THE FINANCIAL MANAGEMENT SYSTEMS USED ON THREE IMPORTANT FARM TYPES IN NEW ZEALAND.

J.C.LOCKHART

1990

A thesis presented in partial fulfilment
of the requirements for the degree of
Master of Agricultural Science in
Farm Management
at
Massey University, New Zealand.

ABSTRACT

Effective financial management is central to long-term profitability on New Zealand's farms, especially in the setting of a market-led economy. While this view is widely accepted and advocated, detailed knowledge of the financial management systems used by farmers is not available. This lack of knowledge limits the opportunities to specify improvements to this increasingly important dimension of farm management.

This study reports the findings of surveys made in 1988 to investigate the financial management systems used by farmers on three important farm types in New Zealand. Surveys were made of South Taranaki dairy farmers, Taihape sheep and beef farmers and orchardists on the Heretaunga Plains. Over seventy individual interviews with farmers were completed. These were complemented with mail surveys of a further ninety farmers. The financial management systems in the three study areas are compared and contrasted using the survey data. These systems are also appraised relative to models of financial management which are developed from basic principles.

Important differences are discerned between the financial management systems used by farmers in the dairy, sheep and beef and pipfruit industries. Although half of the surveyed dairy farmers complete a financial plan, only a small proportion of these attempt to reconcile the outcome of farming events with their plans. The situation in the sheep and beef industries is similar. However, a greater proportion of farmers in these industries completes the planning function than in the dairy industry. This is likely to reflect farmers' responses to the removal of publicly funded support for their enterprises and the limited extent of co-operative activity of producers in both the meat and wool industries relative to the dairy industry. The majority of orchardists surveyed use formal financial planning methods and effect a greater degree of control over their operations than do farmers in the other industries surveyed. Orchardists achieve this by updating their budgets both more frequently and regularly than do dairy and sheep and beef farmers. Detailed cross-tabulations of key aspects of the financial management systems on the surveyed farms are reported. Cluster analysis techniques are used to classify the financial management systems of the farmers on each of the three farm types surveyed. The attributes of farmers in the three clusters derived in the analysis are described. It is concluded that significant opportunities exist to improve the financial management systems used by New Zealand's farmers, at least in the three industries surveyed. Practicable means of achieving these improvements are recommended.

ACKNOWLEDGEMENTS

I wish to express my considerable gratitude to Professor F.M. Anderson for his continuous assistance, support and self control during the completion of this study.

This study would not have been possible without the co-operation of the farmers of South Taranaki, Taihape and Hawkes Bay. The hospitality and cooperation was excellent. I hope that they will benefit in some way from this study. The Kiwi Co-operative Dairy Company, New Zealand Apple and Pear Board and Federated Farmers also provided assistance during the surveys.

A number of people in the Department of Agricultural and Horticultural Systems Management have assisted me and provided inspirations throughout this study, in particular Mr A.F. McRae. Help and constructive comments were always available from Mr D.I. Gray, Mr W.J. Parker and Dr A. Wright. Mr I.F. Kirton and Mr J.A. Stone from the Department of Accountancy were instrumental in developing my crude grasp of the accounting function and;

Christine and Denise for the lively office-banter,
Jenny and Bill for the tennis and Steinies in Inglewood,
Philips for the technology that helped, and hindered, this production,
Noel for the bed in Utiku,
MG for providing a lively alternative to what is otherwise drab motoring,
Pamela for the 'room with a view' in Frimley,
Omega for the constant reminder that time is slipping by,
Elizabeth for the scones and legal advice,
Charles Upham (V.C. and bar) for the challenge, and the sword,
Jo for introducing me to Carolyn,

and

my wife, Carolyn.

Partial funding of this study was provided by the Massey University Research Foundation.

Any deficiencies in this thesis are my responsibility and are not due to those mentioned above.

TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1. INTRODUCTION

> He [Major Major's father] was a long-limbed farmer, a God-fearing, freedom-loving, law-abiding rugged individualist who held that federal aid to anyone but farmers was creeping socialism.
>
> Joseph Heller. Catch-22, 1961.

1.1 FARM MANAGEMENT NEEDS IN THE NEW ENVIRONMENT

For a number of decades before 1984, successive New Zealand Governments have pursued protection and exchange rate policies designed to benefit the agricultural sector. A range of assistance measures evolved, including subsidies on purchased farm inputs and outputs, and our agricultural services. Inevitably some of these policies had side effects which were countered by the introduction of additional measures. A maze of assistance programmes were in operation, the combined effects of which were extremely complex (OECD, 1987). Market prices and returns were distorted and resources moved from less protected to more highly protected sectors. This led to sub-optimal investment decisions from a national point of view. The Government's policy, as presented in the Budget document of 1984, was to move to a lower and more even level of assistance across all activities in a 'progressive and predictable manner'. The policy was not to introduce special aid features for sectors of the industry which do not adapt successfully to a changing domestic and international environment (Moyle, 1984; Douglas, 1984). To date this stance has largely been maintained[1].

Agricultural production in New Zealand is 'based on the family farm' (Stone, 1968). The New Zealand farmer fulfils the combined roles of entrepreneur, manager and provides at least part of the labour force for which the farmer receives a residual (and variable) income. Trading profit is often insufficient to achieve farming objectives, and business acumen is rarely developed through competition. Stone (ibid.) described the competition for overseas markets as being 'at best second hand competition'. The agricultural sector has become increasingly exposed to market forces as Government policy has moved away from ad hoc interventionism (Walton, 1987; Bryant, 1988). So, although the competition may still be second hand, farmers are now receiving clearer market signals.

Primary producers are not the only members of the agricultural sector to come under the scrutiny of Government. Producer Boards have been evaluated by Treasury, and some which were concerned purely with the local market have been phased out. Of the remaining export-orientated Boards, namely the New Zealand Apple and Pear Marketing Board, the New

1 The Wine Industry Assistance Package (Fraser, 1989) and the labour market are exceptions to this stated Government policy.

Zealand Dairy Board, the New Zealand Meat Producers Board and the New Zealand Wool Board, only the functions of the NZAPMB have been reviewed and it seems to have remained virtually unchanged despite recommendations for loss of some powers (Whitty, 1988). The creation of the New Zealand Kiwifruit Marketing Board in 1988 appears to be in conflict with Government's stated policy goals. The old Ministries and Departments which were basically supportive of agriculture such as DSIR, MAF and Lands and Survey, have been replaced by truncated organisations with less political influence and 'less loyalty towards those they serve' (Whitty, ibid.).

Taylor (1986) reported declining stock numbers and production levels of both wool and lambs on sheep and beef farms in New Zealand. At that time, farm investment, farm income and land values were all being eroded. Increasing numbers of what were once viable units were being, and remain, hard pressed to meet the economic demands associated with the Government's new policies. During the last five years of economic restructuring in New Zealand, the agricultural sector has been beset with economic and physical problems. High real interest rates and inflation, and changes in the value of the New Zealand dollar have all had an impact on farm profitability. Regional droughts and flooding in 1988-89 have also resulted in major costs for producers. Since 1984 prices of some agricultural sector products have, however, increased significantly. Higher prices for both wool and, more recently, for dairy products (Evans, 1989) have stimulated renewed interest in the rural sector. Dairy product prices have returned, in real terms, to 1983/84 levels (NZDB, 1989) as is shown in Table 1.1. The recent increase in dairy product prices has given renewed optimism to dairy farmers. The profitability of these farmers has yet to be restored to pre-1984 levels.

Table 1.1. Milkfat payout to N.Z. farmers from 1983/1984 to 1989/1990 ($/kg milkfat).

Year	Price	
	nominal	in 1989 prices
1983/1984	3.40	5.50
1984/1985	3.70	5.30
1985/1986	4.00	5.00
1986/1987	3.20	3.40
1987/1988	3.60	3.80
1988/1989	5.40	5.40
1989/1990	6.00[a]	6.42[a]

[a]Projected return.
Source: NZDB, 1988; NZDB, 1989.

According to Brazendale (1985), the new economic policies of Government will ensure that the most efficient producers receive the greatest rewards. However, some farmers, although being technically efficient producers, are poor financial managers. While farmer's developed their

financial management systems against the background of Government support, many do not appear to have adapted to the changed farming environment. The 'triage principle' cited by Dillon (1979) could be applied to New Zealand farmers. They can be classified (like human casualties) into three groups: those farmers whose businesses will fail no matter what is done by way of support for them; those who, if properly treated, should survive; and those who can look after themselves. McRae and Kirton (1987) suggest that 'there are a few farmers with a high level of business acumen who do not require further help, however, most farmers have systems with few formal attributes and require help. The bottom group of farmers are already in a severe financial predicament and may be beyond saving'.

For a private sector business to survive it must be profitable over the long term. While acknowledging the existence of management objectives other than profit maximisation on farms, farmers must still maintain their business in a profitable state to survive. The financial state of at least a third of New Zealand's farms has been described as 'critical' (MAF, 1987a). Some farmers' investment decisions implemented just prior to this recent period of change will have contributed to their current poor financial situation. Other farmers who have relied, albeit unwittingly, on Government to ensure the profitability of their business do not have the financial management skills or systems in place on their farms which are necessary for the survival of their farm.

Alexander (1986a) urged that for farmers to survive the present downturn in farm profitability, they must 'harden their resolve to adopt sound management practices'. By contrast, less Government interference in the economy presents frequent opportunities that, if exploited, will increase farm profit. For example, exchange rate movements are directly reflected in export meat price schedules (Journeaux, 1987). New Zealand farmers need to manage their production systems using objective rather than subjective decision making methods. The financial information which farmers use must be both timely and accurate to achieve this goal. An actively used financial management system is necessary to ensure that the best management decisions are made. This issue is the focus of this study.

1.2 THE PROBLEM AND THE STUDY OBJECTIVES

Financial planning, control, and profit evaluation are regarded by most farm management professionals as subjects that are generally well understood (Guy, 1987). However, McRae and Kirton (ibid.) in their study of farm accounting practices suggest that the theory and practice of farm financial planning, control and profit evaluation are in need of updating by both the farm management and farm accounting professions. Farm financial management is most often considered to be the function of the accounting profession. Lockhart et al (1988) showed that on farms where financial management is deliberate, rather than ad hoc, it is the result of slow

evolution for a specific enterprise. McRae considers that the current low level of understanding of financial management displayed by farmers is a matter of some concern as it may indirectly be restricting the adoption of the technological and economic changes required by farmers for their business to survive.

New Zealand farmers rarely use information provided by the formal accounting process for decisions relating to the profit evaluation function (Lockhart et al, ibid.). Financial management on most farms focuses on the acquisition of current account funds regulating farm spending to stay within some prearranged overdraft limit. Current account statements from the bank, stock firm or dairy company, and lately GST books, are often the sole source of information considered when making financial decisions.

The limited scope and impact of financial management on New Zealand's farms suggests there is a significant opportunity for the design and implementation of improved financial management systems. Additionally, because the country's farmers are no longer buffered against the vagaries of the market place, it is likely that those farmers using effective financial management systems will have more profitable farms than their counterparts who rely upon mainly informal and qualitative financial management methods. However, although the need for farms to be profitable is universally acknowledged, there is a dearth of information on the nature and extent of financial management systems used by New Zealand farmers.

A number of surveys completed by MAF and others (Hockey, 1963; Fitzharris, 1971; Leonard and Fraser, 1971; MacGillivray, 1973; Dale, 1973) have sought to learn from New Zealand's farmers the different sources of information they use when planning. They identified the information used by farmers when planning, largely in regard to technological change and provided details on the information farmers supposedly received. However, these surveys did not report or examine how the information was actually used in the planning process. Other studies have focussed on technological change (Kampanellas, 1979; Greer, 1971). This was consistent with the focus at that time on production issues in all of New Zealand's agricultural industries. None of these studies specifically addressed the topic of financial management.

This study reports the findings of surveys made in 1988 to investigate the financial management systems used by farmers in three of New Zealand's main rural industries. The first objective of the surveys was to identify and describe the informal and formal financial management systems used and, where possible, to relate generally the type of system used to the overall farm situations. Data were gathered to enable the financial management system in operation by farmers in the three industries to be compared and contrasted against the special circumstances and needs of farms in each industry.

The second objective was to devise a schema for the classification of farmers' financial management systems and to use this scheme to characterise the attributes of the systems used by different groups of farmers.

1.3 THE RESEARCH APPROACH

Production from sheep and beef farms and dairy farms together account for 51% of New Zealand's export receipts (NZDS, 1989). Horticulture accounts for another 6.6% of exports, as shown in Table 1.2.

Table 1.2. The sources of New Zealand's export receipts ($NZ million fob).

Year ended 30 June	1984	1986	1988
Meat and meat products	1,705	1,732	2,217
Dairy products	1,427	1,716	1,776
Crude animal materials	227	199	273
Wool	1,166	1,379	1,728
Hides and skins	200	320	547
Total pastoral based exports	4,725	5,346	6,541
Fresh kiwifruit	126	294	443
Apples and pears	89	118	162
Other fruit and vegetables	190	240	230
Cereals and cereal products	82	86	48
Seeds	26	43	135
Honey and eggs	6	12	7
Total agricultural exports	5244	6139	7566
Total New Zealand exports	8,623	10,572	12,451
Percentage of export receipts from agriculture	60.8%	58.1%	60.8%

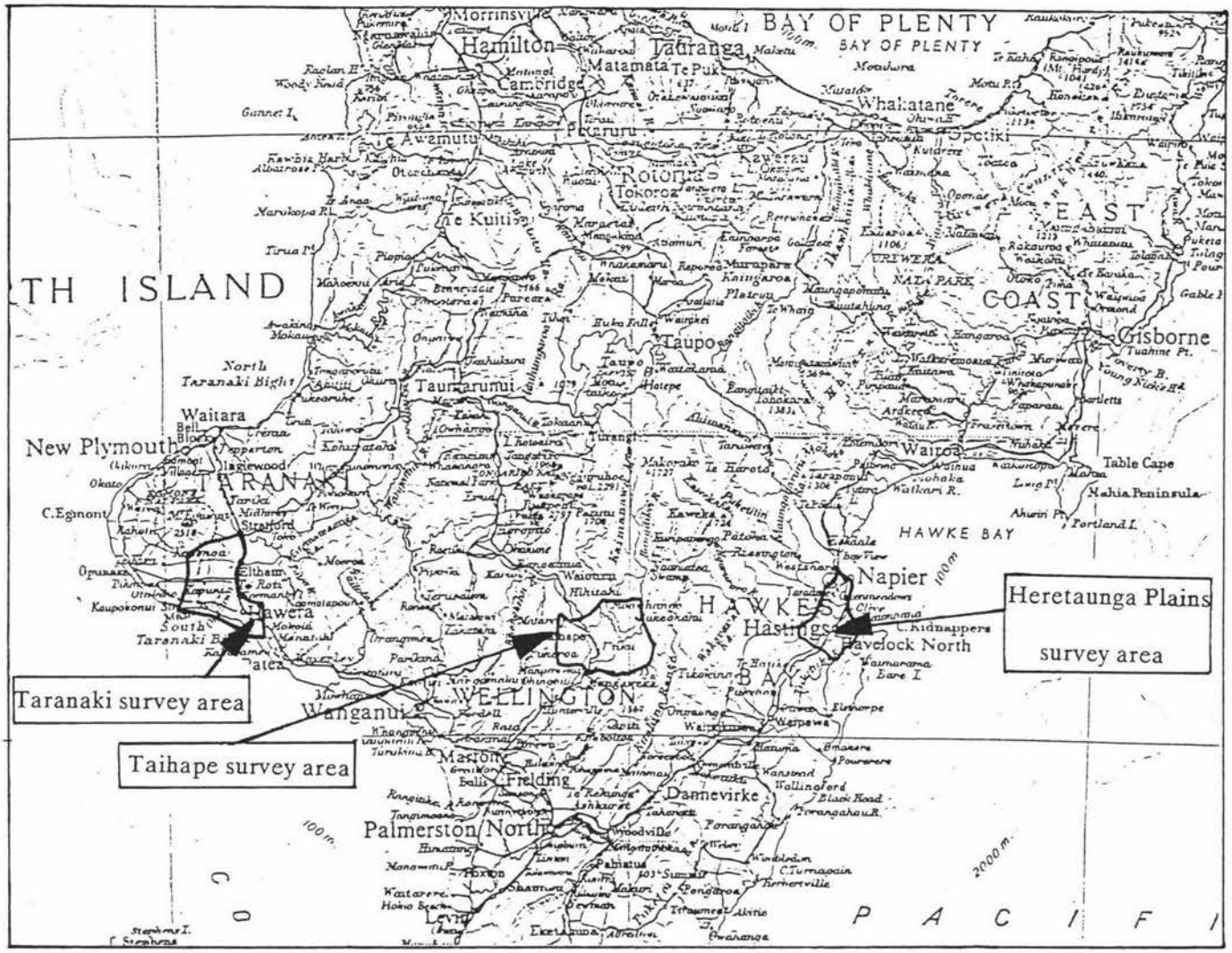
Source: Department of Statistics, 1989.

Together, sheep and beef farms, dairy farms and pipfruit orchards account for some 89% of the farm gate value of products from New Zealand's farms (MAF, 1988). Therefore, it is appropriate to examine the financial management systems on farms in each of these three industries. Because comparisons between farms within each sector and between sectors are facilitated when mature rather than developing enterprises are the object of the surveys, it is also appropriate to select study areas where the industries have a long (by New Zealand standards) and stable presence. By selecting mature industries the study will largely avoid farmers undertaking enterprise changes as the financial management systems observed on mature farms will not be expected to be complicated by the needs of development planning.

To minimise costs of undertaking necessary field work it was also desirable to have the study

areas within reasonable distance of Massey University. The location of these study areas is given in Figure 1.1. The three study areas selected all have long histories of excellence in production. An overview of each of the three study areas follows.

Figure 1.1. The three study areas.



1.3.1 Dairying in South Taranaki

The dominant physical feature of Taranaki is Mount Egmont, an active volcanic cone rising to 2518m asl. The mountain markedly influences weather patterns in the surrounding districts. South Taranaki receives 1300-1500mm of rain annually. Rainfall increases to an average of 2000mm at an elevation of 400m asl (Palmer et al, 1981), the approximate boundary between pastoral farming and the Egmont National Park. Rainfall is most often evenly spread, however, summer dry spells can occur on farms closer to the coast.

The first two cows in South Taranaki were owned by the Reverend Skevington after he set up the Heretoa Mission Station at Inaha in 1842. Cattle were driven up from Wellington for the new settlers in the district. Dairying, at Hawera for example, was originally a means of

providing food for families as well as produce for barter for tradesmen's goods until a secure income was assure (Bromley, 1981). Butter was first exported from South Taranaki in 1881 to Tasmania by the Peterson family. By 1895 refrigeration had developed to the stage where it permitted exports of butter to England through the Port of Wellington. Proprietary dairy factories were built in Normanby, Okaiawa, Kapuni, Hawera and Meremere by 1895. Each of these served a district within a three mile radius, the distance a horse and cream cart could travel within an hour.

There are now 328 seasonal supply dairy farms in the Waimate West County all of which supply milkfat to the Kiwi Cooperative Dairies Ltd (NZDB, 1986). The area is renowned for dairy farming with one of the highest county average figures in New Zealand for milkfat production per cow and milkfat yield per hectare. The effective area per farm in the County averages 57 hectares while the average herd size is 165 cows. Nationally, dairy farms have an average effective area of 67 hectares and herds of 136 cows. The higher stocking rates in Waimate West County are sustained by higher than average pasture production.

1.3.2 Sheep and Beef farming in the Taihape District

Weather in the region is well suited to the needs of pastoral farming. Taihape receives some 1300mm of rain annually. Seasonal variations to this are small. Farms to the east of Taihape tend to receive lower rainfall than those to the west. Farms to the east receive some 1100mm which is in the main evenly distributed, however, some water deficits can occur. Farms to the west of Taihape receive 1400-1500mm of rainfall annually (MWD, 1971).

The town of Taihape was first settled in 1846. Initially, the hills surrounding Taihape were bush, clad with rimu, totara, red and white beech. Sir Thomas Duncan started and financed the settlement of the first 45 farmers in the district in the late 1840s. Development of the district in the early decade of settlement was hampered by poor market access. Limited development took place for the rest of the century. On Christmas Eve 1907, the main trunk railway was eventually completed and engines from both Auckland and Wellington met in Taihape (Lowry, 1986). The region's development accelerated after that time and the town grew to a maximum population of 3002 during the steam train era.

Currently, there are 182 sheep and beef farms in the Taihape district. The district is bounded to the north by the Napier-Taihape road and the south by Ohingaiti and Rangiwahia. It is spared the extreme variations in rainfall encountered on sheep farms on the east coast as it receives regular summer rainfall. The better summer rainfall in the Taihape district results in more consistent stocking rates over time and annual production on farms is reliable.

1.3.3 Pipfruit on the Heretaunga Plains

The Heretaunga Plains is the oldest orcharding district in New Zealand (MAF, 1972). The district receives 700-800mm of rain annually with frequent summer dry spells. The district is spared the high wind runs received by most regions of New Zealand although the very warm summer days are often disturbed with dry fohn north-westerly winds. Winters are sufficiently cold for the chilling needed by pipfruit and stonefruit.

The earliest farmers in the district were William Guthrie, who planted sturmer apples at Mangateretere in 1874, and John Goddard who established the Havelock Nurseries in the late 1870s. The fruit trade began in 1899 when fruit and vegetables were transported in 'considerable quantities' to Wellington by the mail train and auctioned early the following morning. Smaller consignments went to Hawera, Pahiatua and Mangatainoka. The Hawkes Bay Fruit Growers Association was established the same year with the aim of developing the Hastings District into a flourishing fruit growing centre (Boyd, 1984). By 1910 there were 540 hectares planted in orchards and, on average, a further 136 hectares were planted annually until the outbreak of World War I. At the time one third of the area in fruit in the Hastings district was planted in apples, one third in peaches and the remainder was in pears, gooseberries, apricots, prunes, raspberries and nectarines (Boyd, ibid.). The Hawkes Bay Fruit Growers Association established their first cool store in 1914. Cool storing of apples and pears prolonged their shelf life and allowed for the development of an export trade. The first shipments were to South America, with fortnightly consignments of apples and small quantities of pears.

The Hastings Apple and Pear Board stores are now being supplied fruit from 532 orchards on the Heretaunga Plains (NZAPMB, 1988). Approximately 50% of New Zealand's total apple and pear crop comes from this region, with 4.5 million cartons being exported annually from the port of Napier in Hawkes Bay.

1.4 ORGANISATION OF THE STUDY

This chapter has provided a brief overview of farming circumstances in New Zealand. The study problem was then identified and the objectives defined. The research approach was introduced and a brief history of each of the three study areas was presented. Chapter 2 provides an overview of the literature on systems concepts and farming systems. Recent farm management literature with special reference to the planning, implementation and control functions of farm management is discussed. Chapter 3 provides a review of farm financial management and a normative model of farm financial management is presented.

The survey methodology undertaken to establish farmer practice in relation to financial management is described in Chapter 4. Chapter 5 provides a description of the dairy, sheep and beef and pipfruit industries. 'Typical' farms in each industry, from the perspective of the design, application and impact of ideal financial management systems are then described. Common features and important differences of the three farming systems studied are identified. Systems specific models of farm financial management are then developed. In Chapter 6 the results of the three surveys are presented and farmer practices are compared and contrasted with the three systems specific models of farm financial management. A schema for the classification of farmer's financial management systems is presented in Chapter 7. The likely benefits from the application of this schema are then discussed and research needs identified. The study's conclusion is presented in Chapter 8.

CHAPTER 2. SYSTEMS, FARMING SYSTEMS AND FARM MANAGEMENT

> It is pure unadulterated country life. They get up early because they have so much to do and go to bed early because they have so little to think about.
>
> Oscar Wilde. The picture of Dorian Gray, 1891.

2.1 INTRODUCTION

Food production systems are older than any other man-made production system. Agriculture has been man's most necessary enterprise other than reproduction, and hunting and gathering, since the end of the last ice age some 12,000 years ago. Since then, farming systems have developed and adapted from the influences of both external stimuli and the needs and demands of farms and their families. Technological advances in agriculture have, since the beginning of the industrial era, largely been the result of reductionist research. Now that these component advances are slight, as evidenced by the declining rate of progress over the last twenty years, there has developed a need for systems level agricultural research. The application of systems thinking to agriculture, although not new, aids considerably to understanding the important characteristics of the systems being studied.

This chapter provides an overview of the recent literature on systems concepts with particular reference to farming systems. The use of models to simulate systems and their components is then introduced. Recent farm management literature is then reviewed with special reference to the functions of farm management. The roles of the farm manager in relation to the functions of management are introduced. The decision making process is then discussed. Based on Dillon's (1980) definition, the three functions of farm management of planning, implementation and control are developed.

2.2 SOME SYSTEMS CONCEPTS

The 'systems approach' addresses problem solving by considering the system under study as an indivisible whole. The systems approach is based on the idea that it is necessary to identify and describe the system that one wishes to understand, whether to improve it, repair or copy it, or to compare it with others (Spedding, 1979; Holt and Schoorl, 1985). Many authors define systems (Ackoff, 1973; Dillon 1976; Holt and Schoorl, ibid.; Wright, undated) but the most useful definition offered, in the context of this study, is that by Spedding (ibid.). Spedding defines a system as;

"a group of interacting components, operating together for a common purpose, capable of reacting as a whole to external stimuli; it is unaffected directly by its own outputs and has a specified boundary based on the inclusion of all significant feedbacks,"

Spedding's definition highlights the importance of the external environment in which the system performs and the ability of the system to react to this environment. External stimuli are important when considering the role of management within an agricultural system. The physical, economic and political environments all provide significant feedback to the manager of an agricultural system. The systems approach is a powerful way of identifying the structure of natural world systems, and of studying the relationships between components and the whole.

Dillon (ibid.) describes scientific thought prior to the advent of systems thinking in terms of two concepts, reductionism and mechanism. Reductionism implies reducing phenomena to their more basic parts while mechanism implies that phenomena can be explained in terms of machine-like cause and effect relationships. The influence of the environment, Dillon claims, was largely ignored because scientific explanations were developed in environment-free laboratories. Science today increasingly tends to gain an understanding of the structure of the parts from an understanding of the functioning of the whole. A systems perspective is, therefore, in strong contrast to Descartes' (1637) reductionist perspective;

"To divide each of the difficulties under examination into as many parts as possible, and as might be necessary for its adequate solution".

Among systems theorists there is agreement (Ackoff, ibid.; Dillon, ibid.) that each component affects the properties of the system as a whole, and each component depends for its own properties and for how it effects the system on the properties of some or other component(s) of the system. By virtue of the properties of its components, a system is an indivisible whole. Because of these properties, a set of elements that forms a system always has some characteristics, or can display some behaviour, that none of its elements or subgroups can. This unique behaviour is described by Conway (1985) as emergent properties.

2.3 FARMING SYSTEMS

According to Haines (1982), the term farming system predates the term systems analysis. Haines notes that each farm is a highly organised set of operations, which exists in a complex of natural, social and economic environments whose interactions shape the individual farm system. Hierarchical concepts also apply in systems theory (Conway, ibid.). Ackoff (ibid.) describes hierarchy as 'every system may be part of a larger system'. A dairy farm, for example, is part of the larger the dairy industry.

Models have been widely used to analyse and design farming systems (Jeffers, 1978; Miller, 1983; McCall, 1984; Ridler et al, 1987). Many authors offer a categorisation of models (Rosenblueth and Weiner, 1945; Churchman et al, 1957; Wright, 1971; Mihram, 1972). Models can be either qualitative or quantitative. Qualitative models are classified as iconic or analog (depending whether the subject is represented pictorially or by some other set of properties) (Churchman, ibid). Mihram classifies quantitative models as either dynamic or static (depending on whether any of its features or symbols change over time); continuous or discrete (a continuous dynamic model uses continuous variables, the discrete model uses discrete variables); and stochastic or deterministic (stochasticity acknowledges variability whereas with deterministic models the outcome from any set of initial conditions is certain). Models are also either optimising or non-optimising. Non-optimising models require the user to make some informal judgement outside of the model when selecting from among alternative systems. Dent (1975) and Spedding (1975) note that there are many kinds of models, but they are all representations of a real system. They are simplified for some purpose and include those features that are essential for the purpose.

A simulation model is a working replica or a re-creation of a situation, component or system. Several authors (Shubik, 1960; Ackoff, 1967; Anderson and Hardaker, 1979) claim that simulation modelling can be used as a tool for anticipation and planning in a range of different settings. A budget is a static, discrete, deterministic, non-optimising simulation model which has a ready application to planning problems in agriculture. Cash forecast budgets have two important advantages over more sophisticated optimising models. Firstly, they are relatively easy to use and so are not particularly demanding of analytical skills, advanced computer facilities, or the like. With respect to these advantages their place for on-farm planning is unequivocal, however, they are quite demanding of knowledgeable intuition. Secondly, simple models permit the chain of causality between assumptions and model output to be more readily traced and understood. Consequently, although the assumptions may be stronger than for more complex models, analysts are less likely to be deceived by their own fabrications. The analyst, in this case the farmer, can easily assess the outcome on farm profit, cash surplus and equity of different prices and quantities of farm inputs and outputs. In doing so tactical decisions can be implemented to ensure that the farmer's goals are achieved.

The operational units of agriculture may be described as agricultural systems (Spedding, ibid.). Several classifications of agricultural systems have been mooted (Duckham and Masefield, 1971; Ruthenberg, 1977; Spedding, 1979). These classifications include all the variations in size and complexity of units that are called enterprises, farms, plantations, regional and national agricultures. Farming systems are simply those which have an agricultural purpose. A farming system combines interacting components including soil, plants and animals which are managed together for the common purpose of meeting the farmer's objectives. A farming system is capable of reacting to external stimuli, such as, physical or economic factors. It is unaffected by

its own outputs. However, the returns received from these outputs will, depending on the farmer's objectives, indirectly affect the system.

The systems approach provides a framework for the description and analysis of agricultural production. The use of this framework to describe agricultural production developed in the early 1970's (Dent and Anderson, 1971; Duckham and Masefield, 1971; Dalton, 1975; Spedding, 1976). All agricultural production systems can be described in terms of their purpose, boundary, context, components, interactions, resources, inputs, products, by-products and constraints (Boulding, 1956; Spedding, ibid.; Haines, ibid.). These features of any system provide a description which has qualitative and quantitative elements.

The boundary of a farming system is specified so that all significant feedbacks are included are included within the system. A farm system encompasses both a production system and a management system (Wright, undated). Gray (1987) defines a production system as 'a biological system that produces products from inputs by the interaction of components within the farm boundary'. The management system is defined by Gray (ibid.) as 'the system used on the farm to plan, implement and control the production system'. Wright states that information is an output from the production system and information is, in turn, an input to the management system.

Agricultural systems are complex. Bywater (1973), Spedding (1976), Thomas (1980), and Bawden and Valentine (1985) all regard farming as a highly complex business enterprise. Bywater claims farming shares many managerial problems with its industrial counterparts, but, in addition, has many unique features. Many of these features may be related to the dependence of agricultural production on biological processes which involve the interactions of complex systems and include substantial elements of uncertainty (Amir et al, 1978; Dillon, 1980). The agricultural manager has to contend with a wide range of biological processes which are fundamentally different. As farm enterprises become more heavily capitalised and managerial decisions become more critical, the margin for error is severely reduced. Therefore, decisions must increasingly be based on the most advanced and detailed information available, and not, as is so often the case, on rules of thumb.

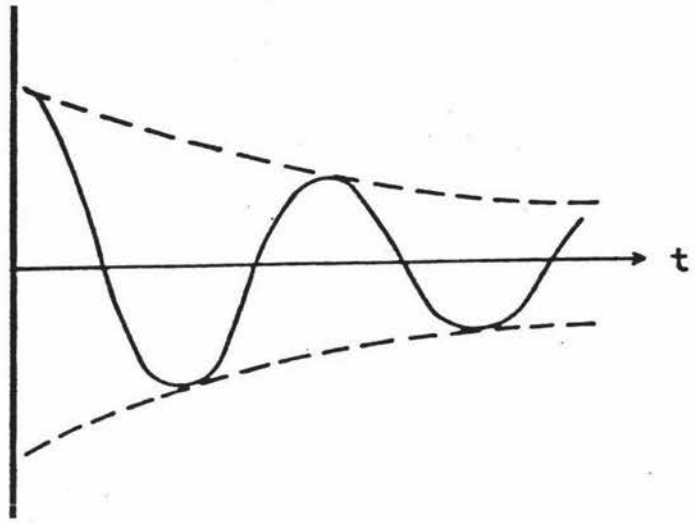
The management of farming systems to achieve multiple objectives adds further to the complexity of resource allocation decisions on farms. Thomas (ibid.) suggests that there is even a wider range of human attitudes towards succession, inheritance and retirement within the family structure than there are farming systems. This dimension is further complicated by considering other economic components of a farm system. Farming systems will be influenced by either external forces or directly by the farmer (Spedding, ibid.; Dalton, ibid; Wadsworth, 1983). Changes to the system itself will also influence the output. The amount, cost, priority, timing, type, genotype, combination, frequency and duration of the components of a system are

all factors that management can influence and/or control. Dalton (ibid.) and Amir et al (ibid.) consider it necessary for the managers of agricultural systems to be aware that interactions exist between the components of a system. However, it does not appear necessary to understand the reasons for interactions, provided management is knowledgeable of empirically linked events. For example, it is unnecessary to have knowledge of biology at a cellular level.

The complexity of the management of commercial agricultural systems appears to increase as increasing pressures are imposed on resources, as economies expand and environmental issues assume greater prominence. Spedding (ibid.) claims that optimal decisions will become more difficult to reach under these conditions. Forecasting under these uncertain conditions is difficult. The 'capable systems agriculturalist', as described by Bawden and Valentine (ibid.), is 'one who approaches real world agricultural situations, experiences, events and problems with a sense of their wholeness'. They suggest a convenient way of examining such wholeness is to 'view it as a dynamic system of interrelated physical, biological, economic and human parts'. The flexibility of farming systems, it is claimed, can be used to compensate for possible losses, and to take advantage of unforeseen events. However, Cherrington (1983) states that decisions made about what to plant on arable farms, once implemented, are usually irrevocable until harvest. If a crop fails there is limited time available to replant within the same growing season (Cheetham, 1988). The ability of the manager to change the output from a system does not appear as great as is claimed by Thomas (ibid.).

Each farming system is dependent on endogenous biological processes to provide stability to it. Exogenously determined events will have important impacts on farming systems which alter the short-term level of output from the production system. However, in the long-term the feedback processes usually dominate those which tend to produce instability with the result that farming systems are, in the main stable. Although the relationships involved are complex, production in the longer term from a farming system is functionally related to the resources available, the production technologies used and the management. These concepts are illustrated in Figure 2.1.

Figure 2.1. The long-term stability of farming systems.



Schematic illustration of an agricultural system which when disturbed from equilibrium is stable. From R.M. May. (1974). Stability and complexity in model ecosystems. Princeton.

2.4 THE ROLE OF FARM MANAGEMENT IN FARMING SYSTEMS

Definitions of farm management are offered in most standard farm management texts (Black, 1947; Bradford and Johnson, 1953; Castle et al, 1972; Nix, 1979; Buckett, 1981; Kay, 1981; Barnard and Nix, 1982). However, in the context of this study, Dillon's 1980 definition of farm management is appropriate. Dillon defines farm management as;

'...the process by which resources and situations are manipulated by the farm manager in trying, with less than full information, to achieve his goals'.

Flood (1955) describes management in a business context as making decisions based on statistical analysis. Rickards and McConnell (1967) state that intuition will not be good enough for making decisions with respect to allocating scarce farm resources among production alternatives to maximise profit. Hence, some form of analysis is required. A distinction can then be drawn between management which occurs in situations where information is collected, analysed and used and other situations.

Giles and Stansfield (1980) conclude that it may be more helpful to think in terms of management applied to farms than of farm management as a subject in its own right. Similarly, Meij (1965) argued that management is the 'common province of different sciences'. According

to Meij, the three functions of farm management of planning, implementation and control are no different from the functions of management as applied to other sciences. While the principles of farm management appear to be in common with that found in other industries, their application is not without its own peculiar challenges. Some of the problems associated with the management of farms, for example the uncertain yields of biological processes, are characteristically different from those associated with management in industry where the level of production is controlled and the impact of external factors on the system, such as, weather is minimal.

Barnard and Nix (1979), Walsh (1981) and Kay (1981) discuss the need for planning in the context of the theory of the firm. The need to plan production arises from three basic considerations; goals are to be achieved, resources available to meet these goals are limited, and the resources available have alternative uses. Planning is then the allocation of scarce resources - land, labour, capital and management - amongst production alternatives in a way which satisfies best the wants or goals of the individual (Castle et al, 1972). One goal will be profit, if not profit maximisation then certainly a 'satisfactory amount' (Dalton, 1982). Both Stokes (1979) and Nuthall (1980) state that goals are essential for the continual development of the farm. It is only when the farmer's objectives are not being met that dissatisfaction will be experienced and change will be contemplated. The choice of what to do will depend on the way in which different plans fulfil the farmer's goals.

Blackie and Dent (1973), Wright (undated) and Squire and Delahunty (1982) begin discussions on farm management with the need for the farmer to forecast input and product prices and yields. The complexities and uncertainties in the agricultural decision making environment and the associated variability in prices lead to variability in farm profits and income (Knight, 1921). Lingard (1974) suggests that this variability makes farm planning difficult, and if prices are unknown when managers are planning production, individual managers form subjective forecasts of prices and base their planning on such forecasts.

Although relatively simple planning techniques are available to farmers, systematic planning for change taking place is not expected to be commonplace. Farmers probably undertake a fundamental replanning of their business 'no more than once or twice in their working lifetime' (Longbottom, 1980; Hardaker and Anderson, 1981). Farm management commentators blame this apparent lack of planning by farmers on the amount of time required and the lack of empathy that farmers show towards office tasks. Both Giles (1973) and Alexander (1988) comment that the choice between investment opportunities on many farms is endless as is the range in returns the investments offer.

Except for those instances when planning indicates that no action is the optimal choice, planning is negated if no follow up action to implement the plan is taken. Squire and Delahunty

(ibid.) describe implementation as the most critical part of farming. Implementation requires the scheduling of the activities and resource use. Resources include not only quantities of materials and numbers of livestock, but also finance and (family) labour. Squire and Delahunty (ibid.) state that these latter two inputs are often ignored by the farmer during the planning process. For example, farmers often consider their own and their family's labour as 'free', so labour is not treated as a resource. However, the allocation of labour to different tasks and enterprises has an important impact on overall farm returns.

Generally, the less use a farmer makes of data, from both on-farm and off-farm sources, the less likely he is to forecast prices and yields accurately (Warren, 1982). Data are derived from the farm business through monitoring both the physical and financial components of the farm. They provide information to the farmer on the progress of the business in relation to the plan. While it is widely acknowledged that monitoring and record keeping can be tedious (Pollard and Obst, 1978), systematic and objective evaluation is unlikely to take place without this information. Makeham and Malcolm (1981) state that 'time spent on planning, budgeting, and deciding between alternative courses of actions can be largely wasted unless the farmer has the skills to put the programme into action effectively'.

Implementation proceeds rarely as planned as unforeseen events inevitably occur (Mitchell, 1981). Conditions on or beyond the farm may change and thereby necessitate some adjustments in the execution of a farm plan. The relative neglect of implementation in the literature has unintentionally reduced its relative importance to less than that of the other two functions of farm management. While many authors stress the importance of implementation, standard texts on farm management such as Castle et al (1972), Barnard and Nix (1979) and Harsh et al (1981) make only passing reference to the topic, supposedly leaving it to chance!

Control is described by Koontz and O'Donnell (1972) and Blackie and Dent (1973) as the 'continuous comparison of projected targets with the present state of the system'. Giles and Stansfield (1980) suggest that inadequate performance can easily be masked in any multi-enterprise business without a control system. In a study of British farmers, Norman (1986) found that farm managers devoted the greatest amount of their time to the supervision of staff and communications and little time was devoted to the control function. In spite of the importance of the control function, farmers spend little of their time on this aspect of management. Norman's results are summarised in Table 2.1.

Table 2.1. Average percentage of UK farm managers' working time spent on management activities and physical farm work.

Farm task	Percentage of time
Farm husbandry	4.6
Other work	6.2
Staff supervision	11.0
Communications	7.0
Physical records	3.7
Buying/Selling	2.9
Other work	4.1
Recording	4.4
Computing	1.8
Capital investment	1.5
Budgeting	1.5
Setting objectives	1.0
Physical farm work	43.9
Self development	6.4
Total	100.0

Source: Norman, 1986.

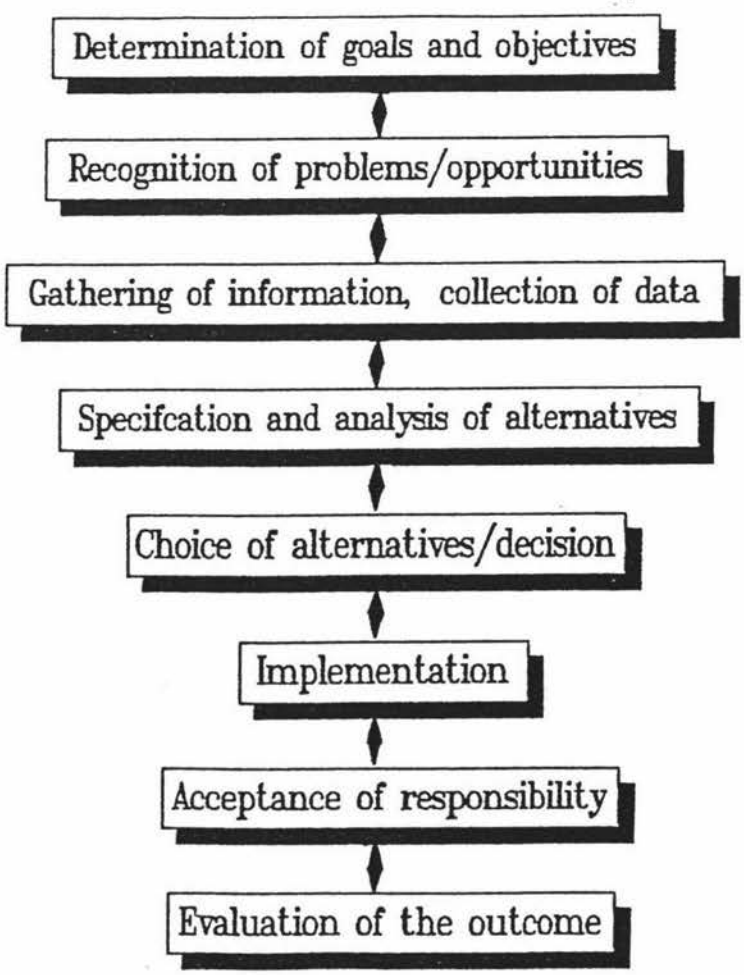
Physical and economic factors external to the farm may influence production to the extent that a new plan with its accompanying new goals may need to be identified (Anderson and Dent, 1974; Stokes, 1979; Giles and Stansfield, 1980). If these factors (or the assumptions made about their future values, such as price expectations) remain unchanged and the performance of the system follows target projections, no adaptive behaviour is necessary. These authors suggest that adaptive behaviour may be necessary when actual performance diverges from the target path. Having determined the cause of the deviation, the decision is then whether to adapt or to remain off target. The adaptive response may involve attempting to return the system towards the previously planned final state or some other feasible alternative. The action taken will depend on the estimated outcomes from the various alternatives and on the manager's preferences. Managers will, however, accept some variation about the planned outcome before planning an adaptive response. Determining the reasons for differences between actual and target performance may not be easy as often several factors are involved. The new course of action may then require the manager to re-evaluate his objectives.

Hardaker and Anderson (1981) suspect that for most farmers 'management is a matter of routine'. Major changes to this routine are seldom contemplated and many of the changes that are made occur more by a process of steady adaptation rather than as one orgastic choice. Only major crises such as marked price changes or severe droughts are likely to prompt drastic action and, even then, the adjustment made may be less radical than seems often to be imagined. The reality is that if farmers constantly sought out all the decision alternatives open to them they would be faced with an overwhelming choice problem. Most avoid this situation by adopting a

While some minor differences are offered in the literature in the definitions of the three functions of management there is little disagreement that there are three distinct management functions planning, implementation, and control. However, each of these three functions only has an operational meaning when goals are defined. Many factors influence the selection of goals including present and future requirements for the business, policies for development, attitudes towards risk, knowledge, tradition, tenancy status as (owner-occupier or tenant) and taxation. Profit maximisation is a commonly assumed but much simplified statement of a farmer's goal.

The decision making process, as defined and described by Bradford and Johnson (1953) describes the individual steps that management makes up until a decision is made. This process has been further developed to include the implementation and control functions as separate steps and is presented as the farm management process (Osburn and Schneeberger, 1983). The relationships among these eight steps are depicted in Figure 2.2. The process is iterative. The steps are mutually independent, with feedback and frequent interaction between the steps.

Figure 2.2. The farm management process.



2.5 A CLASSIFICATION OF THE DECISIONS OF FARM MANAGERS

Many authors (Black, 1947; Fayol, 1949; Pearce, 1958; Castle et al, 1972; Buckett, 1981; Kay, 1981; Harsh et al, 1981) have classified farm management decisions. Two schemes have been prominent. One is based on the essential character of the decision area involved. The other is based on the type of decision involved. In the first scheme, decisions are defined as being mainly of a technical, commercial, financial or accounting character. The decision types schema classifies decisions on the basis of the characteristics of the decision. Decision types are classified on the basis of importance, frequency, imminence, revocability and the number of alternatives available.

The classification of a farm manager's decisions into decision areas is more relevant to this study as it provides a framework from which a normative model of farm financial management can be developed. Mumey (1987) draws the distinction between financial management and the general topic of farm management. Financial management is closely related to the management of assets, or the stock of and accumulation of wealth needed to operate the farm business. Farm management decisions are divided into the following four decision areas (based on Osburn and Schneeberger, 1983);

(1) **Technical decisions** are those concerned with production choices, especially what to produce and what production technology to use, and how to adapt production to changing economic and technical conditions. Technical decisions will include, for example, the setting of calving dates, drying off dates and lambing dates, determination of weaning policies and the scheduling of both irrigation and pest and disease control. Farmers will have limited choice on many decisions reflecting, for instance, the farmer's skills and experience with the husbandry and the requirements of quality control for products destined for export. Pest and disease control on orchards, for example, is largely determined by spraying programmes recommended by the New Zealand Apple and Pear Marketing Board.

Not all daily activities of managers are accurately described as management functions (Koontz and O'Donnell, 1972). The technical activities of farm husbandry should not overshadow the other essential activities of the farm business. Husbandry activities such as making hay, feeding stock and maintaining and operating machines hold an absorbing fascination for most farmers but good husbandry alone does not ensure the long term profitability of a farm business (Black, 1947; Pearce, 1958).

(2) **Commercial decisions** include all buying and selling decisions. This area involves procuring inputs plus the orderly storage, handling and the marketing of commodities produced. It also includes market forecasting and contracting in of specialist services. In

the past, stock firms and produce companies undertook and had responsibility for many of the commercial decisions of their farmer clients. Stock agents bought and sold livestock and merchandise agents acquired and stored inputs and commodities produced. However, as the New Zealand economy has been deregulated farmers have been exposed to the availability of a wider range of inputs and in some cases a wider range of markets, for example, live export sheep. The New Zealand farmer then requires an expanded data base from which to make commercial decisions. Reliance on one stock firm, for example, will not ensure that the best returns are achieved.

(3) **Financial decisions** involve those concerned with the acquisition and use of capital. These decisions include determining future investment needs and arranging their financing. Financial decisions may involve setting performance standards (targets) for certain enterprises or segments of the business. Financial decisions on many farms in New Zealand were and are confined to the acquisition of seasonal finance. Prior to the recent changes in the structure of New Zealand agriculture seasonal financiers were largely spared the risk of lending as long as Government underwrote farmers' profits. With the deregulation of the economy, bankers and other capital lenders typically now require information each year from farmers as to their ability to support such borrowing.

(4) **Accounting decisions** largely remain the province of the farm accountant. Farm accountants have benefited from the increase in compliance work required of businesses such as GST, changes to PAYE and the increase in the number of provisional tax instalments. A number of authors have been critical of the farm accounting process in New Zealand (Gay, 1979; Golub and Huffman, 1984; Guy, 1987; Stone, 1988; Lockhart et al, 1988). This criticism can be substantiated when the annual farm accounts are used, or regarded, as a primary source of financial information by the farm manager. Attempts have been made by farm accountants in New Zealand (Latta, 1979; Alexander, 1986) to present information in a more useful form than that presented in the typical annual accounting report, NZSA (1977). According to Gay (ibid.) conventional annual reports are 'low in decision making information'. However, with the addition of a cash flow statement, a trend statement and a net worth statement the annual farm accounts could be a more useful source of information for the farm manager. Despite criticism of the content of farm accounts, there has been little improvement in them to date in this regard and accounts typically only include the elements necessary to comply with the Government's taxation determination needs.

In New Zealand it is a necessary part of any business to furnish tax returns (Arthur Young, 1985; Inland Revenue Department, 1986). To claim depreciation allowances the tax return must be based on a double entry accounting system. This requirement is supportive of the need to employ a farm accountant. For these reasons the farm

tax return must be based on a double entry accounting system. This requirement is supportive of the need to employ a farm accountant. For these reasons the farm accountant's role should not be passive, and information on tax planning, livestock valuation, depreciation and the treatment of capital and development expenditure should be provided by the farm accountant for financial planning.

The four decision areas described above are mutually interdependent. The outcome from technical decisions will directly affect commercial decisions and financial decisions which both in turn will affect accounting decisions. A farm's lambing percentage may, for example, affect the marketing strategy for lamb sales, farm income and farm taxation. Similarly, the marketing strategy for farm produce will influence the husbandries used as well as farm income. The scope of the farm manager within each of the four decision areas is illustrated in Table 2.2.

Table 2.2. Examples of farmers' decisions within each of the four decision areas (based on Osburn and Schneeberger, 1983).

(1)	**TECHNICAL DECISIONS:**	
	(i)	Deciding what to produce and how to produce it:- Enterprise choice and combination. Input levels and combinations. Quality of output. Varietal mix. Tree replacement.
	(ii)	Using land:- Capability and fertility. Tillage practices and soil conservation. Regulations and constraints.
	(iii)	Determining level of mechanisation:- Capital requirements. Availability of services. Labour implications.
	(iv)	Determining scale of production:- Economies in production or buying. Shape of cost curves. Degree of specialisation. Capabilities of management.
(2)	**COMMERCIAL DECISIONS:**	
	(i)	Acquiring inputs:- Own. Rent/lease. Hire. From whom. When/how long. Quality and quantity.
	(ii)	Marketing products:- Open market. Contract. Hedge. Direct to buyer or store. Delivery point. Quality. Integration. Producer boards.
	(iii)	Forecasting:- Yields.
(3)	**FINANCIAL DECISIONS:**	
	(i)	Acquiring funds:- Quantity and terms. Sources. Lender services. Equity position. Liquidity position. Seasonal financing of inputs.
	(ii)	Using funds:- Relative profitability of alternatives. Time horizon and payback. Cashflows.
	(iii)	Forecasting future needs:- Depreciation of assets. Expansion and contraction. Changing technology. Prices of products and inputs.
	(v)	Recording business transactions:- Accounting method. Choice of accounts. Cash flow forecasting and periodic summary.
	(vi)	Keeping production records:- Enterprise. Ownership units. Production statistics. Trend statements.
(4)	**ACCOUNTING DECISIONS:**	
	(i)	Tax reporting:- Income taxes provisional and terminal. Wages. ACC levy. Depreciation. Tax planning.
	(ii)	Filing documents with governmental and regulatory agencies.

2.6 SUMMARY

This chapter has provided a review of recent literature on systems concepts with particular reference to farming systems. The use of models to simulate systems and the natural long-term stability of farming systems was then introduced. A distinction was then made between the production system and the management system of farming systems. Farm management was then discussed. Dillon's (1980) definition of farm management was found appropriate for this study and the farm management process was then introduced. Special reference was then made to each of the three management functions of planning, implementation and control. Osburn and Schneeberger's (1983) classification of farm management decisions provided the basis of identifying management decisions and then separating financial management from the other three farm management decision areas; technical decisions, commercial decisions and accounting decisions.

CHAPTER 3. FARM FINANCIAL MANAGEMENT

> Some couples go over their budgets very carefully every month, others just go over them.
>
> Sally Poplin. In F.Metcalf's Humorous quotations, 1986.

3.1 KEY COMPONENTS

This chapter presents a review of literature on farm financial management. First, key components of farm financial management are introduced. Each of the three functions of farm financial management; financial planning, implementation and control are then discussed. A normative model of farm financial management is then developed.

Warren (1986), writing in the context of British agriculture, suggested that the finances of a farm business need to be managed as 'assiduously as any crop'. However, the author recognised that some farmers are in the enviable position that they don't have to bother with financial management. The view was then presented that although these farmers may be able to afford the temporary luxury of ignoring financial management, they should not resent paying for this neglect in the long run. He implied that although some farmers do not concern themselves with financial management, in the long run they may be worse off for having ignored it. There appears no reason to suggest that this same argument can not be applied equally to New Zealand farmers.

Business objectives are many and varied but a first objective must always be to have an adequate cash income with which to meet business and private commitments (Zioganas 1988). Harle (1974) claims that the level of profit of the individual farm is fundamentally determined by the level of technical efficiency achieved. Unlike product prices and costs which are set exogenously to the farm, technical efficiency levels are principally determined endogenously. Once an adequate income is assured, secondary objectives such as capital appreciation, tax saving, achieving an easier life, or recognition as a stud breeder, for example, can be pursued.

Alexander (1988) reinforces the view that the primary goal of any businessman should be profit. Few of the goals set by a business manager can be achieved if the business is not profitable. Profit maximisation may not be the primary objective on many farms. The profit level that satisfies the manager encompasses factors which may be tacitly understood but seldom made explicit or set as an objective in the business plan.

Hayton (1988) identifies three goals that the business should meet, or have the potential to meet. These are the provision of a livelihood for the proprietor, the maintenance of business

assets in good order and sufficient growth to enable it to survive the long run. In the short term he claims business managers are more concerned with cash flow than with profit. But over the long term a business must generate a profit to survive. However, profit could, for example, be the result of consistent increases in land value and this alone may not ensure the continued solvency of the farm business. Kirton's (1988) ideal financial management system includes the accurate statement of cash, profit and solvency, while Alexander's (1986) comments are dominated by the theme that 'cash is king'. A combination of cash surplus, solvency and profit over the long term will ensure the survival of the farm firm. Other objectives of the owner can only be met once long term profitability is assured.

Farmers are unlikely to achieve their financial goals without a financial management system. An ideal financial management system for farmers (based on Kirton, ibid.) should incorporate;

(1) a clear statement of both personal and financial goals.

(2) an accurate statement of current position (cash, profit, solvency).

(3) a plan for the coming period translated into the expected effect on cash, profit and solvency, based on the farmer's goals and a statement of the farmer's current position

(4) a means of assessing progress against the plan.

Kirton's financial management system incorporates the three functions of farm management. Once the farmer's goals are defined, an assessment of the current position is made before a plan can be devised. The plan is then implemented and the control function provides a mechanism to assess progress against the plan. The following section describes how the three functional areas of farm financial management of planning, implementation and control can be used to meet these four requirements of a financial management system.

3.2 FARM FINANCIAL PLANNING

Farm financial planning involves uncertainty. Budgeting and cash flow forecasting are the most commonly used methods for short term financial planning. Longer term planning involving investments requires the use of other planning techniques such as the discounted payback period, the net present value and the internal rate of return (Firth, 1985). Elrick and Bright (1982) claim that these methods of appraising investments are too complicated for routine on-farm use by farmers. Support for this view is provided by the very limited use on farms of even basic farm financial evaluation techniques. In this situation it is unlikely that these more sophisticated techniques will be used.

Generalisations such as 'there is no money in sheep', offer the farmer concerned with business profitability little guidance (Pearce, 1958). Financial management, like all aspects of

management, requires careful planning (Holt and Schoorl, 1982; Norman et al, 1985). Financial planning is the central component of financial management (Blackie, 1976; Hayen ,1982; Mappleback, 1987) and assists the farmer to develop a 'financial awareness' of the farm operation. A financial plan is a model of the anticipated outcome of a predetermined course of action. The purpose of such a model according is to assist managers in gaining an understanding of the likely financial impact of their decisions (Hinman and Hutton, 1970; Hayton, 1988). The dynamic nature of a business and its cash management needs must be appraised so that planned adjustments can be made in anticipation of an adverse situation, thereby obviating the need to make forced decisions (Mylvaganam, 1983).

Both Charlton (1972) and Abbiss (1983) identify budgets as the normal means of describing, under a specific set of assumptions, the financial consequences of making the projected change to the farm as a whole. The major deficiency of conventional farm budgets as models of a farming system relate to the inadequate treatment of variability. Variability in product and input prices and product quantities are the common sources of risk (Bhandari, 1982). Anderson (1988) and Parker (1989) both suggest that variability is usually treated by assigning conservative values to uncertain parameters. This approach does not ensure the best decision is made when time dependent and non-linear systems are the target of management. Anderson also claims that although the management literature includes many applications of sophisticated mathematical models to farm-level tactical decision problems, the unstated and untested inference is often that they can be applied by farmers to address practical problems (Dantzig, 1955). Their correct application often requires advanced mathematical skills, time and money to build and validate the model for a particular farm, more data to specify them than are ordinarily available except at unreasonable cost, and more computer power to run them than that provided by a modern micro-computer. The author claims that these considerations have combined to negate their adoption by farmers, so their contribution thus far to real world decision making has been negligible. Few farmers in New Zealand appear to use sophisticated mathematical models as an aid in solving tactical decision problems. The use of these models is largely by staff in academic and research institutions on institution farms, and a few commercial farms with close links to these institutions.

Modern spreadsheet software packages, in support of computerised financial management systems, have data base management routines which can be linked to the spreadsheet package to allow storage and handling of substantial bodies of data. By integrating the spreadsheet and data base management routines, spreadsheet-based budgeting models can, in principle, address the problem of modelling essential variability (Anderson, 1988). In such a way the familiar budget can be transformed into a powerful tool for tactical decision making. However, it will require a level of sophistication in software application not commonly found outside universities and other research institutions (Lockhart, 1987).

The corporate planning environment, as discussed by Park (1984), has similar financial management problems to those of agriculture. Park claims that the literature on budgeting tends to be highly technique-orientated. 'It is as if a first rate budgeting system would emerge and be used effectively, only if such techniques are used'. The reality, he suggests, is not so simple as at times the corporate environment and organisational dynamics overshadow a technically brilliant budgeting system. Park suggests that there is no universal system for evaluating the effects of variability when budgeting that is currently available for all companies; there are 'really only alternative approaches to choose from within the range of reasonably sound alternatives'. Therefore, there is some recognition that the general budget may not be suitable to apply to all business'. This theme is developed further in Chapter 3.

As the real cost of money and the cost of poor financial management have increased the cash flow forecast is becoming increasingly used in farm management Brook (1986). Cash flows can be used not only as a forecasting tool but as the basis for determining seasonal financial needs. Brook believes that if the lender can be convinced that the farmer (borrower) knows intimately how each figure in the cash flow forecast is derived, then the lender can have some confidence in the farmer having financial control of his (or her) business. The object of the budget is to set production targets and limits for costs. The basis for each target must be realistic (Knight, 1977).

Events will happen during the planning period which will change the timing and/or the amount of budgeted income and expenses. Unless the budget and cash flow forecast is monitored there is little to be gained in having completed one (Lee, 1985). Revision dates can be established with the budget, but a variation in cash estimates sufficiently large to indicate need for revision, becomes obvious when it occurs (Stone, ibid.). The difficulty arises in identifying the acceptable level of deviation between realised and targeted values as this may depend on factors such as the scale of the operation, level of indebtedness, flexibility of the production system and the projected cash flows of the enterprises being managed. Corrective action, or at least identification of why realised performance differs from that which was planned, is then required.

3.3 THE IMPLEMENTATION FUNCTION OF FARM MANAGEMENT

Most modern large scale firms separate ownership from managerial control (Gasson et al, 1988). Mitchell (1981) suggests that most business problems are associated with failure to achieve, or worse still to recognise, this goal. Malloch and Weston (1953), Latta (1983) and Alexander (1986) all suggest that if a farmer is to operate his farm in a businesslike manner he should look on his farm as a business separate from his own personal affairs. The lack of separation of ownership from management is easily overcome. Both Latta and Alexander comment on the need to separate personal drawings from farm expenses in an attempt to

differentiate between the financial management of the farm business with that of the farmer and his family. Clark (1981) suggests that farmers operate separate farm bank account and personal accounts, and arrange a monthly transfer of funds from the farm account to the personal account.The survival of owner-operated small businesses can be prejudiced by the poor management of drawings. Thus, separation of the farm from the family as regards financial management is highly desirable.

Preston (1985) considers the cash book to be the most important tool a farmer can use to monitor his (or her) cash position in relation to budget. A cash book kept by the farmer can be a routine source of information. The task of acquiring data presents no obstacles, since data are generated as a by-product of every transaction or event. Preston correctly questions the value of cash books and monthly reports from accountants because delays inevitably occur and the value of timeliness can be lost. Brown (1973) suggests that cash books should be made up at frequent intervals and at specific points in time. It is usual to enter the expenses at the time the cheques are drawn, and the receipts at the time amounts are transmitted to the bank. Farmers should process accounts regularly on one or two days each month to pay accounts and update financial records.

Alexander (1988) advocates use by farmers of a formal monitoring system and suggests that it provides the tools and approaches to help a farmer make his farm profitable. Key indicators in the farm financial monitoring system include; cash flow forecasts, cash books, cash flow statements, separate personal and farm accounts with automatic funds transfer monthly, debt management and the monitoring of equity. Warren (1982) describes the penalty of not monitoring cash flow as at best failing to recognise opportunities and at worst failing to retain the ownership of the business.

Harrington and Schapper (1979) and Harsh et al (1981) identify financial management as the most important farm management decision area. These authors suggest that the planning function can be supported by a management information system (MIS). A MIS gathers, analyses and integrates data from within the farming system and from outside the farming system. Many MIS are implemented with generic 'off-the-shelf' software rather than custom-built programs. Management information systems offer a means of directing, editing and organising data into information at a time and place where this information may be used in decision making (Blackie and Dent, 1979). MIS have developed as microcomputers have become more commonplace. However, they address only a part of the management process. Their significant contribution is with respect to the implementation function. A MIS provides the farm manager with increased access to information for both the planning and control function. However, given the small number of financial transactions completed by a 'typical' farmer in each of the three study areas such sophistication appears unnecessary[1]. Computers will aid in the retrieval and analysis of

data. The farm manager can also benefit from increased accuracy, relief of monotony and in some cases, a reduction in cost (Pugh, 1977; Westlake, 1980; Hayen, 1982; Topham, 1982; Anderson, 1988).

3.4 FARM FINANCIAL CONTROL

Budgetary control, as most frequently practised on farms, is concerned with end-of-year analysis (Blackie and Dent, 1973). However, farmers may well benefit from a more frequent examination of their performance. This would convert a budget from a weak planning instrument, where it is not examined until the end of the trading year, to a vigorous control method which is checked regularly throughout the year. Blackie and Dent (ibid.) recommend that cash flow forecasts and physical data based on the budget be forecast on a short period basis, the length of which must depend on the characteristics of the enterprise and farm. High turnover, capital and input intensive enterprises such as housed dairy production, suggest the authors, are likely to require at least monthly reports detailing important input and output factors. Deviations of these factors from their forecast values would serve as warning that the enterprise was not performing according to plan. Adjustments to the budget must then be made as soon as such adjustments are seen to be necessary (Malloch and Weston, 1953). No mention is made as to the level of tolerance that an enterprise can withstand prior to adjustments being made. However, farmers could establish their own tolerance limits prior to initiating a course of action.

Knight (1977) claims that 'budgets are often prepared and no further reference is ever made to them'. To be of any real value it should be referred to regularly throughout the planning period. The principles of using budgets for control purposes are well established. Control requires regular monitoring of income and expenditure so that a deviation from target can be noted and, hopefully, corrected in a timely fashion (Preston, 1985; Lamb, 1985; Brook and Crengle, 1986). There are various ways of doing this, the most common being the comparison of the year's cumulative totals or running totals with the previous year's totals and targeted totals for the current year.

Knight (ibid.) suggests that monthly comparisons are justified for intensive stock farms but quarterly analyses are sufficient for mainly arable and horticultural systems. Each production system will have its own requirements of financial monitoring. This discussion is continued in Chapter 3 with the development of the systems specific models of farm financial management.

1 Informal estimates provided to this author by rural accountants suggest that dairy farmers have 18-24 farm income and 65-70 farm expenditure transactions annually. Sheep and beef farmers have 20-25 farm income and 75-80 farm expenditure transactions while pipfruit farmers have 8-10 farm income and 110-120 farm expenditure transactions annually. Pipfruit farmers' expenditure transactions include approximately 60 transactions for casual labour.

Attempts to monitor a budget by relying solely on a current account balance as the indicator parameter is 'fraught with the possibility of error' (Toothmath, 1972). Without reference to a financial plan, a bank balance provides little useful information. The farm manager needs to know what accounts are unpaid and what proceeds are due if he is to assess the position at any point. Furthermore, control of expenditure is difficult at the point of payment (Blackie and Dent, 1973; Longbottom, 1980).

The consideration of individual enterprises on the farm is the basis of Stokes' (1979) proposed method of financial monitoring. This method, although acknowledged as being complicated and involving accurate recording of inputs and products on an enterprise basis, is considered essential (Mallyon, 1966; James and Stoneberg, 1976; Clark, 1981; Beck and McCarthy, 1983). In New Zealand, on mixed livestock enterprise farms such as sheep and beef farms, the financial contribution made by one enterprise can be masked by another if each enterprise is not monitored separately. A similar situation exists on orchards. Different varieties of pipfruit require different inputs, variations in yields exist and the returns from each variety differs. Without an enterprise-level analysis there is no objective means of differentiating between the returns each enterprise contributes to farm profit.

The cash book can provide accurate, timely and useful information. Receipts and expenditures may be categorised into trading items, personal items and capital items. Further classification can be made according to the enterprise to which the transaction belongs (Morris, 1978; Dalton, 1982). Usually the farmer who keeps a detailed enterprise record computes a profit or loss figure on the enterprise at the end of the season, or at the end of the financial year (Hopkins and Heady, 1949; Hopkins and Turner, 1958). An enterprise analysis can be initiated from the cash book provided recording is done on an enterprise basis. Production indices can be calculated to devise unit production costs. Usually the objective of calculating these indices is to show whether the enterprise should be continued in the farm organisation.

Despite claims by Norman et al (1985) and Naylor (1986) that the accounting function is fundamental to the success of the farm business, many producers regard historical accounts as little more than a matter of curiosity. Moverley (1986) suggests that the principal requirement of any accounting system must be that it is as simple as possible whilst still providing all the necessary information. However, Lockhart et al's (1988) survey of farmers in the Manawatu showed the limited use made by farmers of their annual accounts. This is summarised in Table 3.1.

Table 3.1. Use made by Manawatu farmers of their annual accounts.

Use made of farm accounts	Percentage of farmers
Not used	56.0
Historical source of information	24.3
Livestock numbers for census etc.	19.7
Total	100.0

Source: Lockhart et al, 1988.

One development of the accounting function is the inclusion of trend statements in annual accounts as described by Gessaman et al (1988). Trend statements detail year-to-year changes in farm finances and can be used by managers to devise more realistic cash flow projections and to make it easier to monitor changes in key financial indicators such as the debt-to-asset ratio, or earned net worth change (Ashmead, 1987). Properly completed trend statements will help identify past profit levels for the farming operation, and will document year-to-year changes in profitability and net worth.

Candler and Sargent (1962) suggested that farm standards (financial and physical performance indicators) may be used to compare technical efficiencies on farms. Farm standards can be calculated by the farmer or they can be provided by the accountant in the form of the trend statement. During a period of rapidly changing technology, the calculation of farm standards is unlikely to assist farmers to make optimum decisions as they don't often consider the resources employed to produce such results. The late 1980s in New Zealand do not appear to be a period of rapidly changing technology in agriculture, as compared with the developments during the 1960s and early 1970s. During these decades major productivity gains resulted from the adoption of intensive subdivision, rotational grazing systems and animal breeding schemes, the use of trend statements and farm standards by today's farmers would appear then to be both appropriate and beneficial.

3.5 A NORMATIVE MODEL OF FARM FINANCIAL MANAGEMENT

Normativism provides a methodological basis for considering objective knowledge of values and to do empirical research on questions about 'the values of different conditions, situations and things' (Johnson, 1986). Normative economics is concerned with 'what should be' (the ideal) whereas positive economics is concerned with 'what is' and practical economics is concerned with 'what you can do to obtain what you want' (Keynes, 1891). Machlup (1978) suggests that being prescriptive, prescribing standards of ideal behaviour is normative, while being prescriptive in so far as actions are prescribed is practical.

A model is an 'abstraction and simplification of the real world' (Spedding, 1988). A model is designed to replicate the important interactions and behaviour of the system or the part of the system being studied. A normative (ideal) model of farm financial management must then replicate the important components and interactions of ideal financial management.

The important components of farm financial management are a financial goal, a financial plan, a means of implementing this plan and a control function. The farmer must first specify his (or her) financial goals. Long-term profit is essential for the survival of a business but other goals, only some of which may be financial, exist. The farmer must know what it is that he (or she) is trying to achieve. Secondly, the farmer must determine his (or her) current financial position. Knowledge of this position, with respect to cash surplus, profit and equity provides the starting point of the financial plan. A financial plan can then be devised to achieve these goals. The plan projects the implementation of farming activities that takes the farmer from his (or her) current financial position to that forecast. The planned outcome simulates the financial position when the farmer's financial goal(s) are achieved. Finally, a means of assessing progress against the plan and evaluating the attainment of the financial goals should be developed. A control system must be devised so the farmer can measure his (or her) progress against the plan both during and at the completion of the planning cycle.

The financial management system based on Kirton (1988) largely fulfils these four components. However, two modifications to his system are necessary. Firstly, the farmer should specify the acceptable level of variation between the outcome and the plan. For example, a financial goal is unlikely to have one value but rather some range of values all of which are acceptable to the farmer. By identifying the level of acceptable variation, the farmer is determining the boundaries of his (or her) 'comfort zone'. Secondly, as an adjunct to the control function, the farm manager should specify the frequency of budget revision at the start of the planning cycle. For example, planning frequency may be determined by either events that occur during the planning cycle or time. The revised ideal farm management system, which is implemented in a stepwise manner in a particular farm context, has the following components:

(1) an objective statement of financial goals and the range of outcomes that will achieve these goals.

(2) an accurate statement of current position.

(3) a plan for the coming period translated into the expected effect on cash, profit and solvency, based on the farmer's goals and a statement of the farmer's current position.

(4) a means of assessing progress against the plan and identification of the events or times that budget review is required during the planning cycle.

The boundaries of the 'comfort zone' will determine where sufficient variation between the outcome and the plan occurs that will render the original plan obsolete. In such a situation the

farmer's financial goals can no longer be met and he (or she) will have to respecify management goals and begin the planning process once more. It is against this qualitative model that farmers' financial management systems on each of the three farm types surveyed will be discussed.

The outcome of financial management cannot be accurately expressed in terms of a single production or performance parameter, such as, profit or cash surplus. Anderson (1985) expresses farmers' circumstances in terms of a utility function stating that a farm manager's utility function must exist that 'embraces all the important attributes' of farm management. Ideal farm financial management is concerned solely with financial decisions. The outcome of these decisions will be the result of the farmer's management ability, resources and both physical and economic factors beyond his (or her) control.

Increases to a farmer's utility realised from the adoption of the normative (ideal) financial management model will depend upon the current state of the financial management system in place on the farm. Some farmers' current financial management may need subtle refinements whereas others may need more significant alterations. For example, some farmers meticulously record financial transactions without either a financial plan as reference or a control function to evaluate the outcome of the plan. In such cases their recording system, often a cash book, has little management value. Farmers completing a budget only to secure seasonal finance would similarly benefit from the adoption of budget revision and control.

The normative model summarises existing knowledge of farm financial management. It has four sequentially implemented components beginning with a clear statement of the farmer's financial goals. With an accurate knowledge of the farm's current financial position a financial plan can then be developed, implemented and controlled to meet these goals.

CHAPTER 4. SURVEY METHODOLOGY

A good farmer is nothing more nor less than a handy man with a sense of humus.
E.B.White. One man's meat, 1944.

A survey was undertaken in each of the three study areas to establish an information base and an understanding of the financial management practices of farmers. This chapter details the survey methodology used in this study. The data coding and analysis procedures are then discussed.

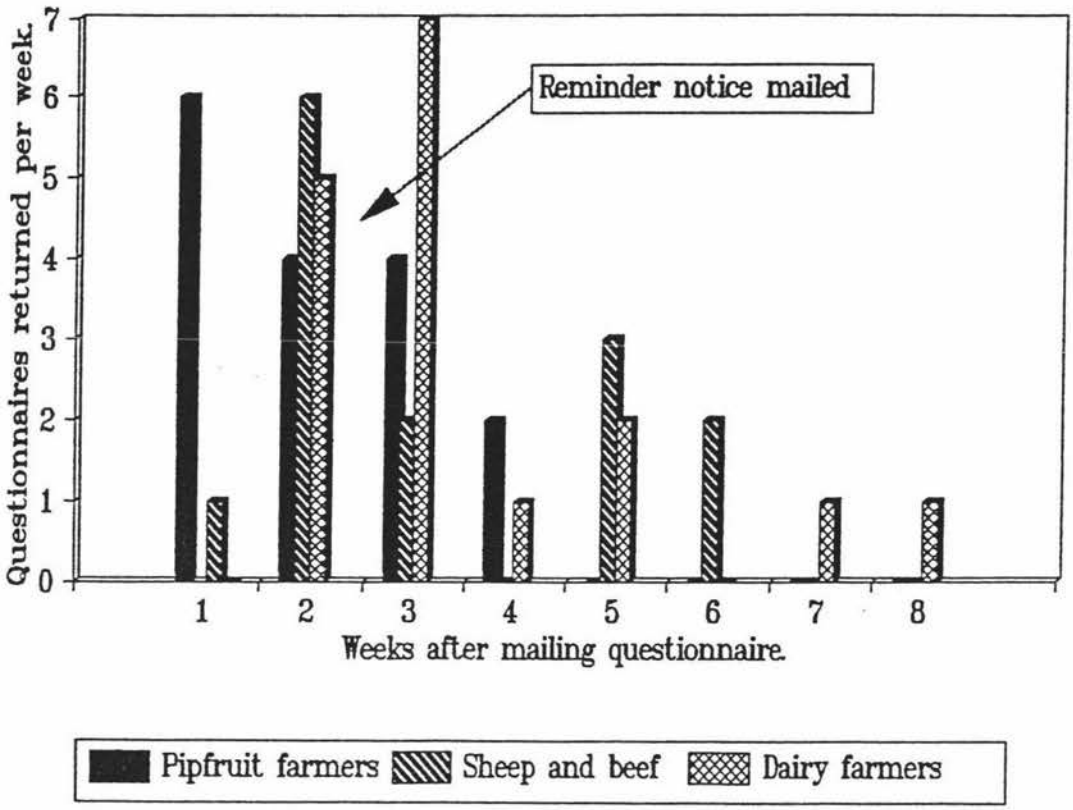
The questionnaire used in this survey was developed in the steps suggested by Hoinvell and Jowell (1978). An early version of it was tested with Massey University's farm supervisors who provided useful feedback on the layout and questions posed. Revisions were made and it was then pilot tested with four farmers in the Manawatu area. All farm types were included in this phase of questionnaire development. The questionnaire was again revised. The same basic questionnaire (see Appendix 1) was used in each of the three farm surveys. Only one of the 22 main questions was framed differently for each of the farm types surveyed. The difference was in regard to the production information being sought.

Direct and indirect contacts were made with farmers prior to administering the questionnaire. South Taranaki dairy farmers were notified generally that a survey was to be undertaken in their area. This was done by including a notice to this effect in the Kiwi Co-operative Dairy Company newsletter which was posted some ten days before the questionnaire was mailed out to the selected farmers. All farmers in South Taranaki supply their milk to the Kiwi Co-operative Dairy Company. In the Taihape area sheep and beef farmers were informed about the survey in the Federated Farmers monthly newsletter which is distributed to all those on rural delivery. Appendix 2 presents the text of these indirect contacts with farmers. No equivalent means of indirect contact was available for the Heretaunga Plains pipfruit farmers. Direct contact was made with farmers by mail. A letter outlining the objectives and dates of the survey was mailed to all survey sample farmers. This contact with farmers was made week prior to both the dispatch of the questionnaire and the onset of interviews (see Appendix 3).

Over 60 names were drawn randomly from census lists of farmers in each of the three areas. In South Taranaki the census list was supplied by the Kiwi Cooperative Dairy Company; in Taihape by Federated Farmers; and in Hawkes Bay by the NZAPMB. Half the farmers were to be surveyed by mail and half the farmers were to be interviewed. The mail questionnaire provided the basis of the interviews. Over 30 farmers in each of the three areas were approached for personal interviews and a further 30 were mailed questionnaires. A reminder notice was posted to the mail survey recipients who had not returned the questionnaire

approximately two weeks after the dispatch of the survey. The timing of the mail survey returns in each region is depicted in Figure 4.1. There was, in each case, a small response to the reminder notice. The overall response rate appears typical of open-ended surveys to farmers, families and business alike and can only be increased at significant extra cost.

Figure 4.1. The timing of mail survey returns.



Interviews in each area were completed over a two week period. Two to four interviews were completed each day with each interview taking a minimum of 45 minutes. Interview time often extended beyond two hours. However, the content of the discussion, in these cases extended well beyond the material in the survey! Travelling time between farms limited the maximum number of interviews which could be completed each day.

The response rates to both the mail survey and the interviews in each district were summarised in Chapter 1, Table 1.2. The complete response rates, including non-response, survey fractions and out of sample data from the interviews are presented Table 4.1. Corresponding data from the mail survey are in Table 4.2.

Table 4.1. Interview statistics from each of the farm types surveyed.

Survey statistic	Farm type		
	Dairy	Sheep and beef	Pipfruit
Original sample	31	26	37
Out of sample	0	2	2
Interview sample size	31	24	35
Interviews completed	28	22	23
Unable to participate	1	1	1
Would not participate	2	1	11

The response rate to the interview survey was high. The response from the pipfruit farmers, however, was not as high. Limited contact between Massey University and the Heretaunga Plains pipfruit farmers as compared with the relatively stronger associations between Massey University and dairy and sheep and beef producers may have attributed to the lower response.

Table 4.2. Mail survey statistics from each of the farm types surveyed.

Survey statistic	Farm type		
	Dairy	Sheep and beef	Pipfruit
Original sample	31	30	36
Out of sample	0	0	2
Mailed questionnaires	31	30	34
Mail surveys completed	17	15	16
Would not complete	0	0	1
Non-reply	14	14	18
Population size	328[a]	182[b]	532[c]
Sampling fraction[d]	19%	30%	13%
Sampling error	1.3%	1.0%	1.8%

[a]Source: Kiwi Co-operatives Dairy Company, Hawera.
[b]Source: Federated Farmers, Palmerston North.
[c]Source: New Zealand Apple and Pear Board, Hastings.
[d]Combining mail and interview samples.

The response rate to the mail surveys was similar in each of the three districts with a return rate of 47-55%. No mail surveys were which returned were unusable although some questions resulted in answers in some questionnaires which were unsuitable for inclusion in the data base. Calculation of the sampling error is based on Stuart (1963).

The data provided on the questionnaires by respondents were coded and entered into a computer file for analysis. The open-ended responses on each questionnaire were assigned numerical codes upon the completion of the survey in each district. Numerical codes were assigned on the basis of coding frames which were determined by the range of responses encountered from each question. Open-ended questions pose some difficulties in coding. The discussions provided by farmers throughout the interview surveys provided a range of responses

to each question. The data from the mail surveys were then coded according to the scheme determined from the interviews. This method of dual surveying minimised misinterpretation of farmer's responses provided in the mail questionnaire. Similarly, the opportunity to question and discuss in detail with farmers their responses to the interview questions increased the general understanding gained of farmer's financial management practices. Continuous variables were ranked and sorted using the spreadsheet programme Lotus Symphony[1] and then grouped into a discrete variable before coding.

Analysis of the introductory questions was completed using Lotus Symphony. Farm production data and farm areas were sorted and ranked using the spreadsheet while the farm enterprises were sorted using the database. All data were then analysed using SPSSX[2] on a mainframe computer. Simple analyses were completed using crosstabulations of farmers' responses to survey questions by farm type. Key variables were then identified that suitably discriminated between good, average and poor financial managers. A clustering procedure using these variables then identified homogeneous groups of farmers within the data set. It was then possible to specify the composition of the data set in terms of the percentages of good, average and poor farm financial managers on each of the three farm types surveyed.

1 Lotus Symphony is a registered trademark of the Lotus Development Corporation. Lotus Symphony is an integrated spreadsheet, database, graphics and word processing package.

2 SPSSX, Statistical Package for the Social Sciences. Version 10, 3rd edition. SPSS Incorporated, Chicago.

CHAPTER 5. THE DAIRY, SHEEP AND BEEF AND PIPFRUIT INDUSTRIES AND FARMS OF NEW ZEALAND: COMMON FEATURES AND IMPORTANT DIFFERENCES IN RELATION TO FARM FINANCIAL MANAGEMENT

> I hate vulgar realism in literature. The man who would call a spade a spade should be compelled to use one. It is the only thing he is fit for.
>
> Oscar Wilde. The picture of Dorian Gray, 1891.

5.1 INTRODUCTION

In this chapter the current state of each of the dairy, sheep and beef and pipfruit sectors at the industry and farm levels is discussed and a 'typical' system within each of the three sectors is described. Selected data from the surveys made for this study are used in the descriptions of 'typical' farms in each industry. The common features and significant differences between each of the three systems are identified with respect to the financial management of the system. A normative model of farm financial management for farms in each of the industries is then developed.

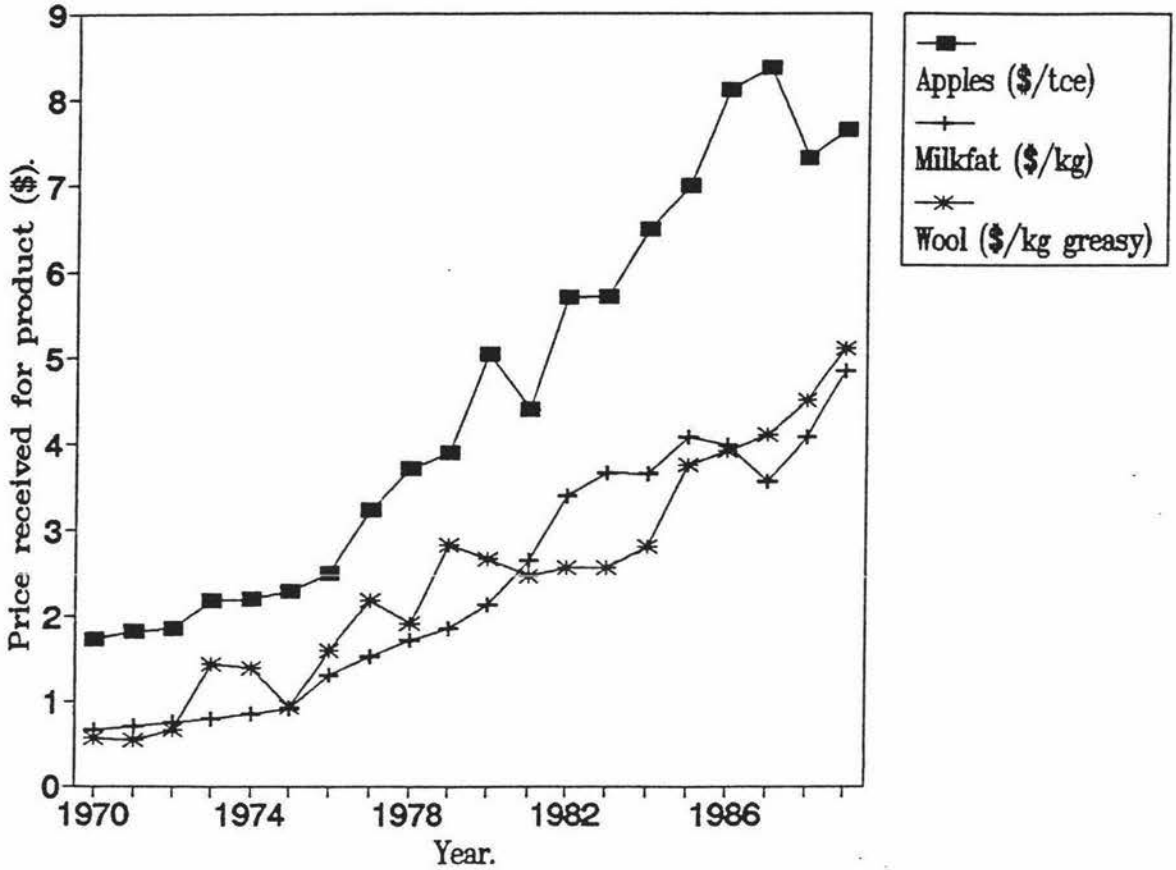
5.2 DAIRYING

5.2.1 The Industry

There are some 16,000 dairy farms in New Zealand, approximately 25% (4,326) of which are operated by sharemilkers and 3% (450) are operated by contract milkers. The remainder are owner-operated farms. Ninety two percent of dairy farms are seasonal supply farms where the milk is sold on the basis of milkfat content. The remaining 8% (1288) of dairy farms produce milk for consumption as fresh milk and other short shelf life products (NZDB, 1987).

Milk and milkfat prices have fluctuated less over recent years than have prices of other pastoral products. The prices of key New Zealand farm products from 1970 to 1989 are graphed in Figure 5.1. The relatively long term ownership of dairy farms, as indicated by the low proportion of dairy farms sold each year reflects to an important extent the relative stability of milk and milkfat prices over time. Farmer-owned milk processing co-operatives are a feature of New Zealand's dairy industry.

Figure 5.1. Price fluctuations of selected farm products from 1970 to 1989.



Exports of dairy products to Australia began in 1897 when Anchor brand butter took first prize in the Melbourne Exhibition. The New Zealand Dairy Board (NZDB) acquires and markets all dairy products intended for export, and regulates the marketing of butter and cheese in New Zealand. The NZDB now operates the national milk scheme, and engages in other activities for the purpose of ensuring an adequate supply and efficient distribution of milk within New Zealand. This latter role was discharged by the New Zealand Milk Board up to 1986/1987. The NZDB purchases all its product from typically large scale producer co-operatives located in the dairying areas of the country.

The NZDB is New Zealand's biggest single exporter by value (Barber, 1986). Annual sales are close to $2 billion with export markets in more than 100 countries. Of the annual production of 800,000 tonnes of dairy produce, more than 700,000 tonnes is exported, accounting for 12% of New Zealand's export receipts in 1987 (MAF, 1987a) and 14.3% in 1988 (Evans, 1989). The NZDB filled export orders of 1,000,000 tonnes of dairy produce in 1988, the balance being met by produce from other countries. New Zealand accounts for only 1.5% of the world's total milk production but is responsible for a quarter of all international trade in dairy products by volume (NZDB, 1989).

Dairy production in New Zealand reached a peak in the 1985/1986 season with 350,000 tonnes of milkfat being processed. This eclipsed the previous record production achieved in 1984/1985

of 332,000 tonnes (NZDB, 1986). Milkfat production for the 1987/1988 season was 330,000 tonnes. Production in the 1986/1987 season was 301,000 tonnes. Cow numbers increased through the 1980s and reached a peak of 2.27 million in June 1987.

The NZDB seeks to ensure that fluctuations in overseas prices are smoothed out when translated into the price the dairy farmer receives for his (or her) milk. Use is made of a reserve account in which half the trading profits are lodged, likewise a deficit can be met from the reserve account. The remaining half of the trading profits is paid out to farmers via their cooperative dairy companies (OECD, 1987; NZDB, 1987). The Board actively manages its foreign currency exposure by adopting a 'largely risk adverse policy' of hedging forward a significant proportion of anticipated sales receipts (NZDB, 1988).

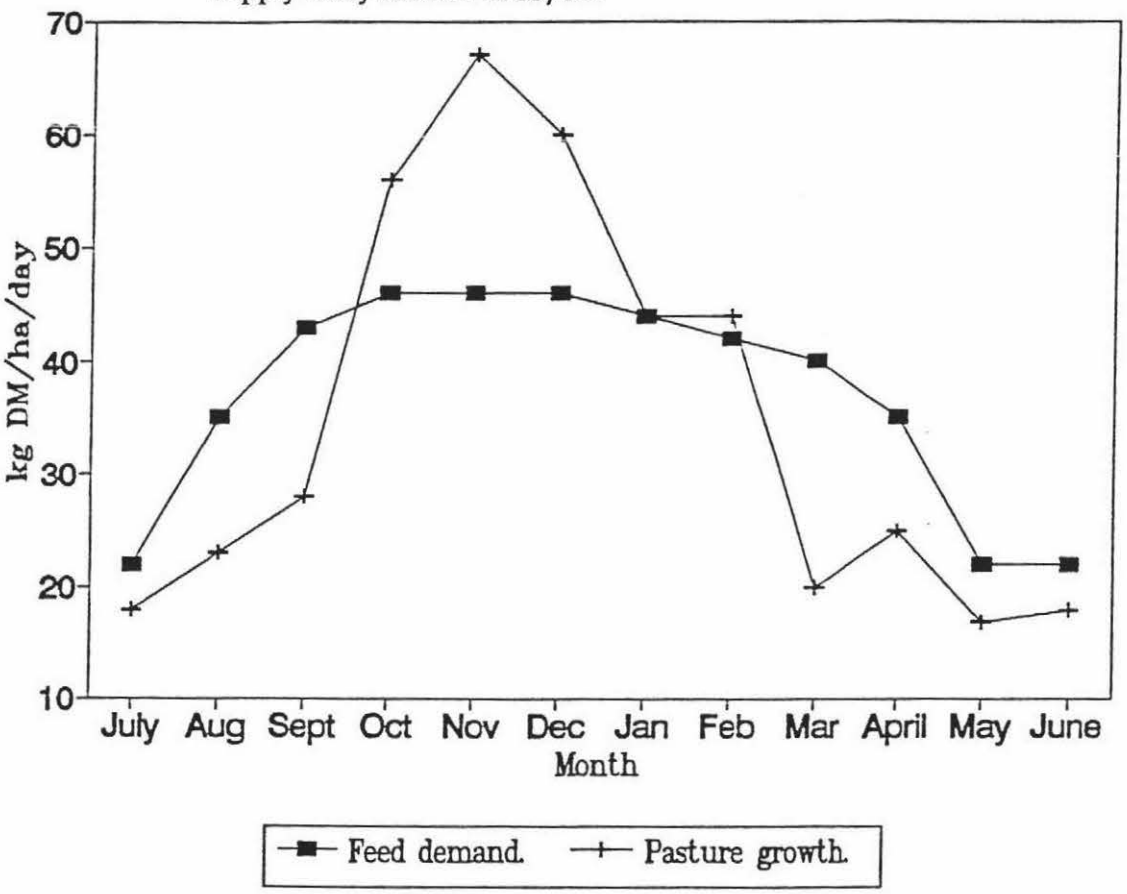
International dairy prices fell in 1983/1984 mainly as a result of surplus stocks of dairy products accumulating in the European Economic Community (EEC). In 1985, 1986 and 1987 international dairy prices were, in real terms the lowest for 40 years. Dairy farmers have seen a deterioration in their terms of trade, as the real price paid for milkfat declines and farm input prices continue to increase (OECD, ibid.). The outlook for dairy products has improved significantly as compared with the 1986/1987 season, mainly as a result of supply management policies stemming production increases in the EEC. The MAF (1988) suggests that the demand for some products has increased the improvement in international prices (albeit from very low levels). This improvement seems more a reflection of downward adjustments to the level of EEC export subsidies. International prices for both casein and milk powders more than doubled during 1988; from US$2,000/t to US$5,000/t for casein and US$700/t to US$1,700/t for milk powder (MAF, 1988; Evans, ibid.).

Grigg (ibid.) suggests several reasons for New Zealand's ability to compete in dairy product markets in the northern hemisphere. Firstly, cows can be grazed year round and mild winters make animal housing unnecessary which reduces capital requirements and overall production costs relative to northern hemisphere producers. Secondly, the summer flush in pasture growth in New Zealand occurs during the northern hemisphere's winter, so New Zealand's dairy production is complementary to that of the northern hemisphere. Thirdly, co-operative dairying was established in the early 1880s and by 1893 there were over 200 dairy factories in the North Island. By the 1920s cheese and butter factories were substantially of larger capacity than those in Holland or Denmark thereby achieving economies of scale which largely negated the cost of distance to major markets. New Zealand has remained a world leader in dairy technology both in the factories and on the farm.

The distribution of dairying in New Zealand is largely determined by climate. Most of the dairy farms are in the North Island in areas receiving more than 1000 mm of annual rainfall. One of the most outstanding features of New Zealand dairy farming is that it relies almost exclusively

on permanent pasture for feed. Pasture growth occurs in all months of the year, except in the far south during winter. Feed utilisation can be controlled, via calving and drying off, to match pasture growth. Figure 5.2 summarises the feed supply and feed situation as recorded on Massey University's No.4 Dairy Farm in 1985/86. Similar data could be provided by monitoring of other seasonal supply farms in the Manawatu and elsewhere. These data illustrate that management can closely match feed supply with feed demand.

Figure 5.2. Feed demand and supply on Massey University's No.4 seasonal supply dairy farm in 1985/86.



5.2.2 The farms

Operations on a New Zealand seasonal supply dairy farm can be summarised as follows. Cows in any herd typically calve over at most a two month period and are milked for nine or ten months. All cows are dry during winter when pasture production is lowest. Milk is supplied to co-operatively owned factories for manufacture into products such as butter, cheese, milk powder and casein. Between a quarter and one third of each herd is replaced each year. Culled cows are usually sold in either the late summer when the feed supply declines, or in autumn as the herd is dried off. Calving has been traditionally concentrated in August. New born calves are removed from the cow at 12-24 hours of age and fed on colostrum whole milk or powdered milk. Calves are weaned off milk at eight to ten weeks.

The average dairy herd in New Zealand is 156 cows grazing on 64 hectares of pasture and producing 152 kg/milkfat per cow (382 kg milkfat/ha) per year. The Taranaki farms surveyed in 1988 had a mean herd size of 175 cows grazed on 62 hectares. Three years previously the average herd of the surveyed farms was 168 cows. Farm size did not increase over this period. The dairy farmers surveyed were attempting to maintain income by increasing production to compensate for declining product prices. However, milkfat production on the survey farms had declined from an average of 481 kg milkfat/ha in 1986 to 399 kg milkfat/ha in 1988. This decline in milkfat production was attributed to poor pasture production in the 1088 season throughout South Taranaki. During these same three years national production fell by a similar amount, 19%. Annual average milkfat production from the surveyed farms in Taranaki, by all farms in Taranaki and nationally are presented in Table 5.1.

Table 5.1. Annual milkfat production per hectare recorded on the surveyed dairy farms, all Taranaki dairy farms and all dairy farms nationally from 1985/86 to 1987/88.

Production region	1985/86	1986/87	1987/88
Dairy farms surveyed	481	421	399
Taranaki dairy farms	446	428	405
New Zealand average	379	374	331

The mean milkfat production per farm per year on the surveyed farms for the 1986-1988 period was 27,900 kg. This is higher than the national average of 24,000 kg. Nationally, milkfat sales account for 85% of the total gross farm income on dairy farms. The balance of farm income is derived from the sale of bobby calves, weaner calves, cull cows and, in some instances from pigs, cash crops and contracting out of labour and services. Off-farm income is negligible. The range of activities and enterprises undertaken by the survey farmers is presented in Table 5.2. In each case only the most significant secondary enterprise is identified.

Table 5.2. Percentage of farmers with a significant secondary enterprise on each of the farm types surveyed during 1988.

Secondary enterprise of surveyed farmers	Farm type		
	Dairy	Sheep and Beef	Pipfruit
No other enterprises	78	60	21
Contracting	5	5	5
Packhouse or shop	0	0	18
Other livestock[a]	15	8	5
Forestry	2	3	0
Stonefruit	0	0	15
Process crops	0	0	15
Other crops[b]	0	5	10
Nursery or glasshouse	0	0	11
Grazing	0	11	0
Stud flock	0	8	0
Total	100%	100%	100%

[a]Includes goats, deer and pigs. On the dairy farms this includes bull beef.
[b]Barley and wheat on sheep and beef farms, citrus and sub-tropicals on pipfruit farms.

Of the farms surveyed in South Taranaki, 13% were operated as sole traders and the balance were partnerships between husband and wife. Half the farmers surveyed were owner-operators and the balance were sharemilkers. The person responsible for the financial management of the farm had most often (79%) completed only three years of secondary schooling and had no tertiary training. On average the financial manager had been farming for 18 years and only rarely had been engaged in any other occupation.

Dairy farm labour is employed only on a casual basis on the average farm, however, as the scale of operation increases, so does the labour requirements. Farms producing greater than 32,000 kg of milkfat (12% of all dairy farms) usually employ one full time labour unit. Most New Zealand dairy farms (70%) have a runoff or graze stock away from the main farm. The runoff is used for the grazing of replacement stock, part of the herd over winter and the production of supplementary feed. Nationally runoffs average 8 ha. On average 23% of the herd is replaced by first calving cows annually. In addition to rearing heifer calves, some 81% of dairy farmers rear beef calves with an average of 47 beef calves being reared per herd. Artificial insemination is used on 71% of farms in preference to natural service. Sixty three percent of dairy farmers use herd testing services provided by the Livestock Improvement Association (NZDB, 1985; NZDB, 1986; NZDB, 1987; NZDB, 1988a).

For the 1988/1989 season advance payments to dairy farmers opened at $2.80/kg milkfat. By October 1988 this had risen to $4.30/kg milkfat. Price increases during a season are backdated across all milkfat produced to that date in the season. Farmers expectations were of a final return from their dairy co-operatives of approximately $5.20/kg milkfat, although this will vary

between co-operatives. The NZDB paid dairy co-operatives $4.83/kg milkfat. The balance was from profits of the co-operatives own activity. The current upturn in milkfat prices since 1988 led to an increased spending by dairy farmers on fertiliser (18%), repairs and maintenance (73%), wages (14%) and personal drawings (10%) (MAFTech, 1989). An important part of this was deferred expenditure from the lean years of 1984/85 to 1987/88 when maintenance dressings of fertiliser were not applied and major repairs were also deferred. Debt servicing in 1989 as a percentage of gross farm income now averages 21%, down from a high of 27% in the 1986/1987 season on New Zealand dairy farms. The increase in income and expenditure, in current dollar terms, will return cash farm surpluses to approximately the same level, in current dollar terms, as 1984/1985. However, after adjusting for inflation, returns have only the 1984/1985 level (see Table 1.1).

MAFTech (1989) describe dairy industry confidence as 'very strong'. This is reflected in land prices where dairy farms were selling for $10-$12/kg milkfat in 1987/1988, they are now selling for $18-$20/kg milkfat, as at October 1989. The total capital required to buy an average dairy farm is now some $450,000 for land and buildings and a further $120,000 for livestock.

5.3 SHEEP AND BEEF

5.3.1 The Industry

Sheep are ubiquitous in New Zealand. The New Zealand economy was reliant upon the exports of lamb, mutton and wool until relatively recent times (Grigg, ibid.). In 1972 41% of export receipts were from sheep and beef products. Since then the percentage of export receipts from sheep and beef products has declined steadily and in 1988 33% of export receipts were from these industries.

The hill country farms of New Zealand carry over one third (34.4%) of the country's flock of 64.2 million sheep. MAF (1972) considers it not possible to state accurately how much land is involved in hill country farming because boundaries between the tussock grassland and the ploughable land are somewhat arbitrary. However, some 5 million ha are probably involved in hill country sheep production. The New Zealand Meat and Wool Boards' Economic Service (NZMWBES, 1988) subdivides hill country into South Island hill country, North Island hard hill country and North Island hill country (NIHC). The approximate areas and numbers of farms in all the various sheep and beef farm classes in New Zealand are presented in Table 5.3.

Table 5.3. The approximate areas and numbers of farms in each of the various sheep and beef farm classes in New Zealand.

Sheep and beef farm classification	Number of farms	Effective area per farm (ha)[a]
South Island high country	300	9,835
South Island hill country	900	1,755
North Island hard hill country	1,700	656
North Island hill country	5,100	364
North Island intensive finishing	4,400	191
South Island finishing breeding	4,100	353
South Island intensive breeding	3,700	179
South Island mixed finishing	1,800	248
Total	22,000	10.8m ha

[a]Effective area per farm is the total area less waste.
Source: NZMWBES, 1988.

The New Zealand Wool Board, established in 1978, is a farmer-controlled authority, the objective of which is to maximise farmer's long term returns from wool. The Wool Board sets and maintains minimum wool prices and bids for and purchases wool at auction in order to reduce the variations in farmers' returns. The basis of wool marketing in New Zealand has always been the auction system. Wool continues to account for about 12% of New Zealand's export receipts (OECD, 1987). But with the reduction in sheep numbers from 72 million in 1982 to 65 million in 1988, both wool production and returns are expected to decline in 1989 and for some years until sheep numbers increase. The rate of decline has reduced during the 1987/1988 season as sheep retention/slaughter decisions have become more heavily influenced by the profitability of wool production in the light of exceptionally low sheepmeat prices. Since the 1983/1984 season total wool production has declined from 360,000 tonnes greasy equivalent, to 345,000 tonnes. During this same period the average auction price of New Zealand wool has risen. However, the increase in average auction price is disproportionately influenced by the contribution from fine wool (MAF, 1988). The outlook for the 1988/1989 season was for a small increase in the world price for coarse wool. The coarse wool greasy price has declined from 600c/kg in 1980, in 1988 dollars, to 390c/kg in 1986. Since then it has risen to 430c/kg (MAF, 1988).

The New Zealand Meat Producers' Board (NZMPB) was constituted in 1922 to protect national and producers' interests. Since then the NZMPB has engaged in most activities of the export trade. It now promotes the sale of meat on international markets. The Board's statutory responsibilities were reduced in 1985 when the Government returned the marketing of sheepmeat back to the private sector. Prior to 1985 the NZMPB had at various times sought control of the industry at all but one level between the farmer and the consumer, that of purchase of livestock at the farm gate. Currently about 90 countries import New Zealand meat. There are six main markets. These are the United Kingdom and Iran for lamb, Russia and Japan for mutton, and the United States and Canada for beef (OECD, 1987).

Busby (1988) commented that the meat industry was in a state of total disarray. Not only were farmers who were confronted by depressed product prices reducing stock numbers but meat companies were struggling to break even. Meat companies trying to market their goods were being disadvantaged by New Zealand's recent history of high inflation, and high processing and transport costs. Export earnings for 1987/1988 have declined 19% for sheepmeat and 5% for beef compared with the 1986/87 season. Overall, total meat earnings for 1988 were down 12% on the 1986/87 season.

The export kill of lamb, mutton and hogget in the North Island the during the 1987/1988 season decreased 23% over that of the previous year. Beef exports declined in value by 9% over the same period (NZMPB, 1988). Meat accounted for 21% of New Zealand's export receipts in 1988, down from 27% in 1975. During this period the export earnings from wool and dairy produce remained approximately constant (NZMWBES, 1985). The effect of depressed product prices on the sheep and beef industry is best illustrated by the NZMWBES sheep and beef farm survey. The 'average' sheep and beef farm in New Zealand incurred a cash deficit of $8,300 for the 1987/1988 season (MAFTech, 1989). This cash deficit, although improved markedly from the previous three seasons, was not indicative of a healthy industry.

5.3.2 The farms

Unlike dairy farms, sheep and beef farms are located in most parts of New Zealand. There are 22,000 sheep and beef farms in New Zealand, of these about a quarter (5100) are described as North Island hill country (NIHC) farms and a further 8% (1700) are described as North Island hard hill country farms (NZMWBES, 1988). The majority of the Taihape region which is studied here is NIHC with the balance being North Island hard hill country. Hard hill and NIHC country are described as carrying approximately nine and eleven stock units per hectare respectively. The NZMWBES (1988a) reports that cattle provide approximately one quarter of farm revenue (one beast to thirteen sheep on these farms) with the balance being derived from the sale of store sheep and lambs, plus wool income. A high proportion of stock is sold in forward store or prime condition. These farms are located throughout the North Island. There are some 7000 holdings in these two farm classes encompassing 3.2 million ha in total (NZMWBES, 1988).

The average NIHC farm is 405 ha with an effective grazing area of 368 ha. The balance of the land is in bush, scrub, gorges, planted forests and buildings etc. The average area of farms in the Taihape survey was 419 hectares, of which some 390 hectares were described as effective. The NZMWBES (1988) reports that the average NIHC farm carries 3,210 sheep, comprised of 2,400 ewes, 700 hoggets and 110 rams and killers. The average flock on farms surveyed in Taihape had 2629 ewes in 1988, slightly down on 2855 ewes in 1986. The extent of the reduction in Taihape

was similar to the reduction which occurred in the size of the national flock over the same period.

Virtually all ewe replacements are home bred. Eighty five percent of lambs are sold in prime condition, 14% are sold as store lambs and the balance (1%) are sold as live export lambs. Ewes which are surplus to breeding requirements are sold as hoggets, 2 tooths and cull/cast for age ewes. The average lambing percentage, defined as the percentage of lambs tailed - docked - to ewes mated, is 95.2% with a mean mating date of 21 March and lambing in mid August (NZMWBES, 1988).

The NZMWBES (1988) reported that the current sheep:cattle ratio is 13:1 on NIHC farms. On the Taihape survey farms the mean sheep to cattle ratio was 14:1. Cattle numbers on NIHC farms are made up of 252 head, comprising 84 breeding cows and rising 3 year heifers, 26 rising 2 year heifers, 83 mixed sex weaners and the balance (60) are steers and bulls. The cattle policy is similar to the sheep policy; farmers breed their own replacements and sell excess breeding stock, steers and bulls. Weaner Friesian bulls sourced from dairy farms are raised on some farms and are sold as either rising 2 or rising 3 year olds. This enterprise is a quite recent development on traditional sheep and beef farms but is an important link between the dairy and beef sectors. Approximately half the steers are sold as rising 3 year olds, the balance are sold as either rising 2 or rising 4 year steers. The average annual calving percentage (defined as the percentage of calves marked to cows and heifers mated) is 84%, with a mean mating date in early November calving in late August (NZMWBES, 1988).

Skilled grazing management is needed on North Island hill country farms if secondary growth is to be checked on pastoral areas. Intermittent grazing is more effective than continuous grazing to control reversion, especially if no cattle are kept as 'toppers'. The sheep kept are mainly crossbreds (Romney, Coopworth and Perendale), with Romneys being the predominant breed of sheep in Taihape. Breeding ewes and finishing cattle (including Friesian bulls) dominate the use of better farm land while wethers and breeding herds of cattle use the poorer farm land. The latter, mainly Angus, Hereford or crosses thereof, are sold as stores to lowland farms. Usually the only animals bought in from outside are bulls and rams. Rams are generally selected from breeder's flocks where some form of objective animal breeding programme is used. However, the majority of buyers do not use these flock or individual animal records when selecting rams.

All the Taihape survey farms were owner-operated and were managed under a wide range of ownership structures. Twenty percent were managed as sole traders, 41% were partnerships and the balance were companies, trusts or a combination of these. Table 5.4 summarises the survey data. The person responsible for the financial management on the farm usually (81%) had only completed a maximum of three years secondary schooling. The surveyed sheep and

beef farmers had been on the farm for 25 years and had had only rare involvement in any occupation other than farming.

Table 5.4. Ownership structures of the farms on each of the three farm types surveyed.

Ownership structure	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Soletrader	13	19	18
Partnership	87	41	59
Company	0	8	13
Trust	0	10	0
Combination of these	0	22	10
Total	100%	100%	100%

Approximately one quarter of the NIHC farms have a permanent employee. On average casual labour is employed for three months of the year. Nearly half (45%) of the gross farm income is from wool sales. In 1987/88 the average farm sold 14,000 kg of wool at a net return of $3.70 per kg. The balance of farm income was derived nearly equally from sheep sales and cattle sales. As was the case with dairy farms, off-farm income on sheep and beef farms is insignificant (MAFTech, 1988; NZMWBES, 1988).

5.4 PIPFRUIT

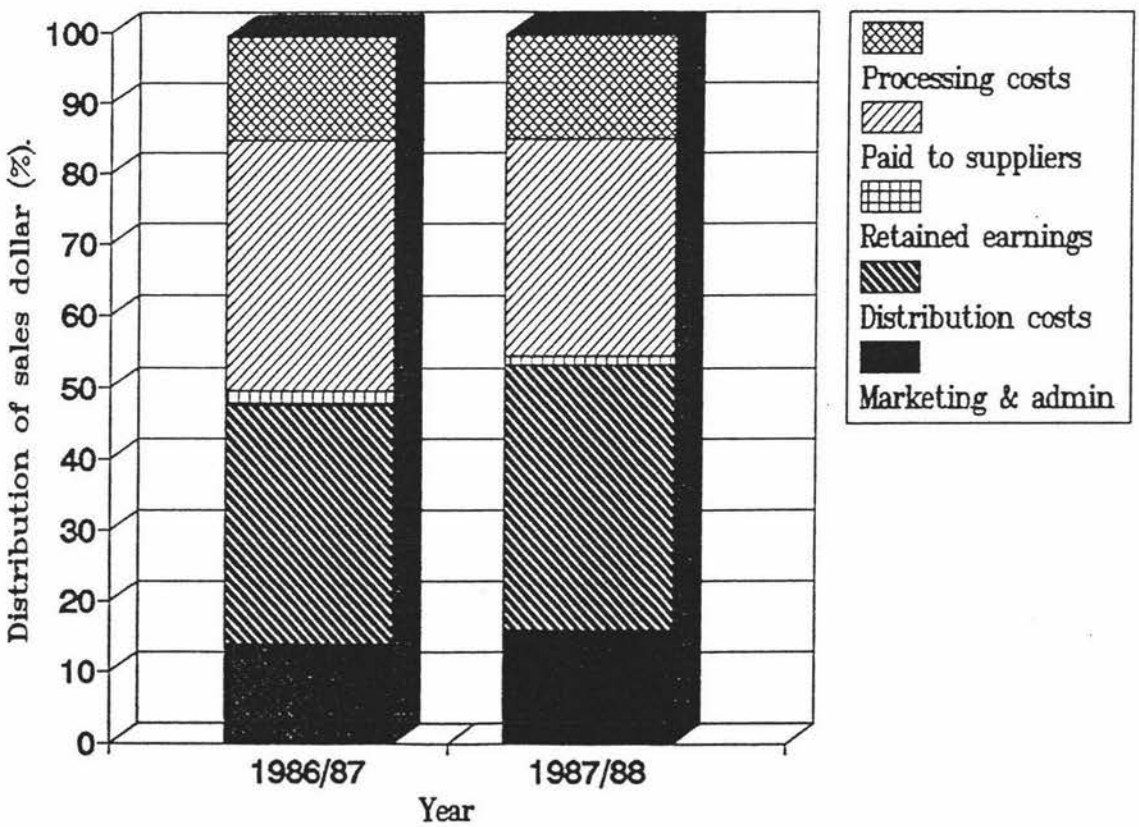
5.4.1 The Industry

The sale, marketing and distribution of apples and pears in New Zealand is controlled by the New Zealand Apple and Pear Marketing Board (NZAPMB). The NZAPMB is a farmers' co-operative which was established in 1948 when farmers believed in the need for controlled marketing to give future security and stability to a rapidly expanding industry. The Board is the sole exporter of New Zealand's apples and pears and is also responsible for the distribution and supply of apple and pears to retail outlets on the domestic market.

Farmers receive interim payouts for their fruit deliveries to the Board. Final payments are made after allowing for forward capital expenditure by the Board. Prior to 1988 the Board's profit was split equally between the farmers and the farmer's stabilisation account for use in years of a trading deficit (NZAPMB, 1986). However, the growers' stabilisation fund was disbanded in 1988 when the majority of growers decided that income stabilisation was an individual grower's responsibility. This move passed some of the financial risks from the Board to the producers.

Sales of fresh apples and pears in 1986 by the NZAPMB totalled 16.2 million cartons. Exports represented 54% of the total crop volume handled by the Board in that year. Export sales were made in 42 markets throughout the world and realised a gross fob value of $257 million. The total sales turnover was $375 million and the payout to growers averaged $8.11 per carton. Of the Board's gross sales only 29-31% is returned to the grower, the balance being absorbed by post harvest handling, distribution, marketing and administration. The allocation of industry costs is illustrated in Figure 5.3. In 1987, total receipts were 16.6 million cartons, gross turnover was $398 million and the payout to growers averaged $8.37 per carton the highest average price and turnover since the Board's inception. The increased supplies on the European market from other southern hemisphere countries, especially South Africa, on the European market continued in 1988. Despite these factors the Board's payout to farmers averaged $7.31 per carton in 1988 from a total of 18.4 million cartons. The gross retail value of the crop was $409 million (NZAPMB, 1988).

Figure 5.3. NZAPMB costs and the distribution of returns to growers.



Pipfruit markets are currently described by the Board as being oversupplied, indicating a greater degree of competition from other southern hemisphere countries. The NZAPMB (1987) maintains that it is only because of the level of quality, organisation and marketing of New Zealand pipfruit that allows the Board the continuation to market apples and pears on many of the world's markets. In response to oversupply by southern hemisphere producers, the European Economic Community has applied a quota on apples entering their markets (McPhee,

1988). The NZAPMB purchases all export fruit supplied by pipfruit farmers. The NZAPMB is not obliged to accept any fruit failing to reach their size, colouration and blemish standards. The Board can raise its standards to avoid taking surplus fruit it is unable to market (Barrack, 1988), a strategy it may adopt if production increases are greater than can be sold.

The Board's domestic and export monopoly has come under the scrutiny of both Government and the 'Campaign for Cheaper Apples' (McPhee, ibid.; Douglas, 1984). However, to this time the Board's powers have not been altered. Farmers are paid more than $12 an export carton for the best Braeburn, $11 for Royal Gala, $7 for Granny Smith, $6 for Red Delicious and $3 for Gravenstein (NZAPMB, 1988a). The Board rarely publicises what it receives per carton. Cross subsidisation between varieties, despite continual reassurances to the contrary from the Board, obscures the market signals to the farmer.

The number of new plantings by variety or the amount of rebudding undertaken by farmers is not publicised. This means the individual farmers do not know with any certainty the projected levels of production for any particular variety. In 1987 an estimated 2 million trees were planted. This major expansion was stimulated in part by the rapid development of public companies in the horticultural sector. Similar levels of plantings are projected to occur over the next few years, however, since the share market crash of October 1987 the rate of additional plantings has slowed markedly. By 1994 total production of pipfruit in New Zealand is estimated to be nearly three times production achieved in 1987 (NZAPMB, 1987).

The industry is in general agreement that quality standards will need to be higher in the future (NZAPMB, 1988). It is expected that colour requirements and defect standards will be tightened. This season (1988/89) the NZAPMB has notified farmers that it will not be exporting smaller sizes in some varieties. This will have a minimal effect on most varieties except Cox's and Red Dougherty. In both cases the minimum size has been increased from 198 to 175 size count[1]. On the basis of past export crops, 198s make up 6-8% of these varieties (MAFTech, 1988).

The NZAPMB does not survey pipfruit producers for financial information in the same manner as done by the NZMWBES and the NZDB. The latter two Boards survey their producers at least annually and this information is available publicly. The NZAPMB does not consider the financial position of their producers to be their responsibility (Bennett, 1989). Information as to the state of the pipfruit industry, at the producer level, is available only through MAFTech Farm Monitoring Reports which are published quarterly. The use of these data sources in Farm Management research is discussed in Chapter 8.

1 A box of apples (tray carton) contains 1 bushel. The size count refers to the number of apples per bushel. Premiums are paid for large apples.

5.4.2 The orchards

The wide range of climates and soils in New Zealand has encouraged production of a great variety of fruit and vegetables. Most New Zealand orchards contain 14 to 16 hectares of mixed plantings with stone fruit often grown along side pipfruit (MAF, 1972). The pipfruit orchards surveyed on the Heretaunga Plains area averaged 15ha and produced at least three varieties of apples. The most common varieties were Granny Smith, Red Delicious and its derivatives such as Hawkes Bay Red and Harold Red. Approximately half of pipfruit orchards do not have enterprises other than apples and pears. The remainder have plantings of other fruit including citrus, kiwifuit, nashi, berryfruit and stonefruit. One orchard in ten has its own packhouse while the majority of orchards transport loose fruit to be packed by neighbours, commercial packhouses or the NZAPMB. The farmer is paid according to the quantity and quality of fruit produced. A separate price schedule is promulgated by the NZAPMB each year, normally in January.

The pattern of ownership of the orchards surveyed for this study was similar to that observed on the sheep and beef farms surveyed. The majority of orchards (59%) were administered as partnerships, 18% were sole traders, 13% were companies and the balance (10%) were combinations of trusts, companies and or partnerships. A few orchards (5%) were either being managed on behalf of the land owner or were leased. Forty nine percent of those responsible for financial management on the orchard had some form of tertiary education. This was a significantly higher proportion than on the other two farm types studied. These data are presented in Table 5.5. The typical farmer had been on the orchard for 17 years, having often been involved in a non-farming occupation prior to this.

Table 5.5. Formal educational levels attained by farmers on each of the three farm types surveyed.

Highest educational level attained	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Primary school only	4	5	3
2 years secondary school	36	22	13
3 or more years secondary	38	54	36
Polytechnic[a]	11	3	15
University diploma	7	8	10
University degree	4	8	23
Total	100%	100%	100%

[a]Includes Flock House, Teachers College and Trade Certificates

The average orchard does not employ permanent labour. Seasonal labour is used for pruning, thinning, picking and packing. The picking season starts in mid to late January with Albany Beauty and Gravenstein and continues through until May when the last apple varieties, Granny

Smith and Red Dougherty, are picked and packed. The only crop with which there has been any significant progress to date with mechanical harvesting is blackcurrants. Consequently large numbers of casual workers, 12 to 16 people on a typical 15ha orchard, must be recruited for picking and packing the crop, over and above the permanent workers who are found on orchards at other times of the year.

The MAF (1988) summarises the current situation for pipfruit orchardists as follows:

'While most growers have an increasing number of plantings of newer high return varieties, the majority of production from mature orchards is made up of Granny Smith and Red Delicious. Both these varieties received a drop in their guaranteed price for the 1988 season (declines of 1.5% and 2.4% respectively NZAPMB, 1988a; NZAPMB, 1987a). This coupled with low export packouts has resulted in a significant drop in income for some growers'.

Payments due to pipfruit farmers were delayed in 1988/89. Furthermore, farmers were warned by the NZAPMB that any payout above the advance price announced would be minimal. The industry outlook is for large crop increases and further market access restrictions. Many farmers did not forward purchase chemicals, and have reduced or delayed expenditure on pruning and maintenance items (MAF, 1989).

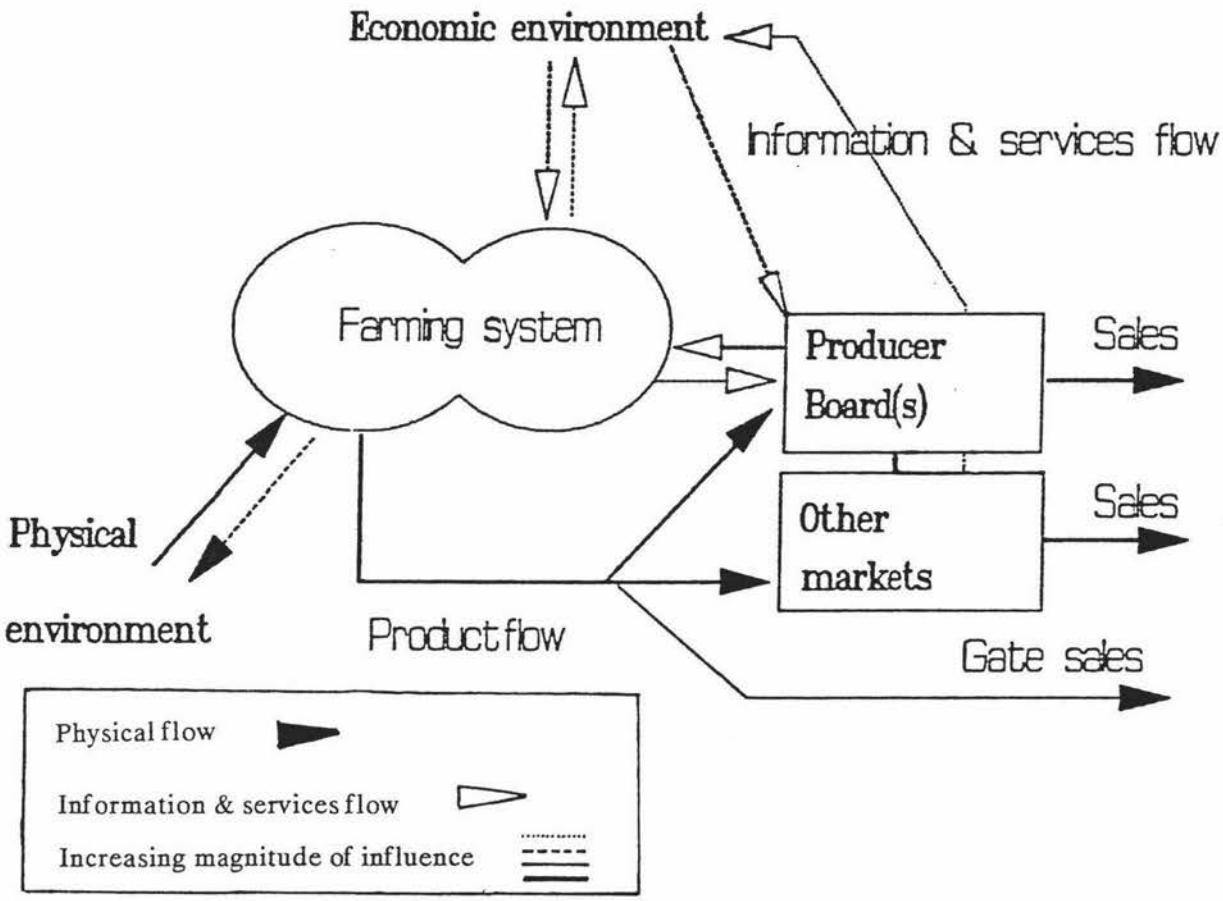
The current state of the three farming sectors studied have been summarised. Both the industry and the production system have, in each case, been reviewed. Of all three sectors studied the dairy sector appears to have, in the medium term, the most optimistic future. Rising international prices for commodities from the dairy industry have increased the nominal payout for dairy farmers' milkfat. However, in real terms these farmers' profitability has only returned to that achieved in 1984/1985. Both the sheep and beef and the pipfruit sector are beset with, in real terms, declining product prices. The sheep and beef industries' attempts at rationalisation have been thwarted by the concurrent decline in stock numbers throughout this farming sector. The pipfruit industry in New Zealand is faced with marked increases in production levels and the pipfruit farmer is still receiving specious market signals.

5.5 COMMON FEATURES AND IMPORTANT DIFFERENCES

A flow diagram can be used to describe a farming system in terms of inputs and outputs. All farming systems are influenced by both the economic and the physical environment. The physical environment will determine land use and enterprise choice decisions. Once these are implemented the physical environment will then influence both the quantity and quality of output. The economic environment will influence output prices, input costs and the value of farmers' resources.

In Figure 5.4 the farming system is depicted as having a production sub-system and a management sub-system with a permeable and arbitrary 'boundary' between the two sub-systems. Output is purchased by producer board(s), other market outlets or sold directly to the consumer. Farmers' returns are influenced by the market and also the economic environment. Market and production information is provided to the farmer by the purchasers of farm outputs, in particular the producer boards. Output prices and quantity, input costs and resource values will largely determine farmers' cash surplus, equity and profit. A general flow diagram, common to all three of the farming sectors studied, is presented in Figure 5.4.

Figure 5.4. The flow of inputs and outputs of a farm system typical of those studied.



Key differences between the three farming systems are now identified and discussed. Farming systems can be described using a combination of Spedding's (1975) and Haines' (1982) methodology. Each system can be illustrated in terms of nine descriptors; purpose, boundary, resources, context, components, interactions, inputs, outputs and by-products (see Section 2.3). These nine descriptors serve to summarise the important features of an agricultural system. Although the principal biological differences of the three systems examined in this study have been noted, it is the financial implications of these biological differences which are the focus of attention. The biological differences may result in changing the timing of the sale of produce, the purchasing of inputs or the risk faced by the farm manager. In New Zealand, the management by farmers of the three farming systems studied is influenced by the servicing

industries, particularly by the producer boards. The producer boards to some degree share price risks with the farmer by pooling proceeds from various markets etc. Furthermore, the NZDB and the NZAPMB pay farmers, by way of advance payments and final instalments, distribute farmers' incomes beyond the harvest periods.

The roles of the producer boards have in the three industries have been discussed earlier. Following the industry discussion, each farm type was described so as to present a 'typical' production system with particular emphasis on the current economic circumstances of each. The important differences between the three systems from a systems management point of view are now highlighted. These differences determine the modifications necessary to the normative model developed later in this chapter. This secondary examination of the model completes the development of the three systems-specific financial management models.

(1) Purpose: The purpose of all farming systems is to achieve an adequate level of return to the farmer and farm family. However, the primary goal of the majority of farmers interviewed was to increase owner's equity. The diverse array of goals suggested by farmers was similar across all three of the farm types surveyed. The primary goal of farmers interviewed is presented in Table 5.6.

Table 5.6. The primary goal reported by the farmers interviewed on each farm type.

Farmer's primary goal	Farm type		
	Dairy	Sheep and beef	Pipfruit
To make a profit	14	23	35
To purchase land	36[a]	9	9
To provide for their children's education[b]	4	18	9
To increase equity[c]	11	14	35
To retire	21[d]	27[d]	4
To enjoy the lifestyle	0	5	4
Unable to specify	14	24	4
Total	100%	100%	100%

[a]Includes sharemilkers progressing towards land ownership.
[b]Differences here reflect differences in proximity of state (especially secondary) schools. Dairy and pipfruit farmers are advantaged in this regard relative to sheep and beef farmers.
[c]At the time of the survey farmer's equity had been eroded by declining land prices, particularly in the sheep and beef and pipfruit sectors.
[d]Declining land prices and the downturn in farm profitability had obliged older farmers to remain on their farms.

At the time of the survey land prices in each of the three farming sectors studied had declined markedly relative to prices in 1984. Consequently, farm owner's equity had

generally been eroded. The surveyed farmers' financial goals reflect the state of the agricultural sectors in New Zealand at the time of surveying, mid 1988. Farmers' financial goals are likely to change in response to the current increase in land values and the subsequent improvement in owner's equity.

(2) Boundary: A system's boundary provides a means, in a conceptual sense, of deciding what is in and what is out of a system. In the case of grassland farms or pipfruit orchards the physical boundary is usually the boundary fence or shelter belt. Generally the boundary of the land resource coincides with the production system boundary (Jones, 1982). On each of the farm type studied the physical boundary is relatively easy to determine. However, other boundaries will exist, for example, the information boundary. The information boundary will identify data sources used by the farm manager outside of the production system. In each individual case boundaries will be unique, but the effect that the physical boundary has on the each production system is not likely to alter the mode of financial management of each.

Farm managers who passively receive information may have a more clearly defined data boundary than farmers who are active information seekers. In the latter case the data boundary will, conceptually, extend well beyond the physical boundary. The sources of data used by farmers in decision making, usually in a technical sense, have been researched and documented elsewhere (see Section 1.2). Of farmers in the three districts surveyed, the South Taranaki dairy farmers appear to be best served by active extension services in the form of both MAF and NZDB advisory officers, field days and discussion groups. The Taihape MAF office was closed in 1986 when user-pays consultancy was introduced by MAF. Since 1986 the district has not had ongoing access to extension services such as that available to farmers in South Taranaki. Similarly, Heretaunga Plains orchardists appear to be poorly served with regard to extension services. Although the NZAPMB and MAF have advisory officers, the free exchange of information between farmers does not appear to take place to the extent that was reported to occur in the discussion groups in the pastoral sectors.

(3) Context: All farming systems operate in the context of a physical and economic environment external to them and which are not influenced by them. Farms in all three sectors now operate in a market-led economy free from intervention other than that dictated by their respective Boards. The role and the prices determined by each of the marketing boards were discussed earlier in this chapter. The marketing boards are a major supplier of information to the farm manager. However, meat companies and, to a lesser extent, domestic markets are also sources of data. Differences exist between the roles taken by each of the Boards and this in turn influences the timeliness of information provided to the farmer, despite the four Producer Boards concerned having

the same goal! The effect that each of the marketing structures has on the financial management of the production system is discussed in detail in Section 5.6.

(4) Resources:

(a) Land; Land use decisions are limited on all three farm types. Enterprise choice decisions are, however, less restrictive although on most farms these are seldom changed. On the dairy and sheep and beef farms land use is largely restricted to pastoral farming, however, on parts of some Taihape farms goats, deer and forestry may be a profitable alternative to sheep and beef. On the Heretaunga Plains land use is restricted to intensively grown crops. The cost of land per hectare ensures that intensive cropping as offered by, pipfruit, grapes, stonefruit and sub-tropical fruit are usually the only profitable enterprises available.

(b) Labour; Pipfruit farming is more dependent than the other systems examined in respect to the use and need for non-family labour. On pipfruit farms labour costs will effect the farmer's cash flow during times of peak employment, for example, during pruning, thinning (where undertaken) picking and packing (where there is a packhouse). The marked difference in labour requirements between the pipfruit production system and the two pastoral production systems may influence the financial management of each, particularly with respect to the recording and payment of employees' wages. Pipfruit farmers appear to be more familiar with labour legislation than do pastoral farmers.

(c) Capital; The total capital requirement of dairy, sheep and beef and pipfruit farms is relatively similar. In most cases NZ$3-400,000 is required to purchase a going concern in each of the sectors. Working capital is required to meet fixed and variable expenses. However, the proportions and control of fixed and variable expenses appear to differ between the pastoral and pipfruit farms. Excluding fertiliser, variable costs on pastoral farms are relatively independent of husbandry decisions. On pipfruit farms labour accounts for 25-30% of variable costs. Changes to husbandry decisions will alter the proportion of fixed to variable costs on these farms.

(d) Management; The management resource comprises the skills of the manager (e.g., his (or her) education, knowledge, experience and dexterity) and, to a lesser extent, the skills of his (or her) advisers. Management skills will vary between farming systems on an individual basis. The number of years in the farming business, the level of education completed and experience gained in other occupations may increase the skills of the farm manager. The pipfruit

farmers surveyed tended to have a higher level of education and had more often been involved in other occupations than did the two other survey group farmers.

(5) Products: main desired outputs: All three systems are dependent on the product sales to meet the farmer's goals. The products from dairy farms are milk, bobby calves, weaner calves, possibly bull beef and cull cows. The products from sheep and beef farms are wool, lambs, cull ewes, cull hoggets, beef and surplus cattle and the products from pipfruit farms are primarily apples and pears but may also include other fruits and honey. The frequency of the receipt of income differs markedly between the three production systems. During the milking season dairy farmers receive income monthly. Sheep and beef farmers can receive income throughout the year, however, this will be determined by the sale dates of wool and livestock. Pipfruit farmers receive income monthly during a relatively confined harvest season from February to May.

While individual agricultural systems are unique, similarities exist both within and between the survey farm types. The three production systems studied have many features in common, in particular the purpose, the unique physical boundary, the need for land and capital, the need for inputs and the lack of by-products. The components and interactions of the three farm types studied present biological differences. However, these differences do not importantly influence ideal financial management. Consideration of the information boundary, the systems context, the labour requirements, the management and products sold all indicate significant differences between the production systems studied. Differences do exist between the three farm types studied with respect to their financial management requirements.

5.6 A NORMATIVE MODEL OF FARM FINANCIAL MANAGEMENT FOR FARMS IN EACH OF THE INDUSTRIES

The general normative model of farm financial management, defined in Section 3.5, can be modified to account for the differences that exist between the three farm types studied, thereby making systems-specific models.

New Zealand dairy companies pay producers on the 20th of the month following production. The base price for milkfat on which payments are made is announced prior to the outset of the milking season. This base price is then revised and usually increased at intervals throughout the season. The final payout to producers is received in July and August following the milking season. It varies between co-operatives, reflecting each co-operative's profit. A farmer could then be expected to revise the budget during the production season in response to changes in milkfat price as well as changes to the actual and anticipated levels of milkfat production.

Twice daily milking during the milk production season and monthly milkfat cheques, provide

the farm manager with both daily (milkfat production) and monthly (income) information throughout the milking season. This frequent and regular flow of information provides the farmer with accurate and timely information for budget revision. Budget revision on the dairy farm can then realistically take place monthly during the milking season and on the receipt of final payments. Therefore, in the dairy farm financial model budget review ideally occurs monthly during the milking season. From drying-off to the receipt of the first payment from the following milking season budget review will largely be determined by the receipt of final payments. The fourth component of the general model, when used in the context of dairy farming, includes monthly budget reviews during the milking season.

Deviations of actual costs and returns from budget are often uncontrollable because of unpredictable growing conditions (Topham, 1982; Lamb, 1985). If, for example, grass growth is poorer than expected, then supplementary feeds (or nitrogen) can be used to maintain planned milk production or liveweight gains. Alternatively, output could be allowed to fall. The NZDB announces, prior to the outset of the milking season, the minimum expected milkfat price. The dairy farmer can then specify the acceptable level of variation in production between the outcome and the plan. Once the outcome shifts beyond either the lower or upper boundary of the farmer's comfort zone the original plan may be obsolete. However, the farmer should recognise a problem before the outcome falls below this lower boundary. Similarly, if the outcome rises above the upper boundary opportunities should be exploited.

The normative model of farm financial management requires only one modification for dairy farmers. The dairy farm system-specific model requires monthly budget revisions during the milking season and budget revision upon the receipt of final payments if these are received before the start of the following season.

The financial management of sheep and beef farming systems and dairy farming systems differs significantly in three ways. Firstly, sheep and beef farms usually have more than one enterprise. Enterprise recording of income and expenditure is necessary so that the financial performance of each is not masked. Detailed end-of-year accounts showing the performance of each enterprise can then be produced. Ideally budgets are produced on an enterprise and whole farm basis (Engelbrecht, 1984). Effective enterprise financial management will show the profitability of each undertaking and allow appropriate resource allocation decisions to be made.

Secondly, income is not necessarily received at regular or frequent intervals on sheep and beef farms. Income is usually received when wool is sold after shearing and when stock are sold. The farmer has limited ability to manipulate the output from the biological production cycle over the short-term. For example, a flock's maximum lambing performance is determined at mating. By contrast, the selling dates of livestock are determined by the producer, although the choice made will be influenced by the respective carcass grading and price schedules.

The third difference between the systems is in regard to the frequency with which production can be sensibly monitored. Sheep and beef production can not be monitored on a daily basis and day-to-day differences in output estimated reliably. pasture production on the Massey University sheep and beef farms is monitored indirectly at fortnightly intervals by measuring pasture cover (Parker, 1984). This information is used by the management of the University farms to update and revise feed budgets. Animal performance is monitored less frequently. Livestock are weighed every four to six weeks. Despite regular revisions to output forecasts the financial budget is not modified at such frequent intervals. The assumption on Massey University farms that there is a direct correlation between feed supply and performance, either physical or financial, is as yet untested. Combining the database used for production records with the spreadsheet used for financial planning would improve the financial management on these farms.

Wool provides some 50% of sheep and beef farm income (NZMWBES, 1989). Budget revision could be expected to take place upon the receipt of the main shearing wool cheque. Similarly, tailing and weaning can provide the farmer with information as to the expected level of output. Tailing is the first opportunity for the farmer to evaluate lambing performance, and weaning gives an accurate indication of lamb sale numbers. As with main shearing, these two events provide data for budget review.

Budget review can ideally take place at these times. An additional evaluation of the budget must coincide with the end of the financial year. Modifications to the general normative model need to reflect these three differences. To this end, sheep and beef farm systems-specific model requires that enterprise recording is completed and budget reviews occur at the time of events, such as, tailing, weaning and the sale of wool.

Pipfruit production requires a careful consideration of the economics of establishment and production when the orchard is being planted. Once the species, rootstock, variety, planting pattern and training system have been determined the main production characteristics of the orchard are set. These may be retained for up to 50 years. In practice, the varietal mix may remain static for the natural life of the tree or until such a time as the farmer sees fit to change. Many orchards are now in a poor cash flow position because the profitability of different varieties has changed since the farm was established. Wilton (1989) suggests that at any time 10-20% of the trees planted should be in a renovated state. In a long-term business technological change must be considered in order to maximise average net return to farmers, even if it means replacing trees which are currently profitable but which are forecast to contribute less to long-term profit than would be obtained by using new varieties, rootstocks, training methods and planting systems (Stewart, 1968; Gow, 1968; Davis and Thiele, 1981). Pipfruit farmers appear to maintain the status quo until declining profitability forces a change, rather than maximising

profitability over the long term. This has implications for the length of the planning horizon used by pipfruit farmers implying they discount the future heavily. The determination of planning horizons is introduced in Chapter 7.

Pipfruit farmers ideally must complete some form of discounting analysis when making tree renovation decisions as income is not received until three to six years after establishment costs are incurred. However, on pipfruit farming systems price schedules (NZAPMB, 1988b) and market feedback comments appear to form the basis of replanting decisions (Wilton, ibid.).

An orchard usually comprises blocks of species and varieties of different ages and productivities. Each of these can be regarded as a separate enterprise with different costs and returns (Stokes, 1979; NZSA, 1986). Pipfruit farmers then also require enterprise recording. A multiple-enterprise system such as a pipfruit farm has similarities with an investment portfolio and is answerable to analysis such as that developed by Markowitz (1952) and Sharpe (1963). With investments, the objectives and purposes of each need to be balanced within the portfolio (Haugen, 1986). A safe or low risk investment, for example, may not provide protection against inflation. Whereas, an inflation resistant investment may not provide adequate liquidity for the operation. It is widely assumed that the greater the risk the more ample the return and conversely the lower the risk the more modest the return.

Taylor (1968) recommends that the annual budget on a pipfruit farm is reviewed at such strategic times in the crop calendar such as November or early December when an early estimate of the crop yield can be made. Budget reviews may again be necessary after another yield estimate is made in January, following harvest and following the final payout later in the season. Fruit sales occur from late January to May each year. Income is received by the farmer from the sale of fruit the month after it is received by the NZAPMB. No guaranteed income is received by pipfruit farmers from the month after the last fruit of a season is picked until the second month of the next season (NZAPMB, 1989). Taylor's (ibid.) recommendations with respect to the timing of budget revision on pipfruit farms need little modification. Budget reviews can occur when crop estimates are made at flowering and thinning in September/October and then in November and again in January. Thereafter income is received monthly (depending on the varieties produced) and the budget can be revised regularly and frequently until late May.

Thus, the ideal model of pipfruit farm financial management must incorporate all the features of the sheep and beef model, namely budget revision largely determined by events and enterprise analysis. Furthermore it must include long-term enterprise planning as a routine activity of managers.

The key differences between the three farming systems, with respect to the financial management of them, have been identified. These differences were then used to develop systems-specific models of farm financial management. A somewhat cursory glance at these three farming systems would suggest that they are quite different. However, biological differences aside, their management needs are largely in common. Differences between the ideal financial management of each of the three farming systems exist mainly with respect to the regularity and frequency of budget revision. The other difference of financial management is a peculiarity of the pipfruit farm where ideally some form of portfolio analysis, long-term analysis of the enterprise mix, should take place.

CHAPTER 6. SURVEY RESULTS

> .... in your report here, it says that you are an extremely dull person. Our experts describe you as an apallingly dull fellow, unimaginative, timid, no sense of humour, tedious company and drab. And whereas in most professions these would be considered drawbacks, in accountancy they are a positive boon.
>
> Monty Python's Flying Circus, And now for something completely different, 1971.

6.1 INTRODUCTION

The results from each of the three survey areas are presented in this chapter and, where appropriate, comparisons are drawn between each of the three farm types. Farmer practice of financial management is then compared and contrasted with the normative models.

The questionnaire consisted of 22 main questions, of which many had more than one part. The questionnaire was structured into five major groups of questions. The farmer's experience, land tenure, historical production and education were the subjects of the first group of questions. The main results from these questions were reported in Chapter 5. The next set of questions were designed to learn from the farmer of the involvement of third parties in the financial management of the farm. Farmers' financial planning and financial control was the subject of the third set of questions. The fourth set was designed to learn of the farmers' accounting function and the final set was designed to learn of the farmer's knowledge of cash surplus, equity and profit. The information provided in farmers responses to these questions is now summarised and discussed.

6.2 THIRD PARTY INVOLVEMENT IN FARM FINANCIAL MANAGEMENT

GST was introduced in New Zealand on October 1, 1986. The Government has been criticised because of the additional administrative burden on business by the imposition of GST. However, considering the small number of transactions a farm manager completes annually - wages are exempt from GST - the burden for farmers is insignificant when a methodical recording system is used. Farm managers who completed their GST returns without outside help and who did not regard it as 'a major ordeal', generally had some form of organised financial recording systems. Two-thirds of all the farmers surveyed completed their own GST returns, 22% of farmers had their GST returns completed by their accountant, 13% of farmers surveyed partially completed their returns and had them completed by their accountants. The remainder, 1% employed a farm consultant to complete their GST returns. There was a significant difference in the results obtained between the three farm types. A higher proportion

of pipfruit farmers completed their own GST returns than was the case with dairy farmers. A smaller proportion of sheep and beef farmers completed their GST returns than either dairy or pipfruit farmers. The relevant data on GST returns are presented in Table 6.1.

Table 6.1. Persons principally responsible for completing GST returns on farms for each of the three farm types surveyed.

GST return completed by	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Farmer	62	51	85
Accountant	22	32	12
Both farmer & accountant	16	14	3
Other person/agency	0	3	0
Total	100%	100%	100%

Farmers can elect to complete their GST returns at monthly, two-monthly or six monthly intervals. The return periods adopted by the survey farmers are reported in Table 6.2. Dairy farmers were approximately equally divided between two-monthly and six- monthly return periods. However, sheep and beef farmers, in most cases (92%) adopted the two-monthly return period. Pipfruit farmers also favoured the two-monthly return interval. A few pipfruit farmers (5%) had adopted the monthly return which is only available to farmers on special application to the Inland Revenue Department.

Table 6.2. GST return intervals adopted by farmers for each of the three farm types surveyed.

GST return interval	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Monthly	0	0	5
Two-monthly	44	92	69
Six-monthly	56	8	26
Total	100%	100%	100%

On some farms third parties other than accountants(for example, consultants and bank managers) are involved in ongoing financial management. The use made of third parties by farmers in each of the three survey districts is summarised in Table 6.3.

Table 6.3. Percentages of farmers of each of the three farm types surveyed reporting involvement of a third party in ongoing financial management.

Third party involved in financial management	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Consultant	5	19	5
Bank manager	9	3	5
Other	2	8	8
Total farmers	16%	30%	18%

The most commonly employed third party for financial management (other than accountants) was farm consultants. Nearly 20% of sheep and beef farmers employ a farm consultant, whereas only 5% of dairy and pipfruit farmers employ them. This reflects the relatively active role of farm consultants in the Taihape district. Only small numbers of farmers formally keep their bank manager regularly involved with financial progress. Most of the farmers employing outside advisers for financial management described their advisers role as 'providing financial management advice'. In some cases the adviser was employed for the sole purpose of the preparation of farm budgets. On one pipfruit farm the adviser was employed to monitor the performance of the property and to report the financial state of the business to the owners. The major tasks performed by third parties on the farms surveyed is presented in Table 6.4. Only the most important task is reported in Table 6.4. Third parties were involved in more than one aspect of financial management on many farms.

Table 6.4. Major tasks completed by third parties involved in ongoing financial management on each of three farm types surveyed.

Major tasks completed by third parties	Farm type		
	Dairy	Sheep and Beef	Pipfruit
None	84	70	82
Planning	9	16	0
Monitoring	0	0	3
General financial advice	7	14	15
Total	100%	100%	100%

The farm accountant is the most common provider of 'general financial advice'. Over half of both the dairy farmers (53%) and sheep and beef farmers (57%) surveyed contact their farm accountant during the trading year for financial advice. These contacts are in addition to those made for routine compliance accounting purposes. Pipfruit farmers are less likely to seek financial advice from their accountant. Farm accountants provide information to their clients on a wide range of subjects. The more common subject areas are budgeting, off-farm investments, development opportunities, sharemilking and the payment farm labour. The

percentages of farmers seeking different advice from their accountant are presented in Table 6.5.

Table 6.5. Proportion of farmers on each farm type surveyed seeking advice from their farm accountant and the nature of the advice sought.

Type of advice sought	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Estate planning	2	0	5
Major purchases	4	0	5
Enterprise change	2	3	0
Budgeting	11	22	10
Off-farm investments	7	8	5
Family support	4	3	0
Discounting	2	0	0
Development	11	5	8
Sharemilking and labour	9	16	0
Total seeking advice	52%	57%	33%

6.3 FINANCIAL PLANNING AND FINANCIAL CONTROL

The next set of questions posed was designed to learn from the farmer the principal components of his farm financial management system. Questions were designed to learn the state of both formal and informal financial planning and control. The information provided by the survey farmers on farm financial planning and farm financial control is now reported and discussed.

The need for separation of the farm's finances from the farm families finances has been the subject of regular comment (Latta, 1979; Alexander, 1986). In all three survey districts some two-thirds of the farmers had separate farm and personal cheque books. The remainder, in each case, maintained one cheque book for both personal and farm expenditure. Farmers not maintaining separate cheque books in many cases often failed to record their personal drawings in any formal manner. These results are presented in Table 6.6. Of the surveyed farmers who maintained separate cheque books, nearly all (93%) had an automatic transfer of funds monthly from the farm account to the personal account. The balance of the farmers surveyed had less regular or less frequent funds transfers.

Table 6.6. Percentages of farmers on each farm type surveyed recording their personal drawings.

Recording method used to monitor personal drawings	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Separate cheque book	76	79	77
Other recording	8	14	21
No recording	16	7	2
Total	100%	100%	100%

Several questions were posed to learn directly of the farmer's level of financial planning and of the methods used to monitor financial performance. Whether a farmer completes an annual farm budget (Ryde and Nuthall, 1984) is not always a useful indicator of active financial management by a farmer. For example, a budget prepared at the start of the financial year that is seldom if ever referred to, has limited value. Financial management is an ongoing, iterative process requiring regular and frequent revision of the budget in response to deviations between the target and the outcome. Therefore the number of times the budget is revised annually is a better indicator of active financial management.

The percentages of surveyed farmers completing budgets is presented in Table 6.7. All the budgets completed by the surveyed farmers were in the form of a twelve monthly cash flow forecast. On two of the dairy farms surveyed all of the financial management was completed by the accountant. This included the signing of all cheques for the farm operations. On these two farms the farm accountant was responsible for budgeting, budget revision, banking and the control of personal drawings.

Table 6.7. Percentages of farmers on each of the farm types surveyed completing an annual budget.

Farmer's action	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Budget completed	47	70	64
No formal budget	49	30	36
Accountant prepares budget	4	0	0
Total	100%	100%	100%

Several reasons for completing a budget were cited by farmers. The most common single reason was to secure seasonal finance. The reasons farmers reported completing a budget are in Table 6.8.

Table 6.8. Percentages of farmers surveyed on each of the three farm types citing different reasons for completing a budget.

Reason for completing a budget	Farm type		
	Dairy	Sheep and Beef	Pipfruit
For own benefit(a)	22	24	15
Secure seasonal finance(b)	15	27	26
Both of the above(a+b)	9	19	23
Other	5	0	0
Total	51%	70%	64%

Budgets were often completed with outside assistance on both the dairy and the sheep and beef farms surveyed. Most commonly this assistance was from accountants. Assistance was also provided by bank managers, farm consultants and stock firms. Again there were a few cases where the accountant completed the budget on the farmer's behalf. Persons aiding farmers in the preparation of the budget are presented in Table 6.9.

Table 6.9. Percentages of farmers on each of the farm types surveyed using different sources of outside assistance for the completion of the budget[a].

Source of outside assistance	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Accountant	22	15	4
Bank manager	4	4	12
Consultant	9	15	0
Stock firm	0	12	0
Accountant (on behalf)	9	4	0
Total	44%	50%	16%

[a]Principal source only is tabulated.

Pipfruit farmers surveyed used significantly less outside assistance for the preparation of annual budgets than farmers on the two other farm types. On many farms the budget was not revised. The number of times that farmers completing budgets revised them is presented in Table 6.10.

Table 6.10. Percentages of farmers on each of the farm types surveyed making budget revisions at different frequencies per year.

Number of times annually budget is revised	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Not revised	16	15	15
Once	5	12	8
Twice	4	5	5
Three times	11	14	5
Four to six times	11	11	10
Monthly	4	13	21
Total	51%	70%	64%

Surveyed farmers in each of the three study areas cited the use of a number of planning means other than the use of the cash flow forecasts. In many cases, despite a cash flow forecast being completed, it was not regarded as the most important planning tool used on the farm. Some farmers reported subdividing the year into quarterly periods and informally setting financial goals, particularly for their current account balance, for the end of each quarter. This method was also reported by Mulholland (1987). Many farmers rely on 'experience', even in some cases where a cash flow forecast has been completed. Some farmers do not recognise the need for any form of planning and claim that neither formal nor informal planning takes place on their farms. These results are presented in Table 6.11.

Table 6.11. Percentages of farmers on each of the farm types surveyed reporting the use of alternative planning methods.

Planning method used by farm manager	Farm type		
	Dairy	Sheep and Beef	Pipfruit
No formal planning done	24	8	10
Cash flow forecast	27	59	54
Quarterly review[a]	20	3	8
Experience based review[b]	18	27	18
Other	11	3	10
Total	100%	100%	100%

[a]Largely informal planning with quarterly review of progress based mainly on current account information.
[b]Informal planning; may be associated with the preparation of a cash flow forecast.

In many cases farmers themselves do not consider their cash flow forecast as a planning tool. This lends further credence to the claim by McRae and Kirton (1987) that cash flow planning is often done solely to secure seasonal finance. The low rate overall of the use of recognised planning on dairy farms relative to the other two farm types can be attributable to the importance of sharemilking in the dairy industry. Some 47% of the dairy farmers surveyed were

sharemilkers. Some sharemilkers surveyed reported that they had ceased to make financial plans because they considered their farm finances sufficiently simple so as to no longer require planning. Of those dairy farmers who were not sharemilkers 17% did not formally plan while 29% used their cash flow forecasts as their financial plan.

A number of sources of information are available to the farm manager to monitor the state of the current account or progress towards the financial goal. Current account bank statements, cash books, GST returns and stock firm statements, for example, can all provide the farm manager with regular data on financial progress. However, the use of most of these sources of data is not without difficulty. In Chapter 2 the use of bank statements to monitor cash flow was described as being fraught with the possibility of significant error. Similarly, both GST books and stock firm statements can provide erroneous data because neither of these data sources will include all the financial transactions completed by the farmer. The farmer must then record actual income and expenses from a number of sources. Providing all income and expenses are banked to and drawn from the same account then the account statement in conjunction with a cash book is the most appropriate form of monitoring the financial progress of the farm plan. The majority of farmers usually receive monthly current account statements from their bank, dairy company or stock firm. Some pipfruit farmers receive current account statements during the picking season at either weekly or fortnightly intervals. The principal source of information used as a record of farm financial income and expenditure is presented in Table 6.12.

Table 6.12. Percentages of farmers on each of the farm types surveyed using different sources of data to record the financial progress of the farm plan[a].

Data source used by farm manager	Farm type		
	Dairy	Sheep and Beef	Pipfruit
No data source used	0	0	8
Bank statement (BS)	71	54	33
Cash book and BS	12	30	51
GST return and BS	13	11	8
Stock firm statement	4	5	0
Total	100%	100%	100%

[a]Principal source only is tabulated.

The bank statement alone and the bank statement used in conjunction with a cash book were the most common source of financial information used by the survey farmers to monitor the state of the current account. There was a wide range in the quality and content of cash books used. Whether or not a cash book is kept by a farmer does not in itself confirm that an active on-farm financial management system is in place on that farm. However, reference to both a cash book in conjunction with the bank statement, given that the cash book is inevitably derived from this

data source, is an indicator of active financial monitoring on farms where a cash flow forecast has been completed.

The higher rate of use of this integrated system by pipfruit farmers compared with farmers in the other two groups is often associated with the use of computers to update and revise budgets on a monthly basis. However, determining computer usage by the survey farmers was not an objective of the study. Financial management can proceed without the aid of computers and given the relatively small number of transactions completed on a New Zealand farm annually, they appear unnecessary for farm financial management. Many of the pipfruit farmers interviewed reported they had initially purchased computers to assist in recording and processing labour data. The use of computers for the completion of GST is mainly a progression from that use. Their financial recording systems then developed from this background, in most cases using off-the-shelf software.

The majority of farmers surveyed on each of the three farm types claimed to complete a reconciliation of the current account statement. Current account statements have been combined from bank statements, dairy company statements and stock firm statements. The percentages of farmers reconciling current account statements is presented in Table 6.13.

Table 6.13. Percentages of farmers on each of the farm type surveyed claiming to reconcile current account statements.

Reconciliation of current account statement	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Not done	21	8	13
Partial reconciliation	18	22	15
Complete reconciliation	61	70	72
Total	100%	100%	100%

Traditionally, farmer's accountants have completed a trial balance prior to the end of the financial year. The trial balance is then used to provide an assessment of the tax liability of the current year's trading. Providing the trial balance is completed some weeks before the end of the year the farmer has the opportunity to reduce the tax liability, for example, by increasing expenditure on tax deductible items. However, the tax laws have been simplified and the scope for reducing the tax liability on New Zealand farms in this way has also been reduced. The tax laws have been changed to favour expenditure decisions made on the basis of projected profitability than on reducing tax liability.

Approximately half of both dairy farmers (42%) and pipfruit farmers (56%) surveyed complete trial balances. Whereas 62% of the sheep and beef farmers surveyed complete a trial balance. In the majority of cases the trial balance is completed by the accountant. The percentages of

survey farmers completing a trial balance is presented in Table 6.14. The greater number of pipfruit farmers completing their own trial balance is again an indicator of the use of off-the-shelf software packages.

Table 6.14. Percentages of farmers on each of the farm types surveyed completing a trial balance.

Completion of a trial balance	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Not done	58	38	44
Completed by farmer	9	11	26
Completed by accountant	33	51	30
Total	100%	100%	100%

The most common balance date used by farmers in each of the three survey areas was June 30. The second most common balance date was the March 31. The balance date data collected in the survey are summarised in Table 6.15.

Table 6.15. Percentages of farmers on each of the farm types surveyed using different balance dates.

Balance date	Farm type		
	Dairy	Sheep and Beef	Pipfruit
March 31	40	11	31
June 30	58	78	41
Other	2	11	28
Total	100%	100%	100%

Recent changes to the system of valuing livestock for the purposes of taxation make a March 31 balance date difficult to manage by livestock owners. The Trading Scheme standard values and the Herd Scheme standard values are currently announced in late May. On pastoral farms with balance dates before the end of June a series of trial balances may need to be completed determining the outcome of a range of livestock values. Pipfruit farmers surveyed often used balance dates other than either March or June. The pipfruit farmers surveyed stated that as the year's final payment from the sale of pipfruit was not received until September or later, a balance date at the end of the calendar year is appropriate. Some uncertainty exists surrounding the timing and value of NZAPMB final payments to pipfruit farmers.

6.4 THE ACCOUNTING FUNCTION

The accounting function was the subject of the fourth group of questions posed to farmers. Nearly every farmer uses a farm accountant, at the very least, to prepare the farm's annual

accounts. Furthermore, farm annual accounts are also 'used' by many third parties, for example seasonal financiers, mortgagors, MAF and the NZMWBES. The farms annual accounts are the only common source of farm financial information. The surveyed farmers who were interviewed were asked how they identified the returns from individual enterprises in their farms. The answers to this group of questions are now discussed in detail.

Farm financial data are presented in various ways to the farm accountant for the preparation of the farm's annual accounts. The 'shoe box' syndrome is no longer prevalent. The extent to which farm data are organised by farmers before they are handed over to the accountant may be a good indicator of the state of financial management on a farm. The data collected on this matter in the surveys are presented in Table 6.16.

Table 6.16. Percentages of farmers on each of the farm types surveyed presenting data to their accountant with and without prior organisation of the data.

State of data presented	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Basic data organised	85	81	46
Basic data not organised	9	11	8
Farm data summarised	6	8	46
Total	100%	100%	100%

The significant difference between the pastoral farmers and the pipfruit farmers surveyed in regard to the extent to which data are prepared by the farmer for the accountant may reflect in part the higher rate of computer usage by pipfruit farmers. Almost one half of the pipfruit farmers surveyed provided their accountant with only a summary of their farm's financial data.

There were significant differences between the components of farm annual accounts between the pastoral farms and the pipfruit farms. The components of the survey farm's annual accounts are presented in Table 6.17.

Table 6.17. Percentages of farmers on each of the farm type surveyed with different components included in their annual accounts.

Component(s) of annual accounts	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Basic accounts	22	54	43
Basic plus tax stmt[a]	27	13	31
Basic plus trend stmt	6	10	0
Basic plus comparative analysis	12	4	0
Basic plus cash flow stmt	0	3	23
Basic plus all of above	33	16	0
Farmer completes own	0	0	3
Total	100%	100%	100%

[a]stmt, abbreviation for statement.

On the majority of farms the farm accountant discusses with the farmer the contents of the annual accounts. However, on 29% of dairy farms, 14% of sheep and beef farms and 15% of pipfruit farms surveyed no such discussions were reported as taking place. Most farmers considered that this discussion was useful but in each of the three survey areas approximately 15% of farmers indicated that they still did not understand the contents of their accounts. Few farmers had ever requested that the components of their accounts be revised. However, some of the pipfruit farmers surveyed reported that they had requested a comparative analysis to be included in their farm's annual accounts. Requests for comparative analyses by pipfruit farmers may only in part be due to the lack of these statements in their accounts. Comparative analysis between pastoral farms is a common subject of pastoral farmer's discussion groups. Similar discussion groups do not appear to exist on the Heretaunga Plains. Many pipfruit farmers and industry personnel describe their operations as being 'commercially sensitive' while the current structure of the pipfruit sector is no different from the dairy sector!

Of the 73 farmers interviewed only three completed some form of enterprise analysis. One dairy farmer managed a two enterprise production system with each enterprise contributing approximately half of the farm's gross income. Each enterprise was managed independently. Similarly, one pipfruit farmer managed a multiple enterprise production system with each enterprise being administered as a separate company. Only one surveyed farmer calculated the gross margin from each pipfruit variety on the farm. The allocation of expenses was, however, arbitrary as labour costs were not recorded on an enterprise basis.

Most of the trend statements encountered in the sheep and beef farm survey had income presented in terms of sheep and cattle stock units. However, trend statements only partly fulfil the requirements of enterprise recording. Expenses, other than stock purchases, were generally not subtracted from the enterprise income to provide a net return as suggested by Mallyon (1966).

Some of the farmers surveyed reported distributing copies of their accounts to seasonal financiers, mortgagors, partners and shareholders. On 40% of all the farms surveyed a copy of the annual accounts is provided to the seasonal financier. However, the New Zealand Society of Accountants does not identify third parties as the end user of a farm's annual accounts (NZSA, 1989). Approximately one third of the survey farmers did not refer to their annual accounts, while a further 17% described their use of the annual accounts as a 'cursory read'. Twenty five percent of the farmers surveyed used their farm accounts as an active source of farm information, for example, for preparation of cash flow forecasts. The balance of farmers surveyed (23%) described the use of their farm accounts as a historical reference only. In most cases surveyed farmers were vague as to which, if any, key figures they looked for in their annual accounts. Many farmers interpreted profit, as reported in their accounts, as the most important figure of the farm's financial success. The decline in land values, and the subsequent review of Government valuations often produced paper losses. Survey farmers considered this as rendering their business unsuccessful, the 'knee-jerk' reaction to which was often being to reduce farm spending further. This reflected the poor understanding of profit and the contribution that land values make to profit by the farmers surveyed.

6.5 PROFIT, CASH SURPLUS AND EQUITY

The final group of questions concentrated on learning from the surveyed farmers their interpretation of profit and equity. At the completion of the questionnaire the survey farmers interviewed were asked to identify their farming goals (reported in Chapter 5) and knowledge of their farm's cash surplus.

'Profit' was identified by the farmers surveyed by a range of indicators including sources of both financial and physical farm data. One third of the farmers in each of the three survey types would look for profit as expressed in their farm's annual accounts. Other surveyed farmers consider their cash books and bank statements as the best indicator of profit. The balance of the farmers surveyed, however, regard profit as 'progress on the farm', increased personal drawings and an increase in off-farm investments. Some surveyed farmers reconciled their annual accounts with their cash book to account for the revaluation of livestock and land. Thirteen percent of dairy farmers, 10% of sheep and beef farmers and 23% of pipfruit farmers interviewed indicated that they attempted to reconcile profit correctly at the end of the trading year.

The farm's cash surplus was often unknown by farmers interviewed. In most cases farmers had only a vague idea as to what the size of their cash surplus of the previous year. Pipfruit farmers were more knowledgeable about their cash surplus. The percentages of farmers in each of the three survey districts knowing their farm's cash surplus is presented in Table 6.18.

Table 6.18. Percentages of interviewed farmers on each of the farm types knowing their farm's cash surplus.

Knowledge of farm's cash surplus	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Did not know	27	27	21
Vague idea	55	54	23
Knew cash surplus	18	19	56
Total	100%	100%	100%

Land values were commonly reported in the survey farm's annual accounts at either historical cost (even where the property had been purchased in 1931!) or Government valuation. Some surveyed farmers had their land values adjusted annually by their accountant to reflect changes in the land market and this suggests that in on these farms profit was being reported more accurately. Some 2.2% of dairy farms, 10.8% of sheep and beef farms and 7.7% of pipfruit farms had the land value adjusted annually. A majority also indicated that the land value in their accounts was unrealistic. The majority of surveyed farmers indicated that they knew the approximate value of their land, however, one quarter of the farmers surveyed admitted to not knowing the value of their land. The percentages of farmers 'knowing' their current land value is reported in Table 6.19. The Taranaki sharemilkers surveyed are excluded from these results.

Table 6.19. Percentages of farmers on each of the farm types surveyed 'knowing' the approximate value of their land.

Knowledge of land value	Farm type		
	Dairy[a]	Sheep and Beef	Pipfruit
'Knew' land value	50	65	80
Did not know	50	35	20
Total	100%	100%	100%

[a]Excluding sharemilkers.

A wide variety of sources were used by the survey farmers to estimate the current value of their land. However, the price of farms sold in the district was considered the most reliable source of information. In some cases recent Government valuations were considered a fair indicator while accountants, stock firms and rural valuers also provided these data. In all three survey districts 90% of the farmers considered it important to monitor equity, even though this

included several farmers who did not know the current value of their land!

6.6 FARMER PRACTICE VIS A VIS THE NORMATIVE MODELS

Verification of a model means to establish its truth or correctness whereas validation of a model is usually defined as 'testing whether model output is adequate for the purpose in mind' (Wright, 1971). The models developed in this study are descriptive (qualitative) models of ideal behaviour derived from current knowledge of farm financial management and farming systems. The models four sequential components summarise existing theory within each of the three farm types studied, therefore, they do not then require further verification.

Ebersohn (1976) suggests that 'in the case of descriptive models an adequate validation may be between the sharpened perceptions of the farming systems structure and function and the vague, ambiguous images which preceded modelling'. The three systems-specific models have achieved this purpose. Differences resulting between the biological processes involved will be acknowledged by a cursory examination, however, there exist only few important differences between the financial management of the three farming systems studied.

Validation of the models on a quantitative basis is beyond the goals of this study. A quantitative validation, to assess how the models may increase the outcome of farm management, requires the application of the models on farms. The performance of the model could then be determined by measuring increases in the farmer's utility. For example, case study farmers would be required to adopt the systems-specific model. The case study farmer's utility would then need to be measured both before and after the adoption of the model. However, validation is usually in the form of a comparison between the behaviour of the model and the real system. The normative model largely summarises existing knowledge. The systems-specific models then apply this knowledge to the appropriate farming system. Farmers current financial management is now explained in terms of the components of the models.

The systems-specific model of dairy farm financial management is as follows;

(1) an objective statement of financial goals and the range of outcomes that will achieve these goals.

(2) an accurate statement of current position.

(3) a plan for the coming period translated into the expected effect on cash, profit and solvency, based on the farmer's goals and a statement of the farmer's current position.

(4) a means of assessing progress against the plan with monthly budget reviews during the milking season.

The majority of the dairy farmers interviewed had clear farming goals. The most common farming goal of the dairy farmers interviewed in South Taranaki was land purchase. Those farmers stating land purchase and profit as their primary farming goal (half of those interviewed) require some form of financial management system in order to achieve these goals. The balance of those farmers interviewed stated primary goals which are, to an extent, less dependent on financial performance. However, on only one occasion was this goal quantified and the time frame for its achievement specified. Without quantification of the farming goal the control function is ill defined. Similarly the planning function is reduced to a 'best guess' of the events likely to happen to the farm over the planning period. The farmer is in these cases reduced to a receiver of farming events rather than the manager of them!

Ideally a farmer must know his (or her) current financial position so that the farm plan has a fixed starting point. Half the dairy farmers surveyed responded that they knew the current value of their land. Eighteen percent of those dairy farmers interviewed stated that they knew their farm's cash surplus, while a further 55% stated that they had a vague idea. The balance admitted they did not know their farm's cash surplus. Only 13% of those dairy farmers surveyed appeared to know the level of profit that they had achieved from farming. Farmer's knowledge of their current financial position on the dairy farms surveyed was, in the majority of cases, poor. The effectiveness of the planning function is reduced when the financial state of the farm at the start is unknown and the goal remains unquantified.

A budget is the simplest form of a whole farm plan. Under half (47%) of the dairy farmers surveyed completed an annual budget. Of these only half acknowledged that their budget was the recognised planning tool on the farm. A quarter of those dairy farmers surveyed did not plan, either formally or informally, while the balance stated that their farm planning was completed with a number of informal planning methods. Planning on the survey dairy farms is most commonly completed by informal rather than formal planning methods.

The control operations of monitoring, evaluation, updating and revising the plan in response to variation between the outcome and the plan, were seldom completed. While 61% of those dairy farmers surveyed reconciled their current account statements, only 35% revised their budgets in response to variations encountered between the outcome and the plan. Fifteen percent of the dairy farmers surveyed revised their budgets more than four times during the year. Few dairy farmers surveyed (4%) revised their budgets monthly. An opportunity recognised by the ideal systems-specific model.

Only 4% of the dairy farmers surveyed can be described as having a financial management system similar to that specified by the ideal systems-specific model. A further 15% of those dairy farmers surveyed have financial management systems that omit only an objective statement of farming goals to fulfil the general model of farm financial management.

The systems-specific model of sheep and beef farm financial management is similar to the dairy farm model. However, opportunities do not always exist for sensible budget revision to occur either as regularly or frequently. The model is as follows;

(1) an objective statement of financial goals and the range of outcomes that will achieve these goals.

(2) an accurate statement of current position.

(3) a plan for the coming period translated into the expected effect on cash, profit and solvency, based on the farmer's goals and a statement of the farmer's current position.

(4) a means of assessing progress against the plan with enterprise recording and budget reviews occurring at the time of husbandries, such as, tailing, weaning and shearing.

One quarter of those sheep and beef farmers interviewed were unsure of their primary farming goal. The most common primary farming goal stated by the sheep and beef farmers interviewed was retirement. Retirement appears to be the most common goal because of declining land prices and the recent marked reduction of farm sales in the sheep and beef sector. Consequently farmer's potential retirement income has been reduced. Farmers who may have sold their properties during the last four years to retire have, in many cases, been obliged to continue farming. Twenty-three percent of those sheep and beef farmers interviewed stated that profit was their primary goal while a further 9% were primarily seeking further land acquisitions. Only 32% of those sheep and beef farmers interviewed stated a primary farming goal that required active financial management for its achievement. Farmers stating that increasing equity in their farms was their primary farming goal are excluded from this 32% as the erosion of equity is, in the majority of cases, a function of declining land prices. Conversely farmers equity will be restored as land values increase, something over which the individual farmer has little influence. Several (9%) of those sheep and beef farmers interviewed had identified the farm surplus required to fulfil their primary farming goal.

Sixty-five percent of those sheep and beef farmers interviewed 'knew' the current value of their land. Given the very few number of land sales in the district prior to the survey this is surprising! The farm's cash surplus was known by 19% of the sheep and beef farmers surveyed and approximately half of these farmers attempted to reconcile profit at the end of the trading

year. As with the dairy farmers surveyed, sheep and beef farmer's knowledge of their current financial position is also poor. Only 10% of those sheep and beef farmers surveyed appeared to know their current financial position accurately.

The majority (70%) of the sheep and beef farmers surveyed completed a budget annually and nearly all of these farmers regard the budget as their primary planning procedure. In many cases this budget was completed as required by seasonal financiers. The marked downturn in sheep and beef farm's income and the subsequent restrictions imposed by seasonal financiers may have been instrumental in the high number of sheep and beef farmers budgeting. The majority of sheep and beef farmers reconcile their bank statements. But budget revision is more common than on the dairy farms surveyed. One quarter of the sheep and beef farmers surveyed revised their budgets more than four times per year with 13%, nearly half of these, updating their budgets monthly. However, no sheep and beef farmers interviewed recorded income and expenditure on an enterprise basis.

Many of the sheep and beef and dairy farmers surveyed identified financial management with the preparation of a budget and in some cases its frequent revision. However, without knowing either the farms current financial position accurately or their farming goal objectively these systems remain incomplete and are of limited value for the successful financial management of the farm. No sheep and beef farmers surveyed had a financial management system as specified by the ideal systems-specific model. This is largely due to the inadequacy of their control function. In this respect, a function of multiple enterprise farming systems, the financial management of the sheep and beef farm is more demanding than a single enterprise farming system. Nine percent of the sheep and beef farmers surveyed had financial management systems complete except for enterprise recording.

Pipfruit farmers are confronted with the need for some form of long-term planning in order to evaluate enterprise choice decisions. The pipfruit model is as follows;

(1) an objective statement of financial goals and the range of outcomes that will achieve these goals.

(2) an accurate statement of current position.

(3) a plan for the coming period translated into the expected effect on cash, profit and solvency, based on the farmer's goals and a statement of the farmer's current position including an evaluation of changes required to the enterprise mix.

(4) a means of assessing progress against the plan with enterprise recording and budget reviews occurring largely at the time of important events, such as, flowering and thinning.

Monthly budget reviews occur during the harvest season.

Profit and again the increase of owner's equity were the two most common farming goals of the pipfruit farmers interviewed. As with the dairy farmers approximately half the pipfruit farmers interviewed were expected to require some form of financial management system in order to achieve their primary farming goal. During discussions with those pipfruit farmers interviewed many had identified the farm surplus required for them to achieve their farming goals. The average return per carton required to meet farm expenditure, at some expected level of production, had been identified on 28% of the pipfruit farms interviewed. This is a significant difference from that recorded on the two pastoral farm types.

Eighty percent of all pipfruit farmers 'knew' the current market value of their farms. During the completion of the pipfruit surveys many pipfruit farms on the Heretaunga Plains were on the market. Over half (56%) of the pipfruit farmers interviewed knew their cash surplus and approximately half of these reconciled their profit from farming annually. More than twice as many (23%) pipfruit farmers than sheep and beef farmers surveyed knew their current financial position accurately. Two-thirds of the pipfruit farmers surveyed completed an annual budget and the majority of these budgets were the primary planning procedure on the pipfruit farm. Fifty-four percent of the pipfruit farmers plan formally while the balance (36%) rely on informal methods. Similar numbers of pipfruit farmers update and revise their budget during the year as do sheep and beef farmers. However, these budget revisions are, in most cases, both more regular and more frequent with 31% of pipfruit farmers revising their budget at least four times during the year. Twenty-one percent of all the pipfruit farmers surveyed updated their budget monthly. The financial management systems on these three farm types cannot accurately be considered collectively. The pipfruit farmers generally have better specified goals, a more accurate knowledge of their current financial position and revise their farm plan more frequently.

Two of the pipfruit farmers interviewed (9%) recorded farm income and expenditure on an enterprise basis. Few pipfruit farmers then have sufficient knowledge to assess their returns correctly from alternative enterprises as required by the long-term planning of the systems-specific model. This is discussed in more detail in Chapter 7. Only 9% of the pipfruit farmers interviewed had financial management systems that meet the requirements of the ideal pipfruit financial management model. A further 21% of the pipfruit farmers had completed all the components of the model except those requiring enterprise analysis. The most common shortfall of pipfruit financial management systems is the lack of enterprise recording. This in turn reduces the farmer's ability to objectively plan long-term tree replacement decisions. These decisions are therefore reduced to the subjective treatments as suggested by Wilton (1989).

CHAPTER 7. A CLASSIFICATION SCHEME FOR FARMERS' FINANCIAL MANAGEMENT AND IMPLICATIONS FOR ITS APPLICATION

> Education ... has produced a vast population able to read but unable to distinguish what is worth reading.
>
> G.M.Trevelyan. English social history, 1944.

7.1 THE ANALYTICAL TECHNIQUE AND RATIONALE FOR ITS USE

Crosstabulations of selected data items by farm type were presented and discussed in Chapter 6. However, it is difficult to draw conclusions of the current state of farmers' financial management systems from bivariate tabulations. Further analysis is required to summarise the data set in terms of a more concise set of variables that, when considered collectively, describe the components of a financial management system. Cluster analysis is a suitable technique to achieve this goal. A clustering procedure aggregates groups of farmers with similar responses to these variables into discrete clusters (groups). By using key variables, denoting the state of the farmer's financial management system, the data set can be classified into performance groups and the attributes of each group then identified.

This chapter presents the results of the application of a clustering technique to the data collected from the three farm types surveyed. This analysis was done to address the second objective of this study. This is to classify farmers according to selected attributes of their financial management systems and thereby identify and recommend how their financial management systems might be improved.

Cluster analysis is concerned essentially with 'grouping a set of N entities (farmers), measured on M attributes into P non-empty and usually disjoint clusters (groups) such that members within a cluster are alike with respect to the M attributes considered' (Sneath and Sokal, 1973). Jain et al (1982) report that there are many ways in which clusters can be obtained and claim that over a hundred different clustering methods have been proposed. Clustering methods can be classified as either hierarchical or non-hierarchical. A hierarchical algorithm was used in this analysis (presented in Appendix 4). Hierarchical analyses are characterised by the construction of a hierarchical tree, known as a dendrogram (Jain et al, ibid.). This method requires the formation of a proximity matrix in which each cell of the matrix describes the similarity or distance between every pair of entities.

The algorithm uses the proximity matrix starting with N single member clusters. At the second step the two most similar entities are placed in the same cluster. At each step the proximity

matrix is recalculated in order to recompute the similarity, or distance, between the clusters and the remaining entities. At the final step all N entities are grouped into one large cluster. The clusters produced at each step then need to be examined to determine which number of clusters, from N to 1, includes appropriate entities in each cluster. For example, an analysis concluded at step 1 has as little value as one concluded at the final step where all entities are members of the same cluster. Dillon's (1979) use of the triage principle influenced importantly the selection of three groups of farmers as the end point of the clustering procedure. The end point of three clusters sought to classify farmer's financial management systems as either 'good', 'average' or 'poor'. These three groups of systems are defined and the attributes of each are discussed later in this chapter.

Cluster analysis has many applications. Sokal and Sneath (1963) describe cluster analysis as being concerned with classification and the techniques are 'part of the numerical field of taxonomy'. Darden et al (1982) suggest that cluster analysis is an appropriate method of segmentation in market research. Fleiss and Zubin (1982) summarise the use of cluster analysis; 'at the pre-classification stage of research, one shouldn't attempt to specify what he is looking for. The data themselves should determine the clusterings, with the clusters having whatever characteristics they happen to end up with'. Each farmer then is assigned to one cluster based on the values of the farmer's variables used in the analysis. Farmers within each group are assumed to be indistinguishable from one another. Some groups will have a hierarchical nature where these groups are further divided into subclasses (Green and Tull, 1988).

Green and Tull (ibid.) suggest a number of ad hoc procedures to provide checks on the clustering results. For example, the clustering method can be varied and the data can be subdivided randomly and the clustering analysis then completed on each of the data groups. The variables used in the clustering analysis can also be altered. Changing the variables used in the clustering analysis will alter the distance between the cluster centres. Some variables will add little to discrimination among data groups, while other variables will have a significant effect on the distance between group centres. By systematically combining groups of variables the distance between clusters can be maximised. Therefore, variables used in the clustering procedure need to be firstly, independent secondly, contribute positively to the distance between cluster centres and finally, have values that will sensibly describe the characteristics of the farmers within each group.

Each variable in the data set was examined to determine whether it was an important component of a farm financial management system as specified by the general normative model. Nine mutually independent variables were identified. These variables were; the highest educational level achieved by the farmer, completion of the farmer's GST returns, separation of personal expenses from farm expenses, the involvement of third parties in ongoing financial management, the frequency of budget revision, knowledge of the farms' cash surplus,

understanding of the meaning of profit, the monitoring of equity and the farmer's primary farming goal. Data from 74 farmers, all of those farmers interviewed, were used in the cluster analysis.

Clustering algorithms are dependent on the values of the variables used in the analysis. Each variable must have an equal weighting. In the survey data set each variable has a different range of values, for example, 1, 2, or 3 compared with 1 to 9. Therefore the variable with the greatest range will have a more significant effect on the outcome of the clustering analysis than a variable with a smaller range. To circumvent this problem each variable was transformed into a standard normal variate. That is, all variables used were transformed from their coded values to a mean of 0 and a standard deviation of 1 in the analysis.

The distance between clusters at the three group stage was used in determining the variables selected for the procedure. An initial cluster analysis was completed using the nine variables identified and the distances between the cluster centres recorded. In turn each variable was excluded from the analysis and the distances again recorded. Four variables did not contribute positively to the distance between the cluster centres. These were then deleted and the procedure was repeated using each possible combination of the remaining five variables. The distance between group centres was maximised when all five of these variables were used in the clustering procedure. The five variables used in the cluster analysis were;

(1) The completion of the farmer's GST return; This variable was coded in the data set as 1,2,3 or 4 with higher values reflecting a descending order of farmer involvement in the activity. One represented completion of the GST return by the farmer, 2 by both the farmer and the accountant, 3 by the accountant and 4 by a farm consultant.

(2) The separation of personal expenses from farm expenses; Formal allocation of personal drawings recognises the separation of the farm's finances from the families finances. Again the majority of farmers had separate farm and personal cheque books, however, farmers not maintaining separate cheque books often failed to record formally their personal drawings. A value of 1,2 or 3 was assigned to each farmer for this variable, again in a descending order of farmers' involvement. A 1 was assigned to those farmers who had an automatic monthly transfer of funds; a 2 was assigned when some other formal system was used; a 3 was assigned when no system was used.

(3) Other persons involved in ongoing farm financial management; The employment of third parties for ongoing financial management is a different role from their employment for ideas, suggestions, advice and comparative analyses in that this often appears to be a 'support' role. The employment of farm consultants and accountants by farmers for the completion and revision of farm budgets may be an indicator of poor understanding by

the farmer of a farm's performance and plan. Again a nominally scaled variable was used to identify farmers' reliance on third parties where 1 represented no reliance and 7 represented the cases identified where the accountant was responsible for all the financial management on the farm.

(4) The number of times a budget is revised during the year; Budget revision cannot take place without the prior completion of a budget. A budget completed solely for the acquisition of seasonal finance and not reviewed has limited value. Similarly, infrequent budget revision is not indicative of active financial management taking place. In the systems-specific model of farm financial management dairy farms' budgets are ideally revised regularly (at say monthly intervals). The survey result indicates that such revision does not take place. Budget revision does not then bias the results in favour of the dairy farmers studied. The frequency of budget revision was represented by nominally scaled variable where revisions monthly were assigned 1, bimonthly 2 and so on to 9 where the farmer does not complete a budget.

(5) The farmer's knowledge of his (or her) cash surplus; Knowledge of the cash surplus is indicative of farmers' knowledge of their current financial position. Knowledge of the farm's cash surplus was represented by a variable with values of 1,2 or 3. The values were again in descending order of the knowledge cited by the farmer. A 1 was assigned to farmers knowing their cash surplus; a 2 to farmers aware of their cash surplus; a 3 to those farmers not knowing their cash surplus.

7.2 THE CLUSTER ANALYSIS AND CLASSIFICATION OF FARMERS

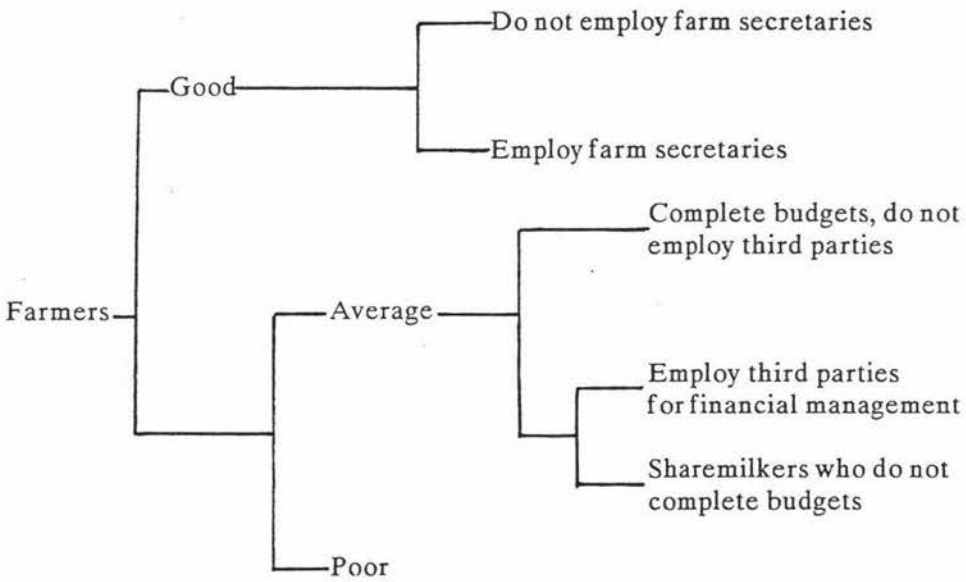
The clusters formed were examined at each stage of the algorithm's operation. The results in Table 7.1 present the percentages of farmers on each farm type in each of the three clusters which can be referred to, for convenience, as clusters corresponding to farmers with 'good', 'average' or 'poor' financial management systems. Of all the farmers interviewed, 31% were classified as 'good' financial managers from the analysis, 51% as 'average' financial managers and 18% as 'poor' financial managers.

Table 7.1. Percentages of farmers on each of the farm types interviewed with good, average or poor financial management systems.

State of the farmer's financial management system	Farm type		
	Dairy	Sheep and Beef	Pipfruit
Good	25	27	43
Average	61	41	48
Poor	14	32	9
Total	100%	100%	100%

During the analysis it was appropriate to examine the composition of the smaller clusters which were ultimately consolidated by the algorithm into 'good', 'average' and 'poor' clusters. Figure 7.1 is a dendrogram of the cluster analysis when six clusters were produced, three iterations before the final result. At that stage 'good' farm financial managers were classified into those that employed farm secretaries (7%) and those that did not (24%). Three clusters were produced for the farmers classified as 'average' financial managers, those that employ third parties for ongoing financial management (7%), those that do not employ third parties for ongoing financial management (40%) and those sharemilkers who do not complete budgets (4%). The sixth cluster comprised farmers with 'poor' financial management systems (18%). Subsequent steps in the algorithm did not add subsets to this cluster.

Figure 7.1. Dendrogram summarising the clustering procedure at the step where six clusters are produced by the clustering algorithm.



The values of the variables in each group determine the important characteristics of the financial management system in common to all group members. 'Good' financial managers complete their own GST returns, separate personal drawings from other farm expenditure, revise their budget frequently during the year and know their farm's cash surplus. They do not employ third parties for financial management but in some cases employ secretaries for the completion of book-keeping tasks. Those farmers employing farm secretaries were identified in a subset.

'Average' farm financial managers generally complete their own GST returns and they separate personal drawings from farm expenditure. However, they do not update budgets frequently and they are often unsure of their farm's cash surplus. Subsets identified in this group are those farmers employing advisers on an ongoing basis and those sharemilkers not completing budgets.

'Poor' farm financial managers do not complete their own GST returns, seldom separate personal drawings from other farm expenses, rarely complete a budget and do not know their farm's cash surplus. They also employ outside advisers for ongoing financial management.

7.3 IMPLICATIONS FOR THE DEVELOPMENT OF FINANCIAL MANAGEMENT ON NEW ZEALAND FARMS

The clustering procedure identified three groups of farmers with common financial management systems across the three farm types surveyed. These three groups were then identified to contain 'good', 'average' and 'poor' financial managers. The performance of these groups of farmers' financial management systems is now discussed and implications drawn.

Dillon (1979) suggests that 'poor' farmers, like the casualties in wartime field hospitals, 'will die no matter what'. However, there are a few 'poor' farm financial managers who employ outside advisers for ongoing financial management. These farmers may have assumed that the financial welfare of their farms is their consultant's responsibility. The balance of those farmers identified as 'poor' financial managers are currently failing to complete even rudimentary book-keeping tasks. Their current needs appear to be at a level offered by secondary or even primary education. Given the scarcity of higher education, in the two pastoral sectors studied, Universities and other post-compulsory schooling institutions have little to offer this group of farmers.

There were three subsets of farmers identified in the cluster classified as 'average' financial managers. Firstly, the sharemilkers who do not complete budgets. These farmers acknowledged during their interviews that their finances were insufficiently complex to warrant the efforts of budget preparation, in most cases these sharemilkers had paid off their herds and were awaiting an opportunity to purchase their first farm. Discussions with these sharemilkers suggests strongly that they are likely to be 'good' financial managers when they acquire their own property. For example, the completion of budgets and budget revision will assume greater importance.

Secondly, those farmers who require assistance to complete their budgets and employ third parties to complete the preparation of GST returns and so on. In most cases the third party employed was the farm accountant. Finally, those farmers partially completing their GST returns but did not employ the same level of assistance for financial management. These latter

two subsets of farmers, need first to improve the specification of their farming goals. With a clearer appreciation of what they are trying to achieve the need for budget revision, to ensure this goal is met, becomes self evident. These same farmers also need an improved understanding of cash, profit and equity. With better knowledge of their current farming position these farmers will be able to better plan how to achieve their goals.

The planning horizon considered by the 'average' farmers is a related aspect of their current financial management that requiring attention. Throughout this study the farmers' planning horizon has assumed to be a trading year. The normative model, the discussion of the literature and the surveys concentrated on short-term financial management. Nuthall (1980) states that 'decision models must, in theory anyway, be stochastic and multi-period in nature' to account for the non-certain and dynamic environment in which farms exist.

It is important to determine the planning horizon for a range of situations including cases involving the assumption of uncertainty in the variables. Planning must consider future periods as first period decisions may affect the opportunities open to a farmer in later periods. The closer, in a temporal sense, the farmer gets to an event the less opportunity he has to alter its outcome. For example, the expected lambing percentage cannot be influenced markedly once mating is complete. Therefore to alter the expected lambing percentage requires the optimisation of husbandry decisions months, and even years with respect to fertility, before the event. The planning horizon required will depend on the nature of the decision. The pipfruit farmer, for example, when confronted with the renovation decision may face a planning horizon of at least 5-8 years. Replanting decisions in the first period, year one, will affect the opportunities available to the farmer in subsequent periods. In each case the planning horizon needs to be determined where first period decisions no longer affect the opportunities available to the farmer.

The level of variability expected within a period will also influence the planning horizon. Total crop failure, for example, on a pipfruit farm is possible when adverse weather occurs at flowering. Such variability encountered within the first period will have a marked affect on the subsequent performance and opportunities available to the farmer. Despite this study concentrating on short-term financial management the decisions made by farmers may need consideration of a far longer planning horizon. As yet the planning horizons for optimal financial management decision making are yet to be determined.

The optimal planning horizon may differ between the three farm types studied, the result of the likely variation encountered on the pipfruit, the sheep and beef and the dairy farming systems. Identification of the optimal planning horizon may also encourage more farmers to adopt formal planning methods. Farmers would then be in a position of anticipating variation, on route to a pre-determined medium-term goal.

'Average' financial managers often questioned the value in budgeting because the budget seldom 'worked'. This appeared to be the most common excuse offered by all farmers when stating that they didn't complete a budget. An examination of the planning horizons required for the achievement of common farming goals will provide evidence to farmers that active financial management requires formal planning and frequent budget revision. Variation will be acknowledged to occur within some periods but the farming goal is, in most cases, achieved after a number of periods. The expectation of variation between the outcome and the plan is not justification to avoid planning and revision, as is the case with 'average' farmers. These farmers planning horizons are currently too short for their financial management systems to cope with such variation.

Those farmers identified as 'good' financial managers have active systems that, in most cases, need only one refinement, enterprise analysis. Enterprise recording was lacking on most of the multi-enterprise properties surveyed, as was discussed in Chapter 6. Enterprise planning and recording on sheep and beef farms is a simple task to be implemented but it requires thorough coding of expenditure against each enterprise. Once this is done the returns from different enterprises can be compared. Pipfruit farmers are faced with a similar task, however, in most cases they manage at least five and in some cases up to thirty individual enterprises. Without this elementary information pipfruit farmers, for example, can not proceed with any from of portfolio analysis.

These pipfruit farmers would benefit most from portfolio analysis. Current orchard renovation decisions may be far from optimal. The Markowitz model developed in the mid 1960s for the analysis of investment portfolios appears to provide the algorithms required to optimise varietal mix. The pipfruit farmer is confronted with a combination of long-term low risk varieties and short-term potentially high risk varieties. A pipfruit farm tree renovation model should provide the basis of optimising tree replacement decisions by pipfruit farmers in New Zealand. Such a model is yet to be developed.

CHAPTER 8. CONCLUSIONS

> A farm is an irregular patch of nettles bounded by short-term notes, containing a fool and his wife who didn't know enough to stay in the city.
>
> S.J.Perelman. Acres and pains, 1947.

Wright (1989) suggested that 'there appears to have been little critical debate in New Zealand about the adequacy of our micro-economic data base used in economic research and policy analysis'. Wright identified six sources of micro-economic data. These are; Department of Statistics annual agricultural census, The New Zealand Meat and Wool Board's Economic Service surveys, the New Zealand Dairy Board surveys, specific industry groups commissioned economic surveys, MAFTech Rural Policy Unit Monitoring Reports and Lincoln College's surveys of farmer intentions and opinions. Wright suggested that, of these, the only reliable data source is the NZMWBES survey data, however, these data are usually 18 months old at the time of publication.

The NZMWBES data set is usually adequate when used for descriptive purposes. For example, the typical NIHC sheep and beef farm, as presented in Section 5.3.2, was described using a combination of both NZMWBES data and those collected in the Taihape sheep and beef farm survey. Likewise the typical South Taranaki dairy farm was described using data from the NZDB surveys and those collected in this study. In both of these cases the publicly available data matched the survey data.

Given the quite variable level of planning on the farms surveyed in this study, the data available involving farmers' intentions and expectations, as collected by Lincoln College and MAFTech, have to be interpreted cautiously. Most often micro-economic data collected are derived from farms' annual accounts. The lack of standard accounting practice on New Zealand farms must be considered when using such data. Wright (ibid.) identified the need for an accurate, current and readily available data base of the agricultural industry. Certainly it would be advantageous for agricultural researchers and policy makers to have such a data base available. However, the current state of the pipfruit sector data base serves as a reminder that business interests are private, the domain of those with their capital at risk.

Two major difficulties were identified in this study with respect to farmers' current financial management practices across the three industries examined. Financial planning horizons are short, typically at most one year, which suggests that farmers may be making sub-optimal investment decisions and sub-optimal enterprise management decisions.

In regard to investment the problem is of special importance to pipfruit farmers. Industry data are scanty concerning the information needed for farmers to make optimal investment decisions. Simple implementation of industry planting guidelines will not result in optimal tree replacement decisions. What is needed, therefore, is adequate experimental and farm data of a type which can be incorporated into an investment planning model. Furthermore, this planning model needs to be able to take account of the special circumstances pertaining to each orchard. Less sophisticated planning models with minor modifications may be used to assess investment decision options on dairy, and sheep and beef farms.

The enterprise management problem, the second major difficulty identified, is common to all three farm types studied. The lengths of farm planning horizons need to be determined, probably on an enterprise basis, to ensure that enterprise management decisions are optimised. The twelve month planning horizon adopted by most of the farmers surveyed may be too short to ensure that optimal enterprise management decisions are made. The closer a farmer gets to an event the less opportunity there is to alter its outcome. To achieve medium or long term farming goals farmers' planning horizons must be of sufficient length to ensure that the effects of decisions made in the first period do not reduce the opportunities available to them in later periods. Optimal planning horizons have yet to be identified for important enterprise management decisions. The length of the planning horizon required for different decisions could be determined by a multi-period discounting spreadsheet model with a linked data base. Likely variations to farm input and output prices and quantities could be stored on this database. The outcome of management decisions within the first period could then be accumulated and the effects of variability encountered in subsequent periods evaluated.

McRae (1988) suggested that there exists considerable scope for the design and implementation of improved financial management systems. In this study ideal financial management systems have been developed for three important farm types in New Zealand. Those farmers most likely to benefit from the adoption of improved farm financial management systems have been identified. Firstly, there are those farmers classified as 'good' financial managers. These farmers' most conspicuous shortfall is with respect to financial control. On multiple enterprise properties this is highlighted by the absence of enterprise level analyses. However, the general circumstances on these 'good' farms are such that these deficiencies can be overcome in each of the three industries surveyed.

A necessary condition for this is that the planning tools be developed. The widespread use of computers in the pipfruit industry suggests that these models will be adopted widely. The lower incidence of computers in the other industries suggests a need for further education of these 'good' farmers. The Dairy Board Consulting Officer service is well placed to provide dairy

farmers with the necessary educational support. Delivery of the educational input to sheep and beef farmers could be problematic as this industry no longer has an industry supported extension service.

The majority of the farmers surveyed in all the industries use 'average' financial management systems. Significant improvements to profitability on these farms could be achieved by the adoption of the financial management systems currently being used by the 'good' farmers. In order to achieve these improvements 'average' farmers will need to develop the skills to assess accurately their current positions in terms of cash, profit and equity. This is the critical deficiency of 'average' farmers in all the industries surveyed. The poor monitoring on these farms directly limits their ability to revise their plans.

These deficiencies can be rectified. It has been argued earlier in this study that the form and content of annual accounts is a major limitation of their utility as a management tool. Furthermore, it was argued that with minor modification to their existing format that they could become significantly more useful to farmers. One option is to educate farmers to understand better the accounting process and the ways in which it can serve farmers' needs. This approach has been used extensively in New Zealand for many years and appears to have had little success. The preferred option will be to educate accountants specifically in the needs of primary industry accounting. The Universities must play a key role in providing this education. Massey University is already committed to this objective.Once those 'average' farmers' financial management systems have reached the level of those farmers identified with 'good' financial management systems their further needs can be addressed as detailed above as for the 'good' farmers.

Regrettably there will always be a group of 'poor' farm financial managers. Some 18% of farmers surveyed in this study were in this group. Although only relatively small numbers were surveyed in each of the industries the results here suggest that poor financial management is of special importance amidst pastoral farmers. The informal data gathered suggests strongly that poor financial management is associated with low profitability. While the gains from improvement in financial management would be substantial the opportunities to realise these improvements are strongly limited by conservative attitudes towards learning, education and change. A view supported by the long tenure on pastoral holdings.

A concerted long-term effort to raise educational standards and develop more open attitudes towards liberal learning and change are pre-conditions to the introduction of improved financial management systems on these 'poor' farms. Special purpose education, as advocated above for the 'average' group, can be expected to have only limited impact.

APPENDIX 1. The survey questionnaire.

1a) How many years have you been farming? ___

b) What position on the farm do you hold e.g., (sharemilker, owner, manager, contract milker)?

2a) Please fill in the table below use either acres or ha.

	1985/86	1986/87	1987/88
No. of cows calved			
MF production			(Estimate)
Milking area			

b) What units, acres or ha, did you use? _____

3) What other income generating enterprises are run on the farm besides milking cows?

---

4) What formal education did you complete?

5a) Who completes your G.S.T. returns?

---

b) How often is this return completed? _____

6) What trading structure do you operate your farm under (sole trader, partnership, company etc).?

7a) Other than your accountant, who else is involved in the financial management of your farm?

---

b) What services do they perform?

8a) Is there anything else you regularly see your accountant for other than the preparation of annual accounts?

Y/N ___

b) If so what is the general nature of these discussions?

_____

_____

9a) Do you have separate farm and personal cheque books?

Y/N ____

b) If not, how do you differentiate between personal expenditure and that of the farm?

_____

_____

c) What steps do you take to keep track of the level of your personal expenditure?

_____

_____

10a) Do you complete an annual farm budget? Y/N ___

b) Why? _____

_____

_____

c) With whom is it done? _____

d) Do you update your annual farm budget? Y/N ___

e) Is this prepared as a monthly or quarterly cash flow?

Y/N ___

f) Is this updated during the year? Y/N ___

g) How often? _____

11a) Other than formal budgeting what steps do you take to plan for farm income and expenditure during the financial year?

---

b) Once this plan (or budget) has been developed how do you monitor progress through the year?

12a) How regularly do you receive current account statements e.g. Bank or Dairy Co. statements?

---

b) What do you check or reconcile upon receiving a current account statement?

13a) Do you see your accountant prior to balance date in order to complete a trial balance or prepare for the end of the financial year?

Y/N ___

b) Who initiates this visit? _____

c) What does this trial balance entail? _____

---

d) When is your balance date? _____

14a) What farm information do you present to your accountant for the preparation of the accounts?

_____

_____

_____

b) In what form was this information presented to the accountant?

_____

_____

_____

PLEASE REFER TO YOUR LATEST SET OF ACCOUNTS

15a) List the accounting reports in your latest set of accounts (read from contents page).

_____

_____

_____

_____

b) Does your accountant explain to you the contents of your farm accounts?

Y/N ___

c) If so, how useful is this discussion?

_____

_____

d) What, if any, alterations to the accounting format or contents have you ever requested?

_____

e) Why? _____

_____

16a) Other than yourself, who receives a copy of your annual farm accounts?

_____

b) What do you use your annual accounts for?

---

17) What are the key figures you look for in your annual farm accounts?

18a) What do 'current liabilities' mean to you?

---

b) What do 'term liabilities' mean to you?

---

c) What do 'current assets' mean to you?

---

d) What do 'fixed assets' mean to you?

19a) What does 'profit' mean to you in the context of your farming system?

---

b) Where do you look to see how much 'profit' you have made?

20a) What basis of valuation is used for your farm, or if sharemilking, cows, in the balance sheet or schedule of fixed assets?

---

b) Is this source appropriate? Y/N ___

c) Do you think this value is realistic? Y/N ___

d) What other method would be more appropriate?

---

e) Do you know the current value of your farm, or if sharemilking, cows?

Y/N ___

f) If so, what sources of information do you use?

21a) What does the term 'equity' mean to you?

---

b) How do you monitor changes in your own equity?

---

22) Is there anything else you wish to add with respect to the financial management system on your farm?

THANKYOU FOR PARTICIPATING IN THIS STUDY, YOU WILL RECEIVE A COPY OF THE RESULTS UPON COMPLETION OF THE ANALYSIS.

APPENDIX 2. An example of indirect contact with the survey farmers.

==========

MASSEY UNIVERSITY SURVEY OF TAIHAPE FARMERS: A survey of hill-country farmers in the Taihape region will take place during the fortnight from 15 to 28 February. The aim of the survey is to learn from hill-country farmers what financial management systems are in place on their farms. You may be telephoned by James Lockhart, a Lecturer in the Department of Agricultural and Horticultural Systems Management, and asked to participate. It will involve a discussion with James on how you manage your farm's finances. Confidentiality of participants is assured.

++++++++++

APPENDIX 3. An example of direct contact with the survey farmers.

Dear

I am a lecturer at Massey University undertaking a research to fulfill the requirements of my Masters degree.

The objective of the study is:

> to describe the financial management systems being used by orchardists on the Heretaunga Plains.

You have been selected at random as one of sixty orchardists on the Heretaunga Plains to participate in this project. Your response will be treated confidentially and the data will be reported in an anonymous form.

The practical and relevant nature of this study will make its findings suitable for publication in an article in the popular horticultural press. You will receive a copy of the study results. I am confident this project will make a valuable contribution to the understanding of and the use made of financial information.

I have endeavoured to keep the questionnaire as short as possible. In no circumstances are specific financial details of your orchard business requested - it is the method by which you run your business which is of interest.

You will need to refer to your accounts when answering some of the questions. Please write in the spaces provided on the questionnaire and upon completion post it to me in the reply paid envelope provided.

Thanking you for your participation.

Yours sincerely

James Lockhart
Lecturer
Agricultural and Horticultural Systems Management

APPENDIX 4. Cluster analysis algorithm

The cluster analysis, presented in Chapter 7, used a proximity matrix to report the distance between each pair of entities. Distances between entities on the matrix were determined using the Squared Euclidean distance measure. With this measure, the distance between the two entities (x and y) is the sum of the squared differences between the values of the clustering variables.

$$\text{Distance } (x,y) = \sum_i (x_i - y_i)^2$$

Where i = variable

The distances between the three cluster centres using the five variables COMPLETION OF GST RETURNS, SEPARATE CHEQUE BOOKS, THIRD PARTIES, BUDGET REVISION and KNOWLEDGE OF CASH SURPLUS were as follows;

	1	2	3
1	-		
2	3.14	-	
3	2.38	3.38	-

BIBLIOGRAPHY

Abbiss, D.B. (1983). Farm planning techniques. In, The role of farm management in food production. Fifth International Farm Management Congress. Commonwealth Agricultural Bureau. pp. 135-142.

Ackoff, R.L. (1967). Management misinformation systems. Management Science, Vol. 14, No. 4, pp. B147-B156.

Ackoff, R.L. (1973). Science in the systems age. Beyond IE, OR and MS. Operations Research. Vol. 21, pp. 661-671.

Alexander, P.S. (1986). Financial planning in the present farming scene and looking forward positively and constructively. Farm Management News, July, pp. 219-224.

Alexander, P.S. (1986a). Strategies for financial survival - but looking ahead positively. Farm Management News, September, pp. 44-47.

Alexander, P.S. (1988). Working with farmers: An accountant's viewpoint. Farm Management News, April, pp. 35-37.

Amir, I. et al (1978). Monitoring and decision-making processes for operating agricultural production systems. Agricultural Systems, Vol. 3, pp. 253-264.

Anderson, F.M. (1988). Dealing with risk: The budgeting option. Farm Management News, April, pp. 28-30.

Anderson, F.M. and Dent, J.B. (1974). Planning and control of human food chains. In A.N. Duckham and J.G.W. Jones (eds.), Human Food Chains and Nutrient Cycles. Amsterdam, North Holland.

Anderson, J.R. (1985). Assessing the impact of farming systems research. Agricultural administration, Vol. 20, pp. 225-235.

Anderson, J.R. and Hardaker, J.B. (1979). Economics and the design of small-farmer technology. Edited by A. Valdes et al. Ames, Iowa State.

Arthur Young and Assoc. (1985). Staples' guide to New Zealand Income Tax Practice. (45th ed.). Auckland, Sweet and Maxwell.

Ashmead, R. (1987). Emerging sales in financing agriculture. Canadian Journal of Agricultural Economics, Proceedings of the 1986 Annual Meeting Vol. 34, pp. 170-183.

Barber, D. (1987). New Zealand's biggest exporter. Management. July. pp. 32-36.

Barnard, C.S. and Nix, J.S. (1979). Farm planning and control. (2nd ed.). Cambridge, Cambridge University.

Barrack, J.A. (1988). A study of some aspects of financial management of horticulture properties in Hawkes Bay. An honours dissertation for B.Hort.Sc. Department of Agriculture and Horticulture Systems Management, Massey University.

Bawden, R. and Valentine, I. (1985). Learning to be a capable systems agriculturalist. Programmed Learning and Educational Technology, Vol. 21, 22No. 4, pp. 273-287.

Beck, G.W. and McCarthy, W.D. (Eds.). (1983). Accounting and planning for farm management. Queensland, Government Printer.

Bennett, A. (1989). Pers. comm. Senior Field Officer, New Zealand Apple and Pear Board, Hastings.

Bhandari, N.C. (1982). Flexible budgeting can save small business. Management Review, June, pp. 45-52.

Black, J.D. (1947). Farm management. New York, MacMillan.

Blackie, M.J. (1976). Management information systems for the individual farm firm. Agricultural Systems. Vol. 1, pp. 23-36.

Blackie, M.J. and Dent, J.B. (1973). Budgetary control - review and reconstruction. Farm Management. Vol. 2, No. 5, pp. 261-271.

Blackie, M.J. and Dent, J.B. (1979). The concept and application of skeleton models in farm business analysis and planning. Journal of Agricultural Economics. Vol. 25, No. 2, pp. 165-173.

Boulding, K.E. (1956). General systems theory - the skeleton of science. Management science, Vol. 2, No. 3.

Boyd, M.B. (1984) City of the plains; a history of Hastings. Christchurch, Victoria University Press.

Bradford, L.A. and Johnson, G.L. (1953). Farm management analysis. London, Wiley.

Brazendale, R. (1985). Some farmer responses to recent Government policy changes. BAgSc Hons. Dissertation. Department of Agricultural and Horticultural Systems Management, Massey University.

Brook, B.A. (1986). A farming financier's response to the changing face of agriculture. Farm Management News, December, pp. 39-41.

Brook, B.A. and Crengle, D. (1986). New rules mean farm finance rethink. Farm Management News, March, pp. 50-53.

Bromley, A.P.C. (1981). Hawera District Centenary. Centennial Committee for the Hawera District Council.

Brown, D. (1973). Farm office organisation. Farm Management. Vol. 2, No. 5, pp. 217-224.

Bryant, D. (1988). Editorial. New Zealand and Southern Horticulture. February.

Buckett, M. (1981). An introduction to farm organisation and management. Oxford, Pergamon.

Busby, A. (1988). Editorial. The New Zealand Meat Producer. New Zealand Meat Producers Board. Wellington.

Bywater, A.C. (1973). Using technical information to aid farm decisions by means of the computer. Farm Management. Vol. 2, No. 6, pp. 341-348.

Candler, W.V. (1965). The role of farm management surveys. Decision paper No. 39. Department of Agricultural Economics and Farm Management, Massey University.

Castle, E.N. et al. (1972). Farm business management: The decision making process. (2nd ed.). New York, MacMillan.

Charlton, P.J. (1972). Financing farm business growth. Farm Management, Vol. 2, No. 2, pp. 60-70.

Cheetham, J. (1988). Pers. comm. Chairman Manawatu Process Crop Growers Association.

Cherrington, J. (1983). A farming year. London, Hodder and Stoughton.

Churchman, C.W. et al. (1957). Introduction to operations research. New York, Wiley.

Clark, M.B. (1981). Office management for farmers. Department of Farm Management, Lincoln College.

Conway, G.R. (1985). Agroecosystem analysis. Agricultural administration, Vol. 20, pp. 31-55.

Dale, N.R. (1973). Sources and the use of information by farmers in New Zealand. Ministry of Agriculture and Fisheries, Extension Report, No. 10.

Dalton, G.E. (Ed.) (1975). Study of agricultural systems. London, Applied Science.

Dalton, G.E. (1982). Managing agricultural systems. London, Applied Science.

Dantzig, G.B. (1955). Linear programming under uncertainty. Management Science. Vol. 1, No. 3, pp. 197-208.

Darden, W.R. et al. (1982). Mapping market mobility: Psycographic profiles and media exposure in Marketing research: Applications and problems. (Eds Jain, A.K. et al.). New York, Wiley.

Davis, J. and Thiele, G.F. (1981). Simulation modelling for orchard management. Agricultural Systems, Vol. 7, pp. 21-36.

Dent, J.B. (1975). The application of systems theory in Agriculture in Study of Agricultural Systems. (Ed. G.E. Dalton). London, Applied Science.

Dent, J.B. and Anderson, J.R. (Eds.) (1971). Systems analysis in agricultural management. Adelaide, Wiley.

Descartes, R. (1637). Discourse on the method. Translated by J. Veitch. (1912). London, Dent.

Dillon, J.L. (1976). The economics of systems research. Agricultural Systems. Vol. 1, pp. 5-22.

Dillon, J.L. (1979). Economics and the design of small-farmer technology. Edited by A. Valdes et al. Ames, Iowa State.

Dillon, J.L. (1980). The definition of farm management. Journal of Agricultural Economics. Vol 31, pp. 257-258.

Douglas, R.O. (1984). House of Representatives: Budget speech and annex. Wellington, Government Print.

Duckham, A.N. and Masefield, G.B. (1971). Farming systems of the world. London, Chatto and Windus.

Ebersohn, J.P. (1976). A commentary on systems studies in agriculture. Agricultural systems. Vol. 1, pp. 173-184.

Elrick, J. and Bright, G. (1982). Inflation and budgeting. Farm Management. Vol. 4, No. 12, pp. 479-486.

Engelbrecht, R. (1984). Management options with intensive systems. Farm Management News, September, pp. 38-43.

Evans, S. (1989). $1 billion dairying bonanza expected. Dominion. January 18, p. 1.

Fayol, H. (1949). General and industrial management. London, Pitman.

Firth, R. (1985). Financial Analysis for decision making. Farm Management News, pp. 38-39.

Fitzharris, M.J. (1970). The Matawai programme. Where do farmers get their information from? Ministry of Agriculture and Fisheries, Extension Report, No 13.

Flood, M.M. (1955). Decision making. Management Science. Vol. 1, No.2, pp. 167-169.

Fleiss, J.L. and Zubin, J. (1982). On the methods and theory of clustering in Marketing Research: Applications and Problems. (Eds Jain, A.K. et al.). New York, Wiley.

Fraser, G. (1989). The Hawkes Bay Wine Industry. Department of Agricultural and Horticultural Systems Management, Massey University.

Gay, B.L. (1979). Management accounting for the New Zealand farmer. Occasional paper No. 30. Department of Business Studies, Massey University.

Gasson, R. et al (1988). The farm as a family business: A review. Journal of Agricultural Economics. Vol. 39, No. 1, pp. 1-41.

Gessaman, P.H. et al. (1988). Preparing farm financial trends sheets. Course notes for students. Department of Agricultural Economics, University of Nebraska.

Giles, A.K. (1973). The use and misuse of capital: A checklist. Farm Management. Vol. 2, No. 5, pp. 225-228.

Giles, A.K. and Stansfield, M. (1980). The farmer as manager. London, George Allen and Unwin.

Golub, S.J. and Huffman, H.O. (1984). Cash flow: Why it should be stressed in financial reporting. Financial Executive, February, pp. 34-40.

Gow, N. (1968). Evaluation of orchard development. In T.M. Morrison (Ed.), Economics and management of fruit growing. Bulletin 7, pp. 96-108. Department of Horticulture, Lincoln College.

Gray, D.I. (1987). A case farm study of high and low sheep performance on Southern North Island Hill Country. MAgSc Thesis, Department of Agricultural and Horticultural System Management, Massey University.

Green, P.E. and Tull, D.S. (1988). Research for marketing decisions. (5th edition). Englewood Cliffs, Prentice-Hall.

Greer, J.P. (1981). Motivation and other factors influencing the adoption of practices by sheep farmers in Oxford County, New Zealand. M.Agr.Sc. Thesis, Lincoln College.

Grigg, D.B. (1974). The agricultural systems of the world. An evolutionary approach. Cambridge, Cambridge University.

Guy, M.C. (1987). Pers. comm. Farm management consultant, Coopers and Lybrand, Feilding.

Haines, M. (1982). An introduction to farming systems. London, Longman.

Hardaker, J.B. and Anderson, J.R. (1981). Why farm recording systems are doomed to failure. Review of Marketing and Agricultural Economics, Vol. 49, No.3, pp. 199-202.

Harle, J.T. (1974). Further towards a more dynamic approach to farm planning - a technically based model of the farm firm. Journal of Agricultural Economics. Vol. 25, No. 2, pp. 153-163.

Harsh et al (1981). Managing the farm business. New Jersey, Prentice-Hall.

Harrington, Q.N. and Schapper, H.P. (1979). Management information systems for the commercial family farm. In M.J. Blackie and J.B. Dent (Eds.), Information systems for agriculture. Applied Science, London.

Haugen, R.A. (1986). Modern investment theory. New Jersey, Prentice-Hall.

Hayen, R.L. (1982). Applying decision support systems to small business financial planning. Journal of Small Business Management, July, pp. 35-46.

Hayton, R.V. (1988). Business viability. Farm Management, Vol. 6, No. 9, pp. 353-358.

Hinman, H.R. and Hutton, R.F. (1970). A general simulation model for farm firms. Agricultural Economics Research. Vol. 22, No. 3, pp. 69-77.

Hockey, P.R. (1963). Awareness, use and acceptance of extension services by Tokomaru Dairy Factory Suppliers. Ministry of Agricultural and Fisheries, Extension Report.

Hoinville, G. et al. (1982). Survey research practice. London, Heinemann.

Holt, J.E. and School,D. (1985). Technological change in agriculture - the systems movement and power. Agricultural Systems, Vol. 18, pp. 69-80.

Holt, J.E. and Schoorl, D. (1982). Perspective for planning in agriculture. Agricultural Systems. Vol. 8, pp. 219-224.

Hopkins, J.A. and Heady, E.O. (1949) Farm Records (3rd ed.). Ames, Iowa State College.

Hopkins, J.A. and Turner, D.A. (1958) Records for farm management. Englewood Cliffs, Prentice-Hall.

Inland Revenue Department (1986). Income Tax Legislation. New Zealand Legislation Series, Vol. 6A.

Jain, A.K. et al. (Eds.) (1982). Marketing research: Applications and problems. New York, Wiley.

James, S.C. and Stoneberg, E. (1976). Farm accounting and business analysis. Iowa, Iowa State University.

Jeffers, J.N.R. (1978). An introduction to systems analysis: with ecological applications. London, Arnold.

Johnson, G.L. (1986). Research methodology for economists: Philosophy and practice. New York, Macmillan.

Jones, L.M. (1982). Defining systems boundaries in practice: Some proposals and guidelines. Journal of Applied Systems Management, Vol. 9, pp. 41-55.

Journeaux, P.R. (1987). Bull beef systems for Wairarapa hill country. MAgSc Thesis. Department of Agricultural and Horticultural Systems Management, Massey University.

Kampanellas, R. (1979). Review of MAF extension services in North Canterbury. M.Ag.Sc. Thesis. Lincoln College, Canterbury.

Kay, R.D. (1981). Farm management: Planning, control and implementation. New York, McGraw-Hill.

Keynes, J.N. (1891). The scope and method of political economy. New York, Macmillan

Kirton, I.F. (1988). Asparagus short course. Department of Accounting and Finance, Massey University.

Knight. D.J. (1977). Management forecasting: The practical implications. Farm Management, Vol. 3, No. 7, pp. 326-333.

Knight, F.H. (1921). Risk, uncertainty and profit. Boston, Mifflin.

Koontz, H. and O'Donnell, C. (1972). Principles of management: An analysis of managerial functions. (5th ed.). New York, McGraw-Hill.

Lamb, D. (1985). Cash management in farming - The part of a farm management consultant. Farm Management news, September, pp. 49-51.

Latta, C.R. (1983). The New Zealand Farmers guide to financial planning. Christchurch, Whitcoulls.

Lee, D. (1985). Cash management for farmers: A banker's view. Farm Management News, September, pp. 43-47.

Leonard, R.K. and Fraser, R.R. (1971). Two measurements of communication with farmers. MAF Extension Report No.12.

Lingard,J. (1974). Resources in agriculture: Management. In Agricultural resources. (Eds A. Edwards and A. Rogers). London, Faber and Faber.

Lockhart, J.C. (1987). Student guide to Multiplan worksheets. Course notes for students. Department for Agricultural and Horticultural Systems Management, Massey University.

Lockhart, J.C. et al (1988). The farm survey. Rural Accountants Seminar. Department of Agricultural and Horticultural Systems Management, Massey University.

Longbottom, G.A. (1980). Management in theory and practice. Farm Management. Vol. 4, No. 2, pp. 58-63.

Lowry, R. (1986). Taihape be happy die happy. Auckland, Wilson and Horton.

Luksus, E.J. (1981). Strategic budgeting: How to turn financial records into a strategic asset. Management Review, March, pp. 57-61.

MacGillivray, P.A. (1973). Featherston County survey. Occasional paper No.4. Department of Agricultural Economics and Farm Management, Massey University.

Machlup, F. (1978). Methodology for economists and other social sciences, New York, Academic Press.

MAF. (1972). New Zealand's agriculture. Ministry of Agriculture and Fisheries, Wellington.

MAF. (1987) Farm monitoring report. Ministry of Agriculture and Fisheries, Wellington.

MAF. (1987a). New Zealand agricultural statistics. Ministry of Agriculture and Fisheries, Wellington.

MAF. (1988). Situation and outlook for New Zealand agriculture. Ministry of Agriculture and Fisheries, Wellington.

MAFF. (1980). An introduction to farm business management. London, Her Majesty's Stationery Office.

MAFTech. (1989). Farm monitoring report. March. Ministry of Agriculture and Fisheries, Wellington.

Makeham, J.P. and Malcolm, L.R. (1982). The farming game. Armidale, Gill.

Malloch, D.M. and Weston, I.W. (1953). Practical farm bookkeeping and costing. (3rd ed.). Christchurch, Whitcombe and Tombs.

Mallyon, C.A. (1966). The principles and practice of farm management accounting. (2nd ed.). Brisbane, Low.

Mappleback, L. (1987). The Management process. Canadian Journal of Agricultural Economics, Proceedings of the 1986 Annual Meeting. Vol. 34 pp. 185-212.

Markowitz, H. (1952). Portfolio selection. Journal of finance. December, pp. 77-91.

McCall, D.G. (1984). A systems approach to research planning for North Island Hill Country. PhD Thesis. Department of Agricultural Economics and Farm Management, Massey University.

McPhee, M.A. (1988). Premium price signals need pushing by Apple, Pear Board. New Zealand Herald. July 21, 1988. Auckland.

McRae, A.F. (1988). Farm management at Massey University. Farm Management News. January, pp. 41-43.

McRae, A.F. and Kirton, I.F. (1987). The responsibility of farm financial management; Farmer, Accoutant or Government. Course notes for students, Department of Agricultural and Horticultural Systems Management, Massey University.

Meij, J.L. (1965). Management, a common province of different sciences. In W.T. Greenwood. (Ed.), Management and organisational behaviour theories. Cincinnati, South-Western.

Miller, C.P. (1983). System modelling in animal production research: An interactive case study. PhD Thesis. Department of Agricultural Economics and Farm Management, Massey University.

Mihram, G.A. (1972). Simulation: statistical foundations and methodology. New York, Academic Press.

Mitchell, G.F.C. (1971). Farm business management advice. Department of Economics, University of Bristol.

Morris, J. (1978). How not to drive your secretary mad. Farm Management, Vol. 3, No. 8, pp. 353-358.

Moverley, J. (1986). Microcomputers in agriculture. London, Collins.

Moyle, C.J. (1984) Labour's intentions for agriculture. Vice-chancellors address. Massey University. 29 June.

Mumey, G.A. (1987). Improving on-farm financial management. Canadian Journal of Agricultural Economics, Symposium Proceedings. Vol 35, pp. 735-740.

MWD. (1971). Wanganui region national resources survey. (Part VII). Ministry of Works and Development. Wellington, Government Printer.

Mylvagaram, I.A. (1983). A description of financial planning decision support systems. M.B.A. Research Report, Faculty of Business Studies, Massey University.

Naylor, J.D. (1986). What goes into a set of accounts and how to read them. Dairy farming annual, pp. 168-171.

NZAPMB. (1986). A brief profile. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1987). Thirty ninth annual report for year ended 30 September. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1987a). 1987 Price list and terms of supply. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1988). Fortieth annual report for year ended 30 September. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1988a). 1988 Price list and terms of supply. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1988b). Planting guide. New Zealand Apple and Pear Marketing Board. Wellington.

NZAPMB. (1989) 1989 Price list and terms of supply. New Zealand Apple and Pear Marketing Board. Wellington.

NZMPB. (1988). The New Zealand Meat Producer. The New Zealand Meat Producers Board. Vol 16, No. 3.

NZDB. (1985). 61st livestock improvement research report. Livestock Improvement Division, New Zealand Dairy Board, Hamilton.

NZDB. (1986). 62nd livestock improvement research report. Livestock Improvement Division, New Zealand Dairy Board, Hamilton.

NZDB. (1987). 63rd livestock improvement research report. Livestock Improvement Division, New Zealand Dairy Board, Hamilton.

NZDB. (1988). Annual report. New Zealand Dairy Board, Wellington.

NZDB. (1988a). 64th livestock improvement research report. Livestock Improvement Division, New Zealand Dairy Board, Hamilton.

NZDB. (1989). New Zealand Dairy Exporter. Journal of the New Zealand Dairy Board, Wellington. September.

NZDS. (1989). Overseas Trade. Department Of Statistics, Wellington.

NZMWBES. (1985). Agriculture's contribution to f.o.b. receipts. Paper No. T100. New Zealand Meat and Wool Board's Economic Service. Wellington.

NZMWBES. (1988). The effect of currency movement on sheep and beef farm incomes. Farm Management News, January, pp. 38-39.

NZMWBES. (1988a). Supplement to the New Zealand sheep and beef farm survey 1985-86. New Zealand Meat and Wool Boards' Economic Service, Wellington.

NZMWBES. (1989). Supplement to the New Zealand sheep and beef farm survey 1986-87. New Zealand Meat and Wool Boards' Economic Service, Wellington.

NZSA. (1977). Management accounting for the New Zealand farmer. Wellington, New Zealand Society of Accountants.

Nix, J.S. (1979). Farm management: The state of the art (or science). Journal of Agricultural Economics. Vol 30, pp. 277-291.

Nix, J.S. and Nicholson, J.A.H. (1974). The technology of agricultural and horticultural production. In Agricultural resources. (Eds A. Edwards and A. Rogers). London, Faber and Faber.

Norman, L. et al. (1985). The farm business. (2nd ed.). Bath, Longman.

Norman, L. (1986). How do farmers and managers spend their management working time. Farm Management, Vol. 6, No. 4. pp. 175-182.

Nuthall, P.L. (1980). A survey of methods for determining a planning horizon. Review of Marketing and Agricultural Economics, Vol. 48, No.1, pp. 21-35.

Osburn, D.D. and Schneeberger, K.C. (1983). Modern agricultural management. (2nd ed.). Virginia, Preston.

OECD. (1987). National policies and agricultural trade: Country study New Zealand. Paris.

Palmer, R.W.P. et al. (1981). Soils of the Egmont and part Taranaki Counties. New Zealand Soil Survey Report. DSIR, Wellington.

Park, J.C. (1984). Budget systems: Make the right choice. Financial Executive. March, pp. 26-35.

Parker, W.J. (1984). A study of management practices and productive performance on a sample of hill country sheep farms in north-east Wairarapa. MAgSc Thesis. Department of Agricultural Economics and Farm Management, Massey University.

Parker, W.J. (1989). An introduction to farm budgeting in New Zealand. Course notes for students. Department of Agricultural and Horticultural Systems Management, Massey University.

Pearce, D.G. (1958). Farm business management: Its principles and applications. Aberdeen, Oliver and Boyd.

Pollard, V.J. and Obst, W.J. (1978). Practical farm business management. Melbourne, Inkata Press.

Preston, R.J. (1985). Cash management in farming: An accountant's view. Farm Management News, September, pp. 47-49.

Pugh, C.L. (1977). Farm management information systems - a practical approach. Farm Management. Vol. 3, No. 5, pp. 247-255.

Rickards, P.A. and McConnell, D.J. (1967). Budgeting, gross margins and linear programming for farm planning. Armidale, University of New England.

Ridler, B.J. et al. (1987). Use of a linear programming model to investigate alternative dairy production systems. Proceedings of the 4th AAAP Animal Science Congress. p. 454.

Rosenblueth, A. and Wiener, N. (1945). The role of models in science. Philosophy of Science. Vol. 12, pp 316-321.

Ruthenberg, H. (1980). Farming systems in the tropics. (3rd ed.). Oxford, Clavendon.

Ryde, J. and Nuthall, P.L. (1984). Farmers record keeping and planning practices: A postal survey. Discussion paper 81, Lincoln College.

Shubik, M. (1960). Simulation of the industry and the firm. The American Economic Review. Vol. L, No. 5, pp. 908-919.

Sharpe, W.F. (1963). A simplified model of portfolio analysis. Management science, Vol. 9, pp. 277-293.

Sokal, R.R. and Sneath, P.H.A. (1963). Principles of numerical taxonomy. San Francisco, Freeman.

Sneath, P.H.A. and Sokal, R.R. (1973). Numerical taxonomy. San Francisco, Freeman.

Spedding, C.R.W. (1975). The biology of agricultural systems. London, Academic Press.

Spedding, C.R.W. (1976). Editorial. Agricultural Systems. Vol. 1, pp. 1-3.

Spedding, C.R.W. (1979). An introduction to agricultural systems. London, Appled Science.

Spedding, C.R.W. (1988). An introduction to agricultural systems, (2nd ed.). London, Appled Science.

Squire, J. and Delahunty, E. (1982). Farm business management. Auckland, Longman-Paul.

Stevenson, H.H. and Sahlman, W.A. (1988). How small companies should handle advisers. Harvard Business Review, March-April, pp. 28-34.

Stewart, J.D. (1968). Management and management accounting. In T.M. Morrison. (Ed.), Economics and management of fruit growing,Bulletin 7, pp. 66-77. Department of Horticulture, Lincoln College.

Stokes, R. (1979). Succeeding on the farm. Farm Management, Vol. 3, No. 11, pp. 504-510.

Stone, J.A. (1968). Accounting for management in agriculture. Sydney, Angus and Robertson.

Stone, J.A. (1988). Rural accounting practice. Primary Industry Accounting Seminar, Department of Accounting and Department of Agricultural and Horticultural Systems Management, Massey University.

Stuart, A. (1963). Standard errors for percentages. Applied statistics, Vol. 12, pp. 87-101.

Taylor, N.W. (1968). Budgeting and planning. In T.M. Morrison (Ed.), Economics and management of fruit growing, Bulletin 7, pp. 96-108. Department of Horticulture, Lincoln College.

Taylor, N.W. (1986). Trends in farm incomes, production and finance in the sheep and beef industry. Paper No. 1930. New Zealand Meat and Wool Board Economic Service.

Thomas, H.A. (1980). Need for a business approach to the problems of succession, inheritance and retirement. Farm Management. Vol. 4, No. 4, pp. 159-152.

Toomath, C.R. (1972). Budgeting for farm management. Wellington, New Zealand Society of Accountants.

Topham, M.R. (1982). The advantage of preparing accounts by computer. Farm Management. Vol. 4, No. 11, pp. 443-447.

Wadsworth, J. (1983). A systems approach for use at farm level in developing countries. Agricultural Systems, Vol. 12, pp. 67-73.

Walsh, S.B. et al. (1981). Managing the farm business. New Jersey, Prentice-Hall.

Warren, M.F. (1982). Use of the partial cash flow budget. Farm Management. Vol. 4, No. 4 pp. 163-170.

Warren, M.F. (1986). Financial management for farmers (2nd ed.). Hutchinson, London.

Walton, T. (1987). Editorial. New Zealand and Southern Horticulture. Wellington.

Watson, R.N. (1968). New Zealand farm accounting. Wellington, Butterworths.

Westlake, W.J. (1980). Computers in the farm office. Farm Management. Vol. 4, No. 4, pp. 163-170.

Whitty, B. (1988). Editorial comment. Farm Management News. Jan.

Wilton, W.J.W. (1989). Rennovation options to suit the situation. The orchardist of New Zealand. New Zealand Fruitgrowers' Federation. April, pp. 19-21.

Winsdale, R.S. (1987). The accounting study - an insider's report. Canadian Journal of Agricultural Economics, Proceedings of the 1986 Annual Meeting. Vol. 34, pp. 163-169.

Wright, A. (1971). Farming systems, models and simulation. In J.B. Dent and J.R. Anderson (Eds) Systems analysis in agricultural management. Adelaide, Wiley.

Wright, A. (Undated). The nature and scope of farm management. Course notes for students. Department of Agricultural and Horticultural Systems Management, Massey University.

Wright, A. (1989). Collection of information to aid design and delivery of effective agricultral policy. Paper presented to MAFTech Workshop on integrated systems analysis and climate impacts. Department of Agricultural and Horticultural Systems Management, Massey University.

Zioganas, C.M. (1988). Defining and determining a 'fair' standard of living for the family farm. European Review of Agricultural Economics. Vol. 15, pp. 55-65.