LITERATURE REVIEW** .......................................................................... 4

2.1. INTRODUCTION ...................................................................................................... 4
2.2. NEW ZEALAND DAIRY PRODUCTION .................................................................. 4
   2.2.1. Environment and seasonal production ......................................................... 5
   2.2.2. Feed demand versus pasture utilisation and animal performance ............... 9
2.3. FEED CONVERSION EFFICIENCY ..................................................................... 13
   2.3.1. Definition ..................................................................................................... 14
   2.3.2. Factors affecting feed conversion efficiency ............................................... 16
      2.3.2.1. Nutrient partitioning .............................................................................. 16
      2.3.2.2. Diet quality ............................................................................................ 19
      2.3.2.3. Genetic merit .......................................................................................... 20
      2.3.2.4. Age ......................................................................................................... 21
      2.3.2.5. Liveweight ............................................................................................ 21
      2.3.2.6. Stage of lactation .................................................................................. 21
2.4. SUPPLEMENTARY FEED .................................................................................. 22
   2.4.1. The effects of supplementary feed in the system ............................................ 23
   2.4.2. Pasture substitution ...................................................................................... 26
   2.4.3. Use of extra feed in early lactation ............................................................... 27
   2.4.4. Use of extra feed in late lactation ................................................................. 29
   2.4.5. Use of extra feed in winter .......................................................................... 30
   2.4.6. Use of extra feed in summer ....................................................................... 31
   2.4.7. Effects from supplement use in the grazing systems ................................... 33
2.5. FINANCIAL .......................................................................................................... 34
   2.5.1. Production function ...................................................................................... 34
   2.5.2. Financial key performance indicators ......................................................... 37
      2.5.2.1. Profitability measures ............................................................................ 38
      2.5.2.2. Financial efficiency measures ............................................................... 39
4.4.6.2. Metabolisable energy requirements for liveweight change ..........66
4.4.6.3. Metabolisable energy requirements for milk production ..........67
4.4.6.4. Metabolisable energy requirements for pregnancy .................67

4.5. STATISTICAL ANALYSIS .................................................................68
4.5.1. Correlation and stepwise regression analyses .........................68
4.5.1.1. Example of regression equation for $x$ .................................69
4.5.1.2. Example of regression equation for $x_1$ and $x_2$ ..................69

4.6. FINANCIAL ANALYSIS .................................................................72
4.6.1. Cost of production .................................................................72
4.6.1.1. Operating expenses ............................................................72
4.6.1.2. Cost of funds ......................................................................74
4.6.1.3. Income ................................................................................75
4.6.2. Key performance indicators ....................................................75

CHAPTER 5 RESULTS ...........................................................................77

5.1. GENERAL DESCRIPTION .................................................................77
5.1.1. Climate ......................................................................................77
5.1.2. Sward conditions ......................................................................78
5.1.3. Pasture quality .........................................................................79
5.1.4. Nitrogen use ............................................................................82
5.1.5. Supplement quality ................................................................82
5.1.6. Liveweight and condition score ................................................84

5.2. BIOLOGICAL DATA FOR THE WHOLE LACTATION ...............85
5.2.1. Milksolids production ..............................................................85
5.2.2. Feed consumption ..................................................................88
5.2.3. Feed conversion efficiency ......................................................88

5.3. FACTORS ASSOCIATED WITH MILK PRODUCTION AND FEED CONVERSION

5.3.1. Dependent (y) and predictor (x) variables ................................88
5.3.2. Correlation matrix ..................................................................90
5.3.3. Milksolids production per cow .................................................92
5.3.3.1. Addition of predictor variables ............................................93
5.3.4. Milksolids production per hectare .............................................94
5.3.4.1. Addition of predictor variables ............................................95
5.3.5. Feed conversion efficiency of all cows (g MS/MJ ME intake by all cows) .........................................................96
5.3.5.1. Addition of predictor variables ............................................98
5.3.6. Feed conversion efficiency of milkers (g MS/MJ ME intake by milkers) .................................................................100
5.3.6.1. Addition of predictor variables ............................................102

5.4. BIOLOGICAL DATA FOR PART LACTATION ............................103
5.4.1. Milksolids production ..............................................................103
LIST OF TABLES

Table 2.1  Simplified outline of the main components of dairy productivity (Holmes, 1988)............................................................... 15

Table 3.1  The effects of stocking rate and supplement use on milksolsids production and lactation length (Cassells & Matthews, 1995)................................................. 42

Table 3.2  Milksolids production for the AGMARDT farms and for the district averages (1999/2000 season) (AGMARDT, 2000).................................................. 46

Table 4.1  Characteristics of the case study farms for the season 2000/2001............... 50

Table 4.2  Characteristics of the herds for the season 2000/2001.............................. 51

Table 4.3  Mean fat and protein concentrations and metabolisable energy (ME) requirements above maintenance for liveweight gain (LWG) and ME spared through liveweight loss (Holmes et al., 2000a)............................................ 66

Table 4.4  Recommended daily metabolisable energy requirements above maintenance for milk production by dairy cattle grazing leafy pasture (11 MJ ME/kg DM). Adapted from Holmes et al. (2000a)........................................ 67

Table 4.5  Metabolisable energy required during different stages of pregnancy by cows (MJ ME/cow/day), in addition to maternal requirements for calf birth weights of 30, 35 and 40 kg (Holmes et al., 2000a)........................................ 67

Table 4.6  Market price utilised in the supplementary inventory (Matthews, 2002, personal communication)................................................................. 73

Table 5.1  Average pasture nutrient values of all case study farms for samples cut to grazing height (season 2000/2001)............................................................... 80

Table 5.2  Nitrogen application for individual farms for the season 2000/2001..... 82

Table 5.3  Average metabolisable energy (MJ ME/kg DM), crude protein (g/kg DM), acid detergent fibre (ADF, g/kg DM) and neutral detergent fibre (NDF, g/kg DM), for the range of supplements utilised on all case study farms in the season 2000/2001. Some values were assumed from the literature (see Section 4.4.2.2)............................................................... 83
Table 5.4  Annual milksolids production and annual milk yield, both per cow and per hectare, lactation days and daily peak production per cow for each farm (season 2000/2001) ................................................................. 86

Table 5.5  Dependent variables analysed in the whole lactation ........................................ 89

Table 5.6  Predictor variables analysed in the whole lactation ........................................ 89

Table 5.7  Pearson correlation (r) matrix between pairs of dependent variables (y) and between predictor (x) and dependent variables ......................................................... 90

Table 5.8  Pearson correlation (r) matrix between the variables pasture, supplement and total intake (x) with the dependent variables (y) ......................................................... 91

Table 5.9  Milksolids production and milk yield per cow and per hectare for the first and second part of lactation, for each farm (season 2000/2001) ................................. 106

Table 5.10 Economic farm surplus per hectare (EFS/H), gross farm income per hectare (GFI/H), return on assets (ROA), operating profit margin (OPM), assets turnover ratio (GFI/A), revenue to labour ratio (GFI/L) and revenue per labour unit (GFI/LU), for the case study farms .................................................. 109

Table 6.1  Effective area (ha), herd size, stocking rate (cows/ha) and annual milksolids (MS) production per cow (kg MS/cow/year) and per hectare (kg MS/ha/year), for the case study farms and regional averages (LIC, 2001; MAF, 2001; Dexcel, 2002, personal communication) ..... 115

Table 6.2  Comparison between theoretically calculated requirements of annual total metabolisable energy (ME) intake per animal by all cows and measured annual total metabolisable energy intake per animal by all cows, for the season 2000/2001 ................................................................. 121

Table 6.3  Annual total metabolisable energy (ME) intake per animal by all cows and annual total milksolids yield per cow. Adapted from Penno (2001) ................................................................. 122

Table 6.4  Average of daily total feed intake (pasture plus supplement) and daily pasture intake per animal by milkers, for the first and second parts of lactation. Percentage of supplementary feed of total metabolisable energy (ME) intake in the first and second parts of lactation ........... 130

Table 6.5  Feed conversion efficiency of all cows (g MS/MJ ME and g MS/kg DM), annual metabolisable energy (ME) and dry matter (DM) intakes per animal by all cows (MJ ME/cow/year and kg DM/cow/year), annual milksolids production per cow (MS/C, kg MS/cow/year) and per hectare
(MS/H, kg MS/ha/year) and stocking rate (SR, cows/ha), for Group one and Group two. The theoretical FCE(ME)md was calculated dividing the actual milksolids production per cow by the theoretical metabolisable energy intake per cow. ................................. 132

Table 6.6 Feed conversion efficiency of milkers, annual metabolisable energy (ME) and dry matter (DM) intakes per animal by milkers and annual milksolids production per animal, for Group one and Group two........ 133

Table 6.7 Feed conversion efficiency of all cows (g MS/MJ ME intake) for treatments receiving no supplementary feed from off farm sources (Control), supplementary feeds of rolled maize grain (MG), whole maize crop silage (WCS), nutritionally balanced ratio (BR) and pasture silage conserved at the farmlet (LS), for three complete years. Adapted from Penno (2001). ........................................................................... 134

Table 6.8 Total feed intake by milkers (kg DM/ha/year), pasture intake by milkers (kg DM/ha/year), stocking rate (cows/ha), cost of milksolids production (NZ$/kg MS) and proportion of supplementary feed used from annual total dry matter intake by all cows (%), for all case study farms....... 139

Table 6.9 Gross farm income per hectare (GFI/H), economic farm surplus per hectare (EFS/H), return on assets and operating profit margin (EFS/GFI), for the case study farms and regional averages (LIC, 2001; MAF, 2001; Dexcel, 2002, personal communication)................................. 142
## LIST OF FIGURES

| Figure 2.1 | Typical seasonal patterns of pasture production in New Zealand, showing the daily accumulation rates (kg DM/ha/day) for clover, grass and total pasture. Mean annual production is also given (t DM/ha) (Korte et al., 1987). |
| Figure 2.2 | Monthly pasture growth rates in the Manawatu region, mean of 11 years data (a) and monthly pasture growth rates from Massey No. 3 Dairy for three years (b) (Matthews, 1994). |
| Figure 2.3 | The relationship between feed demand and supply in a pastoral system, in a moist summer and cool winter region, with 2.5 cows/ha and no supplements (Holmes & Matthews, 2001). |
| Figure 2.4 | The relationship of pasture intake per animal to various pasture characteristics and methods of pasture allocation (Poppi et al., 1987). |
| Figure 2.5 | A summary of the effects of increasing stocking rate by 1 cow/ha on milksolids production per hectare (a) and milksolids production per cow (b) in trials comparing different stocking rates between 1958 and 2000 (Penno, 1999). |
| Figure 2.6 | The digestion and metabolism of dietary energy in ruminant animals. Adapted from Hodgson (1990). |
| Figure 2.7 | Partitioning of nutrients (Bauman & Currie, 1980). |
| Figure 2.8 | Energy balance for lactating dairy cattle: energy balance, milk yield, milk composition and dry matter intake (a); energy status is represented by the bars, while mean milk yield, mean fat percentage and mean protein percentage are represented by the symbols □, ○, and ■ respectively (Vries & Veerkamp, 2000). Energy balance and dry matter intake (b) (NRC, 1988); energy balance, milk yield and energy intake (c); the dashed line indicates recommended overfeeding during the last one-third of lactation to recover body energy stores needed to support the next lactation (Bauman & Currie, 1980). |
| Figure 2.9 | Trends in the ratio of feed and grazing costs (a) and ratio of fertiliser (b) as a proportion of total expenses (Deane, 1999). Trends in ratio of total cash expenses to farm income (c) (Deane, 1999). |
Figure 2.10 Immediate and carry-over effects of supplementary feeds in dairy systems. (Brookes, 1996; Holmes & Matthews, 2001) (adapted)........25

Figure 2.11 The relationship between feed demand and supply in a pastoral system, in a moist summer and cool winter, with 2.5 cows/ha, early calving and supplements feed in early lactation (Holmes et al., 2000c).................28

Figure 2.12 Graphical illustration of a production function (Kay & Edwards, 1994)......................................................................................................................................................36

Figure 4.1 Factors influencing the outcomes of a pastoral dairy system........48

Figure 4.2 Sward data collection and measurements.............................................52

Figure 4.3 Supplement data collection and measurements.....................................56

Figure 5.1 Monthly rainfall recorded at No. 4 Dairy Unit, Massey University, Palmerston North.................................................................77

Figure 5.2 Average adjusted pre and post grazing herbage mass values for all case study farms (kg DM/ha) of milkers and dry cows (season 2000/2001)....78

Figure 5.3 Pasture dry matter content for samples cut to grazing height and ground level. Average values for all case study farms for the season 2000/2001. .............................................................................................................................................79

Figure 5.4 Average metabolisable energy (ME) (a), crude protein, acid detergent fibre (ADF) and neutral detergent fibre (NDF) (b) for all case study farms, for pasture samples cut to grazing height (season 2000/2001)....80

Figure 5.5 Average botanical composition for all case study farms of pasture samples cut to grazing height (a) and to ground level (b) for the season 2000/2001..............................................................81

Figure 5.6 Average daily intake per cow for all farms (kg DM/cow/day) by milkers (Aug to May) and dry cows (Jun and Jul), for the season 2000/2001...84

Figure 5.7 Annual feed intake per cow and per hectare, by milkers plus dry cows, expressed in dry matter (a and c) and metabolisable energy (b and d), for each farm (season 2000/2001).................................87

Figure 5.8 Feed conversion efficiency of all cows and feed conversion efficiency of milkers, expressed in dry matter intake (DM) (a) and metabolisable energy intake (ME) (b), for each farm (season 2000/2001)........88

Figure 5.9 Simple linear regression for the variables MS/C and TME/Cm...........92
Figure 5.10  Simple linear regression for the variables MS/H and TME/Hm. .......... 94
Figure 5.11  Simple linear regression for the variables FCE (ME)md and TME/Cmd. ................................................................. 97
Figure 5.12  Simple linear regression for the variables FCE (ME)md and MS/C ....... 97
Figure 5.13  Quadratic regression for the variables MS/C and TME/Cmd ............. 98
Figure 5.14  Simple linear regression for the variables FCE (ME)m and TME/Cm . 100
Figure 5.15  Simple linear regression for the variables FCE (ME)m and MS/C .... 101
Figure 5.16  Simple quadratic regression for the variables MS/C and TME/Cm .... 101
Figure 5.17  Feed intake per cow and per hectare by milkers for the first part of lactation, expressed in dry matter (a and c) and metabolisable energy (b and d), for each farm (season 2000/2001) .................................................. 104
Figure 5.18  Feed intake per cow and per hectare by milkers for the second part of lactation, expressed in dry matter (a and c) and metabolisable energy (b and d), for each farm (season 2000/2001) .................................................. 105
Figure 5.19  Feed conversion efficiency of milkers (MS/total intake by milkers) for the first and second parts of lactation, expressed in dry matter intake (DM) (a) and metabolisable energy intake (ME) (b), for each farm (season 2000/2001) .................................................. 107
Figure 5.20  Cost per kg of milksolids (bars) for each farm and their respective entrepreneur’s profit for three prices of milksolids (MS): NZS3.4/kg MS (a), NZS4.2/kg MS (b) and NZS5.0/kg MS (c) .................................................. 108
Figure 5.21  Average cost per kg of dry matter (a) and MJ of metabolisable energy (b) consumed, for individual farms. ......................... 109
Figure 5.22  Quadratic regression for the variables MS/H and TDM/Hm, involving the eight case study farms utilised for the financial analysis. .......... 110
Figure 5.23  Average physical product (APP) and marginal physical product (MPP). ................................................................. 111
Figure 6.1  Comparison of adjusted and unadjusted estimates of pre (a) and post (b) grazing herbage mass (AGMARDT, 2001). ......................... 119
Figure 6.2  Simple linear regressions across all farms between estimated and required (theoretical) annual metabolisable energy (ME) intake by all
cows with (a) and without (b) liveweight change during the season 2000/2001 (Present data).................................................................. 121

Figure 6.3 The effect of intake of metabolisable energy (ME) on milk output and liveweight change (Broster & Thomas, 1981)..................................... 135

Figure 6.4 Simple quadratic regression for the variables MS/H and TDM/Hm, involving the eight case study farms utilised for the financial analysis. ................................................................................. 138
<table>
<thead>
<tr>
<th>Plate 4.1</th>
<th>Botanical composition of thawed sample collected at grazing level (left) and botanical composition of fresh sample collected at ground level (right).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 4.2</td>
<td>Examples of condition scoring system for Friesian cows (LIC, 2000).</td>
</tr>
</tbody>
</table>

59
LIST OF APPENDICES

Appendix 4.1 Example of a monthly calibration regression between RPM reading (kg DM/ha) and visual sward assessment (kg DM/ha) for an individual farm (season 2000/2001) ........................................... 160

Appendix 4.2 Soil types and characteristics for all case study farms ........................................... 161

Appendix 5.1 Adjusted pre and post grazing herbage mass (kg DM/ha) of milkers and dry cows, for each farm (season 2000/2001) ........................................... 163

Appendix 5.2 Metabolisable energy concentration (MJ ME/kg DM) in pasture cut to grazing height, for each farm (season 2000/2001) ........................................... 165

Appendix 5.3 Concentrations of crude protein, acid detergent fibre (ADF) and neutral detergent fibre (NDF) (g/kg DM) in pasture cut to grazing height, for each farm (season 2000/2001) ........................................... 167

Appendix 5.4 Botanical composition of herbage cut to grazing height for each farm (season 2000/2001) ........................................... 169

Appendix 5.5 Contribution of each feed to total feed intake (MJ ME) for the whole season (2000/2001), for individual farms. Some supplements used in particular farms were not plotted in the graphs, due to a very small proportion compared with total feed intake. They were: baleage (Farm 2, 0.1%), hay (Farms 2 and 5, 0.1% and 0.2%, respectively) and molasses (Farm 4, 0.05%) ........................................... 171

Appendix 5.6 Liveweight (kg) and condition score estimated from approximately 25% of the herd at four different periods (late September (1), late November (2), mid March (3) and late May/early June (4)), for each farm (season 2000/2001) ........................................... 173

Appendix 5.7 Milksolids production per cow (kg MS/cow/day) and number of milkers for each farm (season 2000/2001) (averages of 10-day periods) .......... 175

Appendix 5.8 Total feed intake (pasture plus supplement) per cow by milkers (MJ ME/cow/day), pasture intake per cow by milkers (MJ ME/cow/day) and milksolids production per cow (kg MS/cow/day), for each farm (season 2000/2001) (averages of 10-day periods) .......... 177

Appendix 5.9 Correlation matrix between pairs of general predictor variables (x) ........................ 179
Appendix 5.10 Correlation matrix between pairs of intake predictor variables (x) .... 180

Appendix 5.11 Cost of production and income for individual farms (season 2000/2001). The values are expressed as totals per farm .............................................. 181

Appendix 5.12 Cost of production and income for individual farms (season 2000/2001). The values are expressed per effective hectare ........................................ 182

Appendix 5.13 Input level of intake (kg DM/ha/year), total physical product (TPP, kg MS/ha/year), average physical product (APP), marginal physical product (MPP), total value product (TVP, NZS5.0/kg MS) and marginal value product (MVP) ................................................................. 183
Vision without action is just a dream.

Action without vision is just activity.

Vision and action together can change the world.

Joel Barker
President
Infinity, Ltd.
CHAPTER 1

GENERAL INTRODUCTION

The primary objective of dairy production systems is to produce high quality dairy products for human consumption by utilising the ability of the grazing ruminant animal to consume and transform feeds that are not suitable for human nutrition into milk. Milk should be produced at competitive prices for the consumer, as well as being profitable for the producers. This implies that the inputs and outputs of the system should be precisely adjusted.

Low milk production costs in New Zealand grazing systems are based on growing and utilising large amounts of grazed pasture. Effective feeding of the herd in a grazing system must ensure that feed demand is matched by the supply of pasture throughout the year (Holmes et al., 1987). The success of New Zealand dairy production over the past years has been based on the increased amount of pasture harvested as a consequence of better pasture utilisation resulting from high stocking rates (Holmes, 1998; Matthews, 1995), combined with genetic improvement, which increased milk production and feed conversion efficiency per animal (Holmes & Matthews, 2001). Traditionally, dairy systems have adjusted herbage intakes to overcome feed deficits, and pasture limitations have resulted in low animal performance (Matthews, 1994). When the objective is to increase production per cow, high pasture allowances are required in order to achieve high animal intakes. However, greater herbage allowance could increase herbage wastage, leading to a conflict between pasture utilisation and forage intake (Hodgson, 1990; Matthews, 1995).
When aiming at high intakes per animal, supplementary feed may replace the cow’s function as the buffer of the system. The input of supplements reduces variation in farm production levels, but supplementary feed inputs and farm profitability vary between seasons (Matthews, 1995), depending on the amount of supplement required and the relative price of supplements and milk.

After identifying that high pasture utilisation leads to a certain degree of animal underfeeding, a group of farmers have gradually changed their production policy from a focus on high production per hectare through high stocking rate to a strategy based on high production per hectare through improved animal performance. They concluded that this objective could be obtained by decreasing stocking rate and utilising supplements strategically, while still maintaining efficient pasture utilisation.

Accordingly, a three-year Dairy Farm Monitoring Programme was established (see Chapter 3) on twelve farms in the Southern North Island of New Zealand. All farms were attempting to improve per cow nutrition in order to improve farm productivity and profitability. This study shows an analysis of the results of the third year of the project, and focuses on the physical and financial components influencing the performance of these dairy systems. The specific objectives of this study are:

- to understand and identify factors affecting productivity, efficiency and profitability of the case study farms;

- to compare the physical and financial performance among the case study farms and with industry data;
to identify opportunities for further improvement in the efficiency of both physical and financial management of the case study farms;

These objectives were accomplished through a series of biological and financial analyses. This thesis is presented in seven chapters. Chapter 2 is a review of literature reporting relevant physical and financial information. It covers the topics of New Zealand dairy production, feed conversion efficiency, supplementary feed utilisation and tools for the analysis of financial data.

The Dairy Farm Monitoring Programme is described in Chapter 3. It contains information regarding the background of the project, objectives, project benefits and outcomes for the 1999/2000 season. Chapter 4 describes the methodology used to monitor the case study farms. It covers the biological measurements and calculations, as well as the statistical and financial analyses.

Chapter 5 provides a general description of the farms followed by information on feed consumption, feed conversion efficiency, factors influencing milksolids production and financial results for individual farms. The main findings and their implications are considered in a general discussion (Chapter 6) and conclusions (Chapter 7).
2.1. INTRODUCTION

Milk production in New Zealand is mainly based on grazed pasture. Grazing production systems are characterised by relatively short lactations determined by the seasonal nature of pasture growth. Consequently milk production is mainly restrained by the availability of feed throughout the year. The possibility of extending lactation through the use of supplementary feed has been widely demonstrated throughout New Zealand. However, the biological and economic efficiency of this approach has shown great variation when supplements are included in the system, due to numerous variables affected by their utilisation. Herd, pasture, reproduction and nutrition management and costs of production play an important role in the efficiency and profitability of a dairy farm. All these factors must be adjusted to take full advantage of the system’s potential. This literature review aims to outline the key points of New Zealand dairy production; the main factors related to feed conversion efficiency and supplementary feed utilisation and the importance of production function and financial key performance indicators.

2.2. NEW ZEALAND DAIRY PRODUCTION

Less than 10% of the total milk produced in the world originates from grazing systems (Steinfeld & Maki-Hokkonen, 1995), including most dairy farms in New Zealand. The reason for the low proportion of milk production from grazing systems is the difficulty