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**SYMBOLIC ORDER AND  
MATERIAL AGENCY:  
A CULTURAL ECOLOGY OF  
NATIVE FOREST  
REMNANTS ON WAIKATO  
DAIRY FARMS**

A thesis  
submitted in fulfilment  
of the requirements for the degree  
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By

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### **Abstract**

Loss of native biological diversity is a world-wide problem of growing international concern. One of the main causes of native biodiversity loss is destruction and degradation of native habitat through land development for agriculture.

The Waikato region is an example of the destruction and degradation of native habitat in association with the development and intensification of farming, including dairy farming. This thesis explores cultural reasons for the loss of native forest in the Waikato region, and reasons why fragments of native forest remain. The research involves a participant observation study of 'typical' dairy farm families for 9 months of the dairy year, in-depth interviews of dairy farmers who have protected a significant proportion of their land for conservation of native habitat, a questionnaire of dairy farmers, and an examination of dairy farm magazines and other literature to identify the values and attitudes that motivate dairy farmers in relation to land management and protection of native habitat.

The title of the thesis suggests two elements that are important for understanding the loss and persistence of native forest in Waikato's farmed landscapes. Symbolic reason refers to the values, attitudes and perceptions of farmers that derive from socio-political and economic forces which encourage productivist practises that leave little opportunity for native forest to survive. Material agency refers to the local circumstances of particular farms and individual people which enable native forest to persist. The thesis argues that persistence of native forest depends on the idiosyncrasies of material circumstance in the face of relentless pressure to transform the production landscape for economic purposes.

The thesis concludes with a suggestion that policies to assist survival of native habitat in farmed landscapes need to include ones that encourage the odds in favour of fortuitous circumstance. In the face of globalised economic pressures, policies for conservation of native biodiversity need to involve a 'portfolio' of measures that apply to individual landowners and the wider rural community by recognising, assisting and rewarding management for non-production values.

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# *CHAPTER 1*

## *INTRODUCTION*

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This thesis is an examination of social and environmental factors that affect the survival of native forest remnants in landscapes of intensive agricultural production. It examines those elements of the social and biophysical worlds that influence the land management decisions of dairy farmers in the Waikato region. This first chapter of the thesis gives the personal and intellectual background to the topic and an overview of the organisation and structure of the thesis. It also provides a justification for the topic, a summary and explanation of the theoretical perspectives that inform the thesis, and a brief overview of the research methods.

### **PERSONAL BACKGROUND AND ITS RELEVANCE TO THE THESIS**

Life experiences shaped the approach and focus of this research. I grew up in East Africa, in a home surrounded by 'bush'. My most vivid childhood memories are of playing in the bush. With the memories come grief, as I realise how that world has been replaced by housing and urban development. Memories and the grief of loss underlie my current research interest. They prompt me to ask: is there a way that New Zealanders in particular and human beings in general can manage their environments with less violence and destruction to the natural world?

In 1970 I completed a Masters degree in Anthropology at the University of British Columbia. That degree introduced me to the concept of culture as understood by anthropologists, and to ethnography as a method of qualitative data collection. It also shaped my approach to this research: it is primarily anthropological in its focus on culture and in its use of participant observation as a method of data collection. The choice of topic was further influenced by my experience as a

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conservation planner with the NZ Department of Conservation. During that time I became particularly aware of the importance of conservation of native plants and animals on private land. Experience and subsequent reading convinced me that in the long-term, conservation of biological diversity on a global scale depends on finding ways to reconcile the aims of farmers and other private landowners with conservation of native habitat at the local scale. Cumulative loss of habitat at the local level leads to loss of habitat at the regional scale and eventually national and global loss. In practice, global maintenance of biodiversity depends on place-based actions at the local level (DoC and MfE 2000; Mitchell and Craig 2000; Norton and Miller 2000; Western 1989).

#### **WHY CONSERVATION OF NATIVE HABITAT IS IMPORTANT**

Briefly, conservation of native habitat is important because it is a critical means of ensuring the survival of native plants and animals, of retaining elements of the landscape that are special to New Zealand, and of preserving the resilience of our biological 'life support systems'. The New Zealand National Biodiversity Strategy identified reasons why native biodiversity is important (DoC and MfE 2000, 2-6). They include the fact that a high percentage of New Zealand plants and animals are endemic (i.e. unique to New Zealand); our native biodiversity is a source of national identity (e.g. the kiwi and the silver fern) and a major attraction for visitors. Many of our native plants and associated fauna are symbolically important (e.g. the cabbage tree, pohutukawa, kowhai, flax, tui, bellbird, kea, kakapo, tuatara and weta), and a number of native species have known or potential commercial value (e.g. as timber trees, or as sources of pharmaceuticals). Natural ecosystems (still largely native forest in areas above 300m) provide vital ecosystem services, such as soil protection, water supply and regulation, and nutrient recycling. The strategy cites research results that suggest that 'the total annual value provided by New Zealand's indigenous biodiversity could be more than twice that of New Zealand's gross domestic product' (Patterson and Cole 1999, cited by DoC and MfE 2000, 3).

'Biodiversity' or 'biological diversity' is the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (UNEP 1992, Article 2). Globally,

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as well as regionally and locally, the current rate of biological extinction is estimated to be several times higher than at any time in the last 65 million years (Barbault and Sastrapradja 1995, 198; Diamond 1989; Jeffries 1997, 37, 113 - 148; MfE 1997, 9.6; Myers 1989; E.O. Wilson 1992). This rate of extinction has led to concern within the scientific community about the long term environmental consequences of such loss. Diversity within (and between) species and ecosystems is widely recognised as a prerequisite for global environmental resilience, as well as a source of critical goods and services for the human community (Mooney et al. 1995). Barbault and Sastrapradja (1995, 198) have summarised the immediate or 'proximate' causes of species extinction as habitat degradation (loss, change in quality, and fragmentation), over-exploitation and hunting, and introduction of alien species.

While the general term 'biodiversity' applies to the variety of all forms of life, in the context of a particular country, such as New Zealand, it is usually taken to mean the diversity of native species, excluding introduced species such as weeds, pests and cultivars. **Native** biodiversity, the variety of native plants, animals and ecosystems that are native to New Zealand, is the focus of this thesis. The pace of introduction of plant and animal species to New Zealand has been so rapid that in absolute terms there is now greater biodiversity than there was before human settlement. Nearly half of all vascular plants growing in the wild have been introduced (2,020 naturalised introduced species compared with 2,350 native species) while the number of introduced, not yet naturalised plants, is almost 10 times more (approximately 22,600) (DoC 2000). However, a key reason for the focus on native biodiversity is that many of New Zealand's native plants and animals are unique to New Zealand. Some 76% of New Zealand's vascular plants are endemic, together with 23% of its terrestrial birds, 85% of its freshwater fish, and 100% of its amphibians and reptiles (DoC 1994, 11). New Zealand has been identified as one of 25 biodiversity 'hotspots' worldwide: so called because of the relatively large number of endemic species and the threats to their survival (Given and Mittermeier 1999; Myers et al. 2000). If these species disappear from New Zealand, they disappear from the planet.

The need for protection of biological diversity was articulated by the UN World Commission on Environment and Development (1987, 165-166) in its report *Our Common Future* (known as the Brundtland report). That was further emphasised by the International Union for the Conservation of Nature (IUCN), the United Nations Environment Programme (UNEP) and World Wildlife Fund for Nature

(WWF) in the global conservation strategy, *Caring for the Earth A Strategy for Sustainable Living* (IUCN-UNEP-WWF 1991, 9). It has since become internationally accepted as a key principle of sustainable development. Political and diplomatic recognition of that concern resulted in the United Nations Convention on Biological Diversity and its ratification by 157 countries.

Loss of native biodiversity (at the levels of species, populations, and habitats) is a particular problem for New Zealand because of the vulnerability of many endemic species to habitat change and introduced competitors. The long isolation of New Zealand (at least 80 million years) has meant that its plants and animals have evolved largely in the absence of competitors from other continents. Although wonderfully adapted to local conditions, they have proved vulnerable to disturbances and competition caused by human activity and introduced species.

The 1997 State of the Environment report noted that, 'Biodiversity decline is New Zealand's most pervasive environmental issue, with 85 % of lowland forests and wetlands now gone, and at least 800 species and 200 subspecies of animals, fungi and plants considered threatened' (MfE 1997, 10.6). That report summarises the causes of national biodiversity loss as loss of lowland habitat (including lowland forest, wetlands and estuarine habitats), declining quality of remaining land and freshwater habitats, impact of pests and weeds, and, in the case of some marine species and ecosystems, human over-exploitation (DoC and MfE 2000; MfE 1997, 10.6).

As a signatory of the Convention on Biodiversity, New Zealand has prepared a National Biodiversity Strategy (DoC and MfE 2000). The Strategy includes as one of its four national goals to 'halt the decline in New Zealand's indigenous biodiversity' (DoC and MfE 2000, 18). Protection of biodiversity by landowners on private land is considered a key means to achieve this goal.

#### **BIODIVERSITY CONSERVATION AND HABITAT PROTECTION**

Loss of native species occurs because of on-the-ground population decline and localised extinction of species from locality to locality over and over again. The New Zealand Biodiversity Strategy summarised the process in these words:

Many populations of these threatened species have disappeared from areas where they were once found. This pattern of local loss is the forerunner of species extinction. Species losses are often the result of an even more pervasive loss - that of natural ecosystems and habitats. Changes in New Zealand's landscapes have had a

dramatic impact on New Zealand's biodiversity (DoC and MfE 2000, 5-6).

'Habitat' is the ecosystem where a species normally lives (Forman 1995, 39) or the typical area or living space in which a population of a species lives (Spellerberg 1999, 233). In relation to native species, it is the living space of native plants and animals. Biodiversity conservation for a wide range of species means protection of the conditions they need to feed, rest and reproduce. Although some native species, such as the pukeko, flax, cabbage tree and fantail, are able to adapt to a wide range of habitat conditions and types of change, others are more restricted in their requirements. For conservation of native species across a broad spectrum it is necessary to conserve a range of habitats. Because most natural habitats contain characteristic communities of co-evolved plants and animals that have developed close inter-dependencies over time, habitat change, such as the introduction or removal of certain species, can lead to decline in other species. Thus many of New Zealand's native birds fail to reproduce not only because their young are predated by introduced animals, but also because introduced animals compete with the parent birds for food. Similarly, many populations of native plants are in decline because of the loss of another species essential to the dispersal of their pollen or seed.

Habitat conservation must be viewed against a broader backdrop of the spatial ecology of biodiversity. In New Zealand, pastoral agriculture has been one of the greatest causes of native habitat destruction, particularly on land lower than 300m above sea level. The areas in New Zealand of highest biodiversity before European contact were the flood plains and coastal lowlands of the North and South Islands. These have also been the areas of closest human settlement and greatest conversion to agriculture. Not only did these areas include the greatest diversity of ecosystems (coastal and low altitude forest of diverse structure and species composition, bog, swamp, flood plain, estuaries, dunelands, lakes, rivers, and streams) they were also critical for the year-round and seasonal requirements of many birds. Today, most land below 300m is privately owned and supports little more than fragments of the original native vegetation. In the words of the New Zealand Biodiversity Strategy,

Sixty-three percent of New Zealand's land area has been converted into farms, exotic forests, settlements and roads. A once continuous range of unique ecosystems has been turned into a patchwork of isolated fragments. Although a third of the country is managed for conservation purposes, most of this is in upland areas

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and the mountains. The lowlands, river margins, wetlands, dunelands and coastal areas have relatively few natural habitats for native species (DoC and MfE 2000, 5-6).

Thus farmed landscapes are critically important for species conservation in New Zealand because they include those areas that were richest in terms of diversity and abundance of native species before the advent of human settlement.

#### **DAIRY FARMING AS A CASE STUDY**

New Zealand dairy farming in particular is problematical from an environmental perspective because it favours lowland areas that are the most naturally productive in ecological terms, is a relatively intensive form of production with significant environmental impacts on water quality and loss of native biodiversity, and because in the New Zealand case it is tied closely to a globalised form of industrial agriculture.

There are significant differences between the social, economic and environmental characteristics of dairy farms and those of sheep and beef farms. Because dairy farming requires land that is well watered, climatically equable, and relatively flat or undulating, it tends to be relatively more expensive than other types of pastoral farm land<sup>1</sup> (i.e. excluding land used for horticulture). In addition, the cost of milking machinery and purchase of shares in the dairy company mean there is a high capital cost attached to dairying. The high cost of land and capital investment, particularly in established dairy areas such as the Waikato, generate great economic pressure to maximise productive use of the land. Effluent wastes per stock unit and per hectare of dairying land are significantly higher than for sheep and beef farming (a lactating cow eats at least twice as much as a dry cow). On the other hand, dairying has not suffered economic downturns to the same degree during the past two decades as have sheep and beef farming, although dairy farmers have faced more overseas marketing pressure to 'clean up their act'. Higher economic returns for milk, relative to those for meat and wool, and potentially more opportunities for off-farm income mean that dairy farmers may be better placed than dry stock farmers to make environmental improvements in their farm management practices.

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<sup>1</sup> Although good dairy farm land is expensive relative to other forms of pastoral farmland the price of land varies significantly between regions, with land prices in Waikato up to twice the price of land in Otago or Southland.

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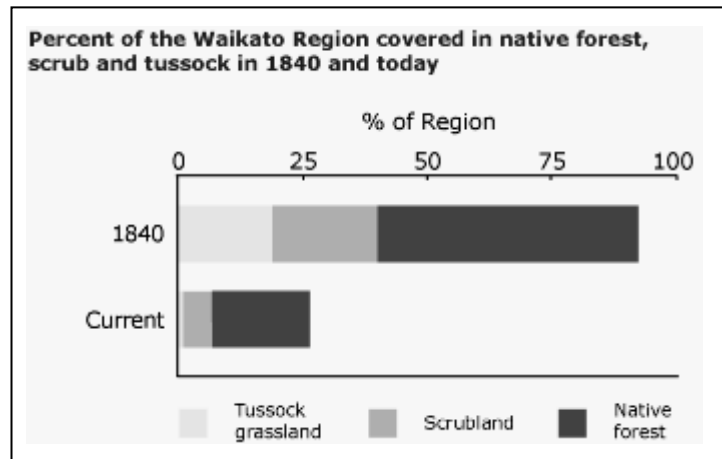
Dairy farming regions – notably Waikato, Bay of Plenty, Taranaki, Northland, North and South Canterbury, Otago and Southland – tend to be more densely populated than the dry stock hill country regions of the North and South Islands, so dairy farmers tend to experience less isolation and to be closer to towns and service centres. Proximity to rural service centres also means that there are more opportunities for family members to earn off-farm income. Furthermore, dairy farmers are linked by their membership of a co-operative dairy factory and participation in farm discussion groups. Farm discussion groups and dairy industry communication can, and do, provide information for improved environmental management.

Finally, there may be a different relationship to the farm itself between dairy farmers and dry stock farmers. For example, farm inheritance is usual for drystock farms, but a significant proportion of dairy farmers acquire their land by gradually building up equity, first as sharemilkers then through one or more 'stepping stone' farms. Because dairying is labour intensive, many dairy farmers plan to get out of milking by middle age by bringing in a sharemilker or herd manager to do the milking. At this point, there is frequently division of interests between the farm owner, who has a long-term view of the farm, and the sharemilker or herd manager, whose main interest is the short term objective of maximising production and income.

These differences mean that persistence of native vegetation on dairy farms is likely to involve different social and economic circumstances from its persistence on drystock farms, and reports about environmental attitudes and management based on the views of drystock farmers need to be treated with caution when extended to dairy farmers.

#### **CONSERVATION OF BIODIVERSITY WITHIN FARMING AREAS**

The Waikato region well represents the process of native habitat loss. Figure 1, shows transformation of the region's ecology from a mosaic of tussock grassland, scrub and native forest in pre-European times, to managed pasture today. Virtually all native lowland habitats, apart from the peat swamps of Whangamarino and Kopuatai, have been converted to farmland. The region stands as a stark example of native habitat loss due to agricultural development.



**Figure 1.1 Percent of the Waikato Region covered in native forest, scrub and tussock in 1840 and today** (Source: Environment Waikato 1995)

Conservationists increasingly recognise that protection of biodiversity will have to occur within cultivated and pastoral landscapes rather than in areas set aside for such purposes (Brunckhorst 2002; Lambeck et al. 2000; Mitchell and Craig 2000; Western 1989, 158-165; Western et al. 1989, 304-324). McIntyre, Barrett and Ford (1996, 156) comment that while reserves will remain important, opportunities to extend or create new reserves are decreasing as pressure on land resources increases. Thus, conservation in areas between reserves must be integrated with other land uses. In relation to New Zealand, Holland (1996, 6) has argued that if we are to occupy islands sustainably we must learn to maintain their distinctive species by, among other things, 'facilitating sustainable mixtures of native and exotic species in permanently settled areas'.

A similar conclusion was reached by Norton and Miller (2000, 27). They cite the estimate of botanist P. de Lange that 20% of threatened vascular plants are confined to private land while a further 60% have their largest populations on private land. The New Zealand Biodiversity Strategy proposes 'to encourage and support initiatives to protect and maintain habitats and ecosystems important for indigenous biodiversity on private land' (DoC and MfE 2000, 41). In the 2000 budget, government announced the allocation of \$37 million over five years for the protection of biodiversity on private land (NZBD 2000).

A concern of conservationists is that habitat fragments tend to be especially vulnerable to degradation (Atkinson 1989). In New Zealand they require active and on-going management to remain as suitable habitat for many native species (e.g. virtually all native birds and many native invertebrates). The reasons for

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degradation of habitat fragments vary, but in the case of lowland forests they include invasion by pests and weeds and changes to the physical properties of the forest as a result of surrounding farm management practices. Invasive plants such as old man's beard (*Clematis vitalba*), grey and crack willow (*Salix cinerea* and *S. fragilis*) and pampas grass (*Cortaderia selloana* and *C. jubata*) compete with native plants for light and space (DoC 2000). In the forest fragments of Waikato, shade tolerant privet (*Ligustrum sinense* and *L. lucidum*) has replaced natives in many areas as the dominant mid-canopy tree. Introduced rats and mice eat the seed of native plants, with the former eating many native insects; possums browse canopy native vegetation (to the point of total destruction in the case of some palatable species) and predate nesting birds and nestlings. Goats and deer browse groundcover and inhibit seedling regeneration.

Forest fragments surrounded by pasture experience edge effects, such as higher light levels and the drying effect of wind, that tend to favour weed species at the expense of native species. Such fragments also tend to suffer from accidental loss of species (for example, by disease, fire, or browsing) and the lost species may not be replaced naturally if the fragment is too isolated for individuals (whether plant, bird or invertebrate) to travel across intervening farmland. In short, many forest fragments lose their capacity to support native plants and animals because they are too small, too degraded, or too isolated to allow species with particular requirements for food, shelter, and safety from predation to survive and reproduce (Channell and Lomolino 2000; Drake et al. 2002; Jeffries 1997; Spellerberg 1996; Worboys et al. 2001).

Although native forest fragments may be too degraded to provide safe, secure and sufficient habitat for many native species, they remain important as the seed banks of a depleted biological heritage. They also provide a starting point for ecological reconstruction of future landscapes that include native and exotic species. 'Pristine' native habitats are unlikely to re-establish in the dairy lands of the Waikato, but we can hope to retain native species by maintaining or restoring the ecological processes that they depended on for survival. In most cases, ecological restoration requires active protection and management by landowners if there is to be any possibility of developing mixed landscapes in which exotic and native species co-exist.

### THE RESEARCH QUESTIONS

It has been argued that conservation of habitat and native biodiversity is important for practical and symbolic reasons, that it has been drastically reduced, especially in areas of agricultural production, and that it is likely to suffer continuing decline unless landowners take part in active management of native habitat fragments.

The over-arching aim of this thesis is to understand the cultural processes that have driven the clearance of native forest for farming (more particularly dairying), and the circumstances (cultural and biophysical) that have allowed fragments of forest to remain. **The prime underlying concern is to find answers to the question: How can we assist the survival of native habitat in landscapes of production?**

Specifically, the research questions that are the focus of this research are:

***Why is there so little native forest left in the Waikato?  
Why is there any native forest left standing?***

### THE CENTRAL ARGUMENT

The following propositions, stemming from reading of the national and international literature, are central to the project, that:

*Commercial dairy farmers, in the main, ignore or oppose protection or retention of native forest remnants because they are driven by a production ethic and by cultural institutions and values that militate against alternative management values such as sustainable management, stewardship and environmental care. Macro-level socio-cultural processes bring about general land management practices by the majority of dairy farmers that result in destruction of native habitat for production purposes.*

*Survival of native forest remnants in the face of production priorities is a consequence of human and biophysical<sup>2</sup> circumstances that vary from place to place (i.e. no one set of circumstances, or combination of circumstances can explain all outcomes).*

<sup>2</sup> For the purpose of this thesis 'biophysical' refers to non-human agents.

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The first proposition is primarily a **cultural** interpretation in the sense that the focus is on the cultural institutions of the knowledge, values and information systems within which farmers operate. The second proposition is a materialist<sup>3</sup>, 'circumstantialist' or place-based interpretation in the sense that it emphasises the efficacy of place-specific material circumstances in the persistence of native forest.

The aim of the research is to examine the extent to which the cultural institutions of economy and trade relations, science, technology, information and communication, along with their associated values, shape the general culture of dairy farmers and influence the way that individual farmers relate to their land. I assumed at the beginning of my research that the widespread loss of native forest was a consequence of predominant cultural values that prioritise production to the cost of native vegetation.

An alternative to a cultural interpretation is that farmers are not driven by a cultural ethic of production but simply by practical considerations of cost and convenience. To the extent that this is the case, it can still be argued that the calculus of cost and convenience is fundamentally cultural in construction. The quantity of effort (personal and financial) that individuals will devote to an enterprise is based on their culturally derived notions of worth and return for effort. The view that farmers are driven by cost or convenience obscures the fact that money is usually a means to an end, and that convenience is shorthand for a calculus of time, energy and resources, all of which involve choices about the ends to which they will be employed (Gasson 1973). I do not deny that economic considerations can determine what farmers do and how they do it: I simply argue that the economic debates can obscure deeper explanations about values and priorities that are in large measure culturally determined.

The second proposition is that multiple common factors may influence remnant forest survival, and that their effect will vary according to different circumstances. Alternative possibilities are that systemic reasons apply to all remnants (if we can but find them), or that each case of remnant forest survival is the consequence of a unique combination of circumstances.

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<sup>3</sup> 'Materialist' as used here is not intended to refer to the Marxist conception of economy, technology and relations of production as the material base of society (Harvey 1973; Harvey 1985; Sahlins 1976), but rather to the physical and personal circumstances that result in the survival of a specific forest remnant. These can be biophysical (e.g. topography) but also human (e.g. an individual farmer who likes the bush).

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In seeking to assess the main propositions explored in this thesis, the following ancillary propositions will also be explored:

1. Dairy farmers depend on a shared, culturally constructed knowledge about land management and environmental relations that is primarily focused on quantitative production values. Non-quantifiable values (such as ecosystem services or native biodiversity) are not expressly noted in the dairy industry literature, and are not recognised by most farmers.
2. 'Production', often conflated with 'profit', is a key value that influences dairy farmers, as distinct from other land management values such as 'sustainable production', 'stewardship' and 'environmental care'.
3. Culturally shared criteria of 'production' encourage farmers to maximise production of milksolids per hectare and, incidentally, promote a style of farming that maximises environmental damage.
4. The focus on 'production' as a key farming value is promoted by all sectors of the dairy industry, and this widespread activity reinforces the concept as a key land management consideration for farmers. For example, dairy farmers depend on scientific research and information-based industries that have as their primary focus production values and criteria of worth.
5. The productivist values and institutional arrangements that drive the achievement of land management objectives by Waikato dairy farmers discourage those land management practices that might enable native ecosystems and habitats to survive.

A key concept that needs further explanation is 'productivism'. The term has been extensively discussed in the UK literature (Evans et al. 2002; Ilbery and Bowler 1998; Lowe et al. 1993; Potter 1998b; Shucksmith 1993; Walford 2002; Ward 1993; Wilson 2001), with Lowe et al. (1993, 221) defining it as 'a commitment to an intensive, industrially driven and expansionist agriculture with state support based primarily on output and increased productivity'. Wilson (2001) has summarised UK notions of the term. Productivist agriculture is said to have an ideologically hegemonic position in society; to involve a policy community that is small, powerful and tightly knit; to be part of a Fordist food regime of bulk commodity production; to involve industrialisation, commercialisation, concentration and specialisation; to have strong state support, to involve capital intensive farm techniques; and to cause significant detrimental environmental effects. Wilson notes that the term has been developed largely in the light of UK experience and need not necessarily reflect conditions elsewhere.

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Elements of New Zealand dairying display many of the characteristics defined by Lowe and summarised by Wilson. It is part of a bulk commodity food regime, is highly specialised and industrialised, involves high inputs of energy and other resources, and is environmentally damaging. But there are differences, one of the most important of which is that New Zealand dairying has had little state support since the mid 1980s and is fully exposed to competition on global markets, often from foreign state subsidised producers. The New Zealand version of productivism sits within a context of economic competition that subjects all production to the rigours of economic efficiency and profit. In practice, this means that New Zealand notions of production must centre on efficiencies of grassland production rather than on production at any cost. British and European farmers are also subject to cost constraints, but perhaps less so than their New Zealand counterparts. British and European farmers receive guaranteed price supports based on bureaucratic policies and quotas, and are not subject to the same marketing constraints. I began my research with an assumption that there is a clear distinction in farmers' minds between 'production' and 'profit'. I found, in the course of research, that for many New Zealand farmers there is no such distinction. More production means more profit, and more profit means more production – production and profit are conflated as one and the same.

#### **THEORETICAL IDEAS AND PERSPECTIVES**

The theoretical base of this thesis has been influenced by personal values, assumptions, and experience. Among these is my experience as an environmental planner. Planning is an applied discipline. It assumes that 'there must be a better way' and that it is worthwhile and appropriate to seek solutions to problems of public policy. Two widely accepted definitions of planning are those of John Friedmann (1987, 38) that 'planning attempts to link scientific knowledge to actions in the public domain', and Andreas Faludi (1973, 1) that 'planning is the application of scientific method – however crude – to policy-making'. Both definitions highlight the link between knowledge and public policy. Environmental planning is concerned with the technical and political processes of decision-making about the allocation of community assets and resources and physical infrastructure (such as roads, buildings and public space). Faludi (1973) has distinguished between 'theory **in** planning versus theory **of** planning.' Theory **in** planning refers to theories that planners use to understand or predict the systems and processes that they work with. Theory **of** planning applies to

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planning as an activity. While much theory of planning is normative – how planning **should** occur – theory **in** planning tends to be geared to understanding substantive issues in a way that enables some form of practical application.

The topic of this thesis may be tangential to the process of planning but it involves a significant substantive issue for public policy: viz. biodiversity conservation. The core concern is for theory that will provide understanding as an element of policy development. In that light, the usefulness of any such theory can be assessed by asking the following:

- What insight does this theory have to offer about the nature of relationships between farmers and the environment?
- Do the insights offered by this theory accord with the research?
- Do the insights offered by this theory provide an understanding of the linkages between farms, farmers and the survival of forest remnants?
- What are the implications for biodiversity conservation policy?

None of the theoretical views I encountered in the literature offered understanding about why most, but not all, dairy farmers were strongly production focused; why some, but not all, were insensitive to the environmental damage of productivist farming; and why some, but not all, were intolerant of native habitat on their land. Instead, different theoretical views gave partial answers to different parts of the puzzle. They have been brought into this thesis to the degree that they cast light on the links between farmers and the persistence of native forest.

Broadly speaking, two main lines of theoretical interpretation inform this thesis: what might be termed a ‘cultural constructionist’ approach, and a notion of ‘material agency’ or ‘place-based’ circumstance. The former shows how cultural values and institutional practices of dairy farmers are shaped by socio-political structures at a national level and transmitted to individual farmers through social interaction. It includes a political economy perspective of nation-wide institutional structures, and symbolic interactionism and critical discourse analysis for an understanding of how ideas, attitudes and values of dairy industry leaders are transmitted to individual farmers. While political economy has been strongly identified with Marxist materialism (Johnston et al. 1994; Unwin 1992), I have included it here as a ‘cultural constructionist’ interpretation because the emphasis in much of the literature is on social and economic structures that influence individual and group relationships to resources and space (for example, Bakker 2000; Castree 2002; Harvey 1973; O’Connor 1993; Robertson 2000; Schroeder

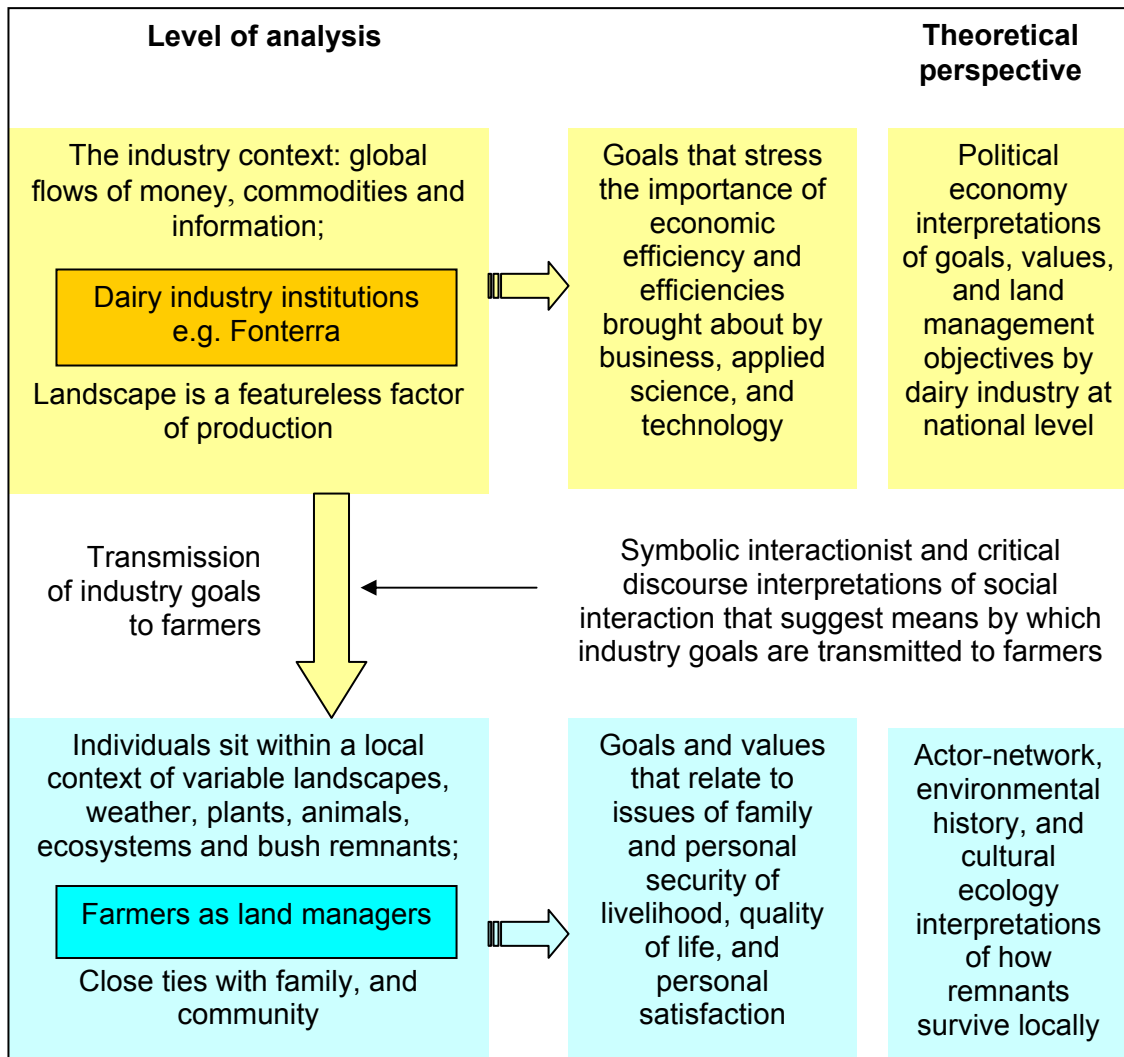
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1999). 'Nature', or the environment, tends to be viewed in the Marxist-based literature as a passive element in the power struggle between social groups.

'Material agency' or 'place-based' interpretations of the persistence of native forest on farmland focus on how mainstream farming practices are countered by local material circumstances of individual farms and farmers over time. They draw from elements of environmental history, actor-network theory, and the insights of anthropologist Tim Ingold (1992; 1995; 2000). In the course of research I moved from a view of nature as a more or less passive context of human activity (a political economy perspective) to nature as an independent force. In the first instance, I saw the landscape (and its native forest remnants) as entirely the result of human action. I then began to see that non-human elements – for example, climate and geomorphic processes – can have an impact on the decisions of farmers that is only slightly mediated by culture. Furthermore, detailed analysis of the activities and views of individual farmers showed that political and socio-economic forces do not affect individuals uniformly. Rather, impacts on individuals are mediated by peer networks, family and friendships, trusted advisors, and the media. In addition, every farmer experiences a personal history which allows him or her to respond creatively to the macro-level processes that touch upon everyday life. From these observations, I moved to a non-dualistic notion of nature based on Actor-Network theory, where both the human and the non-human act equally as agents.

In short, the different theoretical perspectives in this research are expected to cast light on different elements of the links between farmers, the dairy industry and the landscape. They can be represented diagrammatically as show in Figure 1.2. The top row identifies a macro-level of industry-wide phenomena that can be usefully interpreted through the lens of political economy. The bottom row identifies a place-based micro-level of farmers and their farms, interacting as actors and agents, influenced, at least in part, on industry-wide goals transmitted through processes such as those described by symbolic interactionist perspectives and critical discourse analysis. The macro-level 'cultural constructionist' interpretations cast light on the question: *Why is there so little native forest left in the Waikato?* The 'local material agency' and place-based interpretations address the question: *Why is there still some native forest left standing?* The symbolic interactionist and critical discourse analyses suggest

mechanisms by which macro-level constructs may be transmitted to farmers and become manifest on the ground.



**Figure 1.2 Conceptual model of the theoretical interpretations of links between dairy industry, farm management, and persistence of remnant bush**

#### METHODOLOGICAL STRANDS TO THE ARGUMENT

The foregoing exploration is backed by four elements of research activity, and involves both quantitative and qualitative methods. Initial research involved a comparison of 'typical' and 'conservation' farmers. It comprised a participant observation study of five 'typical' dairy farm families over a period of 9 months (from the time cows are mated in October, to when they calve in July/August). The families were typical in the sense that they had no native vegetation on their farms, and were strongly concerned with milk production as a key farm objective. All but one of the families was above average with respect to their milk production. The aim of this initial stage was to learn about the practical aspects

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of dairy farming, and the day-to-day management and livelihood concerns of mainstream dairy farmers. The second element of this initial study involved in-depth interviews with 10 'conservation' farmers, individuals who had set aside significant areas of land from production for conservation under a Queen Elizabeth II Trust conservation covenant. The 'typical' and 'conservation' farmers provided the base for a detailed and probing search for differences in values, farm objectives and management practices, as well as the personal or family circumstances of mainstream dairy farmers and farmers who had set aside land for conservation. It should be noted that the distinction between 'typical' and 'conservation' farmers was made purely on the basis that the 'typical' group had no bush on their farm while the 'conservation' farmers had demonstrated a practical commitment to conservation by placing some of their land under a conservation covenant or protecting it from stock.

The second element involved a quantitative questionnaire survey. The questionnaire was developed on the basis of what had been learned from the initial qualitative studies, and was administered to 130 farmers selected at random from the electoral rolls of the Karapiro, northern King Country and Port Waikato electorates. The aim of the survey was to test quantitatively those insights gained through investigation of farmers with and without native bush on their properties.

The third element comprised an intensive study of the literature to which dairy farmers are regularly exposed. It involved qualitative discourse analysis of 3 significant dairy 'texts', and content analysis of 200 articles randomly selected from a popular dairy farmer magazine. The aim of the discourse and content analyses was to identify nature and demonstrate the importance of messages that individual farmers regularly receive from the dairy industry as a whole.

The fourth element was a survey of the relevant academic and dairy industry literature. It aimed to obtain a more comprehensive picture of farmer values and motivations, and to uncover theoretical perspectives that would enable me to decipher why commercial farmers in western countries farm the way they do.

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**FOREST REMNANTS AND HISTORICAL CIRCUMSTANCE**

An issue that is relevant, but not addressed in this thesis, concerns the historical circumstances that have left forest fragments on some farms. Government policies and socio-economic changes since the beginning of European settlement have greatly influenced the nature and extent of native forest clearance (for example, see Hawes and Memon 1998; Memon and Wilson 1993). Until the mid-1980s and 1990s successive New Zealand governments were reluctant to impose restrictions on the ownership rights of private rural landholders by regulating the clearance of native forest. Furthermore, clearing of forests was encouraged by government subsidies, rural bank lending policies, and farm support services which favoured agriculture and conversion of forest to farmland. A consequence was that by 1920, native forest had been reduced from about 53% of New Zealand's land area at the time of European settlement to 25%, and to 23% by the 1980s (Memon and Wilson 1993).

In 1984 the election of an urban-based labour government brought about a drastic change in fiscal and farm support policies. By 1986 the new labour government had withdrawn all agricultural subsidies and floated the New Zealand dollar, bringing about reduced returns to farmers for their exports. Farmers were exposed to the force of global competition in a way that they had never before experienced. A consequence of the changes was that many farmers stopped farming land that was marginally profitable and concentrated their efforts on land that was inherently more productive. Marginal land was either left to regenerate or (increasingly) converted to exotic pine trees for commercial production.

In 1991 the government introduced the Resource Management Act, a piece of legislation that required all development, including forest harvesting and development, to undergo environmental assessment procedures and avoid, remedy or mitigate detrimental environmental effects. The Resource Management Act procedures created a bureaucratic break to native forest clearance in that harvesting had to comply with the requirement to avoid, remedy or mitigate adverse environmental effects. However, in most areas of the country landowners could still clear native forest for agriculture. In 1993 the government introduced the Forest Amendment Act specifically as a measure to reduce the commercial harvesting of native forest. The act required that no indigenous forest could be harvested without an approved sustainable forest management plan (Memon and Hawes 2000).

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In short, the remnants of native forest that exist today are survivors of an ebb and flow of government policies which have served both to encourage and discourage the destruction of native forest. A detailed study of historical events would help to highlight the impact of such policies in clearer detail. An initial aim for the research was just such an historical study and I explored the feasibility. It quickly became clear that the research required for an historical understanding of the survival of native forest remnants depended on closely detailed research of highly local sources; it was not practicable to do an historical study that would provide region-wide understanding. However, I wanted to be able to make general statements about links between cultural values and loss of native habitat and considered that, on its own, an historical study of a few farms would be susceptible to the vagaries of individual circumstance. I reluctantly concluded that it was not possible to do justice to both 'vertical' and 'horizontal' studies of the links between forest and socio-cultural phenomena, and decided that the historical study must await future research.

#### **ORGANISATION OF THE THESIS**

**Chapter 2** presents the Waikato region as a case study of native habitat loss in association with the intensification of agriculture. It describes the environmental consequences of intensive dairy farming and the current state of native biodiversity in the region.

**Chapter 3** reviews the structure and practice of dairying in the region and how farm management at the local level is linked with the structure of an industry that is national as well as global in the way it manufactures and markets its products. It reports on the academic literature about farmer attitudes and values as they relate to land management and environmental or conservation practices. It sets the Waikato within the broader context of western industrial agriculture by noting similarities to other intensive farming areas, notably Western Europe, North America and Australia.

**Chapters 4** examines 'social constructivist' interpretations of the relationships between humans and the environment. These are views that focus on the way that cultural institutions, including economic forces and power relationships, influence or determine the way that different cultural groups relate to their natural environment. The chapter examines the concept of culture as a mechanism for environmental adaptation, and how political and economic relations can structure the way people relate to the environment. It introduces the ideas of symbolic

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interactionism and critical discourse theory to suggest the mechanisms by which political and economic forces at global and national level may be transmitted to individual farmers.

**Chapter 5** explores theoretical perspectives that appear to make sense of variations in and resistance to mainstream land management practices. A proposition of the thesis is that while socio-cultural, political and economic elements may in large part account for the reasons why farmers farm in ways that result in loss of native habitat, they do not fully explain variations among farmers. Instead, local circumstances related to the farm and the personality and characteristics of the farmer are important for an understanding of how and why native forest remnants persist in the face of cultural mechanisms that discourage protection of native forest.

**Chapters 6, 7, 8, 9 and 10** present the research findings. Chapter 6 outlines the research design. It explains the philosophy behind the different methodological approaches and summarises the research strategy. Chapter 7 describes the participant observation study and in-depth interviews with conservation farmers, and then presents key findings. Chapter 8 introduces the questionnaire survey and summarises the key findings. Chapters 9 and 10 describe and present key discoveries from the discourse and content analysis, respectively, of dairy farmer 'texts'. Interpretation of the results presented in these chapters is related to the theoretical perspectives discussed in Chapters 4 and 5.

**Chapter 11** examines the propositions listed in this chapter in the light of research results and suggests a conceptual framework or model that combines elements of the 'cultural' and 'material/local' perspectives to suggest reasons for the differences between farmers with native bush on their farms and those without.

**Chapter 12** concludes the study by relating findings about the persistence of remnant forest in the production lands of Waikato to the wider international context, thereby demonstrating the general relevance of the findings.

# ***CHAPTER 2***

## ***WAIKATO REGION:***

### ***LANDSCAPE CHANGE AND***

### ***LOSS OF NATIVE HABITAT***

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This chapter links with the next in providing a description of the Waikato case study area. It charts the changes to native habitat and suggests how these are related to agricultural development. Chapter 3, in contrast, focuses on people and the practice of dairy farming. This chapter describes pre-European landscapes, as inferred from scientific evidence, and contrasts them with the landscapes of today. It reports findings from the scientific literature about the environmental consequences of intensive dairy farming in the region. It argues that the broad outlines of native biodiversity loss in the Waikato are similar to loss of native biodiversity in those parts of the world characterised by industrialised western agriculture.

#### **THE PRE-HUMAN LANDSCAPE AND NATIVE BIODIVERSITY**

To understand the impact of farming on native habitat and biodiversity within the Waikato, it is necessary to make a brief detour and note those biological communities considered to have characterised the region before Polynesian and European settlement. Inferences about likely pre-human and pre-European vegetation and wildlife are based on studies of the ecology and distribution of native species and remnant habitats, historical records, and the work of

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Leathwick, Clarkson and Whaley (1995) completed for the Waikato Regional Council, Environment Waikato.

The lowlands of central Waikato and the Hauraki Plains, which support the most intensive dairy farming in the region, were formed largely by alluvial in-filling of pre-existing valleys and depressions over the past 20,000 years (McCraw 2002; Selby and Lowe 1992), and by deposition of volcanic ash from periodic volcanic activity in adjacent regions. As a consequence, soils throughout the area are a complex mix of different parent materials. Soils and topography have, in turn, influenced the diversity of native vegetation and the biological communities which evolved in the region (Jay 1997). For example, there is a major difference between the lakes of the lower Waikato and those between Hamilton and Te Awamutu. The lakes of the lower Waikato are recently formed, shallow riverine lakes connected to the hydrological cycle of the Waikato River (Selby and Lowe 1992). The lakes around Hamilton and Te Awamutu (collectively known as the 'Waipa peat lakes') were formed in association with growth in the surrounding peatlands. They tend to be deeper and relatively acidic, and support distinctive and highly specialised biological communities. The unusually long life span of these lakes (15,000 to 18,000 years compared with a more normal few thousand years), allowed the evolution of communities that are more or less distinct for each lake and include some endemic taxa.

Another characteristic of the Waikato landscape are the expanses of bog and swamp. Bogs form in poorly drained hollows where rain is the primary source of water for plant growth. Decay of plant material is slow or incomplete, because of a lack of oxygen in the watery conditions, and standing water becomes highly acidic. Bogs tend to 'grow' vertically, as peat. 'Raised bogs' or 'peat domes' result from peat accumulation, and may become higher in their centres than at their edges (DoC 1996, 165). Swamps are periodically or permanently flooded by through-flowing water. They contain organic matter, minerals and other materials deposited by the floodwaters. They are richer and less acidic than bogs, and their decomposition occurs more rapidly. There is generally a seasonal fluctuation in water level, and plants as well as animals must be able to survive alternating flood and drought (DoC 1996, 173).

The pre-human vegetation is thought to have been almost entirely forest, except for extensive areas of bog and swamp (Nicholls 2002). Maori settlement,

estimated to have begun about 1300 AD, brought significant changes in vegetation cover, with reduction of forest by fire then conversion of the disturbed land to bracken fern and cultivation. Large areas of wetland remained relatively untouched. By the time of European arrival, the landscapes of central Waikato and Hauraki Plains were a jigsaw of bogs, swamps, lakes, rivers and alluvial flood plains; of water and wetland interspersed with forest and fernland. In winter and spring the land became saturated as floodwaters spilled out over adjacent plains to replenish swamps and peatlands. During summer and autumn the floods receded and water from swamps and peat bogs would gradually filter out. During a long dry summer the peat could dry to the point of burning. Fires sometimes started and they might burn slowly for weeks before the returning cycle of rain and flood extinguished them. These conditions ensured a great diversity of habitats, including lowland kahikatea and cabbage tree forest, gallery forests (on river terraces and old alluvial gravel bars), the many aquatic habitats of river, lake and stream, bogs, and numerous swamp habitats (varying with the length and extent of seasonal flooding, and depth of flood water).

Apart from eels, the Waikato River supported some 17 species of native fish. Wetlands and forest provided food, shelter and breeding habitat for insects, reptiles and vast numbers of waterfowl and wading birds. Some of this richness and diversity remains in the 4870ha Whangamarino wetland, a composite of floodplain, mineralised swamp, and acidic peatbog (DoC 1996). Altogether, 239 wetland plant species have been recorded there, of which 60% are native. It also provides seasonal habitat for 30,000 to 50,000 waterfowl (DoC 1992, 32).

The peatlands were less diverse biologically, but equally interesting. The plants which grew there were adapted to conditions of high acidity and low nutrient status, for they survive in little more than sunlight and rainwater. Two species of jointed rush (*Sporadanthus traversii* and *Empodisma minor*) were the dominant species, (Selby and Lowe 1992) accompanied by a variety of bladderworts, mosses, ferns, and rare orchids (DoC 1996).

On higher ground, the predominant vegetation was rainforest, ranging from kauri-taraire forest in northern parts of the region, through kahikatea, and rimu-tawa forests in central Waikato, and tawa with various broadleaf species (notably titoki, kohekohe, hinau, rewarewa, mangeao and pukatea) elsewhere (Burns and Smale 2002).

Few remaining forest patches in the Waikato contain more than a few hundred native species, but we can infer the former diversity by collating plant lists for different remnants. Surviving remnants show subtle variations in the distribution of plant species according to soil, topography and microclimate. Thus, the vegetation of gully slopes, with drier freer-draining conditions, was different from that of gully floors, and the vegetation of river terraces and alluvial fans was different from that on the gley soils of former lake beds. The different forest types, according to Champion, correlate to underlying soil and soil moisture, the nature and extent of former flooding, and incidence of frost (Champion 1988).

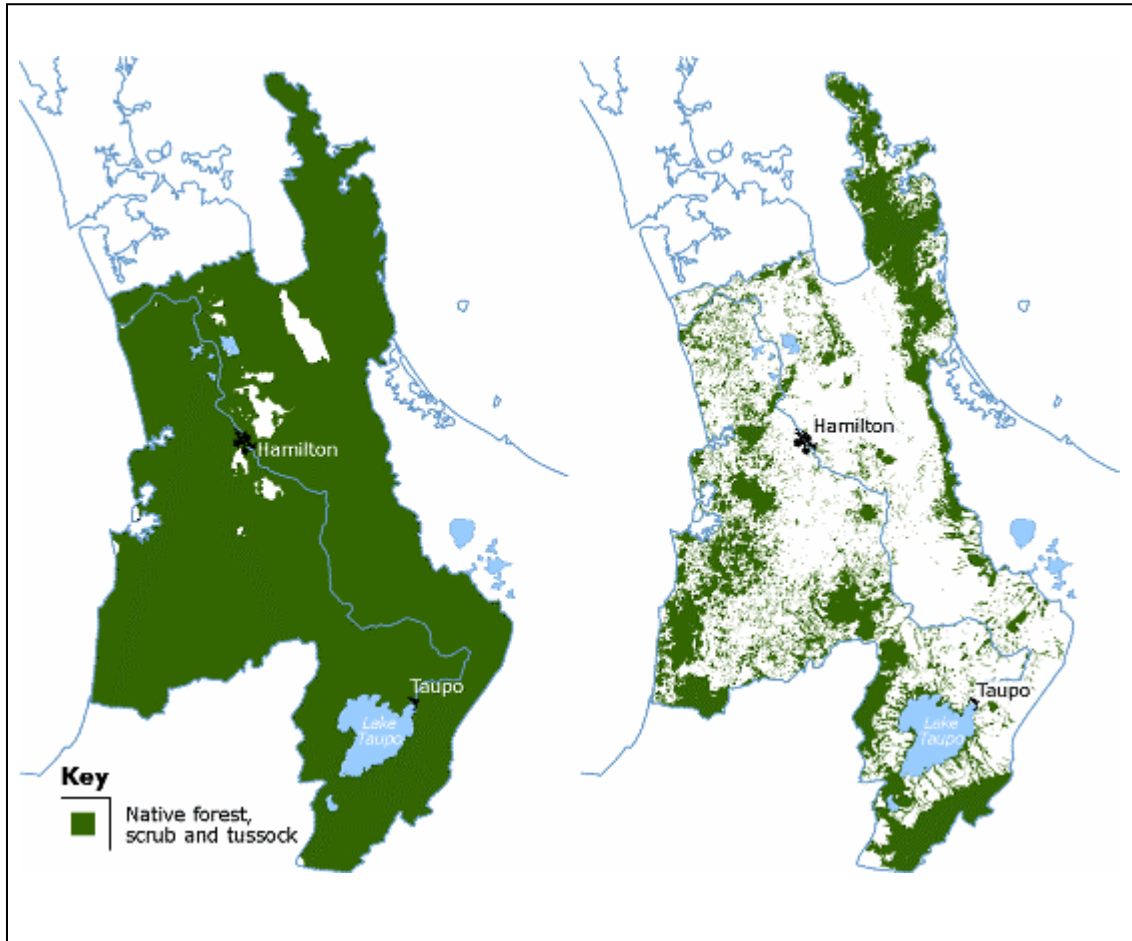
#### **CURRENT STATE OF NATIVE BIODIVERSITY IN THE REGION**

A modern day traveller in the Waikato lowlands and Hauraki Plains will see almost nothing of the former diversity and richness of native habitat. Leathwick, Clarkson and Whaley (1995) summarise some of the main changes. At the time of European arrival, primary forest was predominant on the hill country south of Auckland, while fire-induced secondary vegetation was found chiefly in the Hauraki Plains, the lowlands of central and south Waikato, and the lower Waipa. An estimated 110,000 ha of wetland existed in the lower Waikato and Hauraki Plains. Since the beginning of European settlement in 1840, native vegetation (forest and wetland) has been reduced to 18% in the lowlands, with only 6% of the former lowland and coastal forest still unmodified (Leathwick, Clarkson and Whaley 1995). Most forest remnants are on the higher and steeper parts of old ranges and volcanoes; the rest are in small dispersed fragments (Champion 2002; Clarkson 2002). Wetlands have been reduced to about 25% of their former to about 30,000 ha at present (EW 1998, 181)<sup>1</sup>. In the Hamilton and Waipa Ecological Districts wetlands have been almost entirely drained for agriculture, with less than 1% now remaining (Leathwick, Clarkson and Whaley 1995, 2). The health of remaining areas of wetland and forest in the region, as well as their populations of native birds, fish, insects and plants, is compromised by continued agricultural development, particularly dairying (Boothroyd et al. 2000; Burns et al. 2000; Champion 1988; DoC 1996; EW 1998). About 100 species of native plants and vertebrate animals are threatened with regional extinction (EW 1998, 73).

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<sup>1</sup> A significant portion of former wetland still remains under the administration of the Department of Conservation as Whangamarino Wetland, and Kopuatai Peat Dome.

Figure 2.1 shows the extent of native forest, scrub and tussock in the Waikato region in 1840 (on the left) and in 2002 (right). By comparing the figure on the right with the map of the dairy farm survey in Chapter 8 it is evident that the areas of greatest native habitat loss coincide with areas of greatest dairy cow density.



**Figure 2.1** Loss of native vegetation in the Waikato region between 1840 and the present. Source: Environment Waikato<sup>2</sup> web page, <http://www.ew.govt.nz/ourenvironment/land/biodiversity/butwhathavewegot/map.htm> (Accessed 21/10/02)

<sup>2</sup> Historic information (around 1840) from Leathwick, J. Clarkson, B. and Whaley, P. 1995: *Vegetation of the Waikato Region: Current and Historic Perspectives*. Landcare Research Contract Report LC9596/022. Landcare Research, Hamilton. Current information from Terralink International Limited, Land cover database.

### THE ENVIRONMENTAL CONSEQUENCES OF DAIRYING IN THE WAIKATO

It is not easy to distinguish between the environmental effects of dairying and those of other types of pastoral farming except that dairying tends to occupy different land and to involve greater intensity of land use, with greater resource inputs (chiefly in the form of fertiliser) and waste outputs. Dairying tends to occupy areas that are lower and flatter than those used for drystock farming. The main environmental consequences of both types of farming include land clearance, habitat loss and degradation, and impacts on water and aquatic habitat. Dairying is more likely to be associated with wetland drainage and has been linked to nitrite pollution of groundwater. These will be discussed briefly in the next section.

Land clearance and habitat loss: As already indicated, primary and secondary native forest in the coastal, lowland and submontaine bioclimatic zones have been severely reduced, mostly as a consequence of land clearance for agriculture (Leathwick, Clarkson and Whaley 2002, 10). Even where native habitat remains, land development for agriculture can reduce the quality of the habitat by exposing it to the effects of wind, light, and invasion by weeds and exotic animals. Denyer (2000) noted the effects of adjacent land use on native forest fragments in the Waikato. She compared fragments that were surrounded by farmland with those surrounded by exotic forest, and found that fragments bordered by mature pine forest experienced less drastic change in day-night temperatures, light and moisture levels. Edge effects on native forest fragments adjacent to pasture extended at least 50m in from pasture, but only 30m in from pine. Burns et al. (2000) examined the distribution, persistence, representativeness, history and biodiversity of forest remnants in the middle Waikato basin. They found 116 stands, compared with 121 stands noted in an equivalent survey in 1977, 70% of which were less than 1ha in extent. They sampled plants, birds, beetles and snails, and found a moderate indigenous biodiversity in all groups except birds, but few rare species. Grazing by cattle was seen as a major threat to the persistence and native biodiversity of stands (Burns et al. 2000, 81).

A distinctive type of native habitat that has been particularly affected by farming is aquatic and riparian vegetation (i.e. vegetation linked to rivers and lakes, rather than bogs and swamps). Clayton (2002, 45) comments, 'much of the aquatic vegetation today presents only a remnant of the diversity of indigenous species

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that was once common. Most river and stream banks are now lined with pasture to the water's edge, with stop banks along many lower reaches to prevent flooding of pasture.'

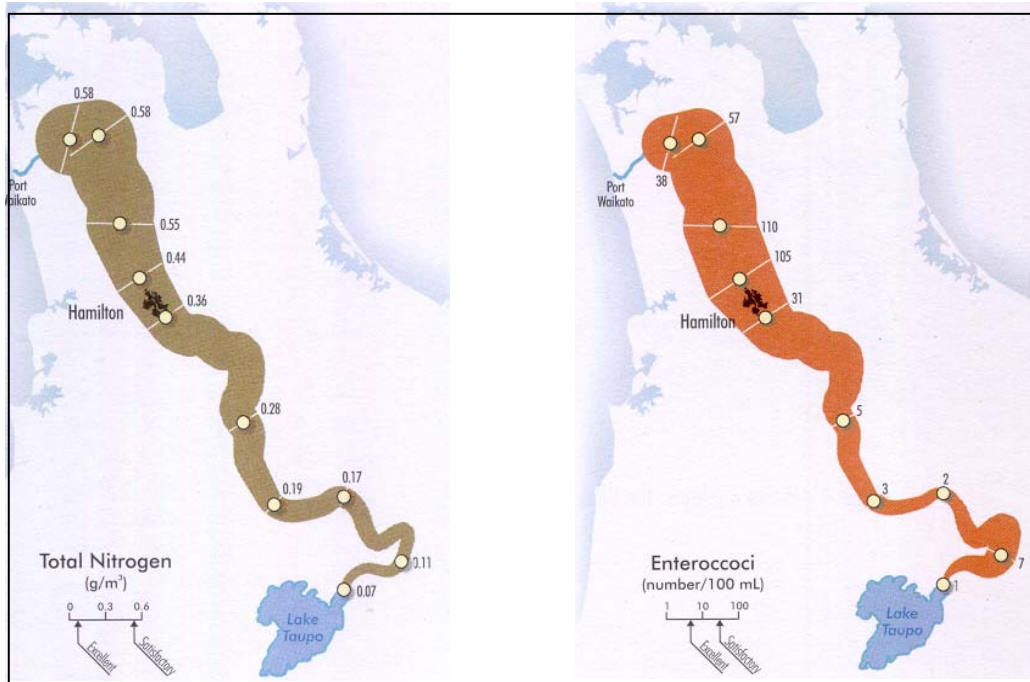
Despite the gloomy picture just outlined, it is important to note positive aspects of the current situation: there are 4000 fragments of native forest, each between 1 and 25 ha in extent (EW 2001), even though Waikato is one of the most intensively farmed areas in the world. Behind the majority of those fragments are farmers who have made choices (implicit or otherwise) to leave the bush standing. A concern of this thesis is to discover why those fragments remain.

Impacts on surface and ground water - Numerous studies and reports by the Environment Waikato and other researchers have documented the effects of dairying on the quality of surface and underground water in the region (Boothroyd et al. 2000; EW, 1998; Vant, Taylor and Wilson 2000). Dairy shed effluent comprises 5 to 15% of the effluent from a dairy herd; the rest lands on the paddock as non-point source pollution (MfE 1999). The average dairy farm in the region has a nitrogen surplus, and it is estimated that 40 to 50% of this surplus is leached into waterways (Boothroyd et al. 2000). Vant, Taylor and Wilson (2000, 1) have noted for the Waikato region that 'much of the nitrogen in several large rivers comes from runoff and leaching from areas of intensive dairying. The yield of nitrogen from these areas is highly correlated with the average stocking rate of dairy cows.'

Boothroyd et al. (2000) found that nitrogen losses from agriculture contributed to significant changes in water chemistry and species composition in aquatic habitats. Excessive growth of algae and the largely introduced macrophyte flora has led to lower oxygen concentrations of streams and decreases in number and diversity of native aquatic plants and animals. Other changes to streams, such as the removal of shade and changes to the substrate from mechanical interference or trampling by stock, also impact on native fish and aquatic invertebrates. The researchers surveyed a major river in the region and found 'a decrease in taxa richness along its length from upland sites to the lower Piako, while total numbers of macro-invertebrates increased' (Boothroyd et al. 2000, 242). They cite McDowall (1990): 'Lowland streams are important migratory pathways for many native fish species, and the occurrence of stressful conditions (fluctuating temperatures, high ammoniacal-nitrogen, low dissolved oxygen), as well as the

loss of suitable habitat and food sources, have had an important impact on their survival' (Boothroyd et al. 2000, 241). In short, the work of Boothroyd et al. has reinforced the observations of studies elsewhere that waterways polluted by agricultural run-off favour some species at the expense of others. Many of the species lost from such rivers and streams are native fish and invertebrates adapted to low-nutrient conditions, while the favoured species make their appearance as algal blooms and 'scums'.

Figure 2.2 shows non-point source pollution of the Waikato River.



**Figure 2.2 Levels of nitrogen (on the left) and enterococci (on the right) at different water testing stations on the Waikato River, as at 1997 (Source: EW 1998).**

The diagram on the left shows levels of nitrogen in the river rising from 0.07 g/m<sup>3</sup> beside Lake Taupo to 0.58 g/m<sup>3</sup> near Port Waikato. Similarly, the concentration of enterococci rises from 1/100 mL at the Lake Taupo water testing station, to 110/100 mL near Ngaruawahia and Huntly north of Hamilton. These levels are above those deemed safe by the World Health Organisation, and the lower reaches of the River are deemed not suitable for swimming by the Regional Council (EW 1998, 139). Point sources of effluent to the Waikato River are highly regulated by the Regional Council and contribute little of the nutrient and biological contamination (EW 1998, 135-146) thus the observed increase is largely from non-point run-off from farms.

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### HABITAT LOSS IN THE FACE OF NEW ZEALAND AGRICULTURE

The habitat degradation and loss that accompanied agricultural development in the Waikato has been repeated elsewhere in New Zealand, and overseas. There is now an extensive literature on land development and destruction of native habitat (forest, grassland, and wetlands) that accompanied it (Brooking, Hodge and Wood 2002; Crosby 1986; Glasby, 1991; Guthrie-Smith 1999; Cocklin, Blunden and Davis 1996; Holland, O'Connor and Wearing 2002; Memon and Wilson 1993; Menzies 1999; K.F.O'Connor 1993; Park 1995; Park 2002; G.A. Wilson 1992; Wynn 2002).

A classic of environmental history is 'Tutira', by Herbert Guthrie-Smith in 1921 (1999 edn.). *Tutira, The Story of a New Zealand Sheep Station* is the work of a man who came to New Zealand from Scotland in the 1880s, and spent the rest of his life farming, watching and recording changes to his land. Guthrie-Smith was an observant and thoughtful man who could link the changes he noted in the landscape to broader social, economic and ecological forces at work in New Zealand society. Park (2002) has recounted how Joseph Banks in 1769, and Charles Hursthouse in 1857 perceived the swamps and wetlands of the Hauraki Plains, and how that area was later drained with government assistance. G.A. Wilson (1992) records how clearing of native bush continued in the Catlins as late as the 1980s, while Cocklin, Blunden and Davis (1996) note that although farmers in Northland in the 1990s may have been sympathetic to environmental concerns and the need for protection of native vegetation, economic constraints and other considerations outweighed environmental concerns. Roche (2002) has described two settlements in the Manawatu region after the First World War. The efforts of the soldier settlers were not automatically successful. Economic conditions, government bureaucracy, and the environment itself all combined to create difficulties. He concludes, 'What Cumberland (1981) would term the "landmarks" left by the soldier settlement schemes now take the form of a rather faint imprint on the landscape. Their cadastral imprint is stronger than their physical presence, although many of the original houses, buildings and some planting still exist' (Roche 2002, 31).

Brooking, Hodge and Wood (2002) have documented the widespread intensification of pastoral agriculture between 1920 and 1985 as a consequence of government sponsored research and technological developments known colloquially as 'the grasslands revolution'. During this period senior government officials and politicians gave enormous support to the development of grasslands agriculture.

Bulldozers apparently minced secondary growth into submission while applied science and increased aerial topdressing raised soil fertility and increased carrying capacity of formerly marginal land. Research, development and government assistance propelled New Zealand to the world leadership of grassland farming and enabled it to maximize supposed “natural advantages” (Brooking, Hodge and Wood 2002).

As noted by Glasby (1991) New Zealand is largely a mountainous country with less than 25 per cent of its area below the 200m contour. Parts of it have heavy rainfall, and other parts (such as the east coast of the North Island) are highly erodible. Despite the geophysical constraints, Brooking et al. (2002) note that the strongest of the grassland advocates were virtually oblivious to the environmental consequences of the conversion of forest and bush to grassland over much of New Zealand’s hill country. Instead, their drive and single-minded commitment was such that Brooking, Hodge and Wood (2002) could describe it as an obsession. It is hard not to be reminded of this word when one considers dairy farming in the Waikato. As we shall see in the next chapter, the farming, research and manufacturing elements of the dairy industry are currently preoccupied with the notion of ‘4% productivity’ increases, which sounds very like the words of grassland farming advocates of earlier decades.

In summary, Holland (2001, 396) notes:

At present, two-thirds of New Zealand is settled, with most residents living in areas below 500m where native ecosystems are now poorly represented. The problem with habitat destruction by people is that it is indiscriminate – most living things in the area are affected – whereas hunting tends to target particular species. Environmental changes initiated by Maori accelerated during the European colonial phase, and in many parts of the country continue to this day. The full impact of eight centuries of direct and indirect habitat modification by people on native plants and animals has still to be felt. Of further concern to conservationists is that many native species populations are approaching their thresholds of viability: the minimum densities commonly quoted in the international literature are at least 500 individuals for a plant species and 1000 for an animal, but the populations of several endangered New Zealand species are now well below those critical values.

It is easy to assume that the above studies have documented the approaches of the past, and that we have learned from past mistakes. The Resource Management Act 1991 is supposed to have introduced a new approach to the management of natural resources to ensure that we will ‘avoid, remedy or mitigate’ any detrimental environmental effects from use or development of land and water. But the water

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quality of the Waikato River and the continuing decline of native habitat in the Waikato region and elsewhere suggest that there are lessons yet to be learned.

#### **HABITAT LOSS: OVERSEAS EXAMPLES**

The habitat reduction and degradation processes that accompanied the development of New Zealand agriculture also happened elsewhere in the western world<sup>3</sup>. For example, published studies have described the process of land degradation that has occurred in Australia (Conacher and Conacher 1995; Graetz et al. 1995; SEAC 1996). With reference to southeast Australia, New (2000), writes that around 0.5% of lowland native grasslands remain as a consequence of ‘massive transformation for agriculture and pastoralism’. Destruction of the native grasslands has led to replacement of long-lived, deep-rooted native plants by shorter-lived exotic taxa, and loss of floristic diversity. ‘For some grasslands, such as some in Gippsland, the original floristic composition cannot be determined because *no* intact remnants are known to survive’ (New 2000, 30). A similar fate has attended eucalypt woodlands over much of Australia.

Like grasslands, such woodlands in many areas are now small remnants, many of them with significantly reduced integrity. Many of the remaining patches of woodland are under continued threat from a variety of processes, including clearing, rising salinity, grazing by stock, nutrient enrichment, changed fire regimes, and invasions by exotic plants and animals. These processes lead to continued loss and degradation of woodland and to local and regional decline of the flora and fauna that depend on woodland habitats (New 2000, 31).

As New describes it, the widespread degradation of the Murray-Darling basin is one of the most notable Australian examples of landscape change due to industrial westernised agriculture.

In Europe, government subsidisation of agriculture along with guaranteed price supports has given rise to a ‘technological treadmill’ effect, as described by Potter (1998b). This is a cycle whereby early adopters of new technologies gain from a reduction in production costs and shoot ahead. But as prices fall in the face of rising output, average farmers are forced to adopt the new technology. Laggards are saved from having to leave the industry as a consequence of cost-price squeezes by government intervention. Competitive farmers are unable to buy out less efficient

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<sup>3</sup> I do not intend to imply that non-western agriculture is less damaging than western industrial agriculture, only that there are processes within western industrial agriculture that, despite the insights of

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farmers at the price of their lower efficiency and have to pay prices for land that are based on government support for inefficient farmers, so land prices are kept artificially high and in turn drive up costs of production higher than would be the case if there were no government support. Farmers bid up land prices on the basis of their expectations about continuation of commodity support. This leads to further intensification of land use and technological innovation designed to boost per hectare production (fertilisers, herbicides) with further escalating pressures on average and under-average farmers to adopt and keep up, thus leading to further overproduction.

In Europe, government support meant that this process changed agriculture within 40 years from a predominantly peasant-based cottage industry, to a predominantly large-scale industrial enterprise (Potter 1998b, 26). There has been intensification of land use in some areas and either marginalisation or slow decline of traditional farming practices elsewhere (CoE 2002; Potter 1998b, 30; Stoate et al. 2001). In areas of more intensive production there has been increased use of fertilisers, pesticides, and energy, along with landscape modification, livestock intensification, overgrazing, large-scale monoculture production, widespread pollution of streams and groundwater, and soil loss or degradation. In marginal areas there has been land abandonment and loss of traditional local management systems (such as particular grazing systems, or local combinations of crops). Overall, there has been reduction in or loss of mixed farming systems characterised by animal and green manures, hedgerows, forest, riparian margins, ponds and marshes, and semi-natural extensive grazing areas on heath and moorland.

A report of the Council of Europe (CoE 2002, 5) summed up the situation in the following words:

As to different habitats, these activities resulted in eutrophication and pesticide pollution from leaching, run-off or deposition from the air, sedimentation and salinisation in waters; increased specialisation and intensification, displacement of traditional practices and increases of monoculture cropping, soil erosion, removal of small-scale habitats and landscape features in arable crop areas; eutrophication, acidification or pesticide pollution, increased specialisation and intensification, displacement of traditional practices, extensive livestock grazing and hay-making, removal of small-scale habitats and landscape features in semi-natural grasslands; eutrophication, acidification, or pesticide pollution and in-appropriate management in heathlands and rocky

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habitats; in acidification, eutrophication and pesticide pollution in forests.

Habitat loss and loss of species are also of concern in North America, where new institutional structures have been developed in an effort to bring integrated approaches to conservation management. A report by the North American Council for Environmental Cooperation (NACEC 2001, 5-6) states that, 'habitat fragmentation is a consequence of both wealth and poverty in the North American society. Whether it is land clearing for subsistence agriculture or the development of golf courses and subdivisions, there will be consequences of biodiversity.... The "nibbling" away of natural habitat as a consequence of expanding agriculture has been a long-standing matter throughout the continent.'

#### **CONCLUSION**

This chapter shows that in the Waikato there has been a close relationship between loss of lowland native habitat, notably wetlands and forest, and development of intensive farming; that on-going degradation or loss of native habitat continues to the present day, particularly in relation to dairy farming; that erosion of native habitat continues despite indications of support for native forest from landowners; and that the Waikato case is but one example of a more widespread process, both in New Zealand and overseas.

Overseas literature (particularly in the case of Australia and the United Kingdom) strongly indicates that habitat loss and environmental degradation are closely linked to features of contemporary western industrial agriculture such as spiralling intensity of production, species monocultures, and agri-chemical use.

# ***CHAPTER 3***

## ***WAIKATO DAIRYING***

### ***AND THE NEW ZEALAND***

#### ***DAIRY INDUSTRY***

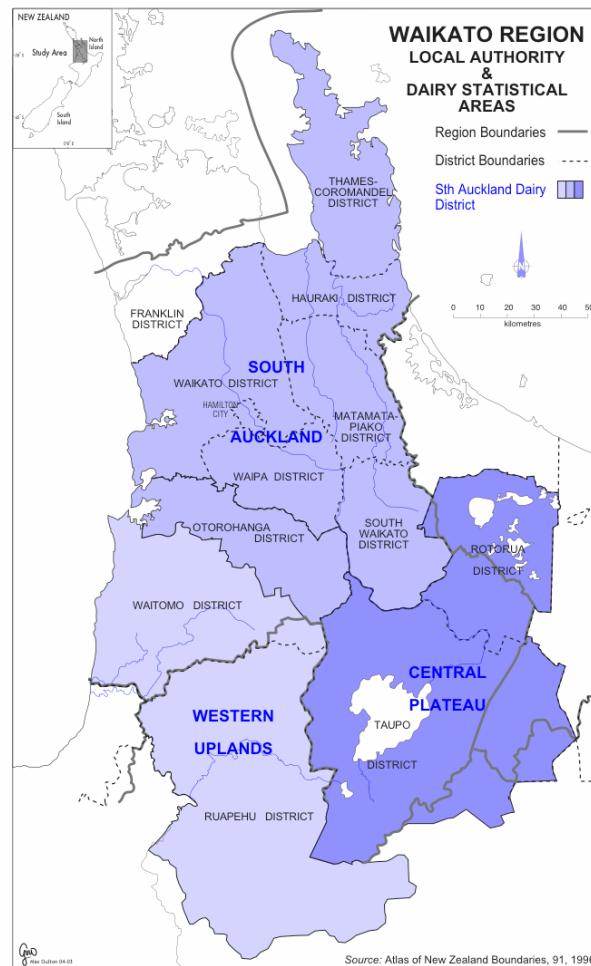
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This chapter describes dairy farming in the Waikato region and the organisation of the New Zealand dairy industry. It reports literature on the values and priorities of farmers and shows how farm management at the local level is linked to a milk products industry that is national and global in its operations. It explains how dairy farmers are subject to productivist values and pressures from a range of organisations and institutions. The chapter concludes with a pointer to Chapter 12, which sets the Waikato example against the context of western industrial agriculture and its impacts on biodiversity and traditional landscapes.

The main sources for this chapter are dairy industry reports, reports of the New Zealand Ministry of Agriculture and Forestry (formerly the Ministry of Agriculture and Fisheries), and the academic literature. The industry reports include dairy company reports and research reports and statistics compiled by dairy industry organisations such as the Livestock Improvement Corporation and Dexcel. Apart from the work of Menzies (1999) the academic literature applies to farming as a whole rather than dairy farming in particular (chiefly Blunden, Cocklin, Smith and Moran 1996; Bradshaw, Cocklin and Smit 1998; Fairweather and Keating 1994; Jones, Cocklin and Cutting 1995; Le Heron 1991; Parminter and Perkins 1997; Parminter, Tarbotton and Kokich 1998; G.A. Wilson 1992).

The study area falls within the Waikato Regional Council (Environment Waikato), a unit of regional government. Regional councils co-ordinate the management of natural and physical resources in their region. As part of this responsibility, they monitor the state of the regional environment and the use of soil and water.

From a dairying viewpoint, the 'Waikato' is slightly larger than the area of Environment Waikato, since it includes the South Auckland, Western Uplands, and most of the Central Plateau regions of New Zealand's Livestock Improvement Corporation's dairy statistics units (LIC, 2001)<sup>1</sup>. Figure 3.1 shows the areas of the Waikato Regional Council and LIC dairy districts units.



**Figure 3.1 Livestock Improvement Corporation Dairy Statistical areas and territorial authorities of Waikato Regional Council.**

Most of the descriptive statistics are from Ministry of Agriculture and Forestry regional compilations and Livestock Improvement Corporation (LIC) statistics.

<sup>1</sup> South Auckland dairy region includes Thames/Coromandel, Hauraki, Waikato, Matamata/Piako, Hamilton, Waipa, Otorohanga and South Waikato dairy districts; Western Uplands comprises Waitomo and Ruapehu dairy districts, and Central Plateau comprises Taupo and Rotorua dairy district. Taupo and Waitomo dairy district fall within Environment Waikato council boundaries, but most of Rotorua and Ruapehu dairy districts fall outside Environment Waikato boundaries.

Ministry of Agriculture regions are coterminous with regional council boundaries, while the statistical sub-units of the LIC dairy statistics can be matched closely to the regional government unit.

#### **ORGANISATION AND PRACTICE OF DAIRY FARMING IN THE WAIKATO REGION**

Dairy farms account for 80% of all economic farming units in the Waikato region (Begg and Begg 1997). Dairying depends largely on grassland farming. Supplementary feed, mainly maize and forage crops, are used by some farmers to tide the herd over periods of shortage. However, many dairy farmers regard grass as the prime crop, and the ability to grow grass for most of the year is a key economic advantage in the global marketplace (Rauniyar and Parker 1998). Specialisation of grass-based production has made New Zealand a world leader in grassland management (Nixon and Yeabsley 2002, 16).

Table 3.1 gives key statistics for a Ministry of Agriculture and Forestry ‘model’ dairy farm in the Waikato-Bay of Plenty. A ‘model’ farm, according to the Ministry, is representative of a particular type (e.g. dairy) within the region, based on statistical averages (MAF 2002a, iii). The Table indicates that in 2001/02 the statistically typical dairy farm in the Waikato/Bay of Plenty area was 85 hectares ‘effective’ (i.e. land used for dairying). It wintered 237 cows at a density of 2.8 cows per hectare, and produced a total of 73,400kg of milk solids (milk fat and milk protein).

**Table 3. 1 Key statistics of a model Waikato/Bay of Plenty factory supply dairy farm, 1998/99 to 2001/02**

	<b>1998/99</b>	<b>1999/2000</b>	<b>2000/01</b>	<b>2001/02</b>
Effective area (ha)	83	83	83	85
Cows wintered	220	225	225	237
Cows milked at 15 December	210	215	215	227
Stocking rate (cows/ha)	2.65	2.70	2.70	2.80
Total milksolids (kg)	57,400	62,300	67,900	73,400
Milksolids/ha	692	751	818	863
KgMS/cow milked	273	290	316	323

Source: MAF Dairy Monitoring Report, July 2002, p.17

The table also shows that there has been a consistent increase in the size and intensity of the typical dairy farm over the 4 years from 1998 to 2001.

Specifically, size of farm has increased from 83 to 85 hectares, and the number of cows wintered per farm grew from 220 to 237 (an 8% increase). The intensity of production has risen from 692kg milksolids per hectare in 1998/99 (273kgMS/cow) to 863kg of milksolids per hectare (323kgMS/cow) in 2001/02. This constitutes a 25% increase in per hectare production and an 18% increase in per cow productivity. Total production per farm increased 28%, from 57,400 to 73,400kgs of milksolids.

This pattern of increasing size and intensity has been a long term trend both regionally and nationally. For Waikato, Ward (1997) noted total milk production for the model farm in 1995/96 was 52,500kgMS. This represents a 40% increase in per farm production in the 7 years from 1995. For the country overall, between 1981/82 and 2001/02 the average size of a dairy farm increased from 63ha (effective) to 103 effective hectares, the average size of herd grew from 130 to 271, and the average stock density grew from 2.1 to 2.7 (LIC 2003a).

The average dairy farm follows a relatively fixed annual rhythm based on the biology of grass and dairy cows. Within the Waikato, cows are milked twice daily for 9 to 10 months of the year, mostly between spring calving and 'drying off' in autumn. Between 2 and 8 times a year, almost all dairy farmers subject their herd to a milk test, whereby the milk from each cow is measured and tested for quality and quantity of milk and milk solids. That information and the parentage and date of birth of every dairy calf is recorded and transmitted to a national herd database maintained by the Livestock Improvement Corporation. The information lets the farmer know which cows are high producers and whether the cow is prone to mastitis (an infection of the udder). Farmers can decide which cows should be culled, their commercial value, which cows are worth the cost of being artificially inseminated, and the life-time production potential of heifers based on their parentage and the recorded production of sister heifers that preceded them.

The information may be part of a general management strategy: does the farmer go for high production per cow, or for low per cow production but high production per farm? If land is expensive, or the farm is economically sub-optimal, or if the farmer is an owner-operator who does his/her own milking, or if the farmer is older, he or she may decide to keep the size of the herd small and go for high producing cows and optimised production per cow. If the farmer has a high debt load, and/or is young and has the energy to milk a large herd, then he or she may

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hold on to low producing cows in order to increase the size of the herd or because he or she cannot afford high producing cows and the cost of artificial breeding.

Prime constraints on year-round production arise from the biology of grass and cows, climate and topography, and the economic context of milk production in New Zealand. Most grass growth takes place in late spring, when ground temperatures have risen and soil moisture is still relatively high. The nutritional value of grass begins to fall with the onset of summer and may decline significantly during the dry months of January, February and early March. Growth picks up again with the autumn rains but declines in May, June, July and August with their shorter days and lower temperatures.

Cow biology also limits production. Cows come into milk after calving and can continue to produce for as long as they are milked. Once milking stops, however, lactation stops, and does not resume until the cow has another calf. Dry cows eat less than milking cows, and the 6 to 8 weeks of no milking in June and July are timed to coincide with low grass growth. Most of New Zealand's cows are genetically capable of higher milk production if they are better fed. In the Waikato an increasing trend is to supplement grass with maize silage and forage crops (MAF 2002b, 15 and 93). However, in economic terms grass is the cheapest feed for cows, and there is only a small margin between the cost of extra feed and the return on extra milk produced. The annual cycle of spring calving, spring-to-autumn milking, and winter dry-off is thus a local adjustment to the growth cycle of grass growth in the Waikato and the lactation biology of cows. As explained later in this chapter, it is also an adjustment to economic circumstances which place pressure on farmers to produce milk at low cost.

Other bio-physical constraints that affect farm management relate to topography, soil, climate and hydrology. Cows are heavy animals (between 400 and 500kg for an adult). If grazed on steep slopes, particularly steep wet slopes, they can cause soil erosion, and if grazed on wet soils in winter they can cause soil damage through pugging. Eroded and pugged soils both result in reduced grass growth and lowered economic returns for the same inputs of time, effort and fertiliser. Thus, farms with steep topography, or heavy, slow draining soils are less productive than farms on flat or gently undulating land with free draining soils. Farms on peat soils are prone to drying out in summer and suffer reduced

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grass growth. Wind and cold can also reduce grass growth and increase the feed requirement of cows. The potential for pollution of groundwater by cows in the paddock (and thus the impact of different stocking rates) varies with the soil properties and time of year. Every farm is different, and every farmer faces the constant need to make management decisions that will have short and long-term consequences. If a farmer runs out of feed in spring because of a sudden surge in feed requirements brought about by a week of bad weather, then the consequence may be a poor milking season or a poor conception rate for underfed cows at mating time, the latter affecting the next year's milking season.

The layout of a dairy farm is important because it affects the ease and efficiency of farm management, milk collection and maintenance of animal health and milk hygiene. The central hub of the farm is the dairy shed and the 'race' or track, which connects it to paddocks. The dairy shed is where milk is collected and stored, where animals are usually treated for nutritional deficiencies, injury, lameness, or infections such as mastitis, where they are brought in for artificial insemination, and where records are kept on calving and mating. A well designed and equipped dairy shed can reduce milking times by a third to a half for a given number of cows, and a well constructed race can increase milk production by reducing the incidence of lameness among cows and reducing the time they take to get to and from the dairy shed.

Not far from the dairy shed is usually an effluent pond, where washings from milking shed and yard are drained. In the Waikato an increasing number of farms, currently about two thirds, spray their effluent onto land, but this comes from the effluent pond. As well as the effluent systems, every dairy farm requires a reliable water supply, copious quantities of which are required for stock and hygiene.

Compared with chicken or pig farming, most New Zealand dairy farms appear, at least on the surface, to involve relatively unsophisticated technology: a dairy shed with some milking machinery, grassy paddocks, and the occasional water trough. In reality, every farm is backed by a technological support structure of great sophistication and scale. The milking machinery in the dairy shed is a significant capital complex, while the infrastructure of veterinary science and animal breeding is highly technical and scientific. In addition, most dairy farms

depend on the industrial infrastructure of milk tanker collection and factory transformation of fresh milk into a host of milk products.

While milk is the main source of revenue for most dairy farms (Begg and Begg 1997), income may be supplemented by off-farm sources such as work by one or the other spouse or from investments. The model Waikato/Bay of Plenty dairy farm in 2001/02 had a gross revenue of \$438,470, 89% of which came from milksolids and most of the remainder from the sale of calves and cull cows. It received a further \$36,500 from off-farm sources. The model farm had a total capital value (farm, forest, buildings, dairy company shares, plant, machinery, and stock) of \$2,155,210 and a debt of \$418,500 (19%). It experienced a net trading profit before tax of \$183,919 (\$113,765 after tax), and a disposable surplus (after principal repayments, capital purchases and the like) of \$33,321 (MAF 2002a, 21 and 22).

Farm income can vary dramatically from year to year (Nixon and Yeabsley 2002). Table 3.2 shows annual farm income and net profit from 1998/99 to 2002/03 and the expected income for 2003/04.

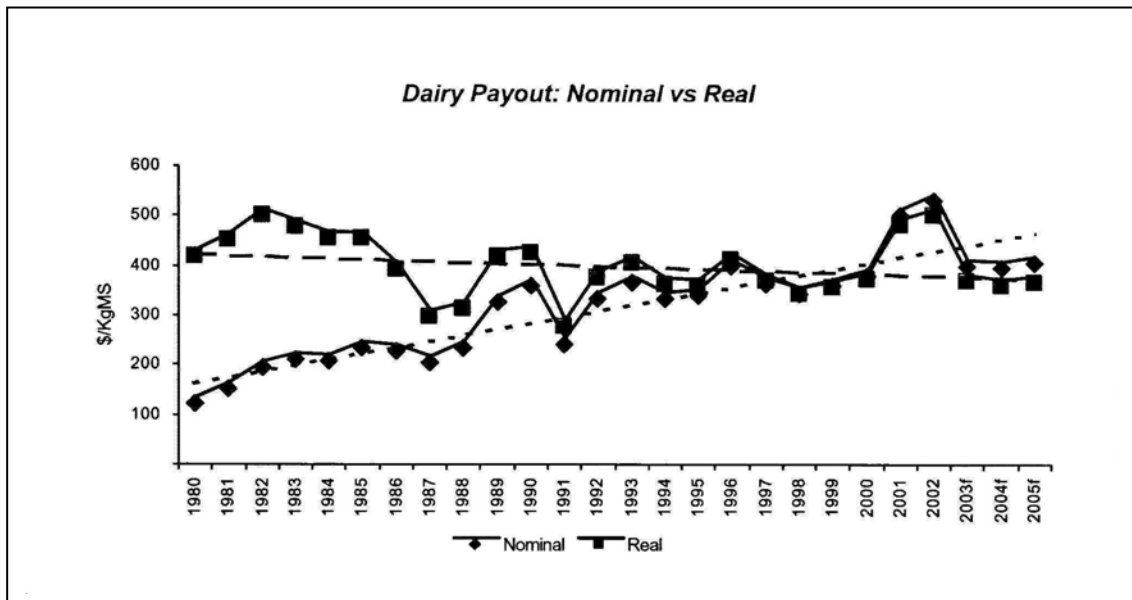
**Table 3.2 Actual and expected changes in gross farm revenue and trading profit for Waikato/Bay of Plenty model seasonal supply dairy farm, 1998/99 to 2002/03**

	1998 /99	1999 /2000	% change	2000 /01	% change	2001 /02	% change	2002 /03	% change	2003/ 04 <sup>2</sup>	% change
	000s	000s		000s		000s		000s			
Gross farm revenue (\$)	228.5	245.9	8	382.2	55	450.4	18	336.1	-25	326.5	-3
Cash farm surplus	65.6	70.3	7	162.6	131	190.0	17	92.3	-51	88.5	-4
Net trading profit (\$)	50.5	59.5	18	157.1	164	180.2	15	82.1	-54	73.8	-10

Source: Adapted from MAF Dairy Monitoring Reports, July 2002, p. 17, and July 2003, p. 12 (MAF 2002a; 2003b)

While the net trading profit (before tax) increased 63% overall in the four years from 1998/99 to 2002/03, it includes an increase of 164% from 2000 to 2001, and a decrease of 54% from 2001 to 2002. The decline in dairy farm income from 2002 was due to a decrease in the international returns for dairy products (MAF 2003b, 1). The year to year variations experienced over this short period illustrate how, in addition to variations of weather and disease, dairy farmers are subject to changes in market conditions over which they have little control and which may impact considerably on their farming operations.

Figure 3.2 shows actual and expected annual dairy payouts for the years from 1980 to 2002, and forecast payout to 2005 based on expected international economic impacts on the price of milk (MAF 2002a). A point to note is the impact on farm income in 1986 and 1987 of the withdrawal of farm supports and floating of the New Zealand dollar by the Fourth Labour government in 1985/86. As well as fluctuations in the rate of payout (from more than \$4.00 in 1990 to less than \$3.00 per kilogram of milk solids in 1991, and from \$4.00 in 2000 to more than \$5.00/kgMS in 2002) the trend line starting at the top left of the graph indicates that over the long term, the real value of the milk payout to farmers has declined when adjusted for inflation.



**Figure 3.2 Actual and forecast trends in the dairy payout, nominal (received) and real (inflation adjusted) 1980 to 2005 (forecast)** (Source: MAF 2002a)

In short, the year-to-year fluctuations in revenue and the effect of a static or declining payout can place pressure on farmers to offset expected downturns by maximising production if they can do so without increasing the level of risk.

#### DAIRYING IN THE WAIKATO COMPARED WITH OTHER PARTS OF NEW ZEALAND

There are 13,982 dairy herds<sup>3</sup> in New Zealand (Fonterra 2003b), more than 5,000 of them within the Waikato region. Waikato accounts for 35% of the

<sup>2</sup> F = forecast

<sup>3</sup> This includes 8,592 herds owned by owner-operators, 5,187 owned by sharemilkers, and 113 managed by contract milkers

national herd, and it is mostly located in central Waikato and on the Hauraki Plains<sup>4</sup> (LIC 2001).

Table 3.3 provides a comparison of New Zealand dairy regions in terms of number of herds, number of cows, average herd size, average farm size, stock density (cows per hectare) and average production per hectare.

**Table 3.3 Comparative statistics for dairy regions in New Zealand 2000-2001**

Farm region	Herds	Cows	% of total	Average herd size	Average effective hectares	Average cows per hectare	Average milksolids per ha (kg)
Northland	1414	303958	9	215	102	2.1	629
Central Auckl.	731	141558	4	194	84	2.4	687
South Auckland	4578	1033608	30	226	79	2.9	884
Central Plateau	506	179763	5	355	138	2.7	853
Western Uplands	84	24076	0.7	287	115	2.5	750
<b>Total 'Waikato'</b>	<b>5168</b>	<b>1237447</b>	<b>35</b>	<b>239</b>	n.a.	n.a.	n.a.
Bay of Plenty	760	185329	5	244	87	2.8	863
East Coast	16	4243	0.1	265	105	2.6	823
Hawkes Bay	65	27791	0.8	428	148	2.7	896
Wairarapa	608	157214	4.5	259	98	2.7	807
Wellington	679	185608	5	273	107	2.6	788
Taranaki	2343	495609	14	212	78	2.7	832
<b>Total North Island</b>	<b>11784</b>	<b>2738757</b>	<b>79</b>	<b>232</b>	<b>88</b>	<b>2.7</b>	<b>818</b>
Nelson/Marlborough	342	81378	2	238	94	2.5	715
West Coast	365	89116	2.5	244	124	2	652
North Canterbury	445	196472	6	442	156	2.8	962
South Canterbury	121	58390	2	483	164	3	1024
Otago	308	117782	3	382	144	2.7	924
Southland	527	203988	6	387	147	2.6	969
<b>Total South Island</b>	<b>2108</b>	<b>747126</b>	<b>21</b>	<b>354</b>	<b>137</b>	<b>2.6</b>	<b>868</b>
<b>Total New Zealand</b>	<b>13892</b>	<b>3485883</b>	<b>100</b>	<b>251</b>	<b>96</b>	<b>2.7</b>	<b>825</b>

Source LIC Dairy Statistics 2000-01

The tabled figures show significant regional variations in average farm size and land use intensity. Firstly, within the Waikato there is a major difference between farms of the South Auckland dairy region (central Waikato and the Hauraki Plains) and those of the Central Plateau (Taupo and Rotorua) and Western Uplands (Waitomo and Ruapehu). The average size of farm in South Auckland

<sup>4</sup> On farms in the LIC South Auckland dairy region of Waikato, Hamilton City, Waipa, Otorohanga, Thames-Coromandel, Hauraki, Matamata-Piako and South Waikato dairy districts

is smaller in terms of area (79ha v. 138ha and 115ha) and herd size (226 v. 355 and 287). South Auckland farms also have a higher stocking rate (2.9 cows per hectare, compared with 2.7 for Central Plateau and 2.5 for the Western Uplands) and a higher rate of milk production per hectare (884 kg/MS/ha compared with 853 and 750). The smaller farm size in the central Waikato and Hauraki Plains in part reflects higher land prices, while the lower average production per hectare in the Central Plateau and Western Uplands reflects differences in climate and topography (colder climate and shorter grass-growing season for the Central Plateau and Western Uplands, and rolling, steeper topography for farms in the Western Uplands) as well as lower land prices.

The tabled differences within the Waikato region mirror regional differences in New Zealand as a whole. Taranaki and South Auckland have the smallest average farm size (79ha and 78 ha respectively) while North and South Canterbury and Southland have the largest (156ha, 164ha and 147ha, respectively). The large milk production figures for Hawkes Bay and North and South Canterbury are boosted by irrigation, while the larger per hectare production figures for Canterbury, Otago and Southland are influenced by lower summer temperatures and longer hours of sunshine in summer. Conversely, drought and bovine heat stress in summer show in the lower production figures for the north of the North Island.

In environmental terms, different regions have different environmental issues associated with dairying so one should generalise with care. On the basis of averages, the South Auckland dairy region is the most intensively farmed dairy region in the country, with small farms, higher stock densities, and higher than average milk production per hectare (884kg/MS/ha compared with 825kg/MS/ha). Because of this greater intensity the values, attitudes and management practices of dairy farmers in the Waikato may not be the same as those of dairy farmers in other parts of New Zealand.

#### **THE STRUCTURE OF THE NEW ZEALAND DAIRY INDUSTRY**

Dairy farmers are part of a large industrial and commercial complex that processes the milk they produce and assists them with production. This infrastructure is fundamental to the way dairy farming is conducted in New Zealand; it structures what farmers can do, and what they must do; it shapes their knowledge, attitudes and objectives; and it influences the way they farm. It

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is the commercial and industrial context within which they work and make land management decisions.

Over the past three years, the New Zealand dairy industry has been through a period of radical restructuring in relation to manufacturing, marketing and governance (Menzies 1999). Restructuring involved amalgamation in November 2001 of the country's two largest dairy companies, the New Zealand Group of Companies (NZDG), formerly headquartered in Hamilton, and the Kiwi Co-operative Dairy Company of Taranaki, together with the formerly separate marketing arm of the industry, the New Zealand Dairy Board. With the amalgamation of these three into a new company, Fonterra, only two independent dairy companies remain in operation: Tatua Co-operative Dairy, near Morrinsville in the Waikato, with approximately 140 shareholders, and Westland Milk Products, formerly the Westland Co-operative Dairy Company, on the West Coast of the South Island, with 345 shareholders. The creation of Fonterra has resulted in major changes in organisation and governance, both of which are on-going at the time of writing. The changes in governance are unlikely to affect the economic and technological trends that currently affect the industry although they may affect environmental relations within the industry.

Briefly, the three dairy companies take milk from a farmer and process it into diverse manufactured products, 96% of which are sold overseas. Farmers are paid by the dairy company on the basis of the amount of milksolids (milkfat, protein, and other solids) produced by the farmer (see description of Fonterra below for more detail).

Apart from the three current dairy companies, the dairy industry includes specialised ancillary organisations directly related to dairying, plus a much larger number of organisations that are more broadly agricultural in nature and include dairy farmers as one of their client sectors (MAF 2003c). The specialised dairy organisations include Dexcel and the Livestock Improvement Corporation, both described in more detail below, and engineering and technology firms which provide specialised dairy machinery and services<sup>5</sup>. The more broadly agricultural agencies include seed firms, fertiliser companies, agricultural consultants, veterinary firms, pharmaceutical companies, machinery and equipment firms,

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<sup>5</sup> Dairy technology firms include manufacturers of milk meters and dairy milking systems, electronic weighing systems, electric fences, veterinary drugs, and calf feeding systems (MAF 2003c)

research organisations, universities (primarily Massey and Lincoln) and the Ministry of Agriculture and Forestry. Regional councils are also a relevant agency for dairy farming because of their responsibility to control the detrimental environmental effects of land use. The key dairy industry agencies are described below.

Dexcel was formed in February 2001 through amalgamation of the former Dairying Research Corporation and the extension and consulting services of the Livestock Improvement Corporation. The aim of the organisation is to improve the productivity of dairy farmers by on-farm research linked to farm consultancy, extension services and farmer education (Dexcel, undated; Dexcel 2003). The organisation's motto is 'Partners in profitable dairying' (Dexcel undated; 2002a) and its goals are (Dexcel undated c.2001):

- The provision of technology and knowledge to increase the productivity of farming systems and improve annual total productivity by 4%;
- The improved sustainability of dairying through the increased use of farming systems which do not compromise the environment and the welfare of dairy cattle;
- An improved human resource capability for the dairy industry through promotion of dairy farming, development of technological and professional capabilities, and provision of training opportunities for dairy farmers and their staff.

These objectives are more sharply focused versions of the aims of the former Livestock Improvement Corporation, being to improve the knowledge and efficiency of farmers by assisting with herd development and farm management. The annual '4% productivity increase' was added as one of the objectives of the new organisation. According to its organisation pamphlet,

Dexcel will play a pivotal role in achieving the dairy industry's 4% on-farm productivity improvement target. It will achieve this by combining and enhancing the considerable capabilities provided by DRC science and the Consulting Officer extension services to co-ordinate production research and development, undertake whole-farm systems research, and ensure the knowledge gained from that research is taken up on farms (Dexcel, undated).

The 4% productivity target has been promoted through Dexcel's extension services and publications directed at farmers<sup>6</sup>.

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<sup>6</sup> For example the article, 'Productivity and profitability' by J. Penno, General Manager of Extension Services in the organisation's quarterly farm journal, Dexcelink (2001).

The organisation has its headquarters in Hamilton, where it runs a large experimental and demonstration farm, but has a New Zealand-wide system of regional offices and farm consultant services. Research officers conduct research and monitoring on a network of 150 farms spread around the country, and farm consulting officers run regional farm discussion groups.

The Livestock Improvement Corporation (LIC) was formerly a subsidiary of the NZ Dairy Board but is now a farmer-owned co-operative. It has two primary functions: animal breeding and provision of herd information record systems. The widespread use of artificial breeding, and the existence of a nation-wide animal database, means that the Livestock Improvement Corporation is one of the most important technical and scientific organisations in the industry. By virtue of its effective monopoly on herd testing and record systems, it is well known and used by most dairy farmers in New Zealand. Most dairy farmers employ LIC technicians to artificially inseminate their best cows, and depend on milk production data stored on the LIC database to decide which cows to cull and which to buy. In effect, LIC provides a unifying organisational structure within the dairy industry because of the comprehensive reach of its services and activities. According to its constitution (LIC 2003b):

The principal activities of Livestock Improvement are supplying goods and services to its shareholders with particular reference to:

(a) improving livestock and farm management practices through means such as the measure and evaluation of the growth, yield of milk or milk constituent, and feed conversion efficiency of livestock; the development and commercial application of artificial breeding of livestock; and the purchase, sale and provision of livestock and semen;

(b) promoting greater efficiency in the livestock industry in general and the dairy industry in particular through means such as stock identification, elimination of unprofitable stock and the encouragement and use of genetically superior stock; and through products based on genetics, biotechnology, information and advice; and,

(c) promoting and carrying out research and development on enhancing the quality of livestock and on farm profitability.

In practice these activities entail (LIC 2002a; 2003c):

- Dairy animal recording: a service used by most dairy farmers to record the sire and dam of each calf, the progeny of every cow, and the milk production records of related animals;
- Herd testing, a service that involves collecting samples of the milk from each cow in a dairy herd several times a year;

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- Milk analysis, where samples from herd tests are analysed and recorded in a national database;
  - Maintenance of a national database which lists all of New Zealand's dairy farmers, their farms and locations, records the location and movement of cows, and details some 90% of annual mating records nation-wide;
  - Animal evaluation unit, a service which assesses the economic and genetic merit of dairy cows;
  - Production of Industry statistics and trends;
  - Animal health management;
  - Research into genetic gain;
  - Progeny testing;
  - DNA analysis and biotechnology;
  - Artificial breeding services;
  - Nation-wide extension services that can advise farmers about stock breeding.

Because its services are used extensively by New Zealand dairy farmers, the values, attitudes and information promoted by the company are influential in dairy farm culture. These are reflected in the publications and corporate statements of the organisation. They offer an optimistic view of economic growth and development, and a scientific and technological approach to problem solving. The Mission Statement of the organisation is 'Leading the world with genetics and knowledge to create wealth for pastoral dairy farmers', and its vision is to 'Create solutions for the world's best dairy farmers' (LIC 2002a). At the front of the Company's 2002 Services Catalogue, the Chairman states, 'Livestock Improvement is dedicated to providing cost effective products and services that enhance on-farm productivity, and will continue to drive value for shareholders through innovative products and services' (LIC 2002b, 1)



**Figure 3.3. Analysis of milk samples by Livestock Improvement Corporation's milk testing stations provide a quality control service that is critically important for farm production (Photo: M. Jay).**

*Fonterra* is overwhelmingly the largest of New Zealand's three extant dairy companies. It comprises a manufacturing infrastructure, research and product development facilities, and a world-wide network of marketing companies. It is co-operatively owned by the 13,800 farmers who supply milk to the company. Shares are held in direct proportion to the quantity of milk supplied. It is governed by a 12-member board of directors plus a chairman, including 9 dairy industry representatives and 3 from outside the dairy industry, and six senior executives (Fonterra 2003a; 2003b; 2003c).

It collects more than 13 billion litres of milk per year, and processes it into more than 600 products (e.g. fresh and frozen desserts, milk powders and proteins, cheeses and cheese ingredients, and pharmaceuticals), which it exports to 140 countries. Fonterra is global in its scale of operation. It generates more than a fifth of the country's export earnings and 7% of national income. It is also responsible for about a third of international trade in dairy products and is the largest exporter of dairy products on the open market. As a multinational company, it has 29 manufacturing sites within New Zealand, and another 35 overseas. In 2002 the top ten markets for this country's milk exports were, in decreasing order, USA, Japan, Philippines, Mexico, Malaysia, Indonesia, Australia, Vietnam, Taiwan and the UK. Countries which were growing in

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importance as export markets included China and India. A significant portion of the organisation's business is conducted entirely outside New Zealand through local branch firms and alliances with international companies. It has alliances, marketing agreements and joint venture arrangements with several international dairy companies, including Bonlac (Australia), Nestle (global), Arla (UK and Europe), and Dairy America (USA). As at October 2001 group assets stood at NZ \$11 billion and shareholders' equity was \$5 billion (Fonterra 2003a; 2003b; 2003c).

Subsidiaries of Fonterra include New Zealand Milk, Fencepost.com, RD1, ViaLactia, and FonterraTech. New Zealand Milk is the division that markets fresh dairy products directly to consumers and the service sector. Its main consumer brands are Anchor (global), Anlene (global), Anmum (global), Bega (Australia), Carabobo (Venezuela), Chesdale (global), Mainland (New Zealand and Australia), Meadowfresh (New Zealand), Peters and Brownes (Australia), Soprole (Chile), and Tip-Top (New Zealand, Australia and Pacific). Fencepost.com is a web-based information and communication service that provides news, weather, dairy industry information and market information. RD1 is a retail service provider formed from the merger of Town and Country Agri-centres (Anchor Mart) and RD1. ViaLactia is a research organisation focused on biotechnology. In the words of the Fonterra website, ViaLactia 'uses biotechnology to develop and commercialise new tools and products for the dairy industry, through bovine, forage and rumen research programmes. Biology underpins the dairy industry, both in on farm production and in dairy product manufacture. Biotechnology is the tool that allows us to examine and modify biological systems, either using natural means or more advanced tools' (Fonterra 2003a; 2003b; 2003c). FonterraTech is the division that develops the commercial feasibility of new products; it 'takes product, process and business developments from concept through commercialisation'.

The enormous scale of Fonterra means that it has a defining influence on New Zealand's dairy industry. That influence reaches beyond the farmer, to include other elements of the industry and New Zealand society. For example, Fonterra is a major employer of scientists and supporter of the scientific establishment. As a Fonterra chief executive officer has noted, Fonterra is 'New Zealand's most significant private-sector investor in research and development. We spend around \$110 million a year and have contracts with something like 460 scientists.

. . . Our investments help provide a critical mass of scientific exploration that benefits the rest of the agri-business sector and New Zealand society as a whole' (Norgate 2001).

Although the USA is the most important single market in terms of value, dairy industry executives perceive that growth of market opportunities is likely to be greatest in Latin America and Asia (Norgate 2001). While North America and Europe are markets which offer high value returns, their population growth is small and projections for milk products are relatively static. The rising level of incomes in many Asian countries, in contrast, is perceived by senior executives in the dairy industry to offer much greater opportunities for export growth. New Zealand milk producers have the lowest costs among developed countries, followed by Australia, Argentina and Hungary (Fonterra 2004). However, the dependence on Asian, Latin American and Middle Eastern markets and the entrenched trade barriers of the wealthier markets in Europe and North America mean that pressure remains on New Zealand producers to keep production costs low. A recent statement by the company outlines seven strategic themes, the first of which is the 'lowest cost supplier of commodity dairy products' (Fonterra 2003d).

With 96% of the nation's domestic milk exported as milk products, and 30% of the free-trade export market in milk products, New Zealand's dairy industry is enormously influenced by world-wide shifts and changes in industry and agri-food structures. Thus the merger of NZDG and Kiwi Co-operative Dairies and the NZ Dairy Board into one large organisation was largely justified by its proponents to the Government's anti-monopoly Commerce Commission on the basis of global industry consolidation. John Roadley (2001, 2), first chairperson of Fonterra, described the global context of New Zealand's dairy industry as follows:

The more immediate challenge and opportunity that I am focused on is ensuring we respond well to the globalisation of our dairy industry. . . With the world market so protected, only around six percent of the world's dairy trade is accessible. There is only restricted access to the other 94% of the world market. That's driving the acquisition of dairy companies already working in protected markets, and the alignment with them in joint ventures. The other key driver of industry consolidation is globalisation by our customers. The top 25 food retailers in the world - our customers- are now involved in a dozen or more major acquisitions annually. . . . You must have scale to have any leverage with a customer as powerful as a Wal-Mart. That reality is driving dairy companies to merge, to acquire

and to enter into joint ventures with one another. And as some of us become bigger, other dairy companies have to do the same. At the end of last month, for example, five medium-sized Swedish dairy companies announced that they would form a cooperative to compete with the local subsidiary of the giant Arla Foods. . . . That's the dynamism of the international dairy industry that we are part of. There are going to be fewer and fewer, but bigger and bigger companies chasing milk supply and customers.

#### **VALUES, ATTITUDES AND CONCERNS OF DAIRY INDUSTRY CHIEFS**

The global context of the industry also shapes many of the values and concerns of dairy industry leaders. The speech by former Fonterra Chairperson, John Roadley, quoted in the preceding section, expresses a degree of concern about the rapid changes occurring internationally and the impact that such changes could have on New Zealand dairying. International changes in the industry are perceived by some industry leaders as a threat. There is the anxiety that if the New Zealand dairy industry does not match the trend to 'bigger and fewer' it will become a victim of the process. The means to countering global competition are perceived to involve growth, efficiencies of production ('productivity gains'), economies of scale, scientific and technological innovation, and superiority. Size and power are linked to confer 'leverage'. Former Fonterra chief executive Norgate (2001, 2) expressed the ethic of commercial competitiveness when he noted:

The case that we put to maintain the unity of our business was that it would enable us to launch an aggressive strategy of acquisitions and joint ventures, to earn the status of one of the world's leading multinational dairy companies. That is our strategy. We will be ruthless in our use of capital. We will make decisions strictly on a commercial basis. We will focus on those parts of the world and those product lines where we see the best potential for growth.

Words and phrases such as 'aggressive strategy', 'ruthless', 'decisions strictly on a commercial basis', and 'best potential for growth' indicate a clearly focused concern with economic efficiency and competitive advantage in a globalised market that is perceived as oppositional and uncertain. The attitudes and values of Roadley and Norgate are not new. Here, for example, is a quote from Sir Dryden Spring (1998, 2) Chairman of the former New Zealand Dairy Board in the Foreword to the Board's 1998 Annual Report: 'In today's market – let alone tomorrow's – only the strong and the swift will survive. Across the globe the industry's competition is consolidating, while retail power concentrates in fewer and fewer hands'. Similar sentiments were expressed by Warren Larsen (2000, 18-19), Chief Executive of the former New Zealand Dairy Board, when he noted,

for a business such as ours, the importance of strong brands, constant innovation, critical mass and a global focus has never been more important. 'Winning Worldwide' offered the answer. . . . The dairy industry has set itself ambitious targets across a number of fronts - enhanced profitability, revenue growth and productivity improvement. Through Winning Worldwide, the Dairy Board has worked hard to put in place the business framework to realise those aspirations. We have recognised the realities of a tougher commercial environment in which the competition is more aggressive than ever and our customers more demanding.

The earlier description of ViaLactia, taken from the Fonterra website, is also worth noting as an expression of the Company's attitudes and values toward nature. It is a highly technocentric attitude, one that perceives biotechnology as a 'tool' that can 'examine and modify biological systems'. The systems which biotechnology seeks to examine and modify are strictly delimited. Specifically, they are those that relate most directly to the process chain that converts sunlight to milk products, cows, 'forage', and the rumen (Fonterra 2002a), all of which are subject to intense research.

The values expressed by key dairy industry leaders over the past five years indicate a strong commercial focus, competitive striving, economic rationality, technical and scientific optimism, innovation and hard work. The high value markets of Europe and North America are considered to offer little prospect of major growth, while the emerging middle class markets of East and South Asia, are seen as a major opportunity. This latter group place a management imperative on dairy farmers to remain economically competitive by keeping the costs of milk production low in world terms (Menzies 1999). There is a recurrent theme that New Zealand dairy farmers need to strive to keep ahead in a competitive global environment. For dairy industry leaders, low cost production is the key to international competitiveness.

As I argue in the later sections of the thesis (Chapter 4 and Chapters 9 and 10) the values, attitudes and concerns of dairy industry leaders are transmitted to farmers by various means, including industry publications, and pervasive assumptions about production, efficiency and profit as goals for farming.

#### **VALUES, ATTITUDES AND CONCERNS OF FARMERS**

With respect to the values, attitudes and concerns of farmers themselves, Menzies (1999) has completed a study of New Zealand dairy farmers in the

South Island. An aim of her research was to ‘understand farmer perceptions and actions relating to environmental quality, their motivation for adopting particular farm management practices, and the factors that influence farmers to adopt environmental management practices’ (Menzies 1999, 2). Underlying her research concerns was the pressure faced by the dairy industry to fulfil the expectations of overseas consumers that New Zealand products are ‘clean and green’ and the realities of farming practise which do not always live up to the ‘clean and green’ image. She found that although farmers regarded environmental care as an important element of ‘clean and green’, it was often an ideal rather than a practise. In her words, ‘they tended to see “clean and green” as a goal or symbol of excellence, whereas other New Zealand stakeholders tended to regard “clean and green” as a claim of fact’ (Menzies 1999, xv). She also notes that although New Zealand dairy farmers link the presence of ‘natural’ vegetation (e.g. wetlands and native bush) with ‘clean and green’ and good stewardship, the same is not necessarily true for dairy stakeholders (such as overseas consumers). She found tensions between farmers, marketers, environmentalists, and consumers about what constitutes ‘clean and green’, and an ambiguity about the standards that are required for farmers to comply with consumer demands for ‘clean and green’ production processes.

Fairweather and Keating (1994) described the goals and management styles of a sample of farmers, including dairy farmers, in Canterbury. On the basis of earlier literature, they note that economic and way-of-life goals are important but that for many farmers, there is a mix of goals. As they note:

Farmers in a wide variety of situations farm to make sufficient economic returns to ensure survival but also value non-economic rewards. While one type of goal may predominate for some farmers, it seems apparent that business and way of life goals co-exist in different ways among farmers in varying situations (Fairweather and Keating 1994, 197-198).

From the responses of their Canterbury sample, they identified three different management styles based on different value priorities. They termed these styles the ‘dedicated producer’, the ‘flexible strategist’, and the ‘environmentalist’.

Dedicated producers set high value on being the best farmer possible. They love farming, enjoy work on the farm, aim for a high quality product, and emphasise planning and financial management. The focus of their personal and family life is the farm. The flexible strategists ‘look beyond the farm gate for both effective

marketing and for pursuing off-farm activities' (Fairweather and Keating 1994, 191). In contrast to the dedicated producer, they seek to reduce work loads and to diversify their assets. For the flexible strategist, the

. . . primary focus of their management style is 'finding a balance' . . . between business and family life, between time spent on- and off-farm, between city activities and country life and, finally, between periods in life when the person is farming and periods when they are doing other things. . . . Flexible strategists see the business as a means to an end. It is important to run the business well, since a profitable farm allows for more choices in determining a desirable lifestyle (Fairweather and Keating 1994, 192).

For their part, 'environmentalists' place high value on 'having a good lifestyle' and the quality of the environment. They are concerned to minimise the use of chemicals, and appreciate the quality of life which farming and the rural environment provide.

In sharp contrast to the dedicated producer, environmentalists see farming as part of a country lifestyle. The country is a good place to raise children, learn from nature and be away from the stresses of city life. Enjoying farming means enjoying the lifestyle (Fairweather and Keating 1994, 195).

Profitability of itself was not central to any of the management styles. Rather, it was a means to an end. Fairweather and Keating also noted that farmer priorities are likely to be linked to other aspects of life, such as the stage of family or personal lifecycle (with younger farmers more likely to be dedicated producers) and whether they had other sources of income. They detected consistency between the management goals of farmers and their social, economic and ecological context.

A similar study of the values and goals of New Zealand farmers (all categories) was reported by Parminter and Perkins (1997). Their study comprised two stages: the first of which involved in-depth interviews with 20 farmers to identify recurrent goals, and the second stage involving a postal survey of 1137 farmers in the central North Island. The goals included maximising farm profits, 'being my own boss', keeping the farm in the family, being part of a stable community, paying off debts, and 'providing future opportunities for my children'. The study found that:

On average the highest ranked goals were those associated with farm production and profitability. Production goals were the most important goals for 43% of farmers. Less than 10% of farmers had their highest goals associated with the environment, although most

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farmers ranked environmental goals relatively highly. No farmers put community goals first (Parminter and Perkins 1997, 108).

Parminter and Perkins (1997, 110) observed that:

Farmers who gave a high ranking for goals associated with production, autonomy, capital, and business tended to have a low ranking of goals associated with personal growth, community, and respectability. The reverse also applied. Goals associated with the environment, family, and off-farm interests tended to have similar ranking for most farmers.

They noted that power and achievement values appeared to be important to many of the farmers surveyed and were expressed through management styles related to the goals of business, production and farm capital value. They concluded that few of the farmers considered their environmental goals to be their most important (Parminter and Perkins 1997, 111)

A study by Parminter, Tarbotton and Kokich (1998) explored the attitudes of farmers toward riparian management practices. Riparian management relates to the areas adjacent to streams, rivers, creeks, ditches and wetlands. By fencing off such areas, stock are prevented from entering and causing damage to the banks and bottom structure of the stream. This also reduces pollution. The decision on whether or not to fence off streams, rivers, ditches and wetlands can greatly increase or decrease the environmental impact of dairying on water quality and aquatic habitat. Sixty farmers were randomly selected from the King Country and Hawkes Bay electoral rolls and interviewed in depth about their management practices and the reasons for their decisions. The study found that most farmers were concerned about the impact of their management practices on water quality but avoided doing anything about it until problems became evident. Farmers did not generally manage their riparian areas differently from the rest of their farmland, except in areas which were considered difficult to farm anyway (Parminter, Tarbotton and Kokich 1998, 256).

The doctoral research of G.A. Wilson (1992) included an examination of the attitudes and values of sheep and beef farmers in the Catlins District of the South Island. The aim of the study was to examine the nature, pace and causes of indigenous forest clearance on farms in the Catlins District of New Zealand, from the beginning of organised European settlement to 1990. Wilson found that

The respondents to the survey had utilitarian attitudes to remnant forest on their land. This influenced the presence of native forest on the land, the forest clearance in the recent past, the use of forest for leisure activities, and the explanation of second growth on the land and plantings of native trees (G.A. Wilson 1992, 117).

Sixty-one of the survey respondents mentioned practical reasons why native forest was still present on their farm. Wilson concluded from his research that 'on the majority of farms in the Catlins District, native forest only persists to the present day because these areas are perceived as being unsuitable for farming' (Wilson 1992, 124). He concluded that older landholders and less formally educated landholders were more likely to have utilitarian attitudes and that 'naturalistic attitudes' were more likely with farmers whose families had been on the land for a longer time (G.A. Wilson 1992).

Wilson's findings for the Catlins contrast with the results of a survey of those landowners in Waikato County with remnant forest on their land. A questionnaire survey of 191 property owners in Waikato County (now Waikato District) with native bush on their property was conducted by the Department of Conservation in 1989 (Cruickshank and Peuckert 1989). The survey found that the attitudes of landowners were highly positive toward native bush and wetland. A majority of property owners thought that there was not enough native bush left in the County, that the remaining native vegetation should be protected, and that they intended to leave the area of native vegetation on their property 'as it is'. A significant majority of property owners (at least two thirds) did not think the County should play an active role in conservation of remnants, but that property owners should be given rates relief, free advice on conservation management, and incentives to fence or manage privately owned bush. A substantial majority (at least two thirds) felt that the bush added to the aesthetic value of the rural landscape and that kahikatea trees were a very distinctive and attractive part of the Waikato.

It is interesting to consider the findings of the Waikato survey in the light of empirical information on the extent of conservation covenants in the region and New Zealand more generally. According to Environment Waikato, more than 184 landowners in the region have protected 503 individual areas (8,411 ha) of native vegetation through Queen Elizabeth II National Trust covenants (EW 2001). Many of those forest fragments are on land that could be used for dairy

production. For the nation, the Queen Elizabeth II National Trust reported in August 2002 that it had 1,620 registered covenants protecting 56,000ha and that 'our work represents only a tiny fraction of the need and the opportunity for conservation on private land, the limiting factor being funding [to cover the legal costs of covenanting]' (QEII 2002). National Trust covenants are entirely voluntary. They are not purchased and landowners receive no compensation, apart from assistance with the legal costs of covenanting and the cost of fencing in some cases. Landowners who wish to covenant some of their land need to approach the Trust and subject their land to assessment by that organisation. If the Trust agrees to covenant with the owner, the area is surveyed and registered on the certificate of title. It thereby becomes binding on all successive owners. The process is lengthy, and it may involve the owner in some costs (for example, the owner may be asked to pay part of the cost of fencing). Thus Queen Elizabeth II covenants are a reflection of strong commitment by individual landowners to protect native vegetation. The empirical evidence, therefore, suggests that a significant number of rural landowners are prepared to go to some length to protect areas of native vegetation.

Bradshaw, Cocklin and Smit (1998) in their study of sheep and beef farmers in Northland, found that despite the considerable private cost of on-farm environmental stewardship approximately one-third of their respondents undertook tree planting primarily for erosion control, fencing of watercourses to exclude stock, and fencing of native bush. Motivations for such stewardship activities included utilitarian reasons (e.g. a desire to prevent stock losses in water courses), but also for aesthetic and heritage reasons. They concluded, 'Farm-level activities which protect or enhance the environment appear to be undertaken with or without direct state subsidies for such actions, as well as during periods of both financial stringency and well-being' (Bradshaw, Cocklin and Smith 1998, 18). They found that the employment of environmental measures is influenced by both public policy and financial conditions. When state subsidies supporting these activities are removed, their use appears to be less likely. Bradshaw, Cocklin and Smit (1998, 18) concluded that without state assistance, the divergence in private costs and benefits associated with these activities inhibits their use.

A Ministry of Agriculture study of North Island Hill Country Farmers (Rhodes, Willis and Smith 2000) found evidence of a substantial commitment to

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sustainable land management, including planting shelter belts, erosion control measures, establishment of conservation reserves, and a concern for the aesthetic qualities of the land. The authors considered that 'Farmers' commitment to sustainability and environmental management is explained in terms of an array of personal and community values which frequently over-ride financial conditions' (Rhodes, Willis and Smith 2000, 2). However for farmers struggling to survive, they found that issues of long-term environmental sustainability are necessarily pushed aside in favour of immediate financial needs.

Underwood and Ripley (2000) have argued that 'the generation of adequate income/profit is the most important single issue for farmers, and influences their economic and environmental performance'. This view is supported by Rauniyar and Parker (1998), who noted barriers to sustainable management by different types of farmers, including dairy farmers. No matter how sympathetic to environmental issues farmers may be, they are unable to commit resources to environmental issues if financial and other resources (such as labour) make such effort impossible. Underwood and Ripley (2000, 13) noted that farmers have a priority ordering of concerns, 'with economic considerations coming first, then social priorities and thirdly environmental aspects of sustainability'. They noted that key constraints to the adoption of sustainable farming practices include low income, high debt, an ownership structure which limits the farmer's freedom to make management decisions, availability of labour, and how long the farmer expects to remain on the farm. In addition socio-economic and personal factors affected the likelihood of farmers adopting environmental and sustainability practices, including age, education, and household structure.

A key constraint to sustainable management practices by New Zealand farmers noted in a number of studies has been lack of relevant, trustworthy and appropriate information (Rauniyar and Parker 1998; Rhodes, Willis and Smith 2000; Underwood and Ripley 2000). Many farmers may be motivated to take up environmental management practices such as tree planting for soil conservation, wetland conservation, protection or restoration of native bush, but they lack information about appropriate species to plant and appropriate management.

The above studies suggest that while a majority of farmers (dairy and otherwise) appear to be driven first and foremost by concern for production and profit,

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environmental stewardship is of concern to many. They suggest that attitudes towards native vegetation may vary from one part of the country to another (e.g. Waikato and Northland farmers appear to value their native bush remnants more than do Catlins farmers). For a majority of the farmers who undertake environmental protection, utilitarian motives seem to be the most important, but non-utilitarian attitudes may also be important. Non-utilitarian motives (both for and against native bush) may be influenced by personal factors such as age, education, stage of the family cycle, or the length of time a farm has been in the family, and expectations of succession. The views of the wider community appear to influence a farmer's attitudes. Information and knowledge appear to be important elements, especially in relation to the appropriate management of native vegetation. Financial constraints are often identified as a barrier to protection of native vegetation, but, equally, there is evidence that many farmers expend time, effort and resources to protect native vegetation despite financial constraints.

In short, the issue of protection of native bush on private farmland is not a straightforward economic or utilitarian issue; it is bound up with farmers' attitudes, values, and personal and family circumstances, the attitudes of others in the farming community, and practical issues such as cost, availability of labour, knowledge and availability of appropriate information.

### **CONCLUSION**

This chapter has described the way that conventional dairy farming is practised in the Waikato region of New Zealand, the structure of the dairy industry with its dependence on a globalised marketing system, and the operational links between dairy farmers and the milk industry. It illustrated some of the prevailing values and attitudes of dairy industry leaders in the context of global trade, and reported the literature about the attitudes and behaviour of New Zealand farmers in relation to environmental concerns.

The New Zealand literature about the environmental attitudes and values of farmers (including dairy farmers) suggests that although economic motivations are a strong determinant of farmer behaviour, they are not the only ones. Non-economic and non-material attitudes and values may also influence farm management decisions. It is possible that so-called economic reasons are almost never solely economic but are, rather, a means to some other end, such as

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achieving the agrarian ideal of 'the good farmer'. Apart from economic incentives or practical reasons for environmental practices, values suggested by the literature that appear to encourage environmental outcomes include a long-term outlook (as when a farmer expects the farm to be inherited by a successor), respect for heritage and tradition, aesthetic values (e.g. pleasure in a varied landscape), and an interest in and enjoyment of wildlife or 'nature' for its own sake.

The next two chapters develop an interpretive framework for a closer examination of dairy farmers in the Waikato. Chapter 4 examines literature that suggests how farmers may be influenced in their perceptions, attitudes and values by broad cultural factors that apply to the dairy industry in general. Chapter 5 examines literature that suggests how local circumstance and the lived experiences of individuals may influence farm management decisions. In Chapter 12, the evidence of farmer attitudes and values toward native habitat and biodiversity reported in this Chapter will be related to an international context. The impacts of dairying in New Zealand, and attitudes of dairy farmers to environmental issues will be compared with those of farmers in other industrialised western countries. The comparison will suggest that many other countries experience similar tensions between productivist goals and non-material concerns for protection of environmental values.

# ***CHAPTER 4***

## ***CULTURE AND THE***

### ***SOCIAL CONSTRUCTION***

#### ***OF NATURE***

*'Mind is the forerunner of all actions.*

*All deeds are led by mind, created by mind.'*

(Words of the Buddha, translated by the Venerable Balangoda Ananda Maitreya, 1993, 6).

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The previous two chapters presented the case study of dairy farming in the Waikato region and the loss of native habitat in farmed landscapes. This chapter and the next explore theoretical perspectives that cast light on factors that influence how and why Waikato dairy farmers manage their land the way they do.

The chapter examines relationships between culture, the environment, and systems of political and economic power. The aim is to provide an understanding of how politically and economically powerful institutions at the national and international levels help shape the way the environment is culturally perceived by Waikato dairy farmers – primarily as a medium of production – and how these perceptions are transmitted to individual dairy farmers. It begins by discussing the concepts of culture and nature as they have been conceptualised by anthropologists and geographers. It notes how culture influences the way that people perceive, relate to, and construct their environment, and suggests cultural values and perceptions that apply to Waikato dairy farmers. It then suggests how these cultural patterns are transmitted from generation to generation of farmers by summarising the insights of symbolic interactionism and critical linguistics.

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Symbolic interactionism and critical linguistics are two theoretical perspectives that suggest means by which the culturally characteristic ways of viewing the world may be transmitted by social interaction and oral communication.

The final sections of the chapter present the closely related theories of political economy and political ecology to show how environmental relations are shaped by social systems of power and influence. The chapter gives a brief overview of political economy and political ecology as theoretical perspectives, and drawing on these perspectives, summarises some significant interpretations of contemporary western agriculture both overseas and in New Zealand.

The perspectives offered in this chapter are intended to cast light on some – but not all – of the factors which shape the relationships between farmers and their environment. In particular, they will help to suggest the cultural patterns that have driven agricultural practices and why so little native forest remains in the region, but not why some persists nevertheless.

#### **NATURE AS A CULTURAL CONSTRUCT**

It's boggy, low-fertility, poor-performing farmland, covered in rushes and, in places, gorse. It is also often littered with stumps. This may not be the typical description of land considered suitable for dairy conversion, but on the South Island's West Coast such land is being developed and on an unprecedented scale.

Leading much of the development is Landcorp farming, which by 2005 plans to be milking 11,000 cows on the West Coast, up to 10% of Westland Milk Products' supply. Using the West Coast's own special land development technique, called hump and hollowing, heavy diggers are the key tool in turning the poorest farmland into prime dairy pasture. Developed to significantly improve drainage, the technique involves forming humps of soil that are typically 2.4m from top to bottom, with 35-40m between each hump. In effect it turns the land into giant corrugations, better able to cope with a West Coast rainfall measured in metres (Chalmers 2002 - News item in *Rural News*).

The above passage, from a popular New Zealand farming tabloid, the *Rural News*, supports a view of the relationship between humans and the environment in which culture determines 'nature'. 'Nature' is, quite literally, transformed to fit human intentions. While the totality of a West Coast environment is rich in native vegetation, the story illustrates that the environment to which readers of the article are expected to relate is one with dairy farming potential. A landscape that

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is not directly suitable for dairy farming is transformed by brute force into 'prime dairy pasture'. The cultural constructionist perspective is one which emphasizes both the human propensity to perceive 'reality' in culturally determined ways, and the human capacity to shape and transform the environment in ways that accord with human purpose. This perspective, like that of the Buddha, considers that human action is shaped not by what is 'out there', but by what is in the mind. As I will attempt to show in this chapter, it is a persuasive interpretation. Not only is human purpose guided by interior values and attitudes, but those values and attitudes are transmitted as much by words and social interaction as by empirical physical realities.

#### **CONCEPTS OF CULTURE AND NATURE**

Culture is one of the most important and most complex of concepts within the social sciences (Jenks 1993; Johnston et al. 1994). The complexity arises partly because of the multiple meanings that have been attached to the word by widely different disciplines (e. g. the humanities and the social sciences) and because of the different dimensions associated with the concept. For example, within the anthropological literature (Milton 1996) culture has been viewed in a general sense as part of all human experience (e.g. religion and kinship are part of human 'culture'), and in a specific sense (such as Japanese culture or 'youth culture'). It has been viewed as the language, customs and material artefacts of a group of people, and as interior mental templates that guide people in their social interactions and way of life.

Marshal Sahlins (1976, Preface vii-viii) has defined culture as the shared symbolic code of a group of people:

. . . the distinctive quality of man [is] not that he must live in a material world, . . . but that he does so according to a meaningful scheme of his own devising . . . . I therefore take as the decisive quality of culture . . . not that this culture must conform to material constraints but that it does so according to a definite symbolic scheme which is never the only one possible. Hence it is culture which constitutes utility.

By contrast, Geertz (1973, 12) argues that culture is both public and private. It involves interior knowledge of culturally meaningful actions, as well as those actions themselves.

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Whether culture is viewed as the visible manifestation of social custom and group life, or an inner symbolic template, numerous studies have shown that through systems of value, myth, belief, and meaning, culture shapes the ways people perceive and interact with the land and their environment (Anderson 1996; Block 1995; Harris 1966; Hirsch and O'Hanlon 1995; Ingold 2000; Rappaport 1984; Sahlins 1976; Selwyn 1995; Strang 1997). Culture, then, defines the material world in which people live and work, and shapes the ways they think and feel about, as well as relate to, their environment.

A study that vividly illustrates how people of different cultures may relate to their environment in completely different ways is by the anthropologist, Strang (1997). Her study involved a detailed comparison of how Australian Aboriginals and White Australian cattle pastoralists perceive, relate to, and create their environment in the same geographical area. The two cultural groups inhabit the same part of the Cape York Peninsula of Queensland but relate to their environment in completely different ways. Their environment is shaped by their cultural systems of knowledge, beliefs, values, social organisation and social reproduction. For Aboriginals, ancestral lands are areas of safety, refuge, spiritual and emotional renewal, and group and personal identity, as well as economic, political and social independence and autonomy. For pastoralists, the same land, as cattle country and 'outback', is difficult, resistant, frequently dangerous, and an arena for proving manhood in accord with wider (white) Australian mythic traditions. The land is viewed and valued by them primarily as an adversary which, with appropriate technology, scientific 'know-how' and (primarily male) enterprise, can be transformed into a productive resource.

These basic orientations (emotional and cognitive) continue to influence how Aboriginals and pastoralists respond to the land, despite the great social and economic changes of the past 200 years. Aboriginal attitudes to land remain strongly affective and protective in the face of commercial opportunities for new forms of production. Cattle station pastoralists, on the other hand, continue to look to technological solutions to the environmental and economic problems that plague them in a tropical environment that is fundamentally unsuited to commercial cattle production. Strang implies that their different culture largely determines the way that Aboriginals and pastoralists perceive and relate to the same piece of land.

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But anthropologists are divided in the way they see the relationship between culture and nature. Kay Milton (1996, 40) summarises the debates of anthropologists as they have addressed the relationship between culture and environment:

While the assumption that human-environment relations are mediated by culture has been fundamental to ecological anthropology, the nature of those relations and of culture's mediating role has been the principal area of debate. There have been three broad ways of conceptualizing the relationship between human beings and their environments: first, human beings adapt to and are therefore shaped by their environments; second, human beings adapt their environments to suit their own needs, and therefore determine or shape those environments; third, human beings interact with their environments in such a way that they shape each other.

Conceptualisations of the relationship between culture and the environment as formulated by geographers have also changed over time. At the beginning of the twentieth century, geographic perceptions revolved around notions of environmental determinism and possibilism (Unwin 1992). Environmental determinists, such as Ellen Semple in the United States, regarded 'man' as product of the earth, dependent on a culture shaped by the practical necessity of adapting to environmental conditions. For Semple, the natural environment provided the physical basis of existence. Human settlement, economic practice, religion and temperament could all be traced one way or another to environment (Unwin 1992). Proponents of possibilism, on the other hand, held that 'There are no necessities but everywhere possibilities; and man as master of possibilities is judge of their use' (Febre 1925, as cited by Unwin 1992, 95). In the 1920s, Carl Sauer and his students developed a somewhat deterministic view of culture as a set of norms and rules which mould the interaction and development of people and landscapes (Anderson and Gale 1992, 3). He considered landscape to be the surface manifestation of culture and bio-physical worlds in interaction over time. In his words, 'Culture is the agent, the natural area is the medium, the cultural landscape is the result' (Sauer 1925, 46).

Sauer's view of culture as a relatively fixed set of customs and behaviour that determine the way individuals relate to their environment has been challenged by more recent geographers. Marxist geographers have challenged the Sauerian disregard for societal relations of production in analyses of landscape. Thus, Cosgrove (1983) argued that social relations of production are critical to the way

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that human beings relate to their environment. He takes Sahlins to task for rejecting Marxist utilitarianism and argues that 'while the material world is constituted culturally [it] remains itself the condition of culture' (Cosgrove 1983, 9). Harvey (1973) noted the impact on urban form, and the creation and ordering of urban space, in the light of movements of capital and urban social relations of production.

Interest in phenomenology brought new focus on the ideational and symbolic aspects of culture by geographers (Daniels and Cosgrove 1988). Geographers began to see the environment not just as a cultural construct, but as 'text' in the sense that it was constructed by human beings in accord with specific intentions and purpose (Anderson and Gale 1992; Cosgrove 1984; Daniels and Cosgrove 1988). For Cosgrove, landscapes are cultural in the sense that people create landscapes by appropriating and using land, and in the sense that the concept of landscape itself is cultural. Landscape 'is a way of seeing that has its own history, but a history that can be understood only as part of a wider history of economy and society' (Cosgrove 1984, 1).

Mitchell (2000) describes changes in the fields of cultural studies and postmodernism through the 1970s and 1980s, and how both (cultural studies and postmodernism) have come to be taken up by the 'new' cultural geographers. He summarises some of the elements of the new cultural geography as: a concern to link landscape with historical context and to show how landscapes may be shaped by images or ways of seeing, and by notions of peoples' relationship to that land; landscape as text; the notion of 'reading' the landscapes; interest in the **symbolic** aspects of landscape; urban and contemporary landscapes; feminist critiques of landscape studies (e.g. space and the cultural construction of femininity and masculinity; masculinity and femininity embodied).

This contemporary view of culture and its relationship to nature or the environment is well expressed by Anderson and Gale (1992), who argue that cultures do not comprise rigid rules that dictate individual human behaviour. Rather, they provide multiple sets of guidelines that allow individuals to interpret the rules creatively and adapt their behaviour to suit particular circumstances. In the view of Anderson and Gale (1992, 3), culture is 'a **process** in which people are actively engaged; a dynamic mix of symbols, beliefs, languages and

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practices that people create, not a fixed thing or entity governing humans.’ In the everyday process of living and enacting their cultural norms and customs, people use and create space, and by doing so they construct geographies. Anderson and Gale (1992, 4) argue that people, not their customs, are the decisive agents in constructing group life and landscapes:

People interpret and grasp their worlds – and indeed reality itself – with the use of symbols and vocabularies that equip them to participate actively in the construction of cultures and geographies. And in the course of constructing cultures, people inevitably construct places and spaces; they ‘construct geographies’. They arrange spaces in different ways; they fashion certain types of landscape, townscape and streetscape; they erect monuments and destroy others; they evaluate spaces and places and adapt them accordingly; they organise the relations between territories at a range of scales from the local to the international. In direct and indirect ways, both wilful and unintentional, people construct environments, regions and places.

In the view of Anderson and Gale (1992, 7), a key factor in the construction of cultures and ‘geographies’ is the system of power within any society.

If frames of mind are sources of cultural understanding and identity for people and institutions, they are also sources of control, conflict and contest. While all of us participate in symbolising the world, people do not enjoy equal access to the conditions for creating those shared symbols.

Anderson and Gale argue that the ‘truths’ that hold in each society are often those adhered to and reinforced by the individuals and groups who hold power. Spatial geographies thus also tend to reflect power relations within a particular society.

Mitchell (2000) expresses similar views even more forcefully. He views culture as consisting of relationships, including relationships of conflict and difference:

It [culture] is not a ‘thing’ until very powerful forces make it so. These forces . . . are always open to contestation and resistance. But so too does reified ‘culture’ – always in conjunction with the economic, social, and political forces that have made it – have real power. . . . ‘Culture’ is both a source of power and a source of domination. And when it is linked with geography – with spaces, places, and landscapes that make it possible – it is a source of power and domination that must always be reckoned with. ‘Culture’, then, is **both** flux and stability, **both** a set of constantly changing relationships and a (socially produced) thing (Mitchell 2000, 293-94).

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He argues that

. . . it is in the interaction – the struggle – between the production of ‘culture’ and its use that ‘culture’ is produced, not as a thing, but as a relationship. So when I ask **who** produced culture, I always turn to the study of relationships; when I ask **why** it is produced, I turn to questions of power (Mitchell 2000, xviii).

The uses of space are mapped out by social relationships as these are influenced by the structures of power.

Pepper (1996) makes the point that notions of nature and the environment are related to the interests and concerns of the speaker. He points out, ‘above all, a historical and ideological perspective teaches us that there is no one, objective, monolithic truth about society-nature/environment relationships’ (Pepper 1996, 3). In his view it is not possible to perceive or apprehend the environment directly. Instead, humans perceive the environment through a cultural filter (Pepper 1996, 6). Different conceptualisations of the environment reflect the concerns of people in different social positions and with different ideologies.

Macnaghten and Urry (1998) put forward a similar view. They assert that ‘The reading and production of nature is something that is learnt. It is a cultural process and varies greatly between different societies, different periods and different social groupings within any society’ (Macnaghten and Urry 1998, 19). They take the view that ‘there is no such thing as nature, only natures. Such different natures both derive from and provide resources for various kinds of contestation over and objections to transformations of the ‘natural’ (Macnaghten and Urry 1998, 22). Equally, they argue that the identification and framing of environmental problems is inextricably cultural and bound up with social and political processes that may not be directly related to the environment. They cite the argument of Grove-White that particular forms of environmental protest have been related as much to widespread public unease with a highly technocratic and unresponsive political culture as with a specific evaluation of the threats to the environment (Macnaghten and Urry 1998, 23).

The foregoing discussion has argued that culture, however defined, includes collective ways of living, thinking, feeling and acting towards the environment that are pervasive and connected to other aspects of life. In New Zealand, dairy farming involves a sub-culture of special knowledge, skills, values and a way of

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life that revolves around the husbandry of land and dairy cows. It is a way of life that influences the daily and seasonal round of activities, family relationships, property and inheritance, professional networks, friendships, personal identity<sup>1</sup>, and community.

The discussion has further suggested that socially and economically powerful institutions are especially significant in shaping mainstream cultural relations toward the environment. I return to this theme later in the chapter with a discussion of the links between national and global aspects of agriculture and environmental consequences. Meantime, in the next few sections, I suggest how culturally shared knowledge, attitudes, values and priorities are transmitted to individual farmers by discussing some of the key insights of symbolic interactionism and critical discourse theorists about cultural learning and how power relations structure social communication.

#### **THE TRANSMISSION OF CULTURAL PERCEPTIONS OF NATURE**

The shared, collective element of culture means that there are ways of transmitting it. A number of theories focus on the means by which culture is transmitted. Two theoretical perspectives in particular have informed the interpretations of dairy farmer culture in this thesis. First is the work of *symbolic interactionists*, and secondly is the perspective of *critical discourse theorists*. Symbolic interactionism explains how cultural perceptions and attitudes toward nature are transmitted. Critical discourse theory posits that mainstream conceptions about the world are structured by power relationships within society.

Symbolic interactionism is a sociological theory that focuses on interactions between individual people and groups of people as the components of social organisation. It is an approach that usually focuses on face-to-face interaction of people in every-day life (Giddens 1997, 565). For the purpose of this thesis, it is a theoretical viewpoint that can explain aspects of **how** it is that dairy farmers develop a more or less shared world of knowledge, values and land management practices. In addition, as I will explain in Chapter 6 'Research Philosophy and Design', symbolic interactionism provides a methodological and theoretical justification for a qualitative approach to research by suggesting that to

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<sup>1</sup> The questionnaire survey described in Chapter 8 was based on the fact that a significant proportion of dairy farmers identified themselves in this way on the electoral roles.

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understand the actions of farmers it is first necessary to understand the meanings that the 'objects' in their world (cows, pastures, native bush, landscape features, etc) hold for them. Thus, methodologically, it involves empirical study of social actions and interactions, and the symbolic meaning which those actions have for the individuals involved.

As a body of theory, symbolic interactionism stands between sociology and social psychology. It examines the aspects of social learning and self-development involved when we learn to become socially competent through communication with others. In the view of symbolic interactionists, people build up worlds of meaning through their interactions with others, particularly members of their family, peer group, or other primary group. According to this perspective,

Humans do not experience the world in its natural state. We do not gather and observe "facts" that interpret themselves; rather, the selection and interpretation of data are based on classification schemes constructed by the observers (O'Brien and Kollock 1997, 16).

From the complex reality of the world around them, individuals learn to pick out and recognise things ('social objects') by observing the actions and interactions of others. The 'objects' which individuals learn to distinguish are any identifiable entity that people may refer to. They include other people, natural and physical objects, institutions, ideals, values, customs, social actions, language and symbols. Objects, from a symbolic interactionist perspective, 'must be seen as social creations' (Blumer 1969, 11). They exist only as they are perceived and arise out of a process of social interaction.

Words and language are key elements by means of which worlds of meaning are transmitted from one generation to the next. Words, of themselves, are simply sounds, but words used in interactions between people become meaningful on the basis of how people behave in relation to them. For a young child, the culturally specific sounds of language come to be recognized as words (and thereby 'social objects') through a process whereby the meaning of each word emerges from the way it is used in different contexts. For this researcher, the meanings of different farming terms emerged in a similar way: by observation and trial and error in the course of interaction with farmers. I discovered what a 'springer' was by walking the paddocks with a farmer at calving time and having

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the cows close to calving pointed out to me. Similarly, plants and animals come to have social significance as objects only when they are recognized as having a separate existence. The plants and animals recognized by Waikato dairy farmers are, for the most part, those which tend to be significant for pasture and milk production. Thus the native vegetation on a New Zealand farm might include native species unrecognised by the farmer and simply classified as 'bush'.

Although words and language are central to the ways in which individuals learn to perceive and order their world, they are not the only way, or even the most important way in many situations. For example, transmission of cultural practices is often by means of practical interaction, shared activity and experience. Within farming, a common observation is that farmers prefer to learn new methods and approaches through farm field days and demonstrations (or even video tapes), rather than through written communication.

Symbolic interactionism as a theoretical focus and as a method of research and analysis has produced a richly detailed literature of small-scale studies of particular social groups in everyday situations: for example, delinquents, homosexuals, the dying, medical groups, racial minorities, and religious cults. These studies provide vivid accounts of the life-world and world view of their subjects, and a wealth of information about the dynamics of group behaviour. Scholars such as Erving Goffman (1959; 1974) have enriched the social science literature by their analyses of the ways in which people seek to influence the behaviour of others by 'impression management' through dress, language and speech, and non-verbal communication.

Denzin (1992) summarises criticisms of symbolic interactionism. These include problems of theory and method (e.g. ambiguous definition of key concepts; reliance on description without prior logico-theoretical frameworks; insufficient data for the generalisations made; inadequate documentation of data); a focus on the consequences rather than the causes of interaction; an a-structural bias with concomitant neglect of history and macro-organizational problems; failure to address political issues; neglect of emotions; and problems related to producing and interpreting texts within the literature.

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Denzin acknowledges that symbolic interactionism fails to adequately deal with macro-levels of power relationships but also demonstrates that many of the criticisms are ontologically based by scientists who favour positivist methods of experimental psychology or quantitative sociology. He argues that criticisms by Huber about the a-theoretical nature of symbolic interactionist research (Huber 1973a; 1973b; 1974, as cited by Denzin 1992, 49-52) are essentially misplaced because they criticise the genre for not undertaking the kind of positivist science that Huber herself favours. Having dispensed with a number of criticisms about the non-scientific and a-theoretical nature of symbolic interactionist research, Denzin suggests that it has been too focused on the empirical and pragmatic: biased toward the study of social minorities (at the expense of the socially powerful), romanticist in its focus on socially marginal groups, and lightweight in its treatment of power and gender relationships, and the importance of economic forces.

These criticisms by Denzin do not preclude the value of the symbolic interactionist insights for the purpose of this thesis. From the viewpoint of this thesis, the key advantage of symbolic interactionism is its insight into how cultural values, attitudes and practices are transmitted. It also emphasises the interdependence of communication and culture (Carey 1989, 64-65; Couch 1990; Denzin 1992; Maines and Couch 1988, 12-13; Gronbeck 1988; Hall 1988). The empirical research for this thesis amply demonstrated the importance of face-to-face interaction among farmers and within farming families in transmission of knowledge, values and attitudes about farming, land management and environmental issues. I discovered much about the culture of Waikato dairy farmers by interacting with them in day-to-day situations. The knowledge, values and attitudes transmitted in this way permeate the thought and assumptions of individual farmers even when they are walking the paddocks on their own or struggling to coax production from a steep hillside that might be better left in native vegetation.

Nevertheless, social interaction is not the only avenue to farmers' knowledge and environmental priorities. It will be argued in the next chapter that interaction with nature is another important means by which farmers learn and by which they make decisions about how to manage their land. The theoretical background to this second viewpoint is also explained in the next chapter. Thus, from the

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perspective of this thesis, the most serious objection to symbolic interactionism is its emphasis on social interaction as the prime source of learning and meaningful experience (Blumer 1996, 11). This focus downplays the importance of experiential knowledge for individual learning, and the capacity of individuals to form independent judgements.

While the results of social learning may provide internal guidance for the individual farmer acting alone, experience and circumstance are also important. As farmers go about their daily tasks on the farm, often with no other company than a dog and livestock, they are observing, thinking, reflecting, and creating new meanings, assumptions and values. For example, they may note that certain 'weeds' are beneficial to cows, or that an area of the farm is prone to soil damage no matter what pasture management system is used. They may come to enjoy the site and sound of Canada geese or paradise ducks on their land, even though the dairy culture classes these birds as a nuisance and a pest. The ways by which meanings become attached to things (whether they be words, people, ideas, natural and physical objects, and customs or practices), is a dynamic process involving individuals who may interpret and create new meanings in episodes of on-going interaction. Experienced farmers know that each farm is different and must be managed differently. Through practical experience, they learn to distinguish those elements of their work environment that are unique to the place and the particular relationship between farmer and farm.

#### **DISCOURSE AND POWER**

Critical discourse analysts such as Norman Fairclough (1989; 1992; 1995a; 1995b), Roger Fowler (1991) and David Lee (1992) are similar to the symbolic interactionists in their views about the social construction of reality. A discourse is a communicative process within a realm of meaning that is shared by those who take part. Like symbolic interactionists, discourse analysts believe that language and communicative interaction shape the way people think and relate to each other and the world.

According to David Lee (1992, 8), language both shapes the way that people conceptualise the world and expresses or reveals those conceptualisations. It shapes the way they think about the world by the way it categorises phenomena

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thus highlighting some features of reality and ignoring others. Language selects properties of the world that are considered to be relevant by the speakers and, thereby, serves to highlight certain properties of reality (i.e. those which the speakers consider to be relevant) and to background others. According to Lee, 'the lexical and grammatical systems of languages play some role in encouraging (and in some cases **forcing**) speakers to select certain features for encoding and to pay less attention to others' (Lee 1992, 8).

Equally, the property of language known as 'agentivity' is one which directs attention to who or what is doing the action. 'Thus not only are categories such as physical object and action the fundamental building blocks of the human world view, but so are the relational concepts that bind them together' (Lee 1992, 7) . As an example, the headline, '*Fonterra keeps organics sweet*', in the rural tabloid *Rural News* (2002), emphasizes the active role of the dairy company in the production and supply of organic milk. But from a reading of the article it is clear that the company is responding to initiatives and pressures from external sources, including market demand for organic milk and the fact that a number of dairy farmers have developed organic milking systems without dairy company encouragement or assistance. While the headline projects an image of the company as the decisive agent in a bold new initiative, in practice the company is following market trends and the enterprise of some of its suppliers.

Lee uses variations in language to identify different social groupings. He argues that, 'linguistic practices [are] the primary medium through which social processes operate. Social and institutional diversity is established and perpetuated through diversity in linguistic usage, different 'ways of speaking''(Lee 1992, Preface x).

A social linguist who has had a significant impact within the social sciences is Norman Fairclough. His approach to discourse analysis has become widely accepted and adopted as a methodology within the social sciences. (See for example, Blommaert and Bulcan 2000; Collins 2000; Darcy 1999; Hastings 1999a; Hastings 1999b; Taylor 1999). An analytical model developed by Fairclough provides the basis for a discourse analysis of dairy farmer communications later in this thesis.

The ideas and discourse methodologies of Fairclough and the critical social linguists are relevant to this thesis because they suggest how farmer ideologies about what it is to be a good farmer are transmitted to farmers by a linguistic process that is dominated by the political economy interests of the dairy industry. In later chapters I shall suggest that the current ideology of Waikato dairy farmers is consistent with the productivity focus of the industry, and that change in industry attitudes to environmental protection are consistent with global consumer demands for quality food and improved environmental performance.

A fundamental tenet of Fairclough is that language and linguistic communication (speaking and writing) are elements of 'social practice'. Social practice means, in Fairclough's words, that 'language is part of society, and not somehow external to it. Secondly, that language is a social process. And thirdly, that language is a socially conditioned process, conditioned that is by other (non-linguistic) parts of society' (Fairclough 1989, 23). As a socially conditioned process, language and speech are embedded in social interaction and are part and parcel of social action. Like any other social practice, what we say and the way we speak reflect and affirm our social identity and social relationships. According to Fairclough (1989, 23)

. . . the language activity which goes on in social contexts (as language activity does) is not merely a reflection or expression of social processes and practices; it is a *part* of those processes and practices. For example, disputes about the meaning of political expressions are a constant and familiar aspect of politics. People sometimes explicitly argue about the meanings of words like *democracy, nationalization, imperialism, socialism, liberation or terrorism*. . . . Such disputes are sometimes seen as merely preliminaries to or outgrowths from the real processes and practices of politics. What I am suggesting is that they are not: they *are* politics. Politics partly consists in the disputes and struggles which occur in language and over language.

An equally important element of Fairclough's writing is that language and power are inter-related (Fairclough 1989; 1995a; 1995b, 54). A main focus in his analysis of language is demonstrating how the use of language can serve to reinforce assumptions of power without any of the speakers necessarily being aware of the process. As he explains (Fairclough 1995b, 54)

. . . connections between the use of language and the exercise of power are often not clear to people, yet appear on closer examination to be vitally important to the workings of power. For instance, ways in which a conventional consultation between a

doctor and a patient is organised, or a conventional interview between a reporter and a politician, take for granted a whole range of ideologically potent assumptions about the rights, relationships, knowledge and identities. For example, the assumption that the doctor is the sole source of medically legitimate knowledge about illness, or that it is legitimate for the reporter – as one who speaks for the public – to challenge the politician. Such practices are shaped, with their common-sense assumptions, according to prevailing relations of power between groups of people. The normal opacity of these practices to those involved in them – the invisibility of their ideological assumptions, and of the power relations which underlie the practices – helps to sustain these power relationships.’

To take another New Zealand example from the dairy industry, a news item from the Waikato Times (13/3/03, 2) reads as follows:

### **Fonterra eyes rules to clean out dirty farmers**

Fonterra is developing a set of environmental rules which could see dirty dairy farmers kicked out of the co-op. The dairy giant is this week showing its farmers a set of assessment criteria, which measure farmers against a set of guidelines – dubbed Market Focus – for water quality, effluent, fertiliser use and animal welfare. . . . Asked if milk supply would be conditional on passing the assessments after that, [Chairman of the dairy company, Henry van der Heyden] said the proposal had not reached its final form but it was “likely”. Farmers would not be worried by a rules-based environment policy, he said. “Through all the submissions we’ve had from farmers and all the survey work we’ve done it’s become very very clear that farmers want to be the master of their own destiny, not subject to the whim of lawmakers.” A clean green image was critical to Fonterra’s overseas trading partners and the New Zealand public expected a high level of environmental safety.

But Te Kauwhata farmer, Jim Cotman, said a rules-based system was “not credible and will not work. I think they should drop this completely. . . . The way they have structured the proposal to be pass or fail says to me that it will fail.” He said farming situations were different all over the country and a rules-based system could not take that in to account.

Both the content of the article and its style reveal something of the power relationships within the dairy industry. The content is about a struggle over the issue of environmental management, in which the dairy company, as manufacturing and marketing agent for milk products, is particularly concerned about maintaining its ‘clean green’ image with overseas trading partners and the New Zealand public. Farmers, on the other hand, who will have to pay the cost of implementing the rules, are resisting, particularly if they are required to

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implement the rules within set timeframes and regardless of local and personal circumstances.

The style and form of the article also reveal, and reinforce, power relationships. Fonterra is the active agent, 'eyeing' the rules and making the judgements about acceptable criteria. Fonterra has the power to decide which farmers are 'dirty', and to 'kick them out'. The authority of the company spokesman is reinforced by referring to him in a formal way with his full title as 'Chairman Henry van der Heyden'. The farmer spokesman, who happens to be a member of Federated Farmers, a former chairman of the Waikato Farm Environment Award, and a former member of NZ Landcare Trust, is referred to as 'Jim Cotman'. In environmental terms, Mr Cotman has a significant depth of experience from which to judge the effects of the proposed rules, but by ignoring this background, and referring to him informally, the article downplays this experience and right to comment. It is unlikely that readers of the article will notice the way that the authority of the farmer spokesperson has been downplayed, or that Fonterra is absolved of responsibility for any of the environmental effects of dairying.

Fairclough develops his arguments on the basis of a theory of power in which the 'hegemony' of dominant social classes is 'constituted to a significant degree in the discursive practices of institutions and organisations.' (Fairclough 1995a, 91). Thus the major institutions of society (the media, the government bureaucracy, the justice system) uphold the hegemonic dominance of particular groups by the way that they control what is said. He considers that one aspect of the way that the power of dominant social classes is upheld is through 'cultural and ethical engineering, the reshaping of subjectivities or 'selves'' (Fairclough 1995a, 93). He argues that within contemporary western societies, language has become the primary medium of social control and power.

Looking again at the example of 'dirty farmers', environmental damage and degradation by the dairy industry is not a recent issue. But the identification of environmental management as an issue, and the way the issue is framed (primarily as an issue of water and waste) is in accord with the way that the dairy company and regional councils perceive the problem. It is also worth noting that because of the way the article is written, with Fonterra given the active role, the dairy company appears to be taking the initiative in correcting a problem that is caused by farmers. This way of framing the issue puts the blame of

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environmental pollution on ‘dirty farmers’ rather than the production-focused thrust of the industry as a whole, and absolves the dairy company of any responsibility to assist farmers in correcting the problem.

According to Fairclough (1995a, 94):

There is a dual relationship of discourse to hegemony. On the one hand, hegemonic practice and hegemonic struggle to a substantial extent take the form of discursive practice, in spoken and written interaction. Indeed, my use of the term ‘discourse’ rather than (say) ‘use of language’ implies the imbrication of speaking and writing in the exercise, reproduction and negotiation of power relations, and in ideological processes and ideological struggle. The concept of hegemony implies the development in various domains of civil society (e.g. work, education, leisure activities) of practices which naturalize particular relations and ideologies, practices which are largely discursive. A particular set of discourse conventions (e.g. for conducting medical consultations, or media interviews, or for writing crime reports in newspapers) implicitly embodies certain ideologies – particular knowledge and beliefs, particular ‘positions’ for the types of social subject that participate in that practice (e.g. doctors, patients, interviewees, newspaper readers), and particular relationships between categories of participants (e.g. between doctors and patients). In so far as conventions become naturalized and commonsensical, so too do these ideological presuppositions. Naturalised discourse conventions are a most effective mechanism for sustaining and reproducing cultural and ideological dimensions of hegemony.

This view of language and its relationship to social order is relevant to an understanding of the way that farmers are influenced by the language and ‘discourse’ of the major dairy institutions, including the dairy company Fonterra and its leaders, the farming media, dairy research organisations such as Dexcel and Livestock Improvement Corporation, and farm service organisations such as seed firms, fertiliser and agrochemical firms, veterinarians, and business consulting firms.

Not all discourses are powerful, and not all discourses are consistent or even broadly in agreement. Indeed, within society many discourses may compete with one another. Lee (1992), for example, illustrates how vernacular language in the post-colonial literatures of Australia and Malaysia can be used by speakers to assert their own cultural identity and their opposition to the perspectives of the dominant language speakers and their discourses of power. He gives a literary example of the use of Australian vernacular to challenge ‘the nexus of colonialist

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and class-based ideology' about the exploration and opening up of Australia (Lee 1992, 162). Fairclough (1989, 34) notes that:

Power relations are always relations of *struggle*, using the term in a technical sense to refer to the process whereby social groupings with different interests engage with one another. Social struggle occurs between groupings of various sorts – women and men, black and white, young and old, dominating and dominated groupings in social institutions, and so on. . . . Social struggle may be more or less intense and may appear in more or less overt forms, but all social developments, and any exercise of power take place under conditions of social struggle.

The field research for this thesis suggests that there is concordance between many of the value and knowledge statements articulated by farmers, and those expressed in the dairy industry and farmer literatures. The literature read by farmers, such as the documents analysed in this thesis (Chapters 9 and 10), appears to express notions of 'truth' that are widely held. Culturally acceptable knowledge is that which is identified as accurate, authoritative and relevant by the key institutions of the dairy industry (Fonterra and the dairy companies, Dexcel, and other consulting and advisory services) and the major scientific institutions (e.g. AgResearch, Massey and Lincoln Universities, the Veterinary Association). They are reinforced by the major service industries, including banks and lending agencies, and agricultural service providers.

The most culturally appropriate values (such as productivity, economic rationality and instrumental efficiency) are promoted by the same politically powerful institutions. Secondary values, such as lifestyle considerations, family loyalty, and loyalty to one's peers and the community tend to be associated with institutions and social groups that are politically less powerful, such as family and the community. Knowledge and values that receive little or no recognition from the community or politically powerful institutions tend to be overlooked, ignored, or doubted by many land managers. For example, the experience or historical knowledge of older farmers may be dismissed as 'old-fashioned' and 'out-of-date' because it does not accord with the latest industry targets. Similarly, values which receive little cultural recognition or support from the community or politically powerful institutions include those which may run counter to production effort: for example, aesthetic values, and the valuing of places for their personal or family heritage.

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However, it is also true that not all dairy farmers think the same way, hold to the same values and priorities, or follow the same land management practices. They are not all equally receptive to the dominant ideology that dairy farming is the business of maximising efficiencies in the production of milk solids. Discourse analysts concede that there are multiple discourses, including those of 'resistance' that run counter to the dominant discourses of establishment institutions. Individuals may move between different discourses, and in doing so may become aware of differences and conflicts of knowledge and reality claims. This multiplicity of discourse practices can be a source of change.

A caution must be noted in relation to the views of critical discourse theorists such as Fairclough: specifically, that the focus is on language as the medium through which individuals learn and perceive the world. Language as the vehicle of conscious thought is said to be the principal means by which individuals acquire their understanding of the world, even though in the material world people are subjected to myriad experiences and situations that involve non-verbal behaviour. In the view of critical discourse theorists, the capacity and power of individuals to change discourses, or to significantly alter fundamental assumptions about the knowledge and reality that underpin different discourses, is normally limited because of the subtlety and pervasiveness of the ways in which 'commonsense' notions of the order of things are communicated.

#### **POLITICAL ECONOMY, POLITICAL ECOLOGY, AND SOCIO-POLITICAL EXPLANATIONS FOR ENVIRONMENTAL DEGRADATION**

The preceding sections have explored the concept of culture, how cultural values and practices are transmitted through person-to-person interaction and discourses of language, and how realms of discourse result in taken-for-granted ideas about the way the world works and what is right, normal and proper. They have also suggested that notions of what is real and true can be consistent with and closely related to systems of power and authority in society. An implication is that within dairy farming, the mainstream ideologies of land management and the norms of what is right and proper for dairy farming are consistent with the interests of the dairy industry.

In the following paragraphs I introduce political economy and political ecology as theoretical perspectives and suggest how they inform understanding analysis of

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dairy farmers' behaviour. Political *economy* is a theoretical perspective that examines the relationships between socio-political and economic structures in society, and other aspects of society such as access to resources. Within geography, political economy has its roots in radical and Marxist thinking but under the impetus of post-structural debates and insights into the importance of individual agency has broadened into a diffuse and pervasive literature where the focus is on the analysis of political and economic interaction (Johnston et al. 1994; Peet and Watts 1989). Political economic perspectives have been particularly valuable in achieving understanding of the dynamics of global food regimes and the extension of global food chains (Bonnano et al. 1994; Goodman and Redclift 1991; Goodman and Watts 1997; Murdoch, Marsden and Banks 2000).

Political *ecology* examines the ways that socio-political relationships impinge on socio-ecological relations; it focuses on socio-political and socio-economic elements of the construction of nature. It has its roots in the Marxist political economy, ecological anthropology and cultural ecology of the late 1970s (Peet and Watts 1996). It proposes that human perceptions of, and relationships with, the local environment are mediated and shaped by political and economic relationships that give structure to wider society, including resistance to hegemonic structures. Like political economy, political ecology places a strong emphasis on the political structures that shape the way resources are allocated and consumed (Blaikie 1985; Blaikie and Brookfield 1987; Bryant 1992; Messer 1987; J. O'Connor 1993; Thrupp 1993). In what has become a classic study on the political economy of soil erosion in developing countries, Piers Blaikie (1985) was able to argue convincingly for a complex chain of socially created relationships between poverty, political inequality and environmental degradation. As argued by Bryant (1992), environmental conditions frequently involve interplay between global economic and political processes, state institutions, access to resources, structures of political exploitation, and the management of environmental resources. Environmental conditions, in turn, have political consequences for the societies involved. As resources decline, the pressures that arise result in conflicts over access, social distribution of costs, and diminishing benefits.

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Peet and Watts (1996) have provided a useful summary of recent directions in political ecology. These include increasing efforts to make explicit links between capitalist economic structures and processes and environmental consequences. A second direction involves greater attention to the *politics* in political ecology. Thirdly, there has been an examination of the relationships between the institutional structures of civil society and political ecology, particularly in relation to the rise of movements and organisations that resist the exploitative environmental actions of the state. And fourthly, there has been growing interest in the discursive dimensions of environmental relations and the way that 'nature' and resources are perceived differently by different groups; and how that knowledge is institutionalised by the powerful and contested by those in opposition.

As an example of this latter, Escobar (1996) has written a scathing critique of the concept of sustainability as developed and promulgated by such institutions as the World Commission on Environment and Development and the World Bank. He argues that there has been a shift in capitalism from destructive exploitation of nature to management and control of nature, and that the discourse of sustainability matches this shift. In his view, the managerial forms of capitalism may be no less destructive to elements of nature or to those in the Third World who experience the consequences of that management. The talk of global environmental issues and solutions, in his view, serves to reinforce the power of the managers who claim to know the source of the problems and their solutions. The question he asks is, 'Who is this "we" who knows what is best for the world as a whole? Once again we find the familiar figure of the (white male) Western scientist-turned-manager' (Escobar 1996, 50).

Political economy and political ecology are overlapping fields, but political ecology has been strongly influenced by ecology and the widespread growth of environmental awareness (Yapa 1996). It has also involved a particular concern for Third World development, particularly the linkages between poverty and environmental degradation (Bryant 1998; Peet and Watts 1996; Walker 2003).

More recent analyses have extended the political ecology focus to developed economies by attempting to make explicit the links between capitalist growth and environmental outcomes (Peet and Watts 1996; Robertson 2000; Walker 2003).

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As yet, however, the political ecology perspective is mainly confined to Third World development literature (for example, see Bryant 1992; 1997; 1998). Nevertheless, a political ecology perspective has informed this thesis to the extent that the Actor-Network analysis presented in the next chapter rests on the assumption that elements of 'nature' are not passive objects of human agency, but partners in an interactive and dynamic process. While the political economy approach tends to exclude nature as an effective force in human relations, the political ecology approach acknowledges that the world in which humans live presents circumstances and dynamic processes which cannot be determined by purely socio-economic and political factors. Political economic forces may shape the way that individual land managers relate to the land, but ecological and physical characteristics of the land may shape the way the land 'responds' to human management, and thereby provide an independent influence to the cycle of interaction. In short, this thesis arguably contributes to the political ecology literature rather than resting on an existing well-built intellectual infrastructure.

Political economy interpretations of modern agriculture in Western societies have been widely explored in the social sciences, particularly in the light of social, economic and environmental problems arising from productionist agriculture (Bonnano et al. 1994; Bowler 1992; Friedland et al. 1991; Ilbery and Bowler 1998; Marsden 1998; McMichael 1994; Potter 1998a; Tarrant 1992). While classical economics perceived the efficiencies and production increases of modern agriculture as progressive and socially desirable, a growing number of rural social scientists have noted the dysfunctionalities of productionist agriculture. Analyses in the US and UK describe the process of agricultural production from the end of the Second World War to the beginning of the 1980s as an 'agricultural treadmill' (Cochrane 1979; Ward 1993), where agriculture has involved cycles of technological and capital innovation in which early adopters of new technologies and systems gained a production advantage. As rising production from the innovators caused prices to fall, average farmers were forced to adopt the new technology to survive. In Europe at least, under the Common Agricultural Policy, laggards were saved from having to leave the industry (as a consequence of cost-price squeezes) by government intervention (Potter 1998b).

Political economic analysis of changes in agriculture in Western countries from the Second World War to the 1990s has emphasised large macro-level social,

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economic and political processes that have influenced the dynamics of agriculture and its relationship to other aspects of society. They have also linked agricultural processes, such as increases in farm size and substitution of labour with capital, with the social processes of rural depopulation, decline of small rural service centres (Bowler 1992), and rural deprivation (Furuseth 1998). They have analysed how food production has become increasingly integrated as an industrial process from farm to factory to consumer. And they have shown that the forces which shape agriculture are not separate from other aspects of society, but are integral to the social, political, economic and technological systems of society at large.

Potter (1998b) summarises the detrimental social and environmental consequences that occurred in the USA and Europe as a result of state-sponsored policies that encouraged agricultural production with little or no regard for social, economic and environmental consequences. In the case of the UK (and other north European countries and the USA), the subsidies and price supports encouraged farmers to maximise income by maximising production. The policies brought farm intensification of some areas and marginalisation or slow decline of traditional farming practices elsewhere. Farming in areas of more intensive production gave rise to increased use of fertilisers, pesticides, energy, land improvement, livestock intensification and overgrazing, large-scale mono-crop production, widespread pollution of streams and ground waters, and soil loss or degradation. In marginal areas there was land abandonment and loss of traditional local management systems (such as unusual grazing systems, or combinations of crops).

In addition to the effects of state policies on western agriculture, and the 'treadmill' of production, the political economy/political ecology perspective has made notable contributions to an understanding of the processes of global integration of food production, processing and trading networks around the world (Goodman and Redclift 1991; Goodman and Watts 1997). Goodman and Redclift (1991) have presented an analysis of the modern agri-food system as one that is globally interconnected and shaped by social and economic changes that extend throughout modern society. These changes include technological advances in genetics and food processing, political relationships between the developed world and the Third World, and changes in the role of women

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(especially women's employment). They argue that 'the modern food system developed around structurally compatible processes, changes in technology and the labour process inside and outside the home, but in ways that have themselves changed our view of the relationship between food and nature' (Goodman and Redclift 1991, xii).

#### **POLITICAL ECONOMY PERSPECTIVES ON AGRICULTURE IN NEW ZEALAND**

The political economy of agriculture in New Zealand has been described and analysed by, among others, Le Heron (1991), Le Heron et al. (1996), Cloke and Le Heron (1994), Cloke (1996), and Roche, Johnston and Le Heron (1992). Le Heron (1991) summarises the state policies of the 1960s and 1970s that assisted and supported agriculture to produce a near doubling of production between 1960 and 1980. He explains how a set of relationships between government and finance institutions favoured national investment in the farming sector, but did not involve global capital. The growing cost of subsidies and production incentives for agriculture in the early 1980s was in the face of a global downturn in commodity prices. It brought increased public opposition to production-focused state policies and provided the urban-centred political support for withdrawal of all agricultural subsidies by the Fourth Labour Government in 1985.

The withdrawal of state support for agriculture and policies of economic liberalisation (for example by floating the exchange rate) exposed New Zealand agriculture to the full force of the global economy and brought new possibilities for global corporate investment in agriculture (Le Heron 1991). A point made by Cloke and Le Heron (1994) is that 'despite these important internal negotiations and constraints it was the economic environment *external* to New Zealand which was the most potent force for change.' Although the immediate changes faced by New Zealand agriculture in the mid-1980s were brought about by government policy, this policy was a response to international trade relations, particularly the closed nature of North American and European markets to agriculture, and the drive by the GATT to bring about liberalisation of trade.

The deregulatory policies of the Fourth Labour Government added impetus to changes that were occurring to New Zealand agriculture. Within the dairy industry, as already recounted in Chapter 3, these included fewer and larger dairy farms and a consolidation of the manufacturing sector with amalgamation of dairy

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factories into fewer and larger companies. Where there was a multitude of independent dairy companies in the 1960s and 1970s there is now one very large multinational company (Fonterra) and two very small companies (Tatua Co-operative Dairy and Westland Milk Products). In short, a response of the dairy industry to economic liberalism and the threat of takeover by global capital has been to consolidate and compete on equal terms with the other multinationals.

A more recent threat to New Zealand's dairy industry has come from consumer and public concerns about animal welfare and environmental degradation. This has prompted rapid policy developments within the industry over the past two or three years as dairy leaders have responded to marketing demands that New Zealand producers live up to the country's 'clean and green' marketing image, and to public concern about the impacts of dairying<sup>2</sup>. In 1999 the Ministry for the Environment (MfE 1999) published a report that expressed concern over the extent and effect of dairy farm effluent on surface waterways and groundwater, thereby signalling this concern to dairy industry leaders. In the same year, a blistering attack on the industry by a leading environmentalist (Salmon 1999a; 1999b) reflected and highlighted the concerns of environmental groups. In 2001, senior representatives of the influential environmental group Royal Forest and Bird Protection Society and the New Zealand Fish and Game Council, an anglers' and duck-shooters' lobby, met senior dairy industry officials (Stuff - Rural 19/7/01) to discuss the problems of dairy pollution, and the Fish and Game Council set aside a \$1 million 'fighting fund' to oppose dairy industry developments that they considered would impact detrimentally on the environment (Waikato Times 2001). A report by the Ministry for the Environment in the same year (MfE 2001) assessed the marketing value of the 'clean green' image for the dairy industry at between \$241 million and \$569 million. The report indicated that New Zealand was experiencing environmental problems that were a serious threat to its clean, green image.

On the surface there was little immediate reaction from the industry to the growing cry of 'dirty dairying', but in 2001, the industry distributed a set of environmental and animal welfare guidelines to all dairy farmers (Barnett 2001), and in 2002, the Westpac Trust NZMP Farmer of the Year Competition included

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<sup>2</sup> When the research for this thesis began in 1999 there were no environmental controls on dairy farming apart from those applied by regional councils to dairy shed effluent and water resource permits, and little or no environmental awareness or concern expressed by any of the leaders of the dairy industry.

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'environmental integrity' as a criterion for the award. In 2002 and 2003 Fonterra was involved in talks with Ministry for the Environment officials and representatives of the regional councils, which culminated in the signing of a *Clean Streams Accord*. The accord will require farmers to fence off their streams from stock access by 2007. An assessment of farm environmental performance will be part of the terms and conditions of supply that each farmer holds with the company. Despite considerable opposition from farmers (NZH, 2003a; TNM, 17/12/02), public comments by Fonterra officials make it clear that the company has been influenced by commercial concern about its marketing image (particularly in the lucrative European and North American markets) and fear that if it does nothing, then regulations will be imposed by government (NZH 26/5/03; TDN 12/12/02; TNM. 14/1/03).

Those fears are not unrealistic. New Zealand's Agriculture Minister (NZH 2003a) warned that if dairy farmers did not support the accord they would face tougher regulations that could involve higher costs. And overseas, New Zealand dairy industry representatives have faced criticism from European farmers for, among other issues, the intensity with which pastures are grazed (NZH 2003b). In short, the dairy industry has made significant moves to improve its environmental performance in recent years. The moves are clearly related to power relationships impacting on the dairy industry from outside, but also within the industry. Inside New Zealand, the dairy industry has faced growing pressure from regional and central government, environmental groups and competing resource users (for example, anglers, recreationists and tourism interests). In the global context, the industry (realistically) fears that poor environmental performance will undermine the major marketing advantage of its 'clean, green' image, and will be used as an excuse to limit entry into overseas markets by trade competitors. Within the industry itself, the resistance of farmers to the Clean Streams accord has been overruled by senior executives who clearly perceive the domestic and international consequences if the industry does not improve its water quality performance.

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**CONCLUSION**

This chapter has argued how the knowledge, values and attitudes that farmers bring to their land management is shaped by their interactions with others, particularly close family and others involved in the industry. The chapter has traversed a selection of theoretical views that together suggest how Waikato dairy farmers share a culture of values, attitudes and land management practices that is strongly focused on achieving economic, technological and business efficiencies consistent with survival in a highly competitive globalised food production system. To the extent that environmental issues are actually considered by dairy farmers and the New Zealand dairy industry, they have been mainly related to aspects which attract threat from overseas competition or loss of markets or regulatory intervention by central and regional government.

The chapter has provided a 'big picture' perspective of how the behaviour of 'average' or mainstream dairy farmers can be linked to the objectives and concerns of the wider dairy industry. 'Big picture' explanations of social and political structures, however, do not easily explain individual variations or departures from social and cultural norms. Why is it that not all farmers maximise production or profit? The next chapter will suggest theoretical perspectives that may provide an understanding of variation and diversity in the way that dairy farmers farm, and why some are prepared to retain native habitat on their farm even if there is a production cost.

# ***CHAPTER 5***

## ***NATURE AND MATERIAL***

### ***REALITY: ANOTHER***

#### ***FORM OF AGENCY***

*Whatever evaluation we finally make of a stretch of land, no matter how profound or accurate, we will find it inadequate. The land retains an identity of its own, still deeper and more subtle than we can know. Our obligation toward it then becomes simple: to approach with an uncalculating mind, with an attitude of regard (Lopez 1986, Arctic Dreams: Imagination and Desire in a Northern Landscape, p.228).*

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The previous chapter argued that our relationships to nature and the natural environment are highly influenced by culture; we learn perceptions, attitudes, values, and priorities that affect our relationship with the environment within the confines of family, peer groups and reference groups, and through the medium of language. The 'construction' of nature is a matter of the mind and a physical fact, as landowners and farmers shape their land according to customary practice in response to their cultural norms and values.

This chapter switches focus and expresses the argument that nature, physical matter and human biology have properties that are fully or partially independent of culture, and that these elements influence the actions of individual farmers and the landscapes within which they live. In this chapter, I provide a counter to a social constructivist interpretation of landscape and the environment and suggest that it is not the only, or even the best, way to understand the landscape of dairy farmers. In particular, it does not explain resistance to the dominant cultural paradigm, exceptions in the way landscape is managed, and surprise in the way

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that interactions proceed. I argue that the landscapes of dairy farmers are shaped by processes that are as much natural and material as ideational, symbolic and cultural.

The key points I make in this chapter are:

- Human beings are part players in the story, not isolated heroes; the role that farmers play in the formation of the Waikato dairy landscape is only one in a complex of inter-related forces.
- Physical and material objects, to the extent that they induce or call forth actions by others (whether people, organisations, animals, or ‘things’), are no less actors or agents than people or organisations.
- Following the above two points, nature and physical matter have agency; that is, they have causative effects on people and culture. Natural conditions such as soil, temperature, climate, topography can facilitate or constrain cultural activities (such as dairy farming); the material reality of roads, buildings, and technological infrastructures (such as dairy factories and laboratories) can enable or disable the production, manufacture and distribution of milk and milk products.
- That which is deemed to be ‘natural’ and that deemed to be ‘social’ is often one and the same: a cow is natural and social. It is natural in its creaturely self, and it is social in its relationship to human beings and human cultural arrangements.
- People are no less natural than social; they are cultural and biological, with biophysical characteristics that shape the way they learn, what they learn, and how they relate to the social and bio-physical world. These biophysical characteristics for certain individuals or in certain circumstances may be more decisive in determining farm management practices than cultural norms and precepts.

The chapter is in four main parts; a short exposition of insights from environmental history about the role of nature as agent in human affairs; a summary of the insights from actor-network theory about agency as a property of relationships; a summary of the ideas of ecological anthropologist Tim Ingold on the organic nature of the relationship between culture and environment; and an account of how all these ideas might apply to the world of Waikato dairy farmers.

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**ENVIRONMENTAL HISTORY AND THE AGENCY OF NATURE**

Ideas about the influence of nature as an independent element in human affairs and human interaction with the environment are not new. At the beginning of the Twentieth Century, geographers arguing for the importance of environment as a determinant of human affairs included the German geographer Friedrich Ratzel, and American geographers William Morris Davis, Ellen Churchill Semple, and E. Huntington (Unwin 1992, 92-98). They viewed the environmental factors of climate, vegetation and geomorphology as providing a crucial material base that determined other aspects of human society, such as settlement and economic organisation. These, in turn, influenced other aspects of society and culture including non-material culture and dominant personality types. Their views were, in some cases, so extreme that they caused resistance to environmentalist interpretations of human relations with the environment, and precipitated or reinforced a division between physical and human or cultural geography that persists to this day.

Although interpretations of those human-environment relations that gave attention to the environmental side of the equation fell out of favour among geographers, they became a focus of interest for environmental historians (Demeritt 1994a; Fitzsimmons and Goodman 1998, 197). A doyen of environmental history, Donald Worster (1990, 1088) suggests that the natural environment has its own ecological imperatives which operate regardless of whether human beings perceive them or not, and that these imperatives have an impact on human affairs. According to Worster, environmental history 'rejects the common assumption that human experience has been exempt from natural constraints, that people are a separate and uniquely special species, that the ecological consequences of our past deeds can be ignored.' Rather, environmental history aims, 'to deepen our understanding of how humans have been affected by their natural environment through time, and conversely . . . how they have affected that environment and with what results' (Worster 1990, 1089). In Worster's (1990, 1144) view, no landscape is completely cultural; all landscapes are the result of *interactions* between nature and culture'.

Furthermore, nature may set limits, impose conditions, or create surprises. In the words of Richard White, (as cited by Fitzsimmons and Goodman 1998, 197), 'Nature does not dictate, but physical nature does, at any given time, set limits on what is humanly possible. Humans may **think** what they want; they cannot

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always **do** what they want, and not all they do turns out as planned'. Nature frequently imposes conditions that human societies have difficulty in coming to terms with. Dunlap (1997, 273), writing about Australia, noted that 'the land battered the ideas [of European settlers] as much as it blunted and broke the tools. The only difference was that the tools went quickly and could be replaced; ideas changed more slowly and new ones had, sometimes painfully, to be made, taking the land into account.'

In similar vein, Holland et al. (2002, 74) have recorded the struggle to impose a pastoral way of life on native ecosystems of New Zealand. The damaging environmental consequences of early methods of pastoral farming survive to this day. 'While settlers understood the need to manage economic risk, it took them many years to appreciate the significance of recurrent environmental events brought about by extreme weather, drought, and flood.'

Among others, Worster has been criticized (Demeritt 1994b; Cronon 1990; White 1990) for conflating nature in the real with ecology as a subject matter (i.e. for failing to distinguish between physical reality and conceptualizations of it), but in my view, this is a pedantic quibble. I doubt that Worster is unable to tell the difference between the processes of nature in the world and the writings of biologists and ecologists about how natural processes are thought to work. While the theories of biologists and ecologists may require revision in the light of empirical evidence, it would take the most obdurate idealist to deny that the biophysical processes of nature have their own agency. Even today, while human beings have the capacity to empty the Aral Sea, create lakes as large as nations, and engineer entirely new genomes, nature delivers events and processes that are beyond our capacity to control or rectify. Even at the local and regional levels, far less on the planet as a whole, we appear unable to stop or reverse the loss of native biodiversity or the invasion of organisms new to the country.

Not all environmental history involves grand sweeping change at macro levels of analysis. One of the great classics of environmental history, 'Tutira' by Herbert Guthrie-Smith (1921, 1999 edn; White 2002; Wynn 1997) is the account of a man who came to New Zealand from Scotland in the 1880s, and spent the rest of his life farming, watching and recording the changes to his land. Guthrie-Smith, an intensely observant and thoughtful man, was able to link the changes he saw in the landscape to broader social, economic and ecological changes in New

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Zealand society. It is a finely detailed book that conveys a rich understanding of the interactions between humans, domesticated plants and animals, and the native landscape in a small part of New Zealand, as well as reasons for those actions and reactions by both human and non-human. As Guthrie-Smith makes clear, the intentions behind his management of the station were not always attended by the expected results. Natural events such as erosion, loss of soil fertility, and invasion by pests and weeds, created sometimes insurmountable challenges.

The relationship between human beings and nature involves an on-going process of interaction. In the words of Butlin and Roberts (1995, 10), 'nature does not create landscapes, stop its work, and then hand over to human agency to complete the transformation: the two sets of processes overlap and interact'. This dialectical relationship has been suggested for New Zealand through the archaeological record of pre-European settlement. There are various interpretations of the interactions between Maori and their environment before the arrival of Europeans (Anderson 2002; Davidson 1984; McGlone et al. 1994), but archaeological evidence clearly indicates dramatic environmental change shortly after the estimated arrival time of the first Polynesians, followed by successive changes in Maori economic and social organization.

Archaeological and other evidence suggests a process of Maori-environmental interaction and mutual adjustment that varied from place to place in accordance with the environmental conditions that characterize different parts of New Zealand. Initial interactions between Maori and their environment were greatly influenced by the cultural heritage of Maori as Polynesians and by the nature of New Zealand's pre-human fauna and flora. It is now accepted that Polynesian settlers caused widespread deforestation of the eastern half of the South Island and, directly or indirectly, the extinction of some 34 species of endemic land birds (MfE 1997; Anderson 2002). McGlone et al. (1994) have argued that the abundance of marine mammals and other marine life, as well as large, flightless terrestrial birds, enabled and perhaps encouraged the tropical Polynesians to settle New Zealand in the first place. Once those resources were exhausted, there was an enforced return to a mixed economy of horticulture and wild foods. With the extinction of large birds and mammals, environmental conditions influenced subsequent patterns of settlement and social organization. McGlone et al. (1994) write that:

Maori settlements and political structures had to reflect the reality that it was only under exceptional circumstances that a limited area could provide all a group needed to survive. The basic Maori political unit, the hapu, had to be large enough to gather all available resources, but not large enough to strain them. Seasonal dispersal and long absences from base settlements were a way of life for most Maori groups. Effective political control over such independent and mobile groups was not possible.

Spatially varied adjustment was influenced by north-south variations in temperature, and east-west variations in rainfall. Once the megafauna had disappeared, the climatic conditions of the North Island provided more favourable conditions for horticulture and there was a concentration of population in the north of the North Island. East-west variations in rainfall made drier areas of the east more susceptible to deforestation, and large areas of both the North and South Islands changed from forest to grassland. Greater rainfall in the west allowed forest to persist or recover from repeated burning, and provided a richer supply of resources (Anderson 2002, 33).

The above analysis is, perhaps, the type of deterministic interpretation that turned later geographers against Ratzel, Semple and the early environmental theorists of the Twentieth Century. But it suggests that environmental circumstances are limiting or enabling, according to cultural circumstance and the dynamic interaction of both. It seems likely that climate change is already influencing the economics and spatial distribution of the dairy industry by making conditions for dairy cows easier (hence more profitable) in the South Island, and more difficult (and less profitable) in Northland. Individual farmers, dairy industry institutions and wider New Zealand society now have a choice about how to react to climate change and its consequences for dairying, but they cannot avoid the fact that climate change has impacts, for example, on the kinds of weeds and pasture plants that will grow and the parasites and diseases that are favoured or not favoured by one climate condition or another – factors that affect milk production.

However, I agree with those critics of environmental history who complain that it is inclined to romanticize and idealise nature and to reinforce the nature/culture dualism. As argued by Demeritt (1994a, 179), ‘the recovery of nature as an autonomous actor and the insistence that nature exists independently from cultural ways of knowing, makes it difficult to talk about how what passes for nature is determined in particular contexts.’ Demeritt argues that by re-enforcing

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a nature/culture dualism and ascribing independent identity to nature, the metaphor of nature as actor tends to pre-empt consideration of the ways in which particular elements of nature are incorporated into relations of power.

#### **ACTOR-NETWORK THEORY AND THE FUSION OF NATURE AND CULTURE**

Like symbolic interactionism, actor-network theory starts with the analysis of relationships and interactions. It analyses the chains of interaction and meaning that take place between 'actors'. It differs from symbolic interactionism by adopting a highly expanded view of what constitutes an 'actor' in social relations; actors, as often as not, are the non-human beings and material objects that shape our interactions and emerge from our relationships.

Actor-network theory is less a unified theory than a stream of post-structuralist perspectives (Law 1999) that incorporate a common set of oppositional attitudes toward grand theory, macro-level analyses of social and political structures, and dualistic modes of categorising the world. Actor-network theorists share not so much a common core of theoretical propositions as a desire to examine social phenomena from fresh and unconventional perspectives and, in particular, to break away from conventional, dualistic modes of analysis (Law 1999).

Relationship is a key consideration for actor-network theorists. They argue that people, their material artefacts, and the phenomena of the natural world acquire their properties in their relationship to other people, artefacts, and natural or material phenomena. An actor is, for the most part, only an actor within a particular relationship and circumstance. Thus a farmer becomes a farmer only when he or she is in relationship to certain animals, and certain conventions relating to land and property ownership. In the words of John Law (1999, 3), 'entities take their form and acquire their attributes as a result of their relations with other entities'. Cow and dairy farmer have 'relational materiality' (Law 1999, 4) in relation to each other, and what they do and what they are a consequence of their relation to each other.

This perception – that entities take their form as a result of relations with other entities – leads to a conclusion that structures do not exist *a priori*, but as a consequence or outcome of network relations and interactions. 'It is not . . . that there *are* no divisions. It is rather that such divisions or distinctions are understood as *effects or outcomes*. They are not given in the order of things'

(Law 1999, 3; italics in the original). Networks are thus strings of relationships associated with particular concerns or enterprises. We may have a milk production network (incorporating among others, farmers, veterinarians, tanker pick-up drivers, and milk testing laboratory technicians), a milk manufacturing network (incorporating the agents involved with milk manufacture) and a milk products sales and distribution network.

A key insight of actor-network theory is that there is no clear division between the human and non-human world. Like environmental historians, actor-network theorists accept the agency of nature in human affairs, but do so in a radically different way. Specifically, they make no distinction between nature on the one hand and society or culture on the other, but insist on objects or entities that are both. In the words of Strathern (1999, 156), actor-network theory deals with 'persons, things, artefacts, and events all in the same breath.' They argue that most phenomena in the human world are neither purely human/cultural, nor non-human/natural/physical, but both at one and the same time. The entity 'dairy cow' is not either natural or human, but both; it is biologically natural, but acquires many of its physical and behavioural characteristics as a consequence of its position and relationships in the social world of humans. As such it is biologically similar to a cattle beast or a steer, but remains a different social entity.



**Figure 5.1 Modified natural stream that has become a drainage ditch** (Photo: M. Jay)

The drainage ditch and the algae that live and multiply within it, are neither wholly natural, nor wholly social, but both. In its unmodified state, the ditch would have been a stream with riparian vegetation to either side, and an assemblage of aquatic plants and animals that was characteristic of a moderately low nutrient status. As a humanly modified stream it contains an aquatic assemblage of plants and animals adapted to highly eutrophic conditions.

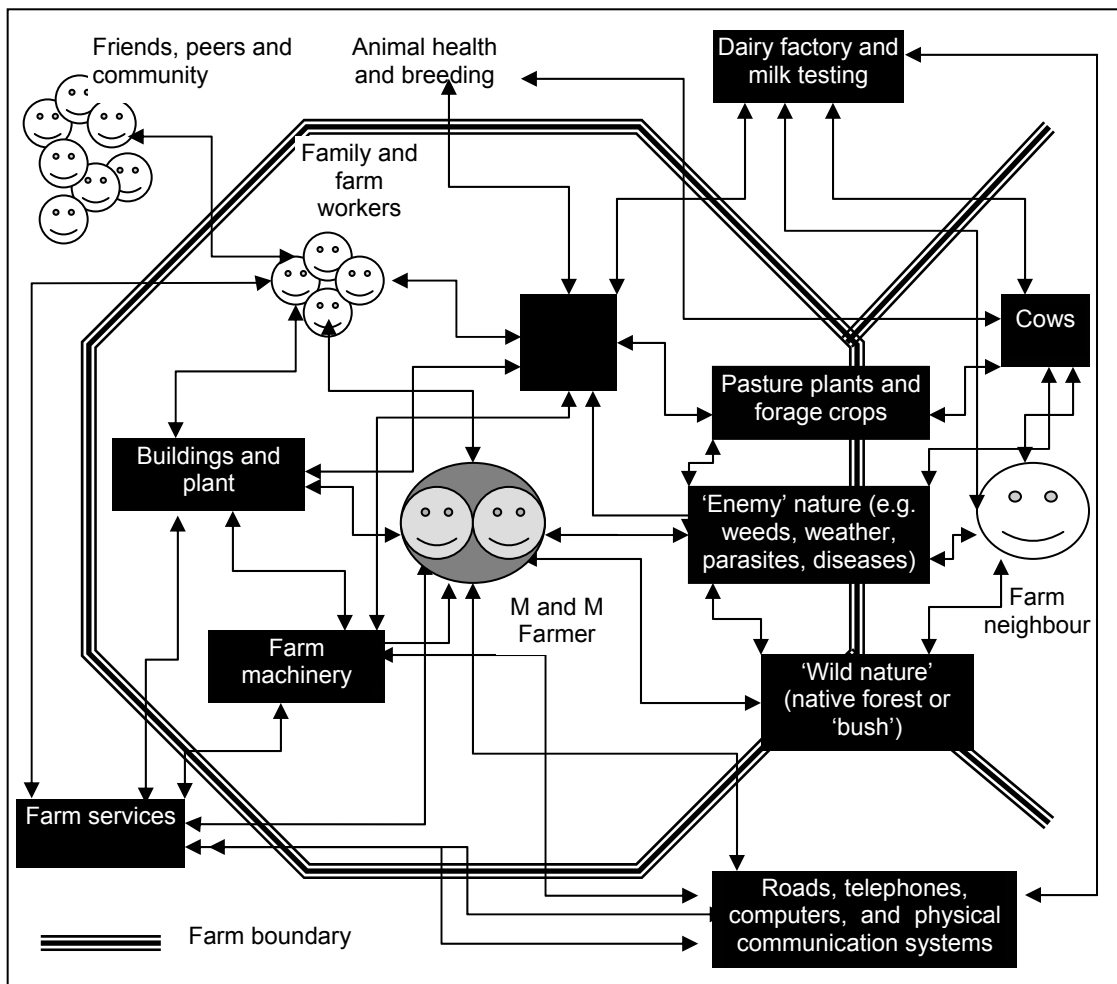
The socio-natural and socio-physical qualities of actors mean that the milk production network includes cows and milk tankers as much as it includes farmers and tanker drivers. Cows and tankers exert an influence on human actions no less than do humans. Thus a farmer spends much of his or her day responding to the needs of cows; the tanker driver and dairy factory motor mechanics spend time responding to the servicing and repair needs of tankers. Actor-network theorists might argue that it is conceptually fruitful to think of activities relating to milk production as a series of network relationships that involve physical, natural and human agents to an equal degree, since events are very much the outcome of the capacities and influence of each on the other.

Just as biological and physical entities may be actors in the drama of human life, actor-network theorists argue that the world of social thought, action, and material construction comprises a non-dualistic reality that involves the cultural (symbolic) and the physical (material) simultaneously. The world that human beings live within is not purely a construction of culturally meaningful objects and relations, rather, it is a composite of humanly meaningful material objects and biophysical entities that have their own intrinsic properties, as well as the social role ascribed to them by culture (Demeritt 1994a, 1996; Law 1999; Law and Moll 1995; Latour 1993). Thus the drainage ditch shown above could equally be an 'aquatic habitat', a 'modified waterway', or a farm drain, and its symbolic qualities would differ accordingly.

According to Latour (1993, 6), many of the phenomena that he studies are 'neither objective, nor social, nor are they effects of discourse, even though they are real, and collective, and discursive'. They are things which have autonomous existence as natural and material objects but are also bound up with social and symbolic significance; as natural objects they have social significance and assigned social roles (Latour 1993, 64). He is saying that the material (natural, physical, and cultural) inheres in the way that people do things as deeply as the conceptual and social. How human beings live, their life-ways, and patterns of action and behaviour, is as much a product of the material world within which they live as of their conceptual worlds and social interaction. By separating the social from the material, or the cultural from the natural, or the human from the non-human, we see and understand only a very partial reality. Further, we deny that the material (e.g. technology, resources, environment) has relevance to the social or spiritual, or that the social or spiritual can have

consequences for the material (e.g. that power relations and status games could be related by chains of causality to poverty and environmental degradation). The linkages between the material, the social, and the conceptual, emotional, and spiritual are noticed selectively, so that we can deny those we do not wish to see.

For this thesis, the two most useful insights of actor-network theory are that there is no clear division between farmer on the one hand, and farm or natural environment on the other; and 'structure' within the dairy farming world is a summation of networks that include the human and the non-human. From an actor-network view, farms and farmers are not so much entities in themselves as points of relationship in a number of densely overlapping networks, linked to other points that are not necessarily human, or non-human, but both. Figure 2 illustrates the kinds of relationships and networks that can be involved on a farm.



**Figure 5.2 Farmer and farm as entities in a network of relationship between human and non-human**

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It shows that the many elements that exist on a farm – its human population, cows, buildings, machinery, pasture plants, weeds, and diseases – are all linked to other entities on and off the farm. The farmer is but one of the entities involved in a network of interlocking chains of relationship linking human and non-human. The linkages between other elements of the network, both on and off the farm, may be vital to the farmer's success or otherwise. Although the farmer may be able to control the nature of relationships between elements (e.g. disease and cows, or soil health and pasture production), there are many elements of the interconnecting networks that are beyond the control of an individual farmer.

Thus the relations between a farmer and his or her land may be impacted by the relations between a complex network of machines and technology (on and off the farm), financial flows of capital and investment, relationships with other people including farm service providers, and so forth. This interconnectedness of networks makes it hard to predict and categorise particular sets of relations between farmer and farm, or farmer and ecosystems on the land. The relationship between farmer and farm or farmer and native bush is the outcome of many network relations between farmer and other points in other networks.

#### **INGOLD AND HUMANS AS BEINGS IN THE WORLD**

Another way of looking at the relationships between people and their environment is that developed by Tim Ingold (1992). Ingold is an ecological anthropologist committed to understanding how culture and environment inter-relate. If culture is a human mode of adaptation to environment, how do the processes of ecology and of culture mesh with one another? If human beings are entirely influenced by culture and if their perceptions of the environment are culturally determined, then how can culture 'fit' itself to the environment in an adaptive sense?

Part of his answer is to argue that human perceptions of nature are not determined by culture – they are not a given set of spectacles that allow us to see only that which culture dictates – but by a process of experiential learning through active engagement with the environment. Basing his ideas on the views of an ecological psychologist, J.J. Gibson, Ingold argues that people come to know the world (including their natural and physical environment) by means of sensory-physical engagement that involves the total person, mental and physical. 'Perception is not a matter of the mental processing of sensory inputs into

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product (percepts) but involves the functioning of a total system comprising both the brain and receptor organs, together with their neural and muscular linkages, within an environmental context. In short, the whole animal, (whether human or otherwise) perceives, not its mind alone' (Ingold 1992, 45).

Ingold, in other words, argues that bodily interaction and engagement with the environment is fundamental to the way that individuals learn to perceive and understand the world; we learn by doing, not talking. In his words, 'people develop their skills and sensitivities through histories of continuing involvement with human and non-human constituents of their environments. For it is by engaging with these manifold constituents that the world comes to be known by its inhabitants' (Ingold 2000, 10). Following this perspective, Ingold (1992, 47) argues that:

Language is not used for generating internal perceptions of our surroundings, nor is it necessary for perception to be shared. The awareness of living in a common world – the communion of experience that lies at the heart of sociality – does not depend on the translation of precepts, initially constructed by subjects from sensory data private to themselves, into the terms of an objective system of collective representations encoded in language and validated by verbal agreement. Sociality is rather given from the start, **prior** to the objectification of experience in cultural categories, in the direct perceptual involvement of fellow subjects immersed in joint action in the same environment.

This perception of the environment, unmediated by culture, allows individuals to respond individually and creatively to the environment as it comes to them. From this viewpoint, cultural 'perceptions' of nature are not so much culturally determined ways of **seeing** the world, but culturally shared ways of **interpreting** the world.

Furthermore, the individual is shaped by the environment (elements of biological and physical nature, other people, and cultural artefacts) as well as by being part of the environment. 'You are what you eat' as the saying goes, and equally, what you eat is what you choose. Ingold views people as human organisms, equally cultural and biological. As biological beings, they share with other organisms the characteristic of emergent development; their development as individuals proceeds as a process of interaction with other elements (people and things) in their environment. What they are is a product of their relationships with other elements in the world around them. Persons in their environment are

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interdependent, and the whole becomes greater than the sum of the parts. In Ingold's words (1992, 51) 'enfolding within persons are the histories of their environmental relations; enfolding within the environment are the histories of the activities of persons. Thus, to sever the links that bind any people to their environment is to cut them off from the historical past that has made them who they are'.

In short, Ingold's answer to the social constructivist view of nature is to do away with the culture-nature dualism and replace it with a notion of environment as that part of the biophysical world ('nature') that is brought into being by engagement. People learn to see, sense and relate to parts of nature (their 'environment') by engagement with those elements of the biophysical world that suit their purpose in the circumstance. Since nature is not everywhere the same, and since people as individuals have reason to engage with different elements of nature in different spaces, the environment of culture emerges or comes into being through the active engagement of individual people in the environment, all going about their multiple activities. According to Ingold, culture is not separate and divorced from nature, but is constituted and constantly re-constituted through the interaction of people with their environment.

Furthermore, in the view of Ingold (1992, 40), 'persons endure through a continuous intercourse with their environment'. As environment changes, to the extent that they endure, individuals must find ways of accommodating to that change or of reconciling conflict between themselves and those elements of the environment that impinge on their purposes. A person is not an immutable fixed identity at birth, nor is he or she an endlessly malleable vehicle of culture. Persons have the capacity to adapt to environmental change, and in doing so, to influence the collective that is culture. Culture thereby adapts to environmental change in accord with the creative responses of individuals to the elements of nature that impinge on their interests and purpose. Culture and environment are emergent entities that arise from the interaction and interdependence of people and biophysical elements. This seems to me an interesting and possibly useful way to consider the landscape of Waikato dairy farmers: that the farmers are as much 'made' by the landscape, as they are the makers of the landscape.

One can view the landscapes of Waikato dairy farmers as 'built' environments, constructed in accord with the intention and prior conceptualisation of the

farmers, or one can think of them as the temporally unstable results of an on-going, interactive process that involves farmers, their machines, technology, industry support structures, cows, pests, weeds, diseases, plants, climate, soil and other natural and physical elements. The latter view sees the landscape as an emergent system greater than the sum of the parts that is in ceaseless change as its constituent elements constantly adjust to one another.

#### **A BIO-SOCIAL PERSPECTIVE OF A FARMED LANDSCAPE**

The relationship between farmers and their environment may be influenced by the biological and physical characteristics of the farm, and this, in turn, will influence the management practices of the farmer. In this chapter, I state how engagement with the world – i.e. practical experience – might be as important as, or more important than, linguistic discourse as a mode of learning for farmers.

The images below suggest how the relationship between a farmer and his or her land (and stock) may be significantly influenced by the physical qualities of the land itself. Figure 5.3 is of land that is well-nigh perfect for dairying; it is relatively flat with rich soils that, with some drainage, can support high production. The farmer (or line of farmers) has responded by clearing all the original vegetation, planting some (mostly deciduous) exotic trees for stock shade and shelter in the summer, and running a large herd of Jersey cows. Jersey cows are a smaller and lighter breed of cattle than the more usual Friesians and, possibly, reflect soils prone to pugging in winter.



**Figure 5.3** Flat, well-drained farm supporting a large herd (Photo: M. Jay)

Figure 5.4 shows a dairy farm that is topographically more difficult for dairy production. It has steep rolling slopes, most of them northward facing. The northerly aspect, and the steepness in parts, means that the slopes will be prone to drying out in summer and to erosion in winter if subjected to the weight of mature cows.

The farmer here has responded to the physical environmental challenges by retaining an area of native bush on the steepest parts of the north facing slope, and planting pines adjacent to the bush. Lower slopes remain in pasture, but to maintain production on the steeper slopes, the farmer needs to be careful about matching the weight of his stock to the steepness of the slope and the time of year. He needs to keep heavy stock off steeper slopes, particularly during the winter. The bush is located on land that would ordinarily be too steep to support mature cows without severe erosion and danger to the cows. Hence, this farm demands careful attention to pasture and stock management and has prompted a response from the farmer that involves a combination of native habitat conservation and commercial tree planting.



**Figure 5.4 A topographically problematic dairy farm on which native bush has been retained and an area of pines planted.** (Photo: M. Jay)

Figures 5.5 and 5.6 show how the built environment can also make a difference in the way a farmer relates to the farm and its physical properties. Figure 5.5

shows a newly built modern dairy shed that allows more than 300 cows to be milked within less than two hours.



**Figure 5.5** Newly built modern dairy shed (Photo: M. Jay)

Figure 5.6 shows a run-down shed that is difficult to keep clean and in good repair and that takes the same time to milk half the number of cows.



**Figure 5.6** An old dairy shed showing the milk storage building at the front (the milking pit is behind and to the left of the milk storage building). (Photo: M.Jay)

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The first dairy shed was shown to me with pride by a sharemilker known as one of the best in the district. The shed is easy to keep clean and gentle on the cows (for example, the suction of the milk cups is gentle). It has an office, where the milker keeps tools, equipment and records, and yarding facilities that allow individual cows to be separated easily from the herd for special treatment (such as veterinary treatment and artificial insemination). The second dairy shed is old, inefficient, difficult to clean, and in poor repair. It took the same time to milk just over half the number of cows as the dairyshed in Figure 5.5. The sharemilking farmer who showed it to me admitted that she felt ashamed of the facilities and resentful of the farm owner; it was one (of several) reasons for poor morale.

Figures 5.3 and 5.4 illustrate how the biophysical properties of a farm can influence the land management of the farmer, while Figures 5.5 and 5.6 illustrate how the material infrastructure of the farm can influence the farmer (or in the case of these two milking sheds, the sharemilker). Actor-network theory allows a move away from social constructionist viewpoints which suggest that people determine what happens on the ground, to the question: 'And what influences their decisions?' In the case of the farmers associated with the two farms and the two dairysheds, the natural and material properties of the farms very clearly had an influence on their decision.

In their encounters with the world of cows, pasture, milking machines, hill slopes, flood plains, pests, weeds, diseases, weather and other phenomena, farmers are not separated from their physical world, nor are they the automatic ciphers of the dairy company and agricultural research stations. They are individuals in relationship with elements of the natural and material world that are endlessly variable. They may view the elements of their environment with a mental store that is well provisioned with the knowledge, theories and value prescriptions of conventional dairy culture, but they interact with a materiality that demands attention on its own terms. In this way, the natural and material phenomena that are part of the farmer's work-a-day world create a separate 'discourse' from that revealed by the discourse of conversations and texts.

It is equally important to note that the world of farmers is not uniform or even predictable. The natural and material world frequently sends new or culturally unanticipated signals which farmers must attend to if they are to survive as farmers. Items break down that the farmer has never dealt with before; stock or

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pasture suffer disease symptoms or damage that have not been encountered before (such as the cow that lost condition for no obvious reason until the farmer discovered she had somehow sliced off half her tongue, or another cow worth over \$1,000 who got her hoof entangled in a piece of wire and cut it right through to the bone). These events mean that farmers must often respond creatively to new or unforeseen circumstances. Although they may respond to events from the natural world as socialised, enculturated individuals, they do not slavishly obey interior cultural recipes for this or that practical situation. Instead, they are influenced by previous experiential learning through direct, unmediated engagement with the natural and material elements of their dairy farm world.

#### **CULTURE AND EXPERIENTIAL KNOWLEDGE**

Different systems of knowledge will develop in different sub-cultures in response to the shared experiences of the group, and the shared beliefs, values and experiences of members of the group. To a large extent, this knowledge becomes a shared cultural heritage on which individuals depend to help them solve the day-to-day issues that they face. Undoubtedly this is the case for farmers, and is one reason why farm discussion groups are appreciated by many farmers, and why magazines, newspapers, and farm management videos are appreciated. They provide a means whereby individual knowledge quickly becomes group knowledge and part of the dairy farmer culture. However, variations between farms and livestock, and the complexity of the total livelihood practice mean that there will always be many situations unaccounted for; situations for which there is no cultural recipe. On every farm the action of farmers in relation to the farm environment is influenced on a daily, weekly, monthly and annual basis as a process of interaction and accommodation between all the natural and physical elements of the land.

Hence the political economy/ecology of the dairy industry is not all-powerful; it cannot control all the communicative interaction – ‘discourse’ – that farmers are involved in. If we take an actor-network approach, and regard human and non-human as equally part of the story, we can suggest that, apart from the discourse between farmers and the dairy industry and related institutions, there is a separate biophysical ‘discourse’ on the farm, between all those elements, biological, physical and material, which are interlinked in the emergent landscape system.

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**CONCLUSION**

This chapter has suggested that there could be a complementary way to interpret the evolution and change of Waikato's dairy landscapes from the political economy/ecology perspective. Rather than viewing landscape as a social construction based on socio-political processes emanating from a dairy industry superstructure, it suggests that the Waikato landscape might be an emergent (and continuously evolving) system that arises from the combined interacting elements of farmers, cows, roads, buildings, weeds, native plants, soils, and the like.

How might that help us to understand the Waikato dairy landscape? It might, for one thing, shift the balance of analytical attention away from the farmer to other elements of the landscape involved in the interactions. It might help us to look for agency in other directions (though neither biophysical, as an ecologist might do, nor sociological, as a social scientist might do). It might also help us to acknowledge that if landscapes are emergent systems, each and every landscape will have its own emergent properties with unpredictable and unique characteristics.

# *CHAPTER 6*

## *THE RESEARCH*

### *PHILOSOPHY AND DESIGN*

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The aim of this chapter is to explain and justify the research design and research methods used for the empirical elements of the study. Chapters 7 to 10 then set out the different components of the empirical research and the key insights that they provided.

#### **THE RESEARCH OBJECTIVES**

Ideally, a research design is a coherent plan of investigation that fits with the theoretical perspectives and aims that underlie the research. As suggested in the literature, notably, Bechhofer (2000), Bouma (1996), Bradshaw and Stratford (2000), and Sarantakos (1993), the research design should be appropriate to the research question and objectives, and based on a broad understanding of methods and approaches, and their strengths and limitations.

Chapter 1 identified the underlying research questions of the thesis. These were:

*Why is there so little native forest left in the Waikato?*

*Why is there still some native forest left standing?*

On the surface, the two questions appear straightforward but the background in Chapters 2 and 3 and the theoretical possibilities provided by Chapters 4 and 5 suggest that there are many ways of answering them and understanding the phenomena behind them. Taken together, the descriptive and theoretical chapters suggest that the issue of remnant native forest must be set within a broader issue of land management practices which arise out of a complex interplay of social, economic, political and practical circumstances which may be influenced by forces that stretch far beyond the Waikato. The drivers of landscape form and change appear to be multiple and diffuse. From the

literature search, it is difficult to identify cause-and-effect relationships between native forest survival and any one social, economic or environmental circumstance. Thus the topic of this thesis does not lend itself to precise hypotheses. Instead, the research aims to identify from the multiplicity of forces that may influence native forest survival, those which appear to be more than usually significant, and to understand more clearly how they might exert their influence.

As mentioned in Chapter 1, an argument that this thesis seeks to examine in particular is that:

*Waikato dairy farmers, in the main, ignore or oppose protection or retention of native forest remnants because they are driven by a production ethic and by cultural institutions and values that hinder or militate against alternative management values such as sustainable management, stewardship and environmental care. Macro-level socio-cultural processes bring about general land management practices by the majority of dairy farmers that result in destruction of native habitat for production purposes.*

Chapter 1 then indicated that in assessing the above proposition, the research would examine the following related propositions:

1. Dairy farmers depend on shared, culturally constructed, knowledge about land management and environmental relations that is primarily focused on quantitative production values. Non-quantifiable values (such as ecosystem services or native biodiversity) are not expressly noted in the dairy industry literature, and are not recognised by most farmers.
2. 'Production', often conflated with 'profit', is a key value that influences dairy farmers, as distinct from other land management values such as 'sustainable production', 'stewardship', and 'environmental care'.
3. Culturally shared criteria of 'production' encourage farmers to maximise production of milksolids per hectare and, incidentally, promote a style of farming that maximises environmental damage.
4. The focus on 'production' as a key farming value is promoted by all sectors of the dairy industry, and this widespread promotion reinforces the concept as a key land management consideration for farmers. For example, dairy farmers depend on scientific research and information-based industries that have a primary focus on production values and criteria of worth.

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5. The productivist values and institutional arrangements which drive land management objectives by Waikato dairy farmers discourage land management practices that enable native ecosystems and habitats to survive.

These propositions reflect the complexity of issues that may be involved; they are not crisp, clear hypotheses, but descriptive suggestions of factors which appear as if they might be relevant in shaping the land management decisions that farmers make. The research design was developed in the light of the above research objectives and propositions. It sought to achieve an in-depth, close-textured qualitative understanding of the multiple priorities, values and socio-economic and environmental circumstances that influence a small sample of mainstream dairy farmers and conservation farmers in the way they manage their land, and why they farm as they do. It then sought a quantitative comparison of a broad spectrum of farmers based on a questionnaire survey of 130 respondents. The qualitative exploration and comparison gave me the experience and background knowledge of farmers and farming to allow administration and analysis of the quantitative survey. The final stages of the research then sought to understand the cultural context of dairy farmers by exploring the political and economic dimensions of the dairy industry, particularly through the medium of dairy industry magazines and reports.

#### **QUALITATIVE AND QUANTITATIVE METHODS**

As explained by Bradshaw and Stratford (2000), qualitative and quantitative approaches address different research questions, employ different research methods, and ensure rigour by those routes. They also provide the researcher with different challenges and call on different intellectual abilities. As a means of learning about a situation, qualitative methods such as participant observation and in-depth interviews provide a richness of experience that cannot easily be matched by books, articles, visual media or quantitative methods. Conversely, quantitative methods encourage a detached perspective that may be more difficult to achieve in the interpersonal situations most common in qualitative methods.

By inclination and background I was pre-disposed to qualitative methods and anticipated that learning would be most effective if it involved multiple dimensions of oneself (e.g. intellectual and emotional). It was also relevant that farming is a very practical enterprise. In light of the considerations outlined in Chapter 5, it was likely that physical interaction with the natural environment might be

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important in influencing the behaviour of farmers. I considered that the only way to realistically discover the importance of practical experience in the way farmers manage their land was to observe and experience some of those practical situations.

Conversely, for the purposes of generalisation, it was necessary to know how representative were the attitudes, values and circumstances of the farmers involved in the qualitative research. That could only be assessed through some kind of quantitative methodology: either analysis of existing data banks or collection of fresh data.

In addition, quantitative methodology, such as a questionnaire survey, demands a degree of intellectual rigour that is a useful complement to the intuitions and observations called forth in qualitative methodology. The process of developing a survey questionnaire requires clarification of thought and examination of the basis of one's insights and hypotheses. When developing a questionnaire, one is forced to ask such questions as: What **exactly** are the relationships that I think are important? **How** are they related and why are they important? Are they the only relationships that might be important? What other factors could be involved? Have the linkages been conceptualised and interpreted correctly? Do the questions relate to the relationships and linkages being proposed?

Although qualitative research may provide new insights and intuitive understanding, it is possible that those insights and understandings may be idiosyncratic or coloured by preconceptions. A quantitative survey can test the insight and understanding by articulated analysis. On the basis of those considerations, I came to the conclusion that the research would have to involve an initial phase of qualitative exploration to ensure greater understanding about farming and land management by farmers, and a follow-up survey to confirm or correct insights and hypotheses obtained through the first phase.

#### **THE ROLE AND TASK OF THE RESEARCHER**

An aim of social science research is to convey understanding about a world of human action and thought in one sphere (in this case, commercial dairy farming) to readers in other spheres (such as the academic world). The process is one of abstraction and translation. A description of Waikato dairy farmers is not the reality of Waikato dairy farmers; it is an abstraction of a complex empirical reality.

As such, it involves selection of 'facts' based on a certain point of view. This means that there is always bias in the way one assesses empirical reality and selects the 'facts' which one wants to convey. The bias is inescapable. That does not mean one should cease the effort to detach subjective perceptions and assumptions from the goal of understanding empirical reality. Rather, it means that one must test one's perceptions and insights as rigorously as possible. This conviction was one reason for undertaking a random questionnaire survey. The survey challenged me to articulate thoughts more clearly and subject them to the test of a larger sample. In short, a guiding principle for the research design was to balance reporting the world of dairy farmers with a richness that conveys understanding, with providing abstract analysis that puts the detail in perspective and suggests how the particularities of the case may have wider significance.

### THE RESEARCH DESIGN

The research strategy involved four principal stages of qualitative and quantitative data collection and analysis, as shown by the following diagram:

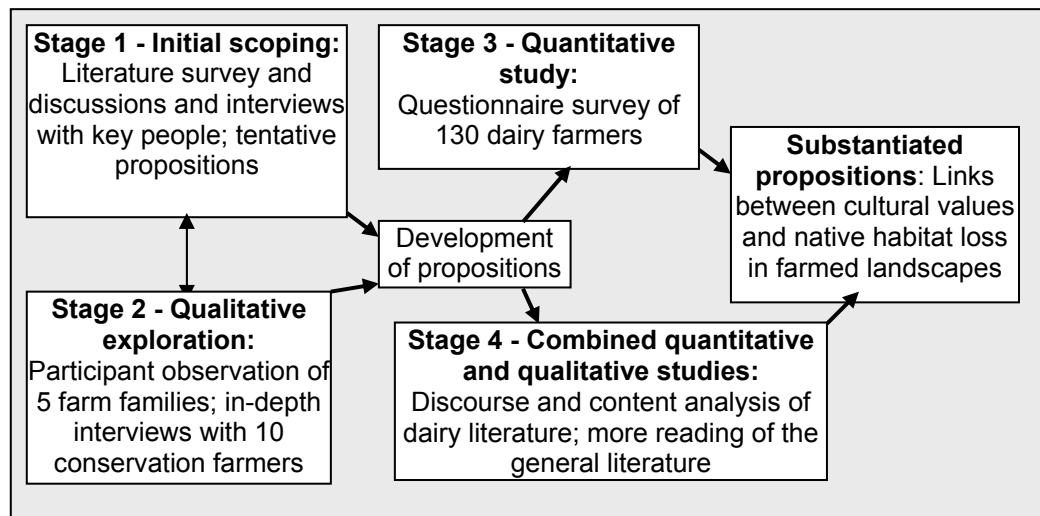


Figure 6.1 Principal stages of the research process

#### Stage 1 – Initial scoping

This involved explorations of the literature, and discussions with knowledgeable individuals about what research had already been done. It quickly became clear that not much published research in New Zealand had focused on dairy farmers, and that in-depth qualitative research was rare. Even conservation of native forest was not a commonly researched topic. Although there were studies that

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compared the attitudes and values of farmers in relation to their land management (e.g. Fairweather and Keating 1994; Parminter and Perkins 1997, Parminter et al. 1998) and other studies that reported attitudes and values (and/or land management) in relation to native forest (e.g. Cruickshank and Peuckert 1989; G.A. Wilson 1992), I was unable to discover any research that involved a comparison of the attitudes, values and management practices of mainstream and conservation farmers as they relate to native forest.

## **Stage 2 – Qualitative exploration: comparison of ‘mainstream’ and ‘conservation’ farmers**

Stage 2 involved two separate stages, ethnographic observation of a small sample of mainstream dairy farm families, and in-depth interviews of a sample of farmers who have indicated commitment to conservation of native habitat on their farms.

*Stage 2.1 – Ethnographic participant observation.* Five ‘typical’ dairy farm families were observed over a 10-month period of the annual dairy-cycle from October 1999 to August 2000. The purpose of this segment of the study was to gain a realistic understanding of what is involved in being a dairy farmer, and why mainstream dairy farmers farm as they do.

Justification: The argument of the thesis is based on a cultural interpretation of farmer values and practices. Participant observation and, even more so, the ethnographic method are effective ways to obtain a holistic understanding of the lived experience of people with a particular way of life (Flick 1998; Miles and Huberman 1994). Participant observation allowed observation of farmers in their day-to-day activities and helped to provide a more complete understanding of farming as a practice and the influence of the farm on the decisions of the farmer.

*Stage 2.2 – In-depth interviews.* In-depth interviews were conducted with 10 ‘conservation’ farmers and other key informants. The ‘conservation’ farmers were those who had shown a strong commitment to environmental conservation, for example, by covenanting some of their land.<sup>1</sup> This research segment followed the participant observation stage because it was necessary to know the

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<sup>1</sup> The term ‘conservation’ farmer was not a term used by the individuals themselves, but is used for the purposes of this research to distinguish farmers who have shown unusual commitment toward

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cultural norms of dairy farming in order to assess if, and to what extent, the conservation farmers are different from the norm.

Justification: The aim was to seek whether there are particular values and farm management practices that could be related to conservation of native bush. Covenanted land is a lengthy, sometimes expensive, legal process that involves registering a legally binding restriction on the use of the land. Farmers who covenant land are near one end of a continuum moving from farmers who remove native vegetation, through those who tolerate it, to those who protect it from stock but do not initiate legal protection, and, finally, those who protect and actively manage remnant habitat for conservation purposes.

Qualitative exploration and comparison in Stage 2 aimed to discover differences in farming philosophy and values between conventional and conservation farmers, as well as possible differences in the personal and socio-economic circumstances that might influence decisions about land management.

### **Stage 3 – Quantitative study: the questionnaire survey**

This involved a survey of a random sample of 130 dairy farmers drawn from the Karapiro, King Country and Port Waikato electoral rolls. The aim was to test the observations and insights gained from Stage 2 and, if possible, to obtain an impression about the extent of conservation attitudes towards native forest.

Analysis of the questionnaire survey brought in the term, ‘farmers with bush’ to describe farmers who have native forest remnants on their farm, whether or not the remnants are protected. The term is used because the quantitative survey did not provide information to distinguish between committed conservation farmers and those who retain native habitat but do not protect it, or those who tolerate it because they are unable or unwilling to remove it. The term includes ‘conservation’ farmers, as well as farmers who have made no efforts to protect their native habitat from stock access or other sources of deterioration.

Justification: The majority of farmers are likely to fall between conservation farmers at one end of the continuum and farmers with little or no concern for native habitat at the other. A survey can indicate what proportion of farms have

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protection of native habitat for example by providing legal protection and fencing to prevent stock access.

indigenous vegetation on them, an overall picture of dairy farmer attitudes to native bush, the values farmers place on bush remnants, and an opportunity to test relationships suggested by qualitative inquiries. The survey was expected to provide data for a more systematic comparison of conventional and conservation farmers.

Stages 2 and 3 provide for qualitative and quantitative comparisons of the attitudes, values, backgrounds and social circumstances of 'typical' and 'conservation' farmers, as far as these can be ascertained by in-depth exploration of a few individuals and a broad-brush questionnaire survey of 130 others. The process can be represented as follows:

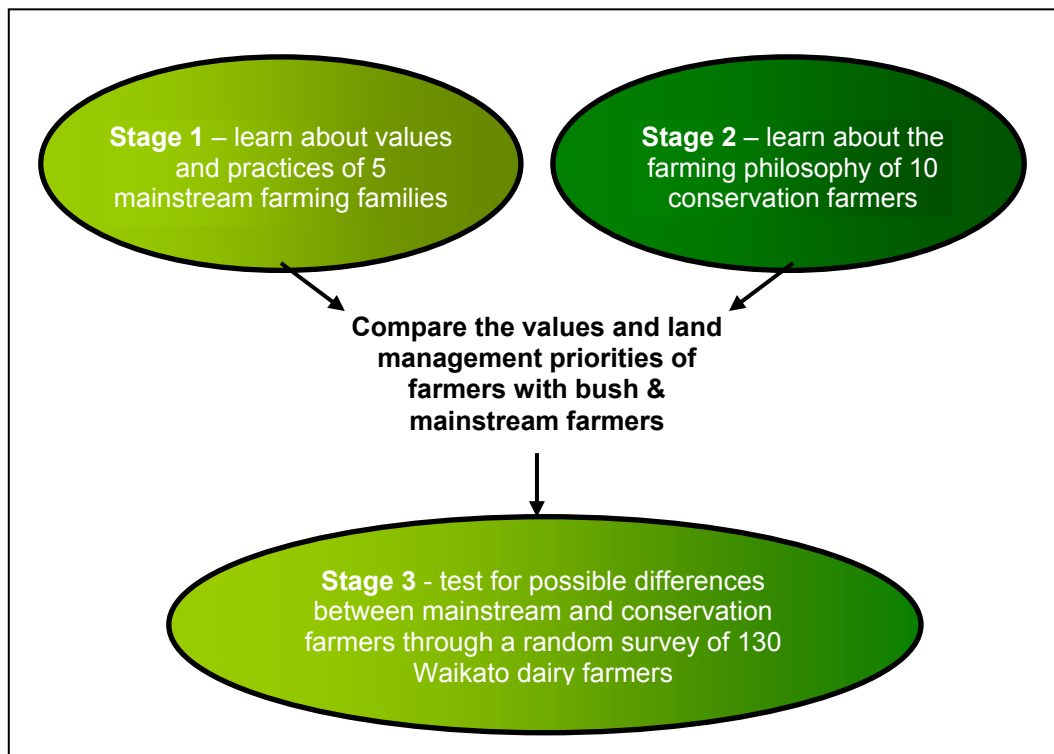


Figure 6.2 Diagram of research process

#### **Stage 4: Combined quantitative and qualitative studies: analysis of dairy industry literature**

This stage involved two types of research: firstly, discourse analysis of primary sources of farmer information; and secondly, content analysis of 200 magazine articles from the New Zealand *Dairy Exporter*.

Justification: This segment of the research aimed to obtain a picture of cultural factors that influence the decisions of dairy farmers, particularly the images and

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information flows they receive from the dairy industry and dairy farm news media. The discourse analysis was intended to convey the richness of detail about the messages that farmers receive from different parts of the dairy industry. It allows interpretive analysis, but cannot 'prove' that messages discerned by the analyst are the same as those picked up by the farmer. The content analysis was intended to assess the extent to which the popular dairy farmer media addresses production issues compared with environmental matters.

A further justification for both the discourse and content analyses was to provide a test for the theoretical proposition that farmers ignore or oppose protection or retention of native forest remnants because they are influenced by cultural institutions and values that militate against alternative management values. The discourse and content analyses applied to documentary sources that are typical of those which cross the farm gate daily or weekly. If I were to discover marked differences between the values, attitudes and farm management philosophy expressed by farmers with the images conveyed by farm media, it would suggest that cultural 'constructivist' interpretations were perhaps not as significant as the theoretical propositions suggest. If the media express messages that are strongly productivist and weakly environmental, and farmers likewise indicate attitudes that are strongly productivist and weakly environmental, it would reinforce the cultural constructivist interpretations.

### **The use of multiple methods, triangulation and robustness**

Use of multiple methods and different sources of information provides for robustness of research that allows the inferences from each method to be tested against the others and, if necessary, modified. Some of my assumptions at Stages 1 and 2 of the research had to be modified in the light of the Stage 3 survey findings. For example, I was surprised by the proportion of respondents to the survey who indicated they had native bush on their farm, and by the proportion of farmers who said they would have liked native bush on their farm.

Use of multiple methods is known as 'triangulation' (Sarantakos 1993, 155). It is often practised to increase the validity and reliability of the research; if the same finding is discovered by different methods, it is considered a reliable finding, and if a conclusion is in accord with a theoretical proposition or hypothesis, it is considered to be valid. Sarantakos cites Lamnek (1988) to the effect that triangulation is inadequate if the methods are based on wrong conditions and

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wrong research foundations; if they are used as a way of legitimising personal views and interests; if the methods cannot be replicated; or if the methods are not relevant to the subject under study (Sarantakos 1993, 156).

In the case of this study the use of multiple methods was intended to add robustness to the research. Trying to find answers to the two research questions was like fishing for a number of elusive fish in murky waters. The different methods are like nets of different mesh size. Even if a number of 'fish' have escaped the investigative net, the use of multiple methods enabled a more representative 'catch' than would dependence on just one or two methods.

#### **ETHNOGRAPHY AND PARTICIPANT OBSERVATION**

Ethnography and participant observation share similar objectives and methodological philosophies. Both involve participation by the researcher in the life-worlds of the people being researched, and both assume that meaning is an important dimension of human action. Participant observation covers the range of research methods, from full participation in the lives of the people being researched, to detached observation at the other. Ethnography involves the former and can run for months or even years.

The field research for this thesis is better described as participant observation because I did not live with the farmers I studied. However, it involved some aspects of ethnography in that it was spread over 9 months, involved repeated visits to the same families, and participation in their family and farm activities (e.g. family meals and social events as well as milking and feeding out hay to the cows). Because it involved repeated visits over many months, I came to recognise and understand aspects of farm life that would not have been evident from one-off visits or discrete observations. In addition, the aims of ethnography as articulated by anthropologist Clifford Geertz were central to my views of the researcher's task.

To Geertz (1973), ethnography is 'thick description'. By that term he means a process of coming to understand, translate and record the details of other peoples' lives in ways that convey the sense and logic of their way of seeing and doing. It is a way of rendering the meaning of other people's actions, and recording that meaning in terms that readers of the ethnographic record can understand. Geertz notes three distinct aspects of the ethnographic process:

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interpretation; identifying the flow of discourse that provides context for interpretation (i.e. identifying the social frame); and fixing the discourse into a timeless frame by lifting it from its temporal moment (i.e. recording the discourse as a fixed record outside its temporal context).

The effort and process of understanding (i.e. interpreting) the meaning of a particular action can only take place through analysis of the cultural context within which that action occurs. Actions derive their social meaning and purpose as part of a system of shared conventions, expectations and the beliefs held by the actors. For example, within the context of New Zealand culture, the person who casually greets an acquaintance with, 'Hello! How are you?' does not expect the other to go into a long description of his or her aches and pains. However, if the exchange is between a doctor and a patient, or if the person greeted is a close friend, then the greeter might expect a detailed reply. For a New Zealander, further differences of meaning (and the social identity or status relationships, of the people involved), can be inferred by the use of different terms: 'Good morning', 'G'day', 'Kia ora', 'Morena', 'Tena koe', as well as by non-verbal gestures such as shaking hands, nodding, eye contact etc. The significance of 'How are you?' can only be assessed by reference to the context of the occasion and in the knowledge of a code of conventions and mutual expectations between the people involved. That knowledge comes from the gradual accumulation of knowledge about the discourses that surround greetings, and the way they vary from one social context to another.

Ethnography allows cues to be picked up in ways that are not possible from one or a series of interviews. For example, it was soon evident that milk hygiene is an important issue for dairy farmers, and that bacterial cell counts in milk are a major concern for the average farmer because they may be penalised for milk with a high cell count. But full understanding of the complex exchange of information between a dairy company and a farmer only came after several months of observing the behaviour of farmers when the daily record of information on milk production and milk quality for the previous fortnight arrived. In that respect, the field research was ethnographic because it enabled a build-up of knowledge and understanding about the meaning of events experienced by dairy farmers.

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Ethnographic observation provided opportunities to notice the importance for farmers of experiential learning discussed in Chapter 5. As they showed me their animals, paddocks and elements of the landscape, the farmers demonstrated how acute were their perceptions and judgements related to management decisions. On the basis of lived experience they could assess the amount of grass in a paddock and how much of the area they would need to fence off each day to provide their cows with enough grass. If they gave the cows too much then precious feed would be wasted; if too little then the cows would suffer and produce less milk. Farmers constantly have to make fine judgements about the welfare of their cows and the state of their land. Some do so on the basis of recommended formulae – so many kilograms of dry matter per cow per day; so much fertiliser per hectare – but the variability of cows, weather, soils, grass, and other factors, mean that no formula can account for every circumstance and most farmers learn to make their judgements through experience.

Ethnography as participant observation can engender an effective learning atmosphere because it involves the person as a learning 'instrument'. Because it is situational and interactive it tends to involve most or all of the sensory perceptions of the learning person and this, in turn, helps enrich and reinforce memory. For example, I was able to remember incidents of behaviour and interaction on the farm more vividly than I could remember conversations during interviews. This was because remembered incidents gave access to diverse cues when searching memory to write down field notes. Ethnographic observation provided a form of physical, sensory and emotional immersion that reinforced the learning response. It also involves redundancy and repeated messages in different contexts. If I failed to pick up a cue the first time, I could pick it up again the second or third time. The different contexts in which such cues did or did not occur helped to indicate more about the significance and context of particular cues.

The ethnographic method is an iterative process of asking questions, collecting data, analysis, interpretation, making an ethnographic record, hypothesising/asking questions on the basis of the record, collecting further data, analysing, interpreting and recording. It serves to develop an accumulated understanding of actions and their meanings.

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**SYMBOLIC INTERACTIONISM AND THE CONSTRUCTION OF SOCIAL REALITY**

The theoretical relevance of symbolic interactionism was explained in Chapter 4. According to symbolic interactionism, individuals learn ways of viewing the world and realms of meaning from their interaction with others. Methodologically, symbolic interactionists 'attempt to take the role of the subject and to interpret the context in which the behaviour takes place. . . . The point is to seek human truths as they are constructed and enacted by the subject' (O'Brien and Kollock 1997, 19). I sought to follow this approach during participant observation and interviews by analyzing actions and discussion in the light of the circumstances. The approach has been outlined by symbolic interactionist, Herbert Blumer (1969, 40). He uses the term 'exploration' to describe 'a flexible procedure in which the scholar shifts from one to another line of inquiry, adopts new points of observation as his study progresses, moves in new directions previously unthought of, and changes his recognition of what are relevant data as he acquires more information and better understanding'. It is a stage of getting to know the worlds of people under study, before attempting to specify hypotheses or set out pre-designed research procedures.

Blumer (1969, 22-27) argued for an empirically based research methodology which he set in contrast to the conventions of the logico-positivist approaches that he saw as the 'overwhelming bulk' of sociological and social psychological research of his time. The shortcomings of conventional approaches, as he saw them, were an 'almost universal failure to face the task of outlining the principles of how schemes, problems, data, connections, concepts, and interpretations are to be constructed in the light of the nature of the empirical world under study' (Blumer 1969, 27). In his view, reality exists only in the empirical world and not in the methods used to study that world; it is to be discovered in the examination of that world and not in the analysis or elaboration of the methods used to study that world.

A criticism of the methodology suggested by Blumer is that it may lack theoretical rigour and fall prey to emergent social or political bias as a consequence of the 'unstated assumptions of the researcher, the climate of opinion in the discipline, and the distribution of power in the interactive setting' (Huber 1973b, 282, as cited by Denzin 1992, 49). This was a danger I appreciated in that I had to be careful not to impose my own preconceived notions on the data. I had assumed from the beginning that there would be significant value differences between

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mainstream and conservation farmers, and constantly had to fight against imposing preconceived notions onto individuals of one or the other ilk.

'Grounded theory' is a methodological procedure that developed from the views expressed by Blumer. It uses the research process to develop theory through systematic observation and induction (Flick 1998; Glaser and Strauss 1967; Strauss 1987; Strauss and Corbin 1990; 1997). Conceptually, the method aims to discover social organisation based on the assumption that it is the outcome of repeated interactions and meaningful relationships between people over time. Observation of such interactions will give rise to insights about the possible meanings and connections between observed patterns of behaviour, and these insights can be tested empirically by designing sampling procedures that will throw light on the behaviour in question. The theory is termed 'grounded' because it is said to come from and be 'grounded' in the research methods used.

The systematic procedures developed by Strauss and others have become highly elaborate, rigorous and detailed. They involve complex systems of coding, 'memoing' (i.e. recording of possible theoretical insights) and sampling designed to observe people's behaviour under different, theoretically relevant, circumstances. I approached the participant observation studies of the farm families in the flexible manner suggested by Blumer and my data recording and analysis techniques for this element of the study were strongly influenced by the techniques proposed by grounded theory. However, I approached the observation of the five farm families with an open, but not an empty, mind. To the contrary; my mind was full of research assumptions and propositions from the outset. Empirical observation required change to some of these assumptions but gave the basis for new or revised theoretical propositions.

#### **THE QUANTITATIVE SURVEY AND ITS JUSTIFICATION**

Efficient and effective research requires all elements of a research design contribute to the objectives of the research (Bechhofer and Paterson 2000). This is especially so for methods, such as sample surveys, that can be demanding of time and resources.

To avoid the additional time and trouble of a sample survey, I explored sources of information that might provide a substitute for a survey. These included Ministry of Agriculture and Forestry publications and statistics, Livestock Improvement

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Corporation dairy statistics, contact with staff of AgResearch, the Dairy Research Institute, the Ministry of Research, Science and Technology (MORST), and the Department of Statistics. Almost all the surveys examined did not draw a clear distinction between dairy farmers and other types of farmers. Although there is information available on land use and land cover, and different spheres of environmental management by dairy farmers (e.g. Fairweather and Keating 1994; Parminter and Perkins 1997; Parminter et al. 1998), there is little published information about the proportion of dairy farms that contain native vegetation, or the values, attitudes and management practices of farmers in relation to native vegetation (but see the references in Chapters 2 and 3 to Burns et al. 2000; Cruickshank and Peuckert 1989; Denyer 2000).

I was unable to discover information in the standard Ministry of Agriculture and Forestry surveys or Department of Statistics agricultural surveys, or elsewhere about the nature and extent of native forest on dairy farms, and the values, attitudes and management practices of dairy farmers in relation to native habitat. Because dairy farmers are tied to a political economy of global dimensions, and subject to productivist pressures from the dairy industry, I concluded that a sample survey could be worthwhile. (See Appendix 3 for questionnaire.)

#### **DISCOURSE ANALYSIS**

Discourse analysis concerns the content and construction of the language and, latterly, visual communications media, used in everyday discourse to reveal structures of knowledge and social practice characteristic of different groups of people. A discourse is a communicative process within a realm of meaning that is shared by those who take part in it. The aim of discourse analysis is to uncover or 'deconstruct' the meanings and assumptions that underlie cultural forms of communication, often with the intention of exposing power relationships between and within different societal groups.

The focus of discourse analysis is the 'text' in its social context. 'Text' was originally used by linguistics to refer to linguistic texts, including any written or spoken product of language (Fairclough 1992). That meaning has been broadened to include virtually all forms of culturally meaningful production including economic, social and political institutions (Johnston et al. 1994, 621). Although the concepts of text and discourse have been broadened to include

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almost any form of communication within a social context, a major focus of such analysis rests on language and language-related media.

An assumption underlying discourse analysis is that 'linguistic practices [are] the primary medium through which social processes operate. Social and institutional diversity is established and perpetuated through diversity in linguistic usage, different 'ways of speaking'' (Lee 1992, x). Furthermore, linguistic practices reveal 'frameworks that embrace particular combinations of narrative, concepts, ideologies and signifying practices, each relevant to a particular realm of social action' (Barnes and Duncan 1992, as cited by Johnston et al. 1994, 136). Lee (1992), Fowler (1991), Fairclough (1992; 1995a; 1995b) and others have used the analysis of media texts (newspapers, TV, movies, advertisements) to analyse social and political structures and changes within society.

'Critical discourse analysis' is an approach which

. . . sets out to make visible through analysis, and to criticize, connections between properties of texts and social processes and relations (ideologies, power relations) which are generally not obvious to people who produce and interpret those texts, and whose effectiveness depends on this opacity (Fairclough 1995a, 97).

More succinctly, Wodak describes critical discourse analysis as a means to make 'transparent structural relationships of dominance, discrimination, power and control as manifested in language' (Wodak 1997, 173)

Fowler (1991, 222) provided a ground-breaking analysis of how language is used in newspapers to shape the ideas and beliefs of readers. He argued that,

News is not a natural phenomenon emerging straight from 'reality', but a product. It is produced by an industry, by the relations between media and other industries, and most importantly, by relations with government and with other political organisations. From a broader perspective, it reflects, and in return shapes, the prevailing values of a society in a particular historical context.

Fowler's focus is the way in which media such as newspapers shape and reinforce the worldview of their audiences. Reader and journalist alike are involved in a discourse which contains values, assumptions, conventions and a world view that is the outcome of ongoing interaction. He notes that the construction of news is a process that involves both writers and readers in an

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interactive and creative process but one that is essentially structured by institutional context and independent of any specific individual.

The arguments put forward by the discourse analysts make sense, in particular that the media express as well as reinforce the values of their readers. Chapter 10 discusses the results of content analysis of articles from the *New Zealand Dairy Exporter*, a subscription magazine that relies heavily on its readership for subscription income and advertising. Given that it has survived competition from other farmer magazines (many of them distributed free) for decades, it is a reasonable assumption that it has survived because it reflects and reinforces the values, assumptions and concerns of New Zealand dairy farmers.

The linguist, Norman Fairclough, has had an important influence on the practice of discourse analysis. His approach is widely accepted and adopted as a methodology in the social sciences (see, for example, Blommaert and Bulcan 2000; Collins 2000; Darcy 1999; Hastings 1999a; Hastings 1999b; Taylor 1999). Like Lee and Fowler, he uses linguistic analysis of mainstream news media to demonstrate how selection of 'news' and the writing and speech of the major news media (newspapers, radio) reinforce the established social order (Fairclough 1995a; 1995b). In doing so, he has provided a model for such analysis and this is the basis for the discourse analysis of dairy farmer texts examined in Chapter 9.

### **CONTENT ANALYSIS**

According to Frey et al. (1992, 195), 'A primary goal of content analysis is to describe characteristics of the content of the messages in mass-mediated and public texts.' They define content analysis as, 'an objective, systematic, and quantitative approach to analysing texts' (Frey et al. 1992 198). Neuendorf (2002, 1) defines it as, 'the systematic, objective, quantitative analysis of message characteristics.' The aim is primarily description rather than interpretation, although interpretation may be involved as part of the analysis.

Content analysis generally involves a systematic procedure for selecting and analysing the material in accordance with pre-determined criteria. The focus of such analysis is the content of the communication, rather than the wider social context of the communicative exchange. 'Texts' may include books, reports,

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articles, films, videos, photos, or other forms of communication (such as stories, myths, conversations and interviews). According to Frey et al. (1992), 'objective' means that the analyst attempts to define the criteria for analysis with sufficient clarity and detail that persons other than the analyst can obtain the same results from the same content. 'Systematic' means that a consistent procedure is applied to each unit of analysis, that all relevant content is analysed, and that the analysis is related to a clearly articulated research question or set of hypotheses. 'Quantitative' means that the analysis yields measurable data.

The reason for including a content analysis of a dairy farmer magazine in the research was to counterbalance possible biases of interpretation in the discourse analysis. It also provided a way of getting to know the farming media better, and of ensuring that I did not overemphasize their productivist content while underemphasizing their environmental subject matter. Content analysis provided another window onto the world of dairy farmers.

#### **CONCLUSION**

The research design for this thesis involved a combination of linked qualitative and quantitative methods designed to provide an awareness of the day to day practicalities of dairy farming and an understanding of farmer attitudes and values toward the environment, then to test some propositions based on the initial qualitative exploration. Qualitative methods included participant observation of five farm families over a period of 9 months from October (when cows are mated) to July-August (the beginning of calving), in-depth interviews of 10 committed conservation farmers, and a discourse analysis of significant dairy farmer 'texts'. Quantitative methods involved a random survey of 130 dairy farmers within the Waikato region and content analysis of a random sample of 200 articles from a popular dairy farm magazine. The overall research design was intended to provide in-depth understanding of the culture of dairy farmers and the organisational context of the dairy industry, and a comparison between mainstream or 'typical' dairy farmers and 'conservation' dairy farmers who had withdrawn land from milk production.

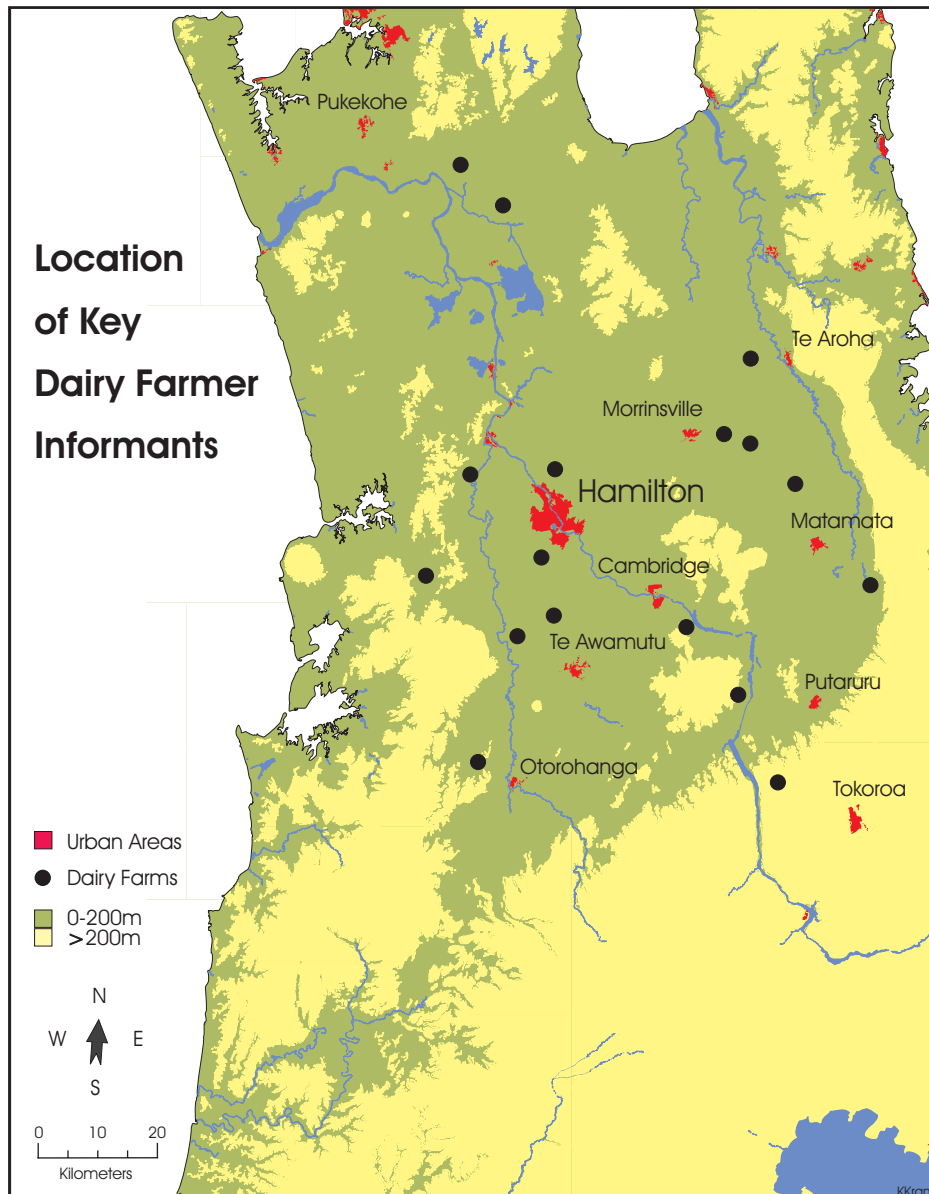
# ***CHAPTER 7***

## ***THE RICH TEXTURE OF FARMING LIFE***

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The previous chapter discussed the research design and explained the qualitative and quantitative approaches to the research. It described how the research proceeded from initial participant observation of five farm families and in-depth interviews of conservation farmers, through a questionnaire survey, to an analysis of dairy farmer texts. This chapter reports the participant observation and interview study while the following chapters report and discuss the results of the questionnaire survey and analyses of texts. Figure 7.1 shows the location of the key farmer informants involved in these two initial stages of the research.

The chapter starts with a summary of methods for recruiting participants, data collection, and factors which may have influenced the research results. It then describes what is involved in being a dairy farmer and factors that influence land management. These include the nature of dairying as a livelihood, elements of risk involved, sources of knowledge and indicators of farming success, reliance on support structures, the ideal of the 'good farmer', and perceptions of the environment. It teases out differences between mainstream and conservation farmers and suggests possible links between variations in the factors that influence land management and protection of native forest.



**Figure 7.1 Residential location of participant observation farm families, conservation farmers and other key dairy farmer informants**

## **METHODS**

### **Participant observation study**

The initial stage of participant observation involved deciding how much time was available for field work, criteria for selecting families, recruitment of families, and ethical clearance procedures. I decided to involve at least four farm families for detailed investigation and visit each family once monthly over the farming year. This limited the burden of visits on each family, but allowed me to make regular and frequent observations. It also meant that I was able to explore differences between families.

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I decided at the outset that the families needed to be 'typical', meaning that they made a living out of dairy farming and were average in terms of farm size, number of dairy cows and quantity of milk production. To recruit the families, I asked friends if they knew of any families who would be prepared to take part in research of this nature for a year. The families were approached indirectly and could say 'no' without giving offence. I then sent a letter to each family, with an explanation of the research and a copy of an ethical approval form, and followed up that letter with a visit. One family decided to pull out after that visit, so I asked friends again and was introduced to another family. Altogether, five families were involved for most of the period. The home visits extended from October (when cows are mated) to July-August, when calving is in full swing. Two families had young children, two were two-generation families (a senior couple with a sharemilker son), and one was a single woman. They were typical in terms of the size of their farming operation, but a comparison of their average milk production with that for South Auckland showed that they were above average in terms of production.

I would phone each family a few days in advance to set a time to visit, and normally arrived at the dairy shed by 6am. I helped put milking cups on the cows, and assisted as well as I usefully could (e.g. hosing down the yard). I would then go back with the farmer for breakfast at about 8.30 or 9.00am. We would talk for an hour or so, and I would then go out with them to observe whatever job was happening (e.g. moving stock, cleaning rubber on milking cups, weed spraying, vaccinating stock), or else I would leave, sometimes returning for the afternoon milking. A decision to leave or stay depended on whether or not it was convenient for the family. I never spent an entire day on any farm, although taking the visits as a whole, I was able to observe the routines of a normal day, and for much of the dairy year.

### **Data recording and analysis**

Data were recorded by dictaphone and hand-written notes after the visit. The dictaphone ensured an accurate record, but my hand-written recollections gave a holistic description. Once the notes were written up, I sent them back to the families and asked them to correct any misconceptions or remove any information they did not want to have recorded. That process provided a 'reality' check, and provided them with an opportunity to give feedback about my reporting and interpretations.

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My ability to ask questions and listen improved with time. Here, the dictaphone was useful because it made me aware of what I was doing. Initially I did not give people enough time to answer questions before responding to what they were saying. As time went on, I became better at asking fewer questions and encouraging people to speak by gestures and appropriate noises which did not break the flow of their thoughts; I became less obtrusive as an inquirer.

What to record? This was where the ‘grounded theory’ notes came into their own. It was useful to go over my notes after a visit and to decide discussion points for the next meeting. I coded my field notes according to topic, and developed ‘memos’ about different themes. Those notes and memos helped me understand what was important to each family, and why.

In terms of analysis, it proved important to analyse ‘on the run’, because this was when events were fresh in my mind and when I was most actively involved in thinking about issues, relationships, and connections. I learned with time and my notes became more sophisticated.

### **Survey of conservation farmers**

Ten in-depth interviews with conservation farmers were completed, as well as interviews with individuals whom I did not class as ‘conservation’ farmers<sup>1</sup>. The respondents were all referred to me as outstanding examples of environmental awareness and these referrals were from district council officers, Queen Elizabeth Trust II officers, and prominent environmentalists in the region.

I sent an introductory letter to each participant with an explanation of the research and a copy of the consent form (shown in Appendix 1). This was followed by a phone call to arrange a mutually convenient time to meet. We met in their homes, with both partners present, and the interviews lasted from two to three hours. They were open-ended and the content evolved as I learned more and discovered new questions (as is advocated by grounded theory). However, there were topics I wanted to cover, such as basic farm facts (e.g. area and

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<sup>1</sup> For example, one was a young woman who had persuaded her father to set aside land; another was a farmer who had completed a resource consent to discharge waste water, and had reformed his practices as a consequence of the requirement to take regular samples of the water downstream of his discharge; another individual had recently entered farming after being a farm consulting officer for many years.

topography of farm, area retired from production, and the type of farming engaged in), the family situation, farm management and farm philosophy and values. Having already discovered some farm management practices and the philosophy of mainstream farmers, I hoped to discover clear differences between the two groups. Toward the end of the interviews, I began to anticipate the questionnaire survey and the questions became more specific and focused on the issues I would be asking in the questionnaire survey.

Field notes were transcribed after each interview and copies were returned to participants, with the request that they inform me if there was anything they wanted to correct. The final notes were those that had been viewed and approved by the interviewees.

### **Ethical issues**

The University's ethical clearance procedures require the informed consent of individuals, that complete privacy and confidentiality of information sources be maintained, that risk to the researcher and informants be minimised, that there be no deception, that there be no exploitation of researcher or participant, that property rights be respected, and that conflicts of interest be avoided. None of those requirements proved difficult to achieve. Participants in the study (the mainstream farmers as well as the conservation farmers) were informed ahead of time about the aims of the research (See Appendix 1), and at the start of field work or interviews I explained the issue of confidentiality and their right not to answer questions or to withdraw from the study. I also explained that they would see my field notes, and I made my environmental concerns clear. As a 'thank you' I sent all who were involved in my research (including those involved in the questionnaire survey), a 44-page report of the main results of the field research<sup>2</sup>.

### **Reflections on the research experience**

Characteristics of age, personality and academic status had an influence on the process of interaction and information gathering in the research. The participants did not perceive and relate to me in completely neutral terms. As an older woman, a 'townie', and an environmentalist, I had an influence on participants which undoubtedly affected how they related to me and what they chose to tell me. In terms of age and gender, the younger men tended to treat me with

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restraint and caution. They provided valuable information about what it is like to be a farmer, but they were sometimes guarded about the information they gave. The two older men tended to treat me with relaxed interest: they were willing and generous informants. All the women were able to talk free of the constraints of gender. Although they were extremely knowledgeable about farming, I tended to rely on them for information about the more 'human' side of dairy farming life, such as community and family relationships.

Before this research, I had had no farming experience but my informants were generous about accepting me on personal terms, and were generally open and forthright in their information. They were willing to range over all aspects of farm life. My naiveté was sometimes an advantage because I could ask questions that might have seemed ignorant or impertinent from someone who was more knowledgeable. I also asked questions about issues that had been taken for granted by my informants, and those questions caused them to re-think issues in new ways.

Undoubtedly, the participants in my farm family study censored or 'massaged' the information they gave me. For some, it was because they wanted to convey a positive view of farming. For others, it was because they did not think I had enough background to understand the technicalities and complexities of their management decisions. And for still others, it was because they wanted to tell me what most interested them rather than provide a general picture.

Ethnography and participant observation inevitably involve changes within the researcher. In trying to understand the world view of the other, the researcher is also changed. I noticed such a change in myself quite early in field work when, whilst driving around the countryside, I began to note landscape features that previously had escaped my attention. My views and understanding of dairy farmers changed in the light of new experience and as my relationships with the participants developed. Initially, my views were strongly influenced by my background as an environmentalist. As time passed, my appreciation of their skill and hard work increased and I came to see farming as an immensely complex activity which requires farmers to balance many uncertainties – disease, weather, low or static returns for their produce, and the interaction of those

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<sup>2</sup> A report entitled 'Dairy Farming and Protection of Native Bush: a Report to Farmers' completed

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factors. The environment is just one of the many issues that they need to think about and balance.

How did my changing knowledge and perceptions affect the research? Changing knowledge clearly helped to provide a basis for later stages of the research. It provided a richer understanding of farming than could be acquired from books or other methods, and I was able to use this knowledge to good advantage when interviewing the conservation farmers. In practical terms, it provided knowledge that helped with the subsequent construction of the survey questionnaire.

If my perceptions were changed by the research experience, what about those of the farmers involved in the research? Did I change them? It would be surprising if I had had no effect on them, but I received the impression that at least for the term of the research, my inquiries did not significantly change their attitudes, values or philosophy about farming. Indeed, it would be surprising if they had. I was a relative stranger, inquiring about an aspect of their livelihood that they had spent years developing and formulating. If any of the participants were changed by the experience, it would have been only as an aspect of on-going experiences in their lives.

#### **FACTORS THAT INFLUENCE THE LAND MANAGEMENT OF ‘TYPICAL’ WAIKATO DAIRY FARMERS**

The next sections of this chapter summarise my understanding about how dairying shapes the relationship of farmers with their environment. Key to that relationship is the fact that for most farmers:

- **dairying is a complex and challenging livelihood;** it leaves little room for extras;
- **dairying is a risky business,** and attitudes to risk affect how one will farm;
- **dairying involves many uncertainties,** and sources of knowledge and indicators of performance influence how one will farm;
- **the uncertainty of dairying fosters a reliance on trustworthy support structures.** These include farming peers, family, and an infrastructure of dairy science, technology, and farm advisory services;

- **milk production is an indicator of professional and social success.** As the main basis of farm income, milksolids are an immediate and socially respected indicator of ability as a farmer;
- **the ideal of a good farmer** in the eyes of most farmers and the industry as a whole, includes economically efficient production;
- **the environment** is generally perceived as a medium of production and source of economic livelihood.

Each of those factors will be discussed in turn.

### **Dairying as a complex and challenging livelihood**

Dairy farming is a complex and exhausting way of earning a living; it does not leave much time for extras. A reading of the *NZ Dairy Exporter* or the Fonterra (and the former New Zealand Dairy Board) annual reports would show that one may be forgiven for thinking that farming is a matter of formulae: 'X' kilograms of fertiliser equals 'Y' kilograms of drymatter, or formula 'p,q,r' equals the cure for bloat. But the real world is more complicated. Cows are young or old with unique metabolic requirements. They can be placid or even tempered, fidgety or fearful. Paddocks may be half a hectare or two hectares in extent. They may be on the cold or the warm side of a hill slope, on poor soil or rich. Rain and low temperature may increase herd feed requirements overnight and cows may fall ill or die from accident or disease.

Every farm involves management of four or five different sub-systems. Each of these systems requires particular knowledge and complex judgements. There is the *stock sub-system*, involving animal health and nutrition, mating and reproduction; the *land and pasture sub-system*, including the management of soil, water, and pasture growth; the *machinery and physical plant sub-system*, involving farm machinery, buildings, fences, water supplies, milking machinery, and effluent disposal; the *finance, business and farm records sub-system*, including farm working expenses such as fertiliser, animal health, and energy, GST, stock valuation, depreciation of plant and equipment, farm wages; and the *human relations sub-system*, involving the family, friends, neighbours, farm labour and contractors.



**Figure 7.2** The inter-related farming subsystems: stock, land and pasture, machinery and physical plant, farm records, finance and business, and human relations (Photos: M.Jay).

Farmers have to think on many levels and time-scales at one and the same time: today, yesterday, next week, next season, pasture, cows, the kids, the milking machinery, water pipes, and finding a contractor. Take the issue of feed supply in the months from mid-July, when cows start to calve, to October, when they begin to cycle and are mated. Grass growth in early spring may be delayed by cold weather, but spring is the time of highest feed demand by cows coming into milk. As they come into milk, cows can quickly lose condition. Poor condition at the beginning of milking can affect milk supply for the entire season, and have an impact on how quickly stock come into season and conceive again. Cows that are slow to conceive will calve late the following season and experience a shorter milking season. Farmers therefore need to make finely balanced judgements about how much feed to give their animals in the face of weather variability in spring. If they feed early cows too much too soon, they may be short of feed later (when all the cows are in milk) but if they starve the early cows they may reduce the total seasonal output.

One participant described pasture management as a balance of knowledge, judgement and risk. Management involves finding the right balance between a host of factors - fertiliser applications, cutting (for hay or silage) and topping, and stock grazing management. Knowledge and judgement are based on experience, learning, and observation of one's practice and that of others.

Judgement comes into play on the basis of knowledge and experience in the light of perceived risks such as weather and the fluctuations of price (eg for silage, forage crops, milk payments). As an example of how different decisions can have different consequences, Farmers 'S' and 'D' followed different strategies one year. 'S' decided to leave his grass untopped<sup>3</sup>. It was a dry October and a wet November. His strategy meant that there was grass to carry him through the dry spell in October but when the rain came the grass went to seed and declined in quality. 'D' cut silage at the beginning of October and ran out of grass before the rain came in November but the grass grew back in better quality and milk production picked up. The complexity of these interactions helped me understand why farmers might want to simplify their management routines, and why environmental matters and protection of native bush might lie a long way down the list of priorities.

For most of the year, the practice of dairy farming is hard and unremitting. If one is a sharemilker or the owner operator, with a single employed worker, one is likely to be milking twice a day for 9 to 10 months of the year with little break. One farmer I spoke to had been a farm adviser:

I now understand why farmers so often didn't do what they were supposed to do. It's because so often you're stone cold tired. They can't be bothered listening to you. And I'm like that. I see now why you don't do all those things; it's because you come in at the end of the day just shattered.

During the milking season, particularly between calving and the end of haymaking in November or December, there is little time for anything other than the daily necessities of milking, stock management, pasture management, keeping the machinery going, and necessary book keeping (such as herd and business records). And at the end of the milking season, there are a number of

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<sup>3</sup> 'Topping' involves cutting the grass before it starts to seed. Topped grass is more nutritious than grass that has turned to seed.

important maintenance jobs to be done, such as cleaning and maintaining the milking machinery, and repair of fences and races.

One could ask, must milking be done twice a day, and must it take so much time and involve so much labour? The answers to those questions come back to values and priorities, especially those concerning production and income. Unless the farmer has lower than usual financial outgoings (e.g. a lower than normal mortgage), or reduced cost of living (e.g. farmers close to retirement who do not have family obligations), or is prepared to accept a reduced level of income, the majority of dairy farmers appear to be tied to a way of life that is physically, mentally and emotionally demanding.

### **Dairying as a risky business**

Despite access to modern technology, dairy farming remains a risky business. For example, on a daily, weekly, monthly, or seasonal basis, farmers must decide the precise amount of grass available for their cows to eat and how much is enough yet not too much. Either way there is a penalty for the wrong decision. If they judge too little, the cows will go hungry and give less milk; if too much, the cows will get more than they need, spoil the pasture, and waste feed.

Risks grow greater as the intensity of farming increases. In the words of a farmer:

If you want to take the challenge of being a good farmer, then you need to go for a high stocking rate. **But!** Management is much harder. You have to be on a good farm and get everything right and everything has to work properly. To do well at a high stocking rate, you have to be a good farmer. If you are an average farmer, you are better to keep to an average or low stocking rate, but if you are a good farmer, you will do better (financially) at a higher stocking rate. A high stocking rate maximises the gains of a good season, but in a poor season, you can really come unstuck. A high stocked farmer needs to react quicker and anticipate changes. At a time like the moment when grass growth is slowing down you can run out of feed very quickly. You need to be able to anticipate that you might run out of feed and buy in ahead of time.

The riskiness of farming tends to make farmers stick with the tried and true – the conventional wisdom of mainstream farming. Different ways of doing things, being new or unconventional, tend to be regarded with suspicion. To the mainstream farmer, leaving land as native forest or wetland can be a waste of

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space unless justified on practical grounds such as savings in labour or fertiliser, protection of soil or water, stock shelter, or because it is unsuitable for grazing.

### **Uncertainty, knowledge, and the importance of indicators**

Many of the events and interactions on a farm involve outcomes that are unclear, especially to the inexperienced farmer. One of my farm families had a cow that cut her foot badly early in the milking season. She was a valuable cow (worth over \$1000) but her cut was so deep that she could not walk into the dairy and could not be milked. The farmer had to decide whether he would keep her and feed her in the hope that her leg would heal and she would be able to join the milking herd after calving the following season, or whether he should shoot her. Another farmer noted that one of his cows had a red eye. He had to make the instant decision, was this a symptom of 'pink eye', a highly infectious disease, or had the animal injured her eye by accident. Diagnosis of the eye as a symptom of disease could involve the farmer in a costly veterinarian's bill, but failure to diagnose as a disease could cause the herd as a whole to become infected.

Because dairy farming involves making decisions that are frequently complex and uncertain in outcome, farmers, especially young ones, depend very much on signs and indicators that tell them they are 'doing things right'. As discussed in Chapter 9, the farmer's daily milk docket<sup>4</sup> is an ideal indicator. It is a record of the quantity and quality of the milk picked up from the farm the previous day. It provides the farmer with up-to-date, precise information about the quantity and quality of the milk from their herd, and for many farmers it is a sign of the health and welfare of their herd, and their farming operation. Many farmers depend on their milk docket to reassure them that they are good farmers.

There are no similar sources of information for farmers about how well they are doing as environmental managers. The signs of soil loss can be subtle, and masked by the application of fertiliser. Poor water quality may be perceived as the consequence of land management up-stream rather than their own management practices. Many farmers are unable to distinguish bush that is degraded from healthy bush, and for many farmers the benefits that might derive from native forest or wetland on the farm are those that only show over long time

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<sup>4</sup> The daily milk docket is a summary of milk production from the farm for each day over the previous fortnight. It provides farmers with precise information about the quantity and quality of their milk. See Figures 9.6 and 9.7 in Chapter 9 for an illustration of the docket as it was in 1999.

frames. In all these respects, the environmental consequences of their farm management may be obscured from many farmers, whereas the indicators of production are clear and immediate.

Despite the ways that farmers have to buffer themselves against environmental uncertainty and risk, each farm is different and each farmer has to learn local farm conditions for him or her self. But the sharemilking system and equity building through stepping stone farms mean that dairy farming characteristically involves relatively short periods of occupancy per farm before a farmer settles into his or her final farm. The movement from farm to farm tends to encourage the application of standard farming principles and practices (such as standard rates of fertiliser application, drainage of wetland, or clearance of native bush) rather than attention to the feedback signs from the land itself.

As I shall indicate in the next section, conservation farmers tended to pay more attention to the farm, and ‘farm to what’s around them’. I suspect that detailed knowledge of a farm, built up over seasons, is all-important if farming practice is to accord with the long-term physical capacity of the land. The importance of this close knowledge emerged clearly when one conservation farmer described the way he assessed parts of his land for tree planting:

We just got that way where we think instinctively of pro-retirement with any piece of land that’s showing sign of being damaged, whether that’s because it faces the south or is shaded. On this farm, there’s quite a lot of southerly-facing slopes and they don’t grow pasture well. In the winter they just grow predominantly moss. And that doesn’t hold the turf together, well there isn’t any turf, so as soon as cattle walk on it, they tread it badly. And when that happens in the winter, the following spring the effect of the stock trampling on it is just like cultivation. And that allows weeds to get established and you’ve got to, you’ve got to be more expensive with inputs for keeping the weeds at bay while you struggle to promote the pasture on a southerly-facing slope that will never grow pasture full stop. So what are you doing persisting? Do you really do yourself a favour ...!

Lack of experience and long-term knowledge about the particular area may be one factor that encourages farming by formula rather than farming to the land and its environmental conditions. Results from the questionnaire survey indicated that 56% (72 of 120) of dairy farmers in the Waikato had been on their farm for less than 10 years and 33% (42 of 129) had been on their farm less than five years (Appendix 4, Table 8). Although my sample of farm family members

and conservation farmers was small, I gained the distinct impression (from them and from hearsay evidence) that younger farmers tended to farm ‘by the book’ (including the bank account book) compared with older farmers, who were more inclined to be guided by their experience.

### **Uncertainty and the importance of support structures**

The uncertainty inherent in many farm decisions means that diverse personal support structures are important for most farmers. These can be family, friends, neighbours, and peers. Many things can go wrong in the dairy shed and the paddock and the reasons are not always obvious. Is production loss due to temperature, dry matter content, disease, or the individuality and relationships among the cows? In the words of one farmer:

The normal drop off is about 10% from November, but this year it was a lot more than that. There was a dry spell at the end of October and then some rain and the grass turned to seed and within about three days production had dropped. And there was nothing you could do about it. Everyone just went into a depression for about a week. It was incredible, because you thought, “What have I done wrong?”

Highly important to the New Zealand dairy industry are farm discussion groups. Initially set up by the forerunner of the New Zealand Dairy Board, farm discussion groups have been an element of the dairy industry for more than 60 years. They are organised by a network of farm consulting officers around the country, employed by Dexcel (formerly Livestock Improvement Corporation Advisory and Consulting Officer Services) and involve monthly meetings on the farm of one of the group members. Members have an opportunity to see what their peers are doing and to discuss issues of concern. As ‘B’ and ‘E’ explain:

‘B’: LIC pays consulting officers to run the groups, and there’s usually about 20-30 farmers in each group. So one consulting officer will run it; there’s usually set topics that they start off with. The group will go to one of the farmers once a month and we’ll turn up 11 o’clock till 2, and there might be some topic that’s a hot topic. We’ll look at the cows. We’ll look at the condition score of the grass that we’re going in to. And that’s how the ideas will float around. And often . . . . This autumn’s not been very good because there’s been a lot of facial eczema and a lot of skinny cows. So we turn up and we try and solve it. Someone pipes up and says “We’ve done this and this. Someone says, “Ah! I remember a couple of years ago . . . “.

‘E’: You can go to a discussion group and think you got nothing out of it and then next week you have a problem and you think: ‘That was a good way to hang a gate’. Discussion groups also help to

bring you into contact with other farmers, so that if you have a problem or if you meet them somewhere, you can get talking. In this way discussion groups take the place of the old days of group haymaking, when you used to get to know neighbouring farmers by working together on haymaking or community projects.

The discussion groups thus provide farmers with practical advice from their own peers, and can be a source of valuable information, practical education, and psychological support.

Neighbours can be another source of support. According to one farmer:

Neighbours can be a great help. Like the couple next door. I've learnt so much from them. We went over and introduced ourselves, and because there was a sharemilker here before, they've sort of just looked over the fence. But they're the sort of people who just help you. They're really good; they have given me a lot of help. Without relying on each other, we've established a relationship where R will come over and we'll have a chat. I think a lot of farmers establish that with other friends. I think you do need to establish those sort of relationships because otherwise you're cut off. I've just made a conscious effort to get to know people in the surrounding area. I've done it for my own personal confidence and to get to know new people.

Family relationships can also be an important source of advice and support. Three of my farm families were two-generation families, comprising the son as a sharemilker, and the parents as farm owners. The parents were close by and could provide practical assistance (such as relief milking, bringing the cows in to the dairy shed, washing the shed, calf rearing) and advice.

However, there can also be tension between the generations because contemporary farming conditions are different from those of 20 or 30 years ago. Economic margins are tighter, regulations are more stringent (e.g. hygiene and milk quality regulations, animal health and welfare, animal identification), environmental standards are becoming increasingly stringent, and farming is more intensive. The management demands placed on farmers are more stringent and complex than two or three decades ago and this may make the experience of older farmers seem less relevant today. If their attitudes to change are also negative and resistant, the experience of older farmers may be discounted along with their negative attitudes. For example, while older farmers may find it hard to accept the need for effluent treatment and regular monitoring of effluent systems, young farmers have adapted and regard it as a cost

associated with doing business (Gibbs, personal communication). One of my informants said in exasperation as his father waxed eloquent about the old days: 'Dad, if I farmed like you did, I would be out of business in a week!' Because contemporary conditions are so different from the past, the discussion groups seem to many farmers a more reliable way of keeping up-to-date with farming practices (particularly the business side of farming) than the experience and knowledge of parents and older farmers.

Science and science-based information sources (such as the dairy industry farm advisory services) are, for many, a trusted source of advice and a buffer against the uncertainty of decision-making. As indicated in Chapter 3, the dairy industry depends on a sophisticated scientific and technological knowledge base. Farmers regularly make use of information from the national herd data base, and there is an enormous amount of scientific advice available through the internet, farm magazines, and farm service providers (veterinarians, soil scientists, animal nutritionists, finance providers and bank managers). Agricultural science has greatly raised the productive potential of dairy cows and pasture plants since the 1960s, and it is not surprising that there is strong support for, and trust in, science and the scientific establishment.

The respect and regard for science felt by many farmers tends to encourage, or reinforce, a reductionist approach to on-farm problems. Although farming is, of necessity, the integrated management of different sub-systems there is a prevailing focus on 'efficiency' and factors relating to the production process (whether it be pasture growth, animal health and reproduction, or constraints to milk production).

### **Milksolids as an indicator of professional and social success**

Milk production is **not** the only thing that matters to most farmers but it is important for two reasons: as an income, and as a widely accepted indicator of success. Dairy farmers are paid by the quantity of milksolids<sup>5</sup> they produce. The

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<sup>5</sup> *Milksolids* (one word) are the *valued* solid components in milk - at present milk fat and protein. Milk solids (two words) are all the solid components in milk, i.e. milk fat, protein, lactose and minerals. If in the future farmers were paid for other solid components of milk (e.g. lactose) then the milksolids term would still be suitable with the appropriate adjustment in relative values. (Dexcel, [http://www.dexcel.co.nz/farmfacts/view\\_farmfact.cfm?id=2\\_1](http://www.dexcel.co.nz/farmfacts/view_farmfact.cfm?id=2_1))

model farm discussed in Chapter 3 showed that the gross farm revenue for a Waikato/Bay of Plenty dairy farm in 2001/02 was \$438,470, of which 89% was from the milk cheque. A further \$36,500 was received from off-farm sources, usually the income of a spouse working off-farm. Because it forms such a large proportion of total income, the amount of milk produced is the crucial difference between doing well and doing poorly. If there is a large mortgage, milk production to provide income over and above the normal running costs is crucial for financial viability and economic survival. Income influences whether or not the farmer can afford to pay a relief milker so that the family can go on holiday, if the children can be sent to a boarding school or a tertiary education institution, what fixtures and labour-saving devices can be bought for the home and farm, and what options for retirement there might be.

High production figures indicate success and those of prominent farmers in the locality can become public knowledge. Thus milksolids are not only a personal sign that one is 'getting it right' as a farmer, but also a public indicator of professional and social success. Farmers with high production rates are proud for the figure to be widely known. One of the discussion groups I attended started with basic facts about the farm, including the per hectare production of milksolids. In farmer magazines such as the *Dairy Exporter*, career success is frequently linked with high rates of milk production. Almost every personal story within the *Dairy Exporter* includes farm production figures as a basic orienting fact, and my farm informants generally had a good idea of who the 'best' farmers were in the neighbourhood.

### **The ideal of the good farmer**

All but one of the farm family groups placed a high value on milk production either for its own sake or as an indicator of being a good farmer. When asked what indicates a good farmer, 'T' replied:

Well, I think high production seems to be the main one really. It's like running a race, it's the fastest that gets the prize; it's the farmer that produces the most milk is the most successful farmer.

Mairi: And where does profit come into it?

T: Well profit is just what you get out of it.

Mairi: From what I've heard, most people would put production first and then profit.

T: That would be right. Yes, profitability comes second to production.

'H' expressed the importance of production by describing his emotional reaction to a drop in production that he had recently experienced:

This season, because it was such a high peak, the rate of drop off after the peak was a blow. The most frustrating thing was trying to hold. It's a real kick in the guts to see cows dropping after the peak, because you've worked so hard to get cows up there and then, well, the longer you can keep them up there, that's where you make all your production gains; other than having a wet summer.

I think we dropped about 10 or 15% in about 2 weeks. It was a real kick in the guts, actually. And the other thing, you were dropping from a high point. It was a psychological thing. You're riding this high, and then you drop down to average. The season to date, for this week, we have done 25,500kgs milksolids, roughly. The previous guy last year, to the same time had done 23,000kgs.

'H's description demonstrates the stress that an unexplained drop in production can cause and also illustrates how aware he was of his own production relative to the previous sharemilker.

According to Gordon Stephenson, former chairman Queen Elizabeth II Trust and former chairman and founder of the Waikato Farm Environment Award, the ideal of 'leaving the land in better condition than when we took it over' has a powerful call for many farmers (personal communication). But production of milksolids provides strong and immediate evidence of 'getting it right' and pervades the ideal of the good farmer.

### **Perceptions of the environment**

Typical dairy farmers do not see their landscapes as whole catchments or natural ecosystems, but rather as farms and farm systems. When they look at the landscape it is with an eye to production. Thus, M mentioned that a nitrogen-starved paddock looks ugly to him and makes him want to correct the balance.

He suggested that:

The way that farmers look at things is economic; it's the drive to create wealth; to make a living, really. I'm not saying that it's necessarily valid. But there seems to be something that we can't help. We can't prevent ourselves from doing that; we always have to maximize the economic output, don't we? It seems to be built into us. I don't think we realise what we're doing. Like we have to go away, don't we, to enjoy the things that you're talking about. Like we have to go off to the lakes, or the mountains. But you're saying

we could have a combination, are you? Within our productive, cultivated landscape?



**Figure 7.3 Farmer's eye view of beautiful pasture**



**Figure 7.4 Farmer's eye view of a weedy mess**

That experience helped me to understand the relativity of my own environmental views and to understand why many Waikato dairy farmers do not rate environmental issues as significant. Relative to the many other issues that they must deal with on a daily or monthly basis, environmental issues are less pressing and have less obvious impact (the consequences of loss in soil fertility and biodiversity are subtle and long-term). The experience allowed me to perceive in a subjective, experiential way, why the prevailing cultural norms of dairy farmers are so compelling; they receive constant messages (in many guises) from their cultural world that their success is measured in terms of production, efficiency, and profit. Countervailing messages about environmental

care and environmental advantages are less obvious and less publicly noted. Perhaps equally important, being environmentally minded is often seen as being a 'greenie' and few dairy farmers want to be labelled a 'greenie' (Gibbs, personal communication).

#### **CONSERVATION FARMERS: ARE THEY DIFFERENT FROM THE OTHERS?**

##### **Dairying as a complex and challenging livelihood**

I saw little to distinguish between the general management practices of conservation farmers and those of mainstream farmers, apart from the obvious fact that the latter had set aside land from production and that they farm less intensively. None of the conservation farmers appeared to be in the top 10% in terms of production, but it is likely that several were in the top 25% and all were within the top 50%. Most did not see themselves as conservation farmers or different from other farmers, and all identified as farmers first and foremost. All derived their main income from dairy farming and were subject to the same industry requirements (in relation to milk hygiene, animal health and welfare, milk payment systems) as other dairy farmers. Only one farmer did not follow conventional dairy farming practice. He was an organic dairy farmer who used no antibiotics, artificial fertilisers, or herbicides, and he received no special premium for his milk; it went into the tanker along with that of his non-organic neighbours.

Despite lengthy exploration of their farm management practices and philosophy, I could identify no major differences in values between mainstream and conservation farmers, despite the fact that the latter had protected native habitat. Nevertheless, it was possible to detect differences in the weighting of priorities and in their relationship to the land. As a group, conservation farmers appeared to be less driven by a production ethic, to be more individualistic in their farming style and farming philosophy, to know their farms better, to view their farm in a more personal way, to be more conservative or risk-averse in their farm management, and to look to spouses or close family for support rather than farming peers.



**Figure 7.5** A forest remnant surrounding a small wetland. Kahikatea and other natives have been planted in the gap between the mature stands (Photo: M. Jay).



**Figure 7.6.** Two areas of remnant forest have been covenanted on this dairy farm, one at the left foreground and the other behind the farm house (Photo: M.Jay).

### **Dairying as a risky business**

Several of the conservation farmers held to the farm philosophy of reducing risks and using natural means as a source of productivity. For these farmers, leaving the trees in place provided shelter for animals and grass. Putting less pressure on the land meant less pressure on the cows and less pressure for them. Perhaps significantly, they themselves appeared to suffer less personal stress<sup>6</sup>, and the majority were still milking their own herd in their 40s or 50s.

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<sup>6</sup> Three of the 6 younger members of the 'typical' farm families acknowledged that they felt high levels of stress at certain times of year and two said they wanted to increase production to a point where they earned enough to be able to pay for a full-time farm labourer.



**Figure 7. 7 A shelter belt to protect pasture and stock from wind chill**

One farmer spoke about an event that had a strong influence on the way he farms:

It all comes back to shelter. In about 1976 we were in the middle of calving, we had 22 cows calve on this particular day; it was the worst southerly storm we had ever experienced. Really cold, bitter weather. Heavy rain all day. We lost no stock at all. But the neighbours lost quite a few stock. But we lost nothing. Now what we're doing here, we're a form of horticulture. But we're growing grass. I remember some years ago reading some results on the effect of wind speed on grass growth. It didn't have much effect up to about 15 miles/per hour but after that it has a dramatic effect. And it compounds. So it has quite a considerable effect on the grass by putting in shelter belts.

This farmer uses his trees and shelter belts to reduce risk by creating an environment that buffers stock and pasture against extreme events and physiological stress.

### **Uncertainty, knowledge, and the importance of indicators**

Knowledge of the farm was important for all the conservation farmers, as already suggested by the farmer who assessed areas of his farm for tree planting. A farmer who had been on his land for over 20 years described the importance of knowledge based on practical experience:

It's management; it's just years of experienced knowledge. Of grass growth, and stock management. It's not something that can be learned by the book. At Ruakura, whatever experiment they do, if it goes Phut! Then they still get paid. If we go phut, then we're down the drain. That's the whole guts of it.

Knowledge of the farm enables the farmer to assess when an area is suitable for stock, and to decide about other possible uses for problem areas. Knowledge of the farm allows the farmer to judge when it is more practical to leave a problem area alone rather than keep trying to battle for increased production.

### **Uncertainty and the importance of support structures**

The conservation farmers were all strong individualists, highly experienced, and confident in their ability as farmers. They did not feel the need to prove themselves. Several did not go to farm discussion groups, or they felt that their

ideas were too different from those of the other farmers for them to feel comfortable with the discussion group. One farmer described it this way:

I've always felt different and I've ... well, just to qualify that, I am by nature a soloist. So I'm a soloist and I've got more and more confident that way. I have never been part of the farm discussion groups. It's not just that I shrug my shoulders and don't care either way. I don't feel comfortable. I always feel as though what we're doing is slightly different.

This person is a dairy farmer whose farm is on flat to rolling country. Over the years, he has converted more and more of his pasture to trees, and has retired gullies and steep slopes that failed to produce. He now has a mixed farm of dairy, trees and dry stock.

All the conservation farmers had strong relationships with, and support from, a spouse or a parent. In many cases their love of the bush or wetland was something they had learned from a parent or a grandparent.

### **Milksolids as an indicator of professional and social success**

For all of the conservation farmers, milksolids were the basic source of income, but production does not appear to have been the top priority in determining management for all parts of the farm. Possibly because of greater than average knowledge of their farm, most considered that milk production was not the most practicable use of some parts of their land, and that they were better in personal and farming terms to leave such areas alone, or to convert them to another use such as trees. Most of the conservation farmers appeared less dependent than usual on peer support; they were 'loners' or they had strong support from a spouse or a family member.

### **The ideal of the good farmer and 'farming to the land'**

While the mainstream farmers all placed high value on production in itself, the conservation farmers were more inclined to balance production with pragmatism and the expenditure of effort.

To the question: 'What makes a good farmer?' one of the conservation farmers who had lived on his farm for nearly 20 years had this to say:

Just being practical. Practical about everything; practical about the weather. Farm to what's around you. Some people farm to the book or farm to the hectare. It's all degree stuff. Every farm is different, and you've got to farm to the weather and the conditions. Soil.

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Climate. Everything. I've farmed 4 different farms and not one of them was the same.

This particular farmer had fenced off an area of wetland because he had come to the view that it would be better for the farm and his own management regime. As one who had lived on his land for a long time, he knew his farm well, was confident of his ability, and did not need to push production as an indicator of his ability<sup>7</sup>.

Another respondent expressed the view that a good farmer is one who works in partnership with the stock and the land. In his view, a good farmer requires,

. . . hard work; brains to think ahead. Empathy with stock is also important; and with land. It's something that grows on you. I regard my cows now as partners, not just to be used. And it grows on you as you get older. They're helping me. And if you think that way it affects how you treat them. I suppose you could do the same with the land (think of the land as a partner)

Another farmer indicated that good farming involved being able to turn a difficulty into an asset:

What I have found out is that there are certain areas on a farm, wet spots, you drain them, you put field tiles, 3 or 4 years later they are wet again, or it comes up somewhere else. So you are constantly **battling** wet spots. So we gave up here. I thought "Well, it's just a waste of time, trying to spend all this money. We may as well do something that is going to enhance the place." So we dug it all out and now it's an asset to the farm.

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<sup>7</sup> Because this farmer had 3 children, two of them teenagers, I believe that his financial incentives were no less pressing than the average townie family or 'typical' productionist farmer.



**Figure 7.8 A created wetland and associated kahikatea remnant. This farmer stopped his struggle against poor drainage and now enjoys the pleasure of the waterfowl that nest on his farm (Photo: M. Jay).**

Another farmer recounts how he has gradually extended the area of his farm planted in trees. For this farmer, the capacity of the land to support stock (particularly cattle) was an important criterion and he is willing to consider alternative land uses for areas which he does not think are suitable for dairy or beef. In his words:

We used to retire areas not only from dairying but from livestock production. With an interest in growing trees, we reckon, well, we seem to feel as though we're always looking for an area for trees. If you start with a square paddock and you could chop each corner off and end up with a paddock a hexagonal shape, then that would be better. The dairy farmer would say it would be an awkward shape but it would be better because we would have something planted in all four corners. The basis of our earning is still the dairy herd and it's a pastoral industry but we don't farm grass as a priority. I'd have to be careful to give the true picture here. It boils down to us concentrating on the best pasture and looking to get more efficient with that, and retiring the worst. But we've continued to get bolder in what we call a marginal area, or a sidling.

Another farmer felt able to accept that an area of swamp was better fenced off than converted to pasture. He was able to forgo the challenge of production.

Like one of the big swamp areas we originally fenced way back was done from a stock management point of view. We had one or two animals get in the swamp and we thought: 'Right this is a waste of time. It's not worth draining.' I mean we did some figures that showed that draining was nonsense. So we fenced it. It was a

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huge effort; and fenced all off, there was five acres of swamp. And it was done from a stock management point of view.

For these farmers, protection of bush or wetland has made their dairy farm operation easier or more efficient. They have learned to 'farm to the land' because it means they can focus their management on the more productive parts of their farm.

Related to the above point, the farm itself in most cases included areas that were difficult to manage - for example, there may have been gullies or steep slopes, or wet patches that keep filling again. As farmers they have taken the attitude, 'If you can't beat 'em, join 'em, and make an asset out of a problem.' For these farmers, a key philosophy is to make the most of their resources (labour and fertiliser).

### **Perceptions of the environment**

I could not tell, from a single interview, how each of the conservation farmers perceived the environment in general. From the way they talked my impression was that, like mainstream farmers, they saw the landscape in terms of farm units rather than ecosystems or natural areas.

However, their attitudes to their own farms were significantly different from the attitudes of the majority of the mainstream farmers. Where the latter viewed most of their farm (apart from the house and surroundings) in terms of production, the conservation farmers appeared to view theirs in a more personal way. They appeared to know the physical properties of their farm well, and in some cases had a close knowledge of the history of the farm and its landscape. The way they talked about their farm, and the detailed knowledge they revealed, suggested a strong attachment to the farm and a comprehensive perspective that went beyond the farmhouse and its immediate surroundings.

One farmer was third generation on the farm. He grew up there and learned how to manage it by experience and observation, noting changes over time. He also thinks that the memories and stories of his father and grandfather gave him a history of the area and a deeper understanding of changes to the wetland since his grandfather's day. The farm is adjacent to a wetland, and parts are inundated annually. He sees the annual cycle of flooding and drying as akin to breathing.

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All the farmers I talked to got satisfaction, recreation and aesthetic pleasure from the areas that they have protected. They liked the beauty of bush or wetland on the property. Often the bush was a source of pride or important memories. One couple have planted over 100 species of trees on their farm, in addition to protecting a gully of native forest. The trees have been planted for a variety of uses, including 'colour and visual enhancement', recreational use, fodder for birds, bees and livestock, timber for fencing and commercial timber, stock shelter, and erosion control. Another couple, who have reconstructed wetland and breeding habitat, explained how they love to spend time in the summer evenings walking round the farm and seeing the birds.

Another couple explained how they had so much enjoyed the native forest remnant on their neighbour's property that they had decided to covenant and restore an area of native forest on their own land so that future generations could have the same pleasure that they had received from those who had left the bush in place. For this couple, the 'environment' was nature and history. It was a landscape where past and future are brought together by the care and actions of individuals who can think about the land in terms of the passing of generations.

### **CONCLUSION**

The present chapter has described some of the key results from a comparison of farmers based on participant observation of five 'typical' or 'mainstream' farm families and in-depth interviews with 10 'conservation' farmers, who had set aside some of their land from production for protection of native habitat.

The comparison explored 7 key factors that appear to influence the relationship of farmers to their land. The factors were: the complexity and challenge of dairying as a means of earning a living, the inherent risks associated with dairying, the uncertainties associated with many of the interactions in dairy farming, scientific knowledge notwithstanding, the need for reliable support structures, the importance of milk production as an indicator of professional and social success, the ideal of the good farmer, and perceptions of the environment.

The complexity and challenge of dairy farming mean that few farmers have the extra time or energy to expend on conservation of remnant vegetation. The inherent risks of dairying include weather, disease and market returns, and individuals have limited power to reduce them. The high level of investment in

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land, machinery and stock make the penalties for miscalculations and mistakes serious. Uncertainties relate to the variable nature of biophysical elements on the farm (soils, topography, aspect, microclimates, and livestock) and may be further increased by the fact that farm occupancy in the Waikato is associated with relatively high turnover rates. Relatively short tenancies mean that many farmers may not have an in-depth knowledge of the land through year-to-year variation in the seasons. Risk and uncertainty can make farming a lonely business in the sense that an individual may face problems that have high potential for failure and financial cost. Risk, uncertainty and loneliness can encourage many farmers to depend on sources of information that are based on industry-wide measures of performance rather than their own knowledge and experience of the farm. Dependence on industry-wide measures and 'farming to the book' can mean that land is perceived mainly (or solely) as a medium of production, without intrinsic value. Industry wide criteria include production of milksolids per hectare as an indicator of professional and social success.

Comparison of the two groups of farmers indicated little to distinguish them in terms of values, general farm management practices and perception of the environment, but some differences in attitudes and relationship to the land, and the weighting of management priorities. The mainstream farmers in this small sample tended to place a high priority on production as a goal and to regard land mainly as a medium of production. Three of the five families took a broad interest in the happenings of the dairy industry at large, were interested in their peers and the latest theories about farm management, and had a good grasp of farm finance and the business side of farming. They were production focused and 'progressive' in terms of their knowledge and interest about what was going on in the dairy industry. The conservation farmers, in contrast, appeared to be less driven by a production ethic, to be more individualistic in their farm management philosophy, to view their farms in a more personal way, to be more conservative or risk averse in their farm management, and to look to spouses or close family for support rather than farming peers.

Linking these patterns back to theoretical perspectives discussed in Chapters 4 and 5, we can suggest that the mainstream farmers were strongly influenced by the political economy factors of the industry outlined in Chapter 4, while the conservation farmers were more influenced by the experiential elements discussed in Chapter 5. Reasons for the stronger influence of experiential factors

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(‘material reality’) on conservation farmers include the nature of their farms (which all included areas that were in some way ‘difficult’), but also longer than average farm occupation and non-material reasons for attachment to the land. The long time on the farm meant that these farmers had an intimate and long-standing knowledge of their farm and had been able to note change over many years. Their knowledge of the farm had made them conclude, in most cases, that it is better to retire areas from milk production than to struggle to graze unsuitable land. Non-material reasons for attachment to the land included family inheritance of the farm and pleasure in the farm environment (the bush and the birds). The influence of peer pressure on conservation farmers appeared to be less than on mainstream farmers and to be countered by personal factors such as an individualistic personality coupled with strong family support.

The field work experience helped me understand in a holistic way what dairy farming entails, and some of the core values that dairy farmers hold to. This understanding helped me make sense of why there is so little native bush left in the Waikato: specifically, in the totality of things which farmers have to worry about, the environment generally and native bush in particular rate as relatively low in order of priorities.

# *CHAPTER 8*

## *PATTERNS OF BUSH*

### *SURVIVAL: THE*

#### *QUESTIONNAIRE SURVEY*

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The aim of this chapter is to present the methods and administration of the questionnaire survey of farmers as explained in Chapter 6. The aim of the survey was to identify factors that might facilitate the persistence of native forest remnants by comparing dairy farms and farmers with and without native bush. A map of the survey area is shown in Figure 8.1.

A key finding of the survey is that, in the main, patterns of native forest survival appear to have more to do with the physical characteristics and age of farms than with differences of attitude, values and management practices between farmers. However, physical characteristics alone do not adequately explain the persistence of forest remnants. The chapter suggests that there **are** differences in farmer attitudes and values but these are not necessarily revealed by the presence or absence of native bush given that the survival of native bush is the end point of historical circumstance. While there may be a tendency for farmers who appreciate native bush to seek ownership of farms with bush, this may not always be the case. Conversely, farmers who happen to have bush on their farm

may have inherited it from previous owners for reasons other than the presence of bush.

## **DESCRIPTION OF SURVEY METHODS AND ADMINISTRATION**

### **Survey objectives**

Specifically, the research questions which the questionnaire survey sought to explore were:

1. What is the size, distribution, and management of native forest remnants on dairy farms in the Waikato?
2. Are there farm-related differences between farmers who retain remnant forest and those who do not?
3. Are there differences based on experience between farmers who retain remnant forest and those who do not?
4. Are there differences of values or priorities between farmers who retain remnant forest and those who do not?
5. Are there differences in farm management between farmers who retain remnant forest and those who do not?
6. In relation to farmers who retain remnant forest on their farm, what values do they attribute to the bush?

### **Sampling method**

The choice of survey method and sample was designed to yield data that could be analysed easily and be reasonably representative of Waikato dairy farmers. The sampling method (a telephone survey) and final sample size (130) reflects a trade-off between resources and precision – with more resources (e.g. more time and assistance), the sample size could have been increased to allow statistically more reliable results.

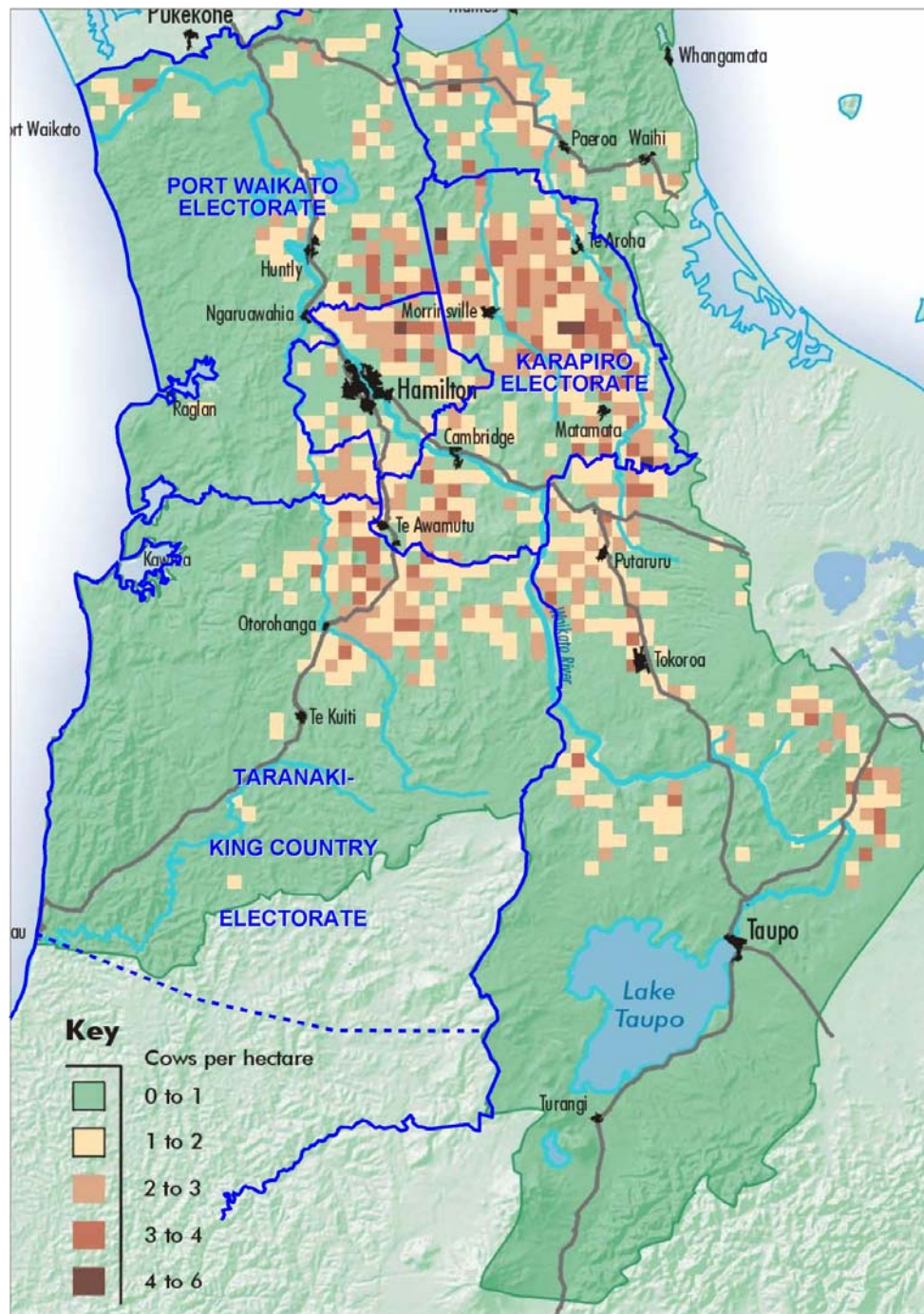
Parfitt (1997, 100-102) has summarised the advantages and disadvantages of interviewer administered, telephone and postal surveys. Interviewer-administered questions, which usually involve a face-to-face meeting between interviewer and interviewee, tend to provide the best results in terms of response rate, avoidance of sample bias, and compensation for the effects of imperfect questionnaire design, but take longer to complete, are expensive in time and travel, and subject to interviewer bias. Postal questionnaires tend to be effective in terms of cost and speed, but poor in terms of response rate, avoidance of non-response bias, and the opportunity to ask complex questions. Compared with a

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postal survey, telephone surveys are likely to produce higher response rates, better avoidance of non-response bias, better control over who completes the questionnaire, and opportunities to explain or clarify the questions for the interviewee. For the latter reasons, I decided to do a telephone survey.

Consistent with the case study focus, the target population is dairy farm owners and owner-managers from central Waikato, the Hauraki Plains and the northern King Country. Farm owners and owner-managers were selected, rather than sharemilkers, because they generally have freedom to decide whether to retain or remove areas of native bush on the farm. For income they depend less than do sharemilkers on milk production, and they have greater incentive to consider the long-term health of land, water and soil.

I decided to use electoral rolls as a basis for the sample because they are public documents and access to them does not depend on any other agency. The Karapiro electorate was chosen because it encompasses land ideally suited for dairying and includes some of the most intensive dairying areas in New Zealand. The northern half of the Taranaki-King Country electorate was chosen because the land tends to be rolling, interspersed with flat alluvial or peaty valley bottoms, and with steep to very steep slopes. Many of the farms have been converted from sheep or beef farms within the past decade and require careful attention to the capabilities of topography and soil. Port Waikato electorate has a mix of farms on flat and rolling terrain. Figure 8.1 shows the area of the three electorates relative to the density of dairy cows. The map has been derived from Environment Waikato (EW 1998) and shows the number of dairy cows per hectare in 1997.



**Figure 8.1** Location of survey area showing electorate boundaries and density of dairy livestock (Source: Environment Waikato 1998)

### Questionnaire design

The questionnaire evolved through an iterative process in accordance with the progressive refinement of my research objectives, juggling of time constraints, the choice of survey technique, refinement of the sample design, pre-testing and pilot testing. The process was similar to that described by Statistics NZ (1995, 41). There were 7 versions of the questionnaire before the pilot test, and a

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further revision as a result of the pilot. Questions were formulated in the light of the research objectives and in ways that a farmer could readily understand. A copy of the final questionnaire is provided in Appendix 3.

### **The conduct of the survey**

For the pilot, all the individuals on the Port Waikato roll who indicated their occupation as '*dairy farmer*', or '*farmer*' were listed and numbered. Since the term '*farmer*' would also include sheep and beef farmers, mixed stock, cropping, and other types of farming activity, it was necessary to decide whether or not to include 'farmers' with 'dairy farmers'. I discovered that some of the dairy farmers I knew had listed themselves as 'farmers', and decided to use the pilot survey to decide whether or not to include self-styled farmers within the sampling frame.

A random selection of names was made and the names were searched in the Waikato telephone book for number and address. The first 25 names of the pilot yielded only 6 dairy farmers for interview, including one who refused. The remainder were people who could not be contacted after 3 phone calls, and at least 9 people who were not dairy farmers, including chicken farmers, hobby farmers, retired farmers, dry stock farmers, sharemilkers, and farm workers. It was then decided to limit the sample selection to the self-styled 'dairy farmers' in the electoral rolls rather than to extend the sample to 'farmers'.

For the final survey, the sample involved selecting those in the Karapiro and King Country electoral rolls who identified themselves as dairy farmers and could be located in the Waikato telephone book. Random selection involved numbering all the dairy farmers in each roll and then selecting a sample at random. The pilot yielded 24 completed telephone interviews (of which 23 provided usable data) and the final survey provided 107 interviews, for a total of 130 usable data forms. I employed a student assistant to conduct most of the interviews, but completed 14 of the pilot interviews and about a third of the interviews for the main survey. The student assistant and I went through the questionnaire together before and after we had each completed several interviews and were able, thereby, to check for consistency in the way we administered the questionnaire and recorded the answers. Because the main survey included only self-styled dairy farmers it comprised a more restricted sample than the pilot survey.

People whose address could be found in the phone book were sent a letter requesting an interview, together with an information flyer that introduced and

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explained the research (Appendix 2). That was followed by a telephone call within a few days. The person who answered the phone was asked if he or she had received the letter and if they were willing to participate in the survey. If they agreed, the interview began and took from 10 to 25 minutes to complete. I did not ask for a particular person to respond to the questionnaire because of the risk of making sexist assumptions about a respondent's knowledge of the farm management decisions. If the spouse who answered the phone could not answer the questions, their partner was brought in to complete the interview. After the interviews, follow-up letters were sent, thanking respondents for their participation. A summary of results was also sent to each respondent (the 'Report to Farmers' mentioned in Chapter 6). The rhythm of the farming year meant that interviews had to be done in April, May, June and July, before calving started. The pilot suggested some amendments and additions to the questionnaire, and reinforced the importance of sending a letter of explanation prior to initial telephone contact.

Originally I had intended to obtain a sample that included equal numbers from Karapiro and King Country electorates but was unable to complete all interviews before calving began. As a consequence the usable sample number from each electorate was 23 for Port Waikato (the pilot study), or 18% of the total sample, 74 from Karapiro (57% of the total sample), and 33 (25%) for northern King Country between Taumaranui and Kihikihi.

One hundred and thirty (52%) of the 250 people located in the electoral roles were interviewed. Eighty-six (34%) of the 250 could not be contacted because they were not listed in the current Waikato telephone book, or could not be contacted after 3 or more attempts by phone. Of the 164 people who were contacted, 34 (14%) refused to participate. No particular reasons can be inferred for the refusal, but those who participated appear to have been, collectively, above average in their milk production relative to the LIC dairy statistics. This suggests that some of those who refused may have been below average in terms of production.

### **How representative were the respondents?**

Respondents were asked to state the total production of milk solids from their farm for the previous year, and this was compared on a per hectare basis with

dairy statistics for the South Auckland and King Country regions. Table 8.1 shows that of those participants who answered the question about their production of milk solids, 70% reported a milk production rate above the average for farms in the LIC South Auckland dairy statistical area.

**Table 8.1 Farms by production of milk solids in the previous year.**

<b>Milksolids production per ha</b>	<b>Frequency</b>	<b>Percent</b>
Above average per ha production	91	70
Average per ha production	24	18
Below average per ha production	5	4
Not stated/missing/can't remember/don't know	10	7
Total	130	100

The evidence suggests that either the respondents were exaggerating, or the sample was skewed in favour of farmers who are above average in milk production. There are several possible reasons why this might be so. Firstly, Karapiro electorate takes in an area that has some of the highest stocking rates in New Zealand (see Figure 8.1), and, as indicated above, just under half (74) of the 130 respondents were from there. Secondly it is possible that individuals who identify themselves as 'dairy farmers' on the electoral roll are more committed than most to an identity as a dairy farmer, and to the ideals and goals of dairy farming. Thirdly, it is possible that those who were willing to be interviewed were more confident than the average about their ability as farmers.

### **Limitations of the survey**

There are limitations with the statistical techniques that can be used for categorical (nominal) data such as that produced by this survey. Nonparametric statistical tests such as Chi square analysis are not as able as parametric statistics to detect actual differences between categories (Gravetter and Wallnau 2002, 427). Chi square comparisons of farmers with bush and those without may fail to detect real differences because the nature of the data does not permit such sensitive analysis as numerical and ordinal data. The survey could not identify subtle relationships between variables or shades of difference between farmers because attitudes, values, priorities and practices about native forest and farm management depend on a multiplicity of circumstances. Furthermore, the number of farms with bush (56 out of a total sample size of 130) was small. This

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meant that it was not possible to analyse differences within the category of farms with bush (e.g. between farms where the bush was protected from stock and those where stock had access to the bush). Thus most of the comparisons in the following discussion are simply between farms (and farmers) with bush and those without.

The way questions were framed could influence the way they were answered and, despite pilot testing, it was not easy to identify how the precise wording of a question would influence the answer. Even such a fundamental question as, 'Does your farm contain any stands of native trees, bush or scrub?' can be a source of confusion because it is unclear that all farmers identify 'native trees' 'bush', and 'scrub' the same way. It is highly likely that weedy disturbed vegetation in non-production areas such as steep slopes and gullies would be classified differently by different farmers. Do all farmers recognise *manuka* and *kanuka* as native, but gorse as exotic, for example?

Although I had spent more than a year doing participant observation research and in-depth interviews of conservation farmers before undertaking the survey, I still found it difficult to frame some of the questions. For example Question 21 (see questionnaire in Appendix 3) was designed to elicit attitudes about a series of possible farming objectives and philosophies (production, profit, personal enjoyment, lifestyle, and conservation). It was difficult to frame the questions clearly and in a way that would highlight priority weightings by different farmers.

Despite a time-consuming process of pre-testing, evaluating, checking and rechecking, the final questionnaire was by no means perfect. In fact it was a lesson on how much of a straitjacket fixed-response survey questions can be. Few of the questions were designed to anticipate the full range of answers that were received, and some of the questions were quite clearly difficult for respondents to answer. For example, Question 22, which asked respondents to rank production, profit, enjoyment, care of the stock, and care of the land in order of priority, brought a point blank refusal from some farmers. They argued that all of the elements were equally important, or that one was not possible without the other, or that farm management involved a balancing of all elements, with the particular weighting of one over another dependent on the circumstances of the time.

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I also received the impression that for some questions some respondents were answering in a way they thought was expected of them. This seemed to be the case, for example, with Question 20, which asked those who had no bush on the farm if they would have liked bush. A majority of those who answered this question said yes, but in some cases it seemed that ‘yes’ was an easy answer, and the answer that they thought was most wanted by the interviewer. One or two were more frank in their answers to this question. They said, ‘yes, they would have liked bush if the farm was bigger’ or ‘yes, bush would be nice but not at the cost of production’. Question 28, which asked for reasons for stock access to remnant forest was also a difficult question for some farmers. Many farmers know that trampling by stock is damaging for remnant forest, and in the context of the other questions in the survey, a frank answer to the effect that stock are allowed to minimise production losses was perhaps difficult to make. Questions also depend on information that can be verbalised by a farmer; it is possible that some farmers were unable to articulate why they left a piece of bush standing, or even give the size of a bush remnant.

The survey nevertheless served as a useful intellectual discipline because it required me to think through the connections and possible relationships between the presence or absence of remnant forest and cultural and biophysical phenomena. I was forced to put down on paper the cultural and biophysical factors that I thought would relate to the presence or absence of remnant forest, and consider those values and attitudes that might influence the way a farmer would relate to the land.

**SUMMARY OF RESULTS: DESCRIPTION OF NATIVE FOREST REMNANTS ON DAIRY FARMS**

The survey did not seek the sort of information a botanist would seek about native forest remnants. A definitive survey of the distribution of forest remnants in the region would have required a completely different survey; specifically, a survey of bush areas, rather than a survey of farmers. Because farmers were the source of information (rather than botanists or ecologists) it is not possible to say that all the vegetation here described as ‘remnant forest’ would fit the definitions of a botanist or ecologist. So it is important to understand that the results reported in this chapter are farmers’ definitions of native bush. Those areas may include vegetation that to a botanist or ecologist is at least partly exotic in its composition. From the viewpoint of biodiversity, however, even bush that is a

mixture of natives and exotics is more varied than an all-production landscape of pasture and commercial pines.

### Number and location of dairy farms with remnant forest

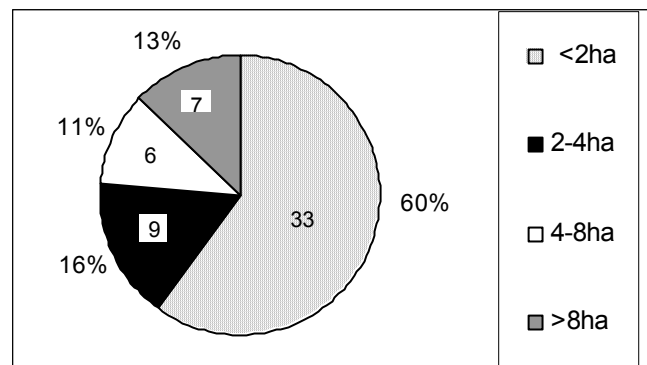
As shown in Table 8.2, 43% (56 of 129 farms) of the sample supported some form of native vegetation. This was a higher proportion than I had expected.

**Table 8.2 Number and percentage of farms with remnant native forest**

Farms by bush category	Number	Percent
Farm has bush	56	43
Farm has no bush	73	56
Not stated/missing information	1	1
Total farms	129	99

### Size of native forest remnants

Figure 8.2 shows the number and percentage of forest fragments by size. Thirty-three, or 60% of fragments are less than 2ha in area and another 16% are from 2 to 4ha, meaning that more than three-quarters are less than 4 hectares in area. Only 13% were more than 8 hectares in area.

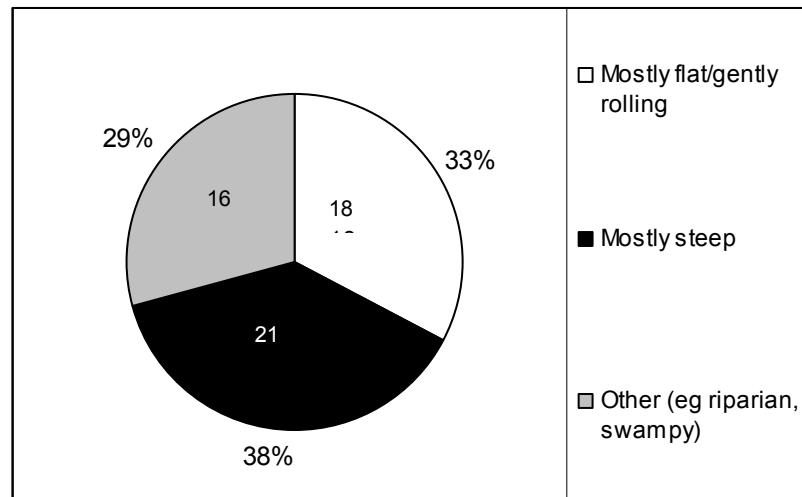


**Figure 8.2 Number and percentage of farms with forest remnants by area-size category**

### Topography of native forest remnants

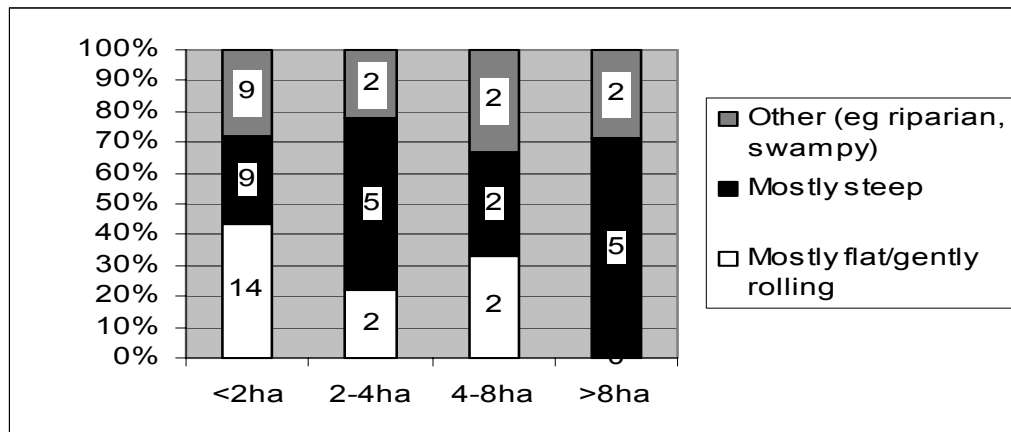
Respondents were asked to describe the prevailing topography of their land occupied by bush fragments. Figure 8.3 shows that while most (38%) remnants were on steep land, a third (33%) were on land that was mostly flat to gently rolling, and 29% were on 'other'<sup>1</sup>.

<sup>1</sup> 'Other' included swampy and riparian areas, or areas made up of a complex mix of topography. For the most part 'other' included land that was 'difficult' in some way.



**Figure 8.3 Number and percentage of farms with forest remnants by type of topography**

Figure 8.4 shows the proportion of fragments in different size categories by predominant topography. The number under each column refers to the size category of the farms and numbers within the columns refer to the number of farms by type of topography. The proportion of farms in each category, by type of topography, can be identified by noting the percentages at the left of the four columns. The first column shows that 14 (44%) fragments under 2 hectares are on land that is mostly flat or gently rolling. The second column shows that most of the fragments of 2 to 4 hectares are on land that is mostly steep; the third column shows that fragments of 4 to 8 hectares are evenly distributed on different types of topography; and the last column shows that all of the remnants over 8ha are on land that is mostly steep or 'other' (i.e. 'difficult' in some way). The graph suggests that fragments on flat or gently rolling land are most likely to be small, while larger remnants tend to be on rougher ground. However, it is worth noting that 4 of the 15 (a quarter) of the fragments between 2 and 8 hectares in size are on easy land.



**Figure 8.4 Proportion of forest fragments by size category and prevailing topography**

In summary, topography does seem to have had an influence on the survival of native forest, but more particularly in relation to large than small remnants.

### **Productive potential of land supporting native forest remnants**

Farmers were also asked if the bush was on land that could be cleared for milk production, in whole or in part. Table 8.3 shows that more than half indicated that their bush was on land that had potential for production.

**Table 8.3 Number and percentage of forest remnants on land with potential for milk production**

Productive potential of forest remnant	Frequency	Percent
Land has potential for dairy production	30	54
Land has no potential for dairy production	26	46
Total	56	100

It was a surprise to learn that more than 50% of forest remnants are on land that could be used, wholly or in part, for dairy production purposes. Because of the cost of land and the income to be gained from land capable of production, I had expected that most remnants would be on land considered to be unproductive.

### **Access by livestock**

Access by stock is a key aspect of forest management because it affects the composition and regenerative capacity of native vegetation. Many native plants are highly palatable to stock and also highly vulnerable to physical damage by browsing animals. In addition, stock access can cause damage to roots and compaction of forest litter and forest soils. Almost any access by stock is

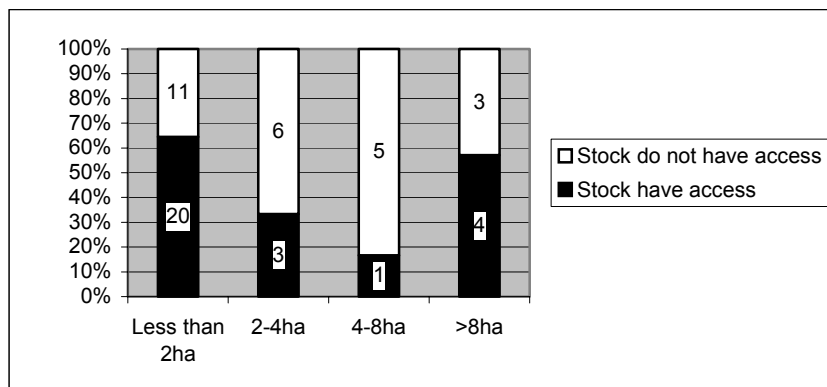
sufficient to eliminate palatable native groundcover (e.g. sedges, grasses, mosses, lichens and many ferns) and the regeneration of larger native trees and shrubs, and will cause damage to the forest floor. It powerfully determines the health and composition of bush remnants and their long-term survival.

Because it is such a key component of the health and long-term viability of forest remnants, farmers were asked about stock access to the bush. Table 8.4 indicates that less than half the bush remnants had protection from stock.

**Table 8.4 Number and percentage of forest remnants that have access by stock**

Stock access to forest remnants	Frequency	Percent
Stock have access	29	52
Stock do not have access	25	45
Unreported	2	4
Total	56	100

From Figure 8.5 it is interesting to note that the larger bush fragments, especially those in the 2 to 4 and 4 to 8 hectare sizes are more likely than not to be protected from stock.



**Figure 8.5 Stock access to forest remnants by area size of remnant**

Translated into practical terms, we can probably say that this indicates that the small remnant stands of kahikatea scattered through the Waikato landscape are less likely to experience protection from stock than stands of mixed bush, fern and scrub on gullies and steep slopes.

### Reasons for stock access

Farmers were asked their reasons for allowing stock access. Many did not answer the question, and it may be that they were reluctant to admit that the

bush continues to be used for production. However, a number of them acknowledged that the access was to allow continued production, but gave other reasons as well, including: 'haven't got around to fencing it'; 'used for stock shelter'; 'there's no practicable access' (e.g. the area is surrounded by blackberry); 'can't afford to retire the land completely'; 'I want to keep the area tidy so let the stock in every so often, just to trim the grass.' These answers suggest that many farmers either do not know about the damaging effects of stock access to bush or do not value their bush sufficiently to afford it protection, or cannot afford fences to keep stock out.

From an ecological and biodiversity viewpoint, stock access to bush remnants is a disaster but it is important to note that 25 remnants (including 3 that are over 8 hectares in size, and 5 that are 4 to 8 hectares) are protected from stock. In percentage terms, this represents 19%, or nearly a fifth, of all the farms surveyed. Given that the survey covered one of the most intensively farmed pastoral areas in New Zealand, and that it was apparently biased in favour of highly specialised dairy farms, this result was, for this researcher, a surprisingly high percentage.

### **Values of native forest remnants**

Farmers were asked a series of questions about the uses of bush on their land in an effort to discover what features they found valuable and which were problematical. Table 8.5 shows that a clear majority of farmers with bush (77%) indicated that it provided stock with shade and shelter, and this is consistent with the finding noted previously that 54% of bush fragments have stock access. Just over half of farmers (55%) indicated that their bush provided a windbreak. Other possible benefits of bush fragments were recognised by less than half the respondents, although most farmers listed at least one benefit from their bush.

Only a minority of farmers (41%) considered their remnant bush provides protection for soil and water, although in the eyes of many ecologists, this is an important function of many bush remnants. Only a minority of farmers obtained recreational value from their bush. In discussion with farmers in other contexts, it appears that today bush may be valued more for aesthetic than recreational reasons, or that farmers enjoy their bush as a habitat for birds and other wildlife. It is interesting to note that less than half (41%) of farmers thought that bush could improve the value of the property.

One aspect that was surprising to this researcher is how few farmers saw their bush as a source of problem weeds or pests. The table shows that only 10% saw their bush as a source of problem weeds, and 24% perceived that it harboured pests.

**Table 8.5 Percentage of farmers answering ‘yes’, ‘no’ or ‘don’t know’ to possible values or problems related to bush remnants**

<b>Uses of Bush Remnant</b>	<b>Yes</b>	<b>No</b>	<b>Don't know</b>	<b>Total number</b>
Provides stock shade/shelter	77	23	-	56
Provides a windbreak	55	45	-	56
Provides timber	7	92	-	55
Improves property values	41	36	23	56
Protects soil or water	41	58	-	55
Provides wildlife habitat	36	64	-	55
Provides recreation	26	74	-	54
Does bush harbour weeds	10	90	-	52
Does bush harbour pests	24	76	-	50

#### **COMPARISON OF FARMS WITH AND WITHOUT NATIVE FOREST REMNANTS**

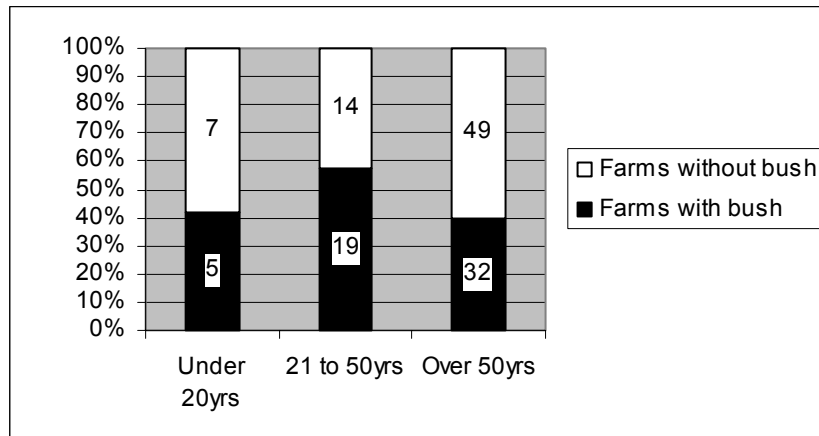
To identify whether the presence or absence of forest fragments could be correlated with physical characteristics of the farms, farms were compared for age, size and topography, these being informative measures and relatively easy to assess by means of a questionnaire.

#### **Age of farms with native forest fragments**

It has been suggested (Burns et al. 2000) that there has been a gradual loss of native forest from older farms over time: that remnants are gradually lost as a result of inappropriate management, neglect, changes of farm ownership, or other reasons. In addition, changes of government policy and economic conditions through time may have served to encourage the destruction of native bush for purposes of farm development.

A comparison was made between farms with bush and those without in relation to the age of the farm as a dairy farm. Figure 8.6 gives a representation of the proportion of farms with and without bush by the length of time the farm has been a dairy farm – ‘age category’ of farm. The figure shows that proportionately, the

youngest and the oldest farms are less likely to have bush than the farms in the middle age category. The number within the bar is the number of farms within each category (farms with bush, and farms without bush) while the column of figures at the left side shows the percentage of farms in each age category. Younger and older farms are less likely to have bush than land that has been in dairying between 21 to 50 years.



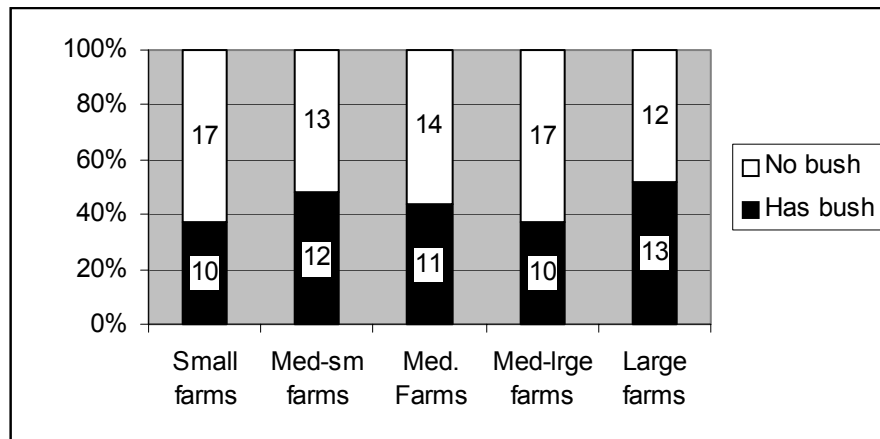
**Figure 8.6 Percentage of farms with and without bush by age category of farm**

Because of the large number of farms more than 50 years old, it appears that farms with bush tend to be those in the oldest age category (32 out of 56 farms with bush were in that age category). However, the diagram shows that in proportion to their numbers, the oldest farms are **less** likely to support forest fragments than farms in the middle age category. Nearly 60% of farms in the 20-to-50 year category have bush, compared with 40% of the farms in the category of farms over 50 years old. This finding lends support to the view that there is progressive reduction in forest remnants over time.

### **Size of farms with native forest fragments**

Figure 8.7 shows the relationship between farm size<sup>2</sup> and frequency of bush remnants. The smallest farms had proportionately fewer than expected remnants compared with the other size-categories, and the largest farms had more than expected. The largest farms, indeed, were slightly more likely than not, to have bush.

<sup>2</sup> The size categories were an arbitrary 5-fold division of all 129 farms for which there was data; small farms were the bottom 20% between 36-53ha in area, medium-small were the next 20% between 54 and 68ha in area, medium farms were 69-88ha, medium-large were 90-112ha and large farms, including the largest 20%, were 113-345ha.



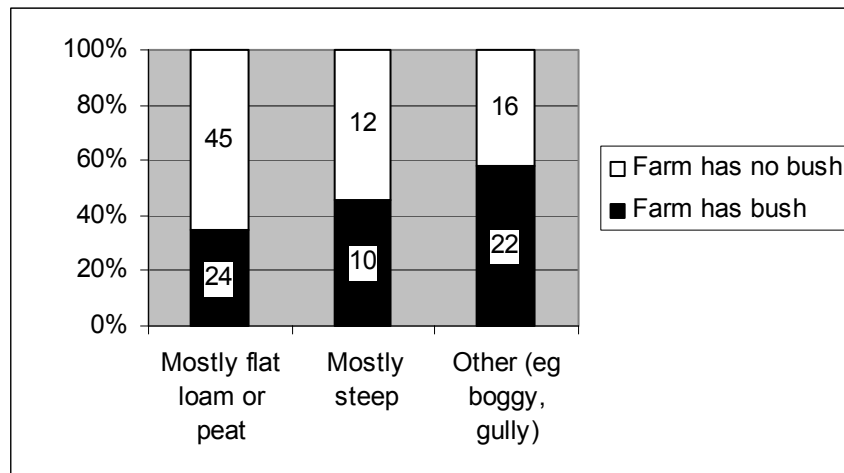
**Figure 8.7 The proportion of farms in different size categories with and without native forest remnants**

However, the numbers are small, and the figures suggest something more complex than a straightforward relationship between size and presence or absence of bush. In a straight area-to-bush comparison, one might expect a gradation from small farms with little bush to large farms with much. But the pattern shows no such relationship. Whether by chance, or for some other reason, in this sample the medium and medium-small farms have more bush than the medium-large farms.

A point to note by those who argue that the owners of small farms cannot afford the 'luxury' of retaining bush on the farm, is that 22 farmers in the two smallest farm-size categories reported some bush, compared with 23 farmers in the two largest farm-size categories.

### **Topography of farms with native forest remnants**

As one might expect from a practical viewpoint, farms on mostly flat land were proportionately less likely to support native bush than those with rolling or steep topography. And farms with steep or difficult topography were significantly more likely to have bush than those with only rolling topography. Figure 8.8 shows the relative proportion of farms with and without bush by type of topography.



**Figure 8.8 Forest remnants by predominant type of topography on the farms**

Compared with area, there is a much clearer relationship between topography and presence or absence of native forest. Less than 40% of farms on flat land had bush, compared with nearly 60% of farms with 'Other' (mostly difficult) topography. It thus seems clear that topography may be a significant factor that encourages the retention of native bush. A Chi square test of the relationship gives a value very close to significant at the 5% level (see Table 2 – Q.4 in Appendix 4).

It would be easy to assume that forest remnants have been left simply for practical reasons because the land is too steep to farm. But it is worth noting that 24 of the 56 farms with bush (i.e. 43%) are on land that is mostly flat. In short, steep or broken topography may be a significant reason for retaining bush, but it is not the only reason, or even a determining reason, for retaining native bush. Some farmers have clearly allowed bush to remain on land that could have been easily managed for dairy production.

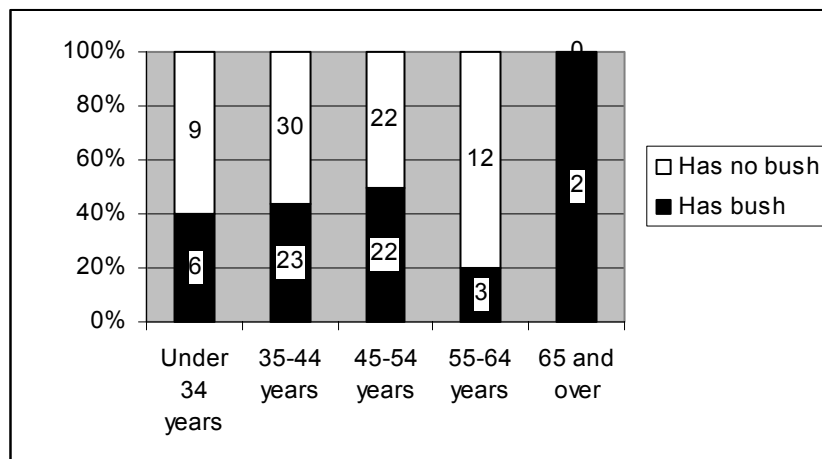
#### **COMPARISON OF FARMERS WITH AND WITHOUT NATIVE FOREST REMNANTS**

Amongst the factors to emerge from the interviews with conservation farmers described in Chapter 7 were the influence of their practical experience on the farm and evolving relationships with peers and farm discussion groups. Data from the interviews suggested that conservation farmers had lived on their farms longer than average, and were less dependent on peer support or the need to prove themselves as 'good farmers' in accord with productivist notions.

### Age and experience

The questionnaire survey sought to explore the possible influence of age and experience by asking farmers how long they had lived on the farm, their age and level of education, and whether they attended farm discussion groups. My thinking was that farmers who had been on their farm a long time and did not attend farm discussion groups would be more likely to protect forest remnants than less experienced farmers, or farmers who appeared to be more dependent on knowledge and experience gained from peers. Having said this, I also thought that young, 'progressive' farmers might be more inclined to retain native forest as a consequence of being more open in their attitudes to new ways of thinking about native forest on production farmland.

Figure 8.9 shows the relationship between age of the farmer and presence of native bush. It suggests there is a positive relationship between age and the presence of bush on the farm up to a certain point, and a negative relationship thereafter. As farmers get older, up to the 45 to 54 age category, they are more and more likely to report bush on their farm, but there is an abrupt drop off among older farmers who are least likely to report bush (apart from two in the 60-plus age group). The Chi square analysis for age (Table 40, Q.39 in Appendix 4) gave a low 'p' value of .147, indicating a weak relationship between age of respondent and presence or absence of bush.



**Figure 8.9 Forest remnants by age groups of farmers**

The data suggest that, with the exception of the two farmers over 65, older farmers may be opposed to native bush on their farm, whereas younger farmers are either in favour of it or do not mind one way or the other. One might surmise a cohort effect in which older farmers are actively opposed to native bush while

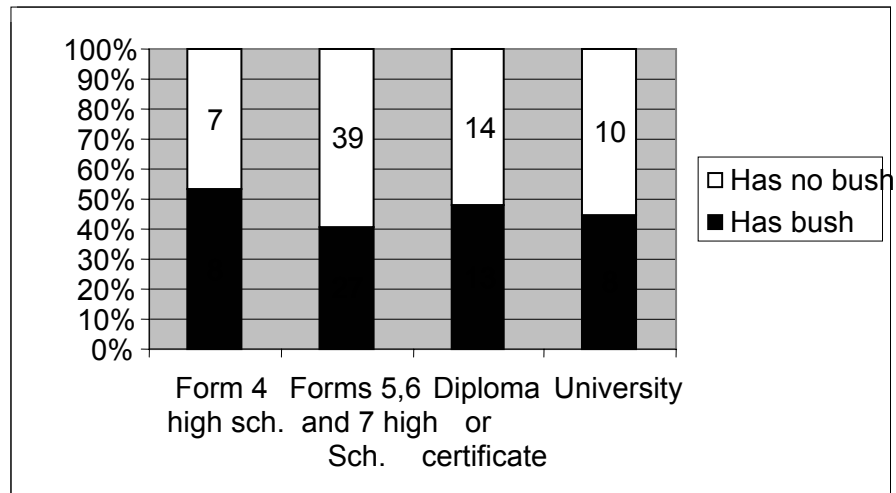
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younger farmers are more sympathetic, though individuals in the first two age-group levels are preoccupied with establishing themselves as farmers. The data support anecdotal evidence that many older farmers associate bush with poor farming practices (untidiness, laziness and wastefulness) while younger farmers are more inclined to view native bush favourably because they associate it with a distinctive New Zealand identity. Anecdotal evidence also suggests that middle-aged farmers are more likely than young farmers to have proved themselves competent as farmers, repaid their loans on purchasing the farm, and slowed down physically.

The 1960s witnessed the enactment of the Water and Soil Conservation Act 1967 and the setting up of the National Water and Soil Conservation Authority and catchment boards (Roche, 1994). The National Water and Soil Conservation Authority was then dismantled with the reforms of the Fourth Labour Government in the 1980s, and the responsibilities of catchment boards were subsumed under regional councils (with the passing of the Local Government Amendment Act 1989). The implementation of widespread catchment management practices from the mid-60s to the mid-80s brought greater recognition within the rural community of the importance of catchment protection for water and soil conservation. It may be that individuals who started farming after the widespread development of water and soil management practices under regional catchment boards were more inclined to view native forest favourably, or less antagonistically. These would now be the middle-aged farmers in their late 40s and early 50s. Individuals starting farming in the post-1985 Labour Government reforms may be less aware of water and soil conservation issues and more inclined to assess bush in strategic terms, where the decision to retain or remove bush is assessed in terms of economic return relative to effort.

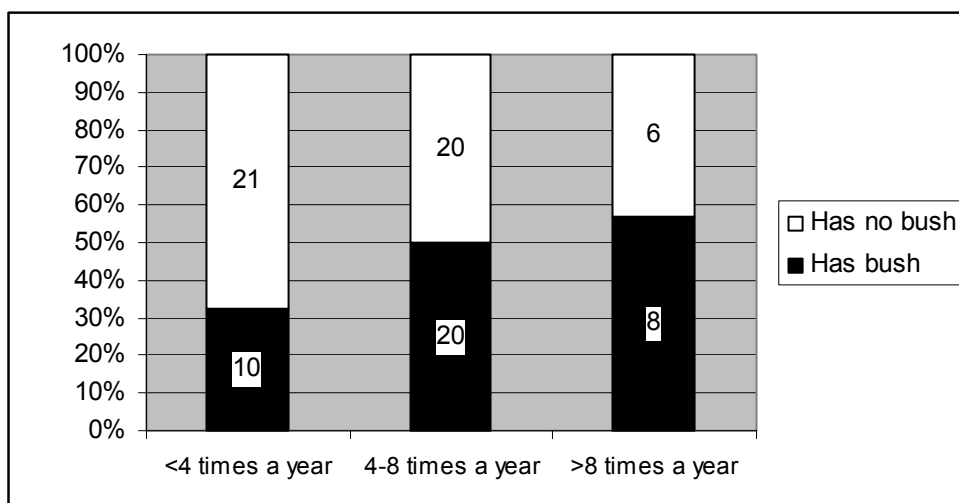
### **Education**

In terms of education, the questionnaire sought data on level of formal education, and attendance at farm discussion groups. Figure 8.10 shows that farmers with Form 4 high school as their highest level of formal education are somewhat more likely to have bush on their farms, while farmers with Form 5, 6 or 7 high school education are least likely. However the difference is small and is not statistically significant, as shown by the results of a Chi square test.



**Figure 8.10 Percentage and number of farmers in each education level who reported presence or absence of forest remnants on their farm**

There is no difference in attendance at farm discussion groups between farmers with and without bush, but there is a difference in the **frequency** of their attendance. Figure 8.11 shows that farmers with bush on their farms are likely to attend more frequently than the farmers without bush.



**Figure 8.11 Percentage and number of farmers with and without forest remnants by frequency of attendance at farm discussion groups**

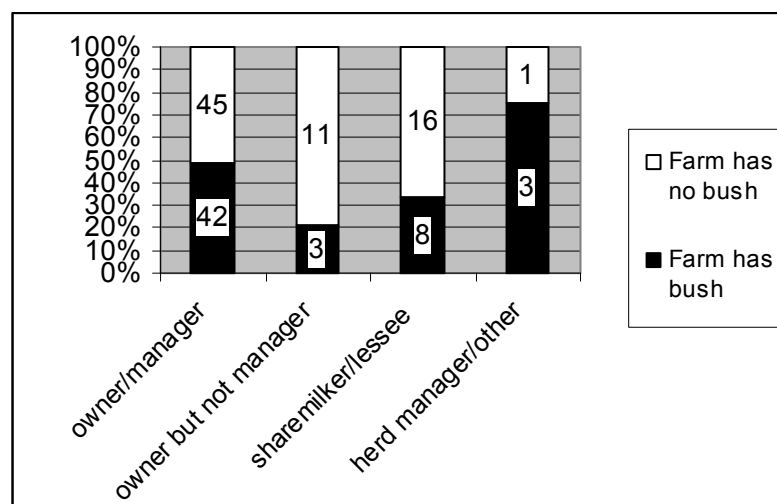
The positive relationship between frequency of attendance at farm discussion groups and presence of native bush suggests that attendance at farm discussion groups encourages a farmer to retain his or her native bush. Topics at farm discussion groups tend to revolve around farm and business management rather than bush conservation, but it may be that a focus on strategic management of

resources encourages farmers to leave bush alone where the financial and production return does not justify the extra input in terms of time, labour and other resources. Hence, for farmers who attend discussion groups, there may be a parallel link between retaining bush and farming strategically.

### Ownership

Ownership status can influence the balance of priorities between generating income and caring for the land. In general, owners have a greater commitment to the long-term health of the land than do sharemilkers or employees, who depend on production for their income. Figure 8.12 relates ownership status to the presence or absence of bush. As expected, the data suggest that owner/managers are more likely to have bush on the farm than sharemilkers. This tends to support the notion that for the owner/manager, as compared with sharemilkers, the long-term value of the farm may be more important.

It is interesting to note that the type of ownership least likely to support bush on the farm is one in which the individual owns but does not manage the farm. These may be farms that support both the family of the owner and the family of the sharemilker or herd manager, and they may be subject to more pressures for production as a consequence of supporting two families. Farms that are managed by a sharemilker or herd manager alone are more likely to be one of several properties owned by the farm owner, and subject to less pressure than a single farm that has to provide a full livelihood for two families.



**Figure 8.12** Percent of farms with or without forest remnants by the type of ownership or management of the farm

### Values and priorities

Question 21 of the questionnaire (in Appendix 3) asked farmers to say whether they agreed, strongly agreed, disagreed, strongly disagreed or were neutral about statements concerning farming. The statements were those that, on the basis of my field research, were designed to reveal any differences in values and priorities. Table 8.6 provides a summary of the data. It shows the percentage of farmers in each category (farmers with bush and those without bush) who agreed or strongly agreed with the statement<sup>3</sup>. The responses to each question were subjected to Chi square analysis to assess whether there was a significant difference in response between the two groups. A more complete record of the data is presented in Appendix 4.

**Table 8.6 Percentage of farmers with bush and without bush who agree with the following statements about farming**

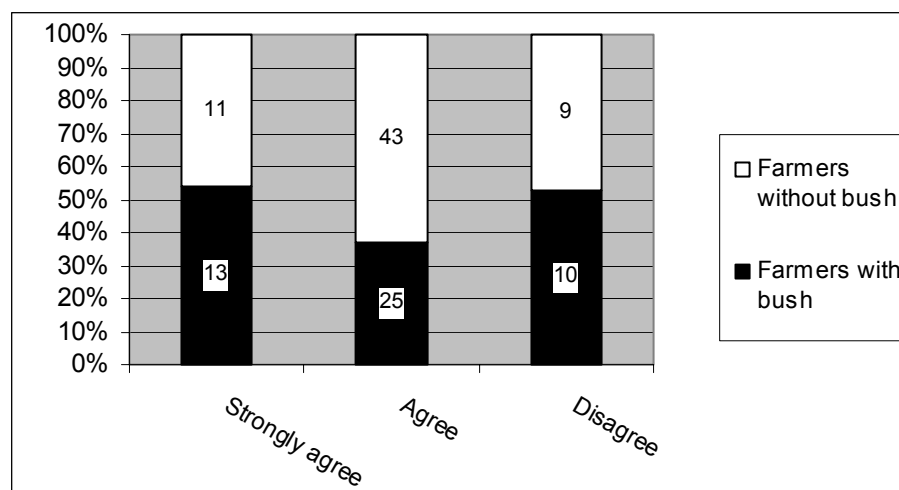
Statements about farming	Farmer s with bush	Farmers without bush	Chi- square significan ce
Farming is about getting as much milk production as possible.	68	74	$\chi^2 = .6$ ; $p = .4$
Personal satisfaction or enjoyment is more important than profitability.	60	56	$\chi^2 = .3$ ; $p = .6$
My goal is to reduce my workload and improve my quality of life.	80	79.5	$\chi^2 = .02$ ; $p = .9$
You can't get by without using some urea on the paddocks.	77	71	$\chi^2 = .5$ ; $p = .5$
Shade trees and shelter belts are more of a nuisance than a benefit.	11	7	$\chi^2 = .6$ ; $p = .4$
Planning and finance are the most significant parts of running a farm.	68	74	$\chi^2 = .6$ ; $p = .4$
I would like to conserve the land but economics don't allow it.	32	42.5	$\chi^2 = 1.9$ ; $p = .4$
Profit is more important than production for success in farming.	75	63	$\chi^2 = 2.1$ ; $p = .15$
Farming is a lifestyle as much as a business.	66	66	$\chi^2 = .001$ ; $p = .97$
Number of farmers in each category	56	73	

Comparison of the percentages 'by eye' suggests that there is little difference in the response pattern to most of the questions with the possible exception of the second-to-last question 'Profit is more important than production for success in farming'. The 'eye' judgement is supported by the Chi-square statistics which

<sup>3</sup> Responses were recoded to two categories: 'agree/strongly agree' and a residual category comprising 'disagree/disagree strongly', neutral or 'don't know', and missing data. The figures shown in the table are the percentage of respondents in each category who agreed with the statement.

indicate no significant difference between the responses to any of the questions (given by a 'p' value equal to or greater than .05), except for the possibility of a weak relationship for the second-to-last question. In their responses to the statement 'Profit is more important than production for success', farmers with bush were more inclined to agree than those without bush. Because the Chi square test tends to underestimate real differences (Gravetter and Wallnau 2002, 427), the low 'p' value of .15 suggests that there could be a relationship although it is not statistically significant at the 5% level. It raises the possibility that farmers with bush are more inclined than those without to farm on the basis of land capability and profit rather than production as a key objective. It could be that some of the farmers with bush have decided that it is more profitable to leave difficult or unproductive land in bush rather than spend extra time, effort and resources for little financial return.

That some of the farmers with bush might be more strategic in their thinking about farming objectives is suggested by a closer analysis of responses in relation to the statement, 'Planning and financial management are the most significant parts of running a farm'. When the data are grouped into three categories, Figure 8.13 shows that farmers with bush are more likely to strongly agree than farmers without bush, and also somewhat more likely to disagree. The figure suggests that farmers with bush are not a homogeneous group but include some who place a high priority on financial management and planning while others resist such an approach.



**Figure 8.13** Frequency response of farmers to the statement, 'Planning and financial management are the most significant parts of running a farm', by bush category

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The support by both groups of farmers for the statement 'Profit is more important than production for success in farming', tallies with the common perception of farming as a business, but it is also an intriguing contrast to the physical realities of stock and pasture management on the ground. It suggests that the contemporary farmer no longer depends entirely on what happens on the farm, but rather what happens in interaction with the regional and international economy. It is not that the biological systems on the farm are more reliable (I assume that they are subject to the same risks of weather, disease, pests and weed invasions), but that individual farms have become less self-sufficient as production units and more dependent on farm services and supplies that are based off-farm. Thus a farmer can off-set ebbs and flows in the biological systems on-farm by management practices that involve the purchase of services and supplies off-farm (such as purchase and application of agri-chemicals, purchase of feed supplements, off-farm grazing contracts for heifers or drystock). Furthermore, it suggests that farmers are more and more encouraged to do so. They compensate for the risks of managing the inherent variability of biological systems on-farm by business and financial arrangements with other farms and farm contractors and services.

In summary, the data suggests that there was little significant difference in attitude between farmers who had remnant forest on their farms and those who did not. In most cases, where there were divisions of opinion, as in the statement about planning and financial management, the differences of view as they related to protection of native forest are minor.

### **Management priorities**

Table 8.7 below gives a comparative summary of responses by the two groups of farmers to the management objectives, profit, care of stock, enjoyment of and care of the land. Respondents were asked to rank the goals of production, profit, enjoyment or satisfaction, caring for the stock, and caring for the land, from most important to least important.

Production and profit are closely related concepts in the minds of most dairy farmers, and for many they are one and the same. Apart from the fact that farmers are paid for milksolids, farm land is valued in real estate terms on the basis of production of milksolids per hectare over the previous three seasons. Farm discussion groups revolve around ways to improve production, and farmers

talk about and informally assess each other in terms of production per hectare. The drive to extend the length of the milking season is a means to increase overall farm production. Thus production is generally taken to be an indicator of profit – it is a tried and true pathway to profit. However, for a minority of farmers who are well attuned to the business aspects of farming the two are conceptually distinct. For the purpose of this analysis I decided that the most reliable representation of farmer views was the goal of 'profit', which for some, was indistinguishable from production but for others was distinct from production. A more complete record of results is provided by Table 26 in Appendix 4.

**Table 8.7 Comparison of management priorities by category of farmer.**

Management goals	Farmer has bush			Farmer has no bush		
	Number of responses	Weighted value of goals	Average priority score for goals	Number of responses	Weighted value of goals	Average priority score for goals
Profit	46	156	3.39	57	209	3.43
Care of Stock	46	139	3.02	58	191	3.08
Enjoyment	44	115	2.61	59.5	169	2.64
Care of land	42	101	2.2	58	139	2.28

As with the attitude statements, I was unable to find any clear differences between farmers with bush on their farms and those without. Although there were differences, they did not seem to relate clearly or consistently to the presence or absence of native forest.

The table shows that both groups of farmers gave 'profit' the highest score and 'care of the land' the lowest. Both groups had the same relative ordering of goals, and the difference in the average score for each goal is very similar (eg. 3.39 and 3.43 for 'profit' by farmers with bush and those without bush respectively)<sup>4</sup>. In summary it is difficult to detect any consistent differences in management goals between farmers with and without bush on their farm.

<sup>4</sup> The ranking was obtained by giving a weighted value to each level of importance (ranging from 1 for 'least important' to 5 for 'most important') and multiplying the total of responses for each goal. The weighted value of 156 points for 'profit' in the 'farm has bush' column was obtained by multiplying the number of farmers who ranked profit as 'most important' by 5, the number who ranked it 'important' by 4, the number who ranked it 'somewhat important' by 3, and so forth, and summing the total.

### COMPARISON OF MANAGEMENT PRACTICES OF FARMERS WITH AND WITHOUT BUSH

Several elements of the questionnaire survey were designed to reveal differences in farm management practices between farmers who have bush on their farm and those who do not. They included questions about planting of trees, hedges or shelter belts on the farm; fencing of drains or streams to protect waterways; and intensity of farming, as measured in terms of production per hectare and stocking rate. The aim of these questions was to see if the presence of native bush on the property could be correlated with other types of management that might be regarded as environmentally positive (e.g. planting trees and shelter belts, fencing drains or streams) or negative (increasing stock densities and high production per hectare).

#### Amenity planting, shelter belts, and stream fencing

There were few differences between farmers with and without native forest in relation to planting trees for non-commercial purposes, planting hedges or shelter belts, removing hedges or shelter belts, or fencing drains or streams. Table 8.8 compares the proportion of farmers in each category who had completed any of those practices. With the exception of planting hedges and shelter belts, the table shows minor differences in the proportion of farmers in each category. The Chi square statistics indicate none of the differences are significant at the .05 level, although the low 'p' value of .17 for 'has planted hedges/shelter belts' suggests there could be a weakly positive relationship between this variable and presence of bush.

**Table 8.8 Comparison of some environmental practices by farmers with and without bush remnants.**

	Farmer has bush		Farmer has no bush		Chi square significance
	Number	Percent of category	Number	Percent of category	
Has planted non-commercial trees	37	66	47	64	$\chi^2 = .04$ ; $p = .84$
Has planted hedges/shelter belts	20	36	18	25	$\chi^2 = 1.9$ ; $p = .17$
Has removed hedges/shelter belts	20	36	25	34	$\chi^2 = .03$ ; $p = .86$
Has fenced streams	28	50	39	53	$\chi^2 = .15$ ; $p = .7$
Farmers in category	56	<sup>5</sup>	73		

<sup>5</sup> The percentage sums to more than 100 % because many farmers completed more than one or two of the activities.

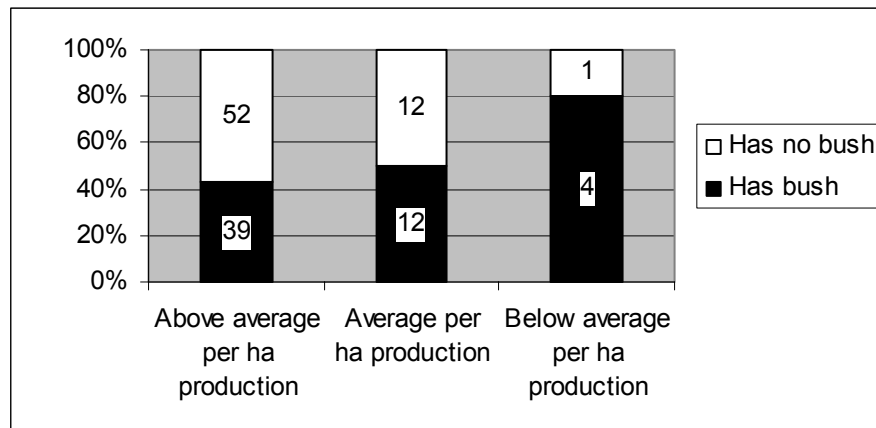
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More than half had planted trees while on their farm (66% of farmers with bush and 64% of those without) and half had fenced streams (50% of farmers with bush and 53% of those without). The most important reason for planting non-commercial trees was for aesthetic purposes, followed by practical reasons (stock shelter). The main reason for planting hedges and shelter belts was for stock shelter followed by aesthetic reasons and combined stock shelter and aesthetic reasons. The main reason for fencing streams was to prevent stock from falling in.

### **Production per hectare and per cow**

Many might argue that leaving land in native bush reduces the productivity of a farm. Thus it is worthwhile comparing per hectare and per cow production for farms with and without native bush. Per hectare production is calculated on the basis of 'effective hectares', namely hectares used for milk production, and is a measure of the **intensity** of land use. A high production of milksolids per hectare implies intensive pasture management, high rates of fertiliser application, and full utilisation of pasture. It does not necessarily imply that all the property is used for production since land not used for production (e.g. land under buildings, trees, or bush) is not part of the calculation. Per cow production is a measure of animal husbandry and often relates to farms with smaller herds which need to produce well to off-set the greater economic efficiencies that can come from larger herd and farm sizes. Generally, in order to produce well, cows have to be healthy and well fed. This often means a trade-off in stocking rates. Farms with high stocking rates may have high per hectare production but lower per cow production. Conversely, farms with lower stocking rates may have better per cow production, but lower per hectare production.

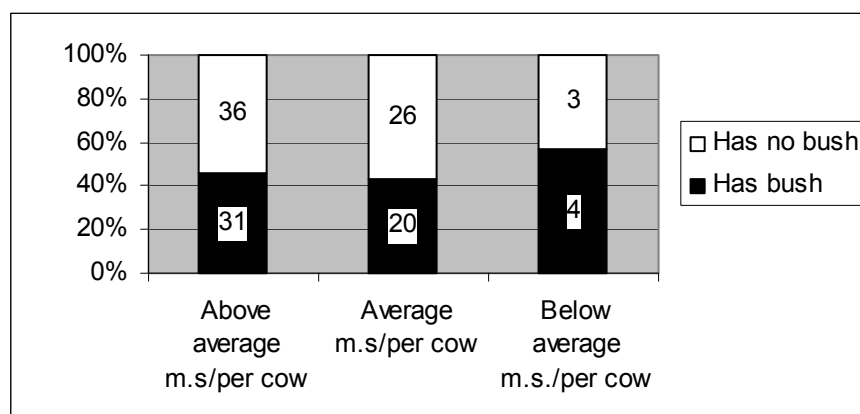
The analysis of these two factors, production per hectare and production per cow, showed slight differences between farms. Figure 8.14 shows per hectare production and shows a negative correlation between production and bush – that is, farms with above average per hectare production are less likely than those with average or below average production to have bush – but the difference is not significant at the 5% level of probability (see Tables 5 and 6 in Appendix 4 for the Chi square statistics).



**Figure 8.14 Proportion of farms with forest remnants, by category of milk production per hectare**

Given that per hectare production is calculated on the basis of 'effective' hectares rather than total farm hectares, the result is not a consequence of the size of farm. However, it could be that farms with above average production are also those which tend to have optimum physiographic conditions (i.e. flat terrain and well-drained soils) for dairy farming, while the farms with more bush and lower production per hectare are those which are physiographically more 'difficult' (e.g. poorly draining, thin or infertile soils, broken terrain).

Turning to per cow production, Figure 8.15 shows a similar pattern in relation to farms with below average production (i.e. those farms with below average production are more likely to have bush) but little difference between farms with average and those with above average production per cow. In other words, farmers who focus on high per cow production are no less likely to have bush than those with average per cow production.

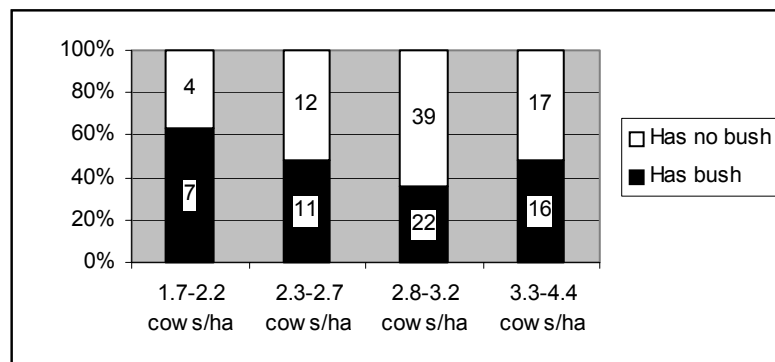


**Figure 8.15 Proportion of farms with forest remnants, by production of milksolids per cow**

### Stocking rates

Stocking rates are a measure of the intensity of land use. They are usually calculated on the basis of cows per hectare of effective milk production area. High stocking rates imply high cow densities, high rates of fertiliser use, and high rates of animal waste outputs.

When comparing farms by stocking rate, there is the suggestion of an inverse relationship between stock densities and native forest remnants; the higher the stock density, the less chance of bush, and the lower the stock density, the higher the chance of bush. Figure 8.16 shows that farms with lower stocking rates are more likely to have bush remnants while farms with higher stocking rates are generally less likely. However, it is interesting to note, that farms with very high stocking rates reverse the pattern – they have the same likelihood of having bush as farms with medium stocking rates.



**Figure 8.16 Proportion of farms with forest remnants by stocking rate**

It is difficult to interpret these results. Because land under remnant forest is not 'effective' dairy land, it is not included in the calculation for stocking rate. Possibly the higher incidence of bush on farms with lower stocking rates reveals a low-input-low-output philosophy which tolerates lower stocking rates and persistence of bush. But there are also the very high stocking rate farms that appear to reverse the relationship, and suggest that there could be a different management philosophy at work. It could be that the very high stocking rate farms are run by highly efficient managers who closely match land use to land capability. On these farms high capability land use areas of the farm may be used for intensive forage production rather than grazing, and areas of lower capability are left in bush.

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## CONCLUSION

The survey sought to discover patterns of bush occurrence that could be related to the biophysical characteristics of the bush itself, characteristics of the farm, and characteristics of the farmer. It noted characteristics of the surviving remnants on dairy farms, and compared the farms in respect of size, topography and age. It also compared the farmers with respect to education, age, experience and ownership status, attitudes about farming, management priorities, and some farm management practices (planting of non-commercial trees, planting of hedges and shelter belts, and fencing of drains and streams).

Key discoveries of the survey are:

- With respect to the patterns of bush occurrence, the topography of the remnant and the size, topography and age of the farm appear to be an influence. The common use of remnants for stock shade and shelter, and the low frequency of their perceived value for other uses militate against their survival.
- Small forest remnants are widespread throughout the region, with 43% of dairy farms reporting some element of native forest vegetation, and 19% supporting forest remnants that were protected from stock. More than 50% of remnants were on land that has potential for production. Remnants on flat land (such as old kahikatea trees) were less likely to be protected from stock than those on steep land or gullies.
- Forest remnants were found on easy as well as difficult terrain. Although they were more likely to be found on farms with difficult topography and the largest farms, contrary to expectations they were also found on small farms (37% of farms under 54 hectares had bush), and farms that were on easy rolling or flat topography (35%). These facts suggest that elements other than physical size and topography are relevant to the survival of remnant forest.
- In absolute numbers, most of the remnants were on older farms, but older farms were proportionately less likely to hold remnants than more recent farms. This supports the view that remnants on older farms are gradually disappearing as a consequence of neglect or mismanagement (e.g. land drainage and/or allowing access to stock).
- Comparing social characteristics of farmers, the factors that may influence bush survival include the age and generation of the farmer, time on the farm,

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attendance at farm discussion groups, and ownership/management status. Farmers in the 45 to 54 age group were those most likely to have bush on the farm, as were farmers who had lived on the farm for only 5 to 10 years. Farmers 55 years and over were much **less** likely to have bush on their farms, as were farmers who had lived on the farm for 11 years or more. Taken together, age and time on the farm suggest the possibility of a cohort difference between farmers over 55 years old and younger farmers. It is possible that farmers who began farming after the development of water and soil catchment management agencies in the mid-60s had a greater awareness of the value of native vegetation for water and soil protection, while those who started farming before this era continue to feel that native bush is 'waste' land. Farms that were managed by owner/managers were several times more likely to have bush on their farm than the farms that were managed by a sharemilker, herd manager, or owner who was not the manager. Formal education did not appear to have much influence, but frequency of attendance at farm discussion groups appears to be positively linked to retention of native bush.

- There are few significant differences in attitudes, values and management objectives of farmers with bush and those without. Profit is the most important objective for a majority of farmers, both those with bush and those without. One significant element for farmers with bush was revealed by responses to the statement, 'Planning and financial management are the most significant parts of running a farm'. Eighty-two percent of all respondents agreed with this statement, but farmers with bush were more inclined than others to agree strongly, or disagree. The difference appears to reflect a division within farmers who have bush between those who depend heavily on planning and financial management and those who resist such planning. It also suggests that a significant proportion of the farmers with bush on their farms manage their land in a way that recognises variations in land capability.
- In terms of farm management practices, there were no significant differences between farmers with bush and those without, except in relation to stocking rates. Farms with bush are more frequently below average in their stocking rate than farms without bush. This below average stocking rate could have been associated with the fact that farms with bush are more likely to be on rolling to steep topography.

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In summary, the survey found that the relationships between variables that influence the survival of native forest remnants are subtle and complex. Although some elements are clear (such as the relationship between remnants and steep topography, or the link between fewer remnants and older farms) there are many elements that are unclear, for example, the link between age of farmer and presence or absence of native bush. Profit, production and practicality appear to be important factors in the equation; they suggest why there is so little native forest left in the Waikato. However, if production, profit or practicality were the only factors related to the survival of forest remnants, why would 35% of remnants be found on flat to gentle terrain (and 54% on land that could be used for milk production), and why would nearly a fifth of all farms have remnants that are protected from stock? Why would there be so few remnants associated with farmers in the 55-to-64 age category, and more remnants than expected associated with farmers in the 45-to-54 age group? These empirical findings suggest that there are complexities to the issue that require more than a political economy/political ecology perspective, and that something more than a social constructionist viewpoint is required to understand the cultural ecology of native forest remnants in the Waikato.

Chapter 5 suggested how bush (or its associated topography and physical characteristics) may have separate agency in the way that farmers make farm management decisions. Chapter 11 suggests a process whereby farmers may be disposed to note the feedback signs from the biophysical properties of the farm (including bush) in a way that influences their farm management decisions. Meantime, the next two Chapters will present research results from the discourse and content analyses of dairy farmer tests.

# ***CHAPTER 9***

## ***THE POWER OF LANGUAGE: A DISCOURSE ANALYSIS OF DAIRY FARMER TEXTS***

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The purpose of this chapter and the next is to illustrate the cultural context of dairy industry knowledge, values, and attitudes about the environment and production as they may influence dairy farmers. Dairy farmers are not isolated managers of the land they farm. They live within a cultural realm that includes the dairy company, scientific research and advisory institutions, commercial farm service firms and organizations (such as stock agents, machinery and equipment firms, veterinarians, fertiliser suppliers, and so forth), voluntary social and professional interest organizations (such as local community groups, farmer organizations, and breed associations), and farm media communications. This wide array of organizations provides a cultural climate of values, knowledge, and assumptions about the world that influence the beliefs and priorities of individual farmers as land managers.

Earlier chapters discussed the social, cultural, and environmental elements of dairy farming in Waikato. An over-arching hypothesis is that protection of native bush by dairy farmers is overlooked because they are strongly influenced by cultural institutions and values that promote production to the neglect of alternative land management values such as stewardship and landcare. Chapter 4 presented the theoretical perspectives of critical discourse analysis and political economy to suggest that most people in society are strongly influenced in their values and perceptions of what is 'true' by the social discourses (communicative realms) of which they are part. It was also suggested that politically dominant discourses in society tend to reinforce established power structures. The critical discourse and political ecology perspectives suggest that societal relationships with the environment

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are frequently in the interests of established power, but not necessarily in the interests of environmental sustainability.

This chapter follows on from the suggestions in Chapter 4 by providing an interpretive discourse analysis of three significant New Zealand dairy farm texts. The chapter which follows provides a quantitative content analysis of articles from a popular dairy farming magazine. The two forms of analysis are complementary and reinforce each other.

The texts selected for this analysis are representative of documents that dairy farmers are regularly exposed to. They are not unusually biased in their focus on production. Rather, they exemplify texts that are directed at farmers to influence their farm management decisions. As such they are examples of the 'discourse' of mainstream farming practice and are linked to power centres within the industry (a major international seed company, the dairy factory that farmers deal with on a daily basis, and Fonterra). They are examples of the communication that helps to shape the knowledge, attitudes and assumptions about what is or is not important in practice, of mainstream dairy farmers.

In Chapter 3 it was noted that a study of South Island dairy farmers by Menzies (1999) found a tension between the environmental perceptions of farmers and those of dairy stakeholders such as consumer representatives and industry officials. From the perspective of this thesis, an important point noted by Menzies is that while farmers were inclined to perceive native vegetation and natural scenery as an element of 'clean and green', the same was not necessarily true of other dairy stakeholders. It is thus worth remembering that although the following analysis shows up a general lack of attention to environmental issues in the texts that were analysed, this does not necessarily mean that farmers are unaware of them. Rather, it reflects the messages that farmers receive from key agencies in the dairy industry. It could be argued that the analysis is one-sided because it singles out texts which focus on production. However, the selection of texts was not based on content but on the fact that they aim to influence farm management (i.e. they were not chosen because they focus on production, but because they aim to influence farmer behaviour).

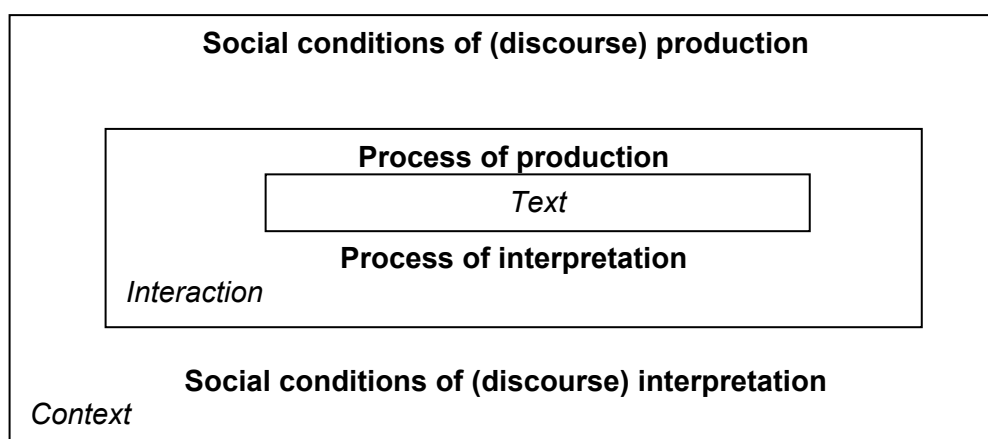
Farmers' literature, such as the documents analysed in this chapter and the next, appear to express notions of 'truth' that are widely held. I have used such documents

to ‘ground-check’ my fieldwork observations of farmers. Individual farmers who were involved in my research expressed their own unique understandings, interpretations, values and priorities, but in general the research showed a concordance between many of the value and knowledge statements articulated by the farmers I spoke to, and those expressed in documents and texts of this and the next chapter.

#### **FAIRCLOUGH’S MODEL FOR CRITICAL DISCOURSE ANALYSIS**

While Chapter 4 provided the theoretical assumptions of critical discourse analysis, Chapter 6 explained how ‘text’ is the focus of analysis and that an aim of discourse analysis is to ‘deconstruct’ the meanings and assumptions that underlie cultural forms of communication. In order to assess the meanings underlying communication, Fairclough has developed an analytical model which examines two dimensions of discourse: the micro level, involving the immediate production of ‘text’ (which may be any outcome of communicative interaction, from an interview or one-to-one conversation, to a news media release), and the macro level of ‘discourse practice’ within the wider society. The contextualising of texts is applied in the analysis of the texts presented in this chapter.

Figure 9.1, shows the ‘micro’ context of text production, namely the immediate social conditions and processes of text production (be it a conversation, a document, or a TV programme) and the processes and social conditions of interpretation of the text (Fairclough 1989, 25).

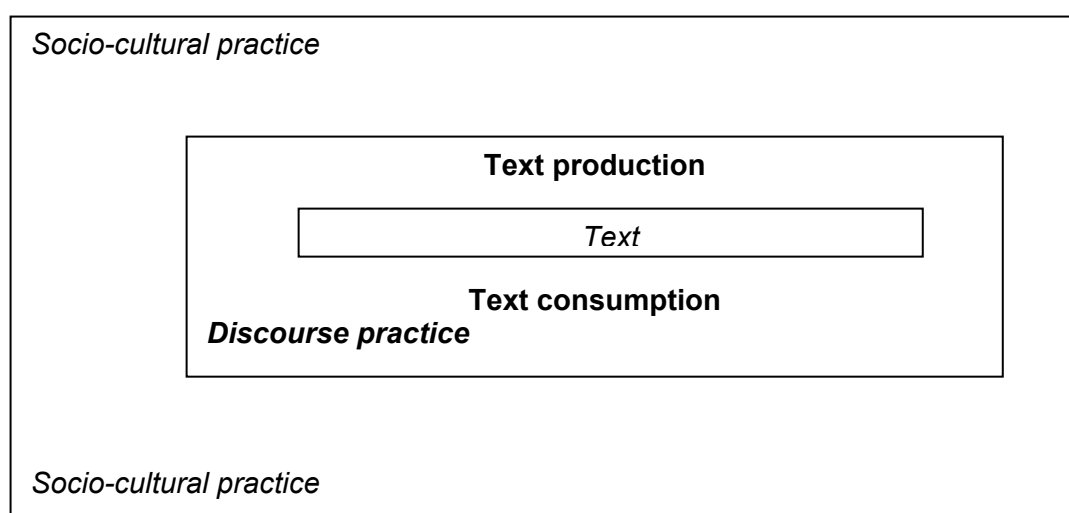


**Figure 9.1** Fairclough's model of the 'micro-level' of discourse as text, showing production and interpretation in the context of interaction (Fairclough 1989, 25)

For example, communication between a shopper and a supermarket checkout attendant – the 'text' – is likely to be influenced by the social circumstances which structure the cultural expectations that the individuals hold of what is acceptable

behaviour. Each individual will tailor what he or she says, and interpret what the other says in the light of the impersonal atmosphere of a supermarket shopping transaction.

Figure 9.2 sets the production and consumption of 'texts' against the broader background of discursive practice within the wider society. At the society-wide level different discourses compete to articulate the interests and concerns of different groups in their struggles for power and influence (Fairclough 1995a; Blommaert and Bulcan 2000). In relation to the issue of dairying and water quality in the Waikato, for example, the discourses of environmentalists, Fish and Game Council representatives, and regional council officials compete against those of dairy farmers.



**Figure 9.2 Fairclough's model of the social context of discourse practices (Fairclough 1995a, 59)**

By 'social conditions of production' Fairclough means the immediate social context in which discourse is produced as well as the wider institutional and societal processes that condition how people perceive and deal with the issues at hand. For Fairclough, 'text' is the product or result of interaction, but this interaction must always be viewed within the broader social framework. The 'processes of interpretation' and 'social conditions of interpretation' influence and give structure to the way that discursive interaction is produced and interpreted by those involved. Although the concept of text has been broadened to include almost any form of communication within a social context (including, most importantly, visual forms of communication), for Fairclough the major focus of discourse analysis rests on language and language-related media

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such as newspapers, reports, transcripts of interviews, documents and publications (Fairclough 1995b, 54).

To illustrate what Fairclough means by social conditions and processes of production and interpretation within the broader frameworks of discourse practice and socio-cultural practice, we can consider elements relevant to my own fieldwork and its production of field notes ('text'). The farmers I interviewed were, like me, influenced by the (contextual) fact that I am a 'townie' and a scientist from the University. The farmers and I made assumptions about the knowledge and values that we thought each held as a consequence of our social context, and interpreted what the other said in the light of our respective concerns. I was fortunate in that the dairy industry has benefited greatly from scientific research, and dairy farmers have reason to feel a general respect for scientific research. Consequently, most of the farmers I approached were pleased to be involved in my research. And, turning to the 'process of interpretation', given that it was impossible to record all the observations and discussion that came up in interviews, my selection and interpretation of the information I received from farmers was almost wholly structured by a research frame that provided the reason for the research in the first place.

In short, the farmers and I were embedded within realms of discourse practice that influenced the ways we think and what we paid attention to. I am enveloped within an academic realm that includes the development of ideas, knowledge systems, and conventions of practice related to research and the publication of articles in journals. For their part, farmers participate in realms of discourse that link them to practices of land management that are closely tied to a system of high technology industrial milk collection and manufacture. Our respective realms of discourse (academic research and industrial milk production) are further framed within New Zealand society, where elements of academic research, such as agricultural science (e.g. at Massey University, Lincoln University, and the Crown Research Institutes), have formed alliances with the dairy industry which strengthen the position of New Zealand dairy science and dairy production within the world at large.

#### **READING TEXTS**

'Text', as used in content or discourse analysis, applies to any set of material or non-material items or practices intended to convey meaning (Johnston 1994, 621), and may include written documents, film, videos, TV, maps, paintings, landscapes, and

other objects of material culture that communicate meaning between creator and perceiver.

Within geography, no one set of methodological guidelines has been developed for reading texts. In general, the approaches employed by geographers using content or discourse analysis have been very eclectic (Forbes 2000, 138). For the purpose of this analysis, I have been guided by the examples of Fairclough, David Lee and, in relation to visual materials, Gillian Rose. Rose has specifically addressed methodologies for analysing visual materials (Rose 2001). Like Fairclough, she examines both the text in itself (i.e. the visual representation, and the social context of its production, interpretation and consumption). She suggests that, 'Looking carefully at images, then, entails, among other things, thinking about how they offer very particular visions of social categories such as class, gender, race, sexuality, able-bodiedness, and so on.' (Rose 2001, 11). Again,

. . . discourse analysis depends on reading with great care for detail. It assumes that the efficacy of discourse often resides in the assumptions it makes about what is true, real or natural, in the contradictions that allow it interpretive flexibility, and in what is not said, and none of these are accessible to superficial reading or viewing (Rose 2001, 158).

In the context of this analysis, discourse analysis of written text and visual images has meant looking at what is said and what is not said about the environment; at how the environment is operationally defined in terms of the elements that are included and those that are excluded; at the attention given to environmental issues relative to other issues; at how environmental issues are positioned relative to other concerns of farming (do they come as forethought or afterthought); and at the language used to describe environmental elements (e.g. is the environment posed as a negative or a positive, and is it described or depicted as an active or a passive agent).

#### **SELECTION OF TEXTS**

The texts selected for this analysis are not random; rather, they are representative of the texts that dairy farmers are regularly exposed to and, because of their context, they are likely to be particularly influential in their communicative impact. The first example is from a highly sophisticated advertising series by an agricultural seed firm, Pioneer Products, which was one of the sponsors of the 2002 Dairy Farmer of the Year competition. The advertisement was placed with the *NZ Dairy Exporter*, one of New Zealand's leading dairy industry magazines, with a wide readership among farmers. It is an example of quality advertising blurbs that are regularly distributed

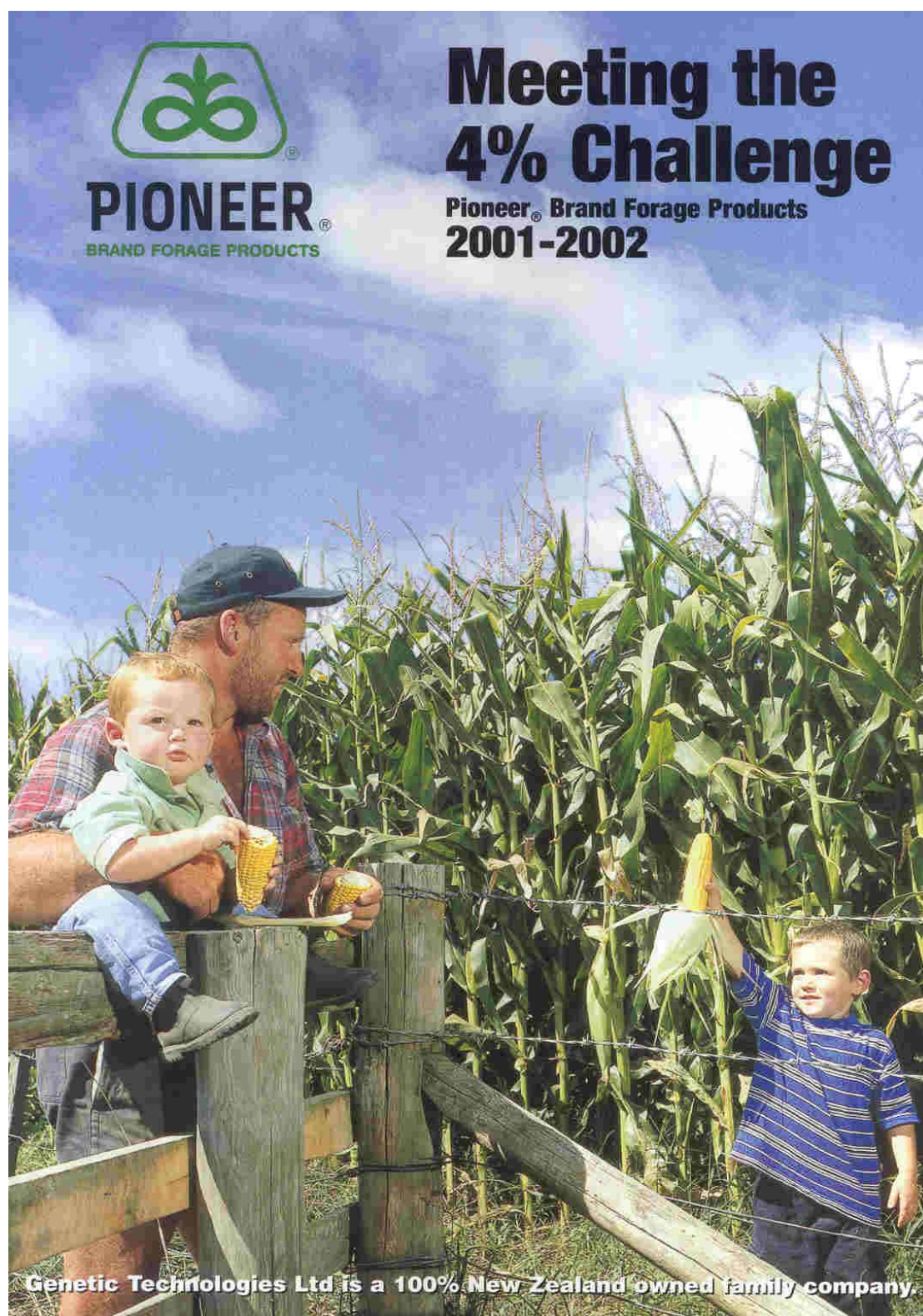
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with the *Dairy Exporter*. The second is a text that farmers receive on a daily basis as a record of their milk supply to the dairy company. It is important to the farmer because it gives him or her a daily indication of milk production and milk quality, the two characteristics that determine payments. The third is a discourse practice related to the Dairy Farmer of the Year competition, a competition open to the 13,800 milk suppliers of Fonterra. The public speeches and criteria associated with the competition were reported in the *Dairy Exporter*, and in *Fencepost.com.*, an internet news site for farmers operated by Fonterra.

In the analysis of these ‘texts’ I have indicated the social context of their production (by Pioneer Products, the dairy company ‘daily docket’ and the Dairy Farmer of the Year industry-wide competition), but have not been able to say much about their interpretation by farmers. This is because, apart from the ‘daily docket’, I did not ask farmers what they thought of the Pioneer Brand advertisements or the Dairy Farmer of the Year competition. However, I was able to note the reaction of farmers to their daily docket. I noted that at least for some farmers (all the mainstream farmers) it was a significant document which they glanced at daily, and if they needed to, examined with care. For the Pioneer Products advertisements I infer that the company would not continue its advertising if the advertisements were not influential in persuading farmers to purchase the seed and use the services of the company. For the Dairy Farmer of the Year competition, I infer that the competition has an impact on a significant proportion of the dairy farming community both from reports about the competition and the competitors in the farming media, and because the companies that are sponsors of the competition are mainstream within the industry.

#### **PIONEER PRODUCTS; PRODUCTION WITH MADE-TO-ORDER BIOTECHNOLOGY**

The picture on the next page is the front cover of a 30-page advertising booklet by Genetic Technologies Ltd, a New Zealand company that is the agent for Pioneer Hi-Brand International Inc, an American multi-national seed firm.



Source, Genetic Technologies Ltd, undated.

**Figure 9.3** Front cover of a farm service brochure advertising forage crops

The booklet is one of a series distributed annually by the *NZ Dairy Exporter*. Maize is an increasingly important forage crop for dairy farmers who aim to extend the

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production potential of their farm beyond that afforded by a grass-only system. The seeds advertised involve a variety of maize hybrids suited to different growing conditions. Being hybrids, they depend on an agronomic/horticultural infrastructure of land, research, cultivation, and harvesting to produce. In the broader social context, this advertisement is for a New Zealand agricultural biotechnology company in partnership with a multinational seed company promoting sales of a product that depends on a high level of capital investment and research infrastructure. The aim of the advertisements is sales, and sale of a product that is expensive to produce and expensive (in terms of pesticides and fertilisers) for farmers to grow. Because the product is biological – maize plants – it is inevitably subject to the vagaries of soils, microclimate and disease. Therefore, farmers who commit to buying take the risk in the hope that the maize will grow on their paddocks as in the booklet. The booklet must convince farmers that the risk is low and that returns (profit and farming success) will be worth the risk.

As suggested in Chapter 7, risk is a major issue for farmers, particularly those who may be following a high-input/high output strategy that aims for high milksolids per hectare or per cow. By planting maize as a forage crop, the farmer must withdraw land from pasture for 4 to 5 months of the peak production season. If a farmer is dependent on forage supplements to boost and extend milk production through autumn, and the maize shrivels because of a dry summer, or does not germinate well because of a cold spring, or is lacerated by a late spring hailstorm, then the return on the time and resources invested in growing the crop may be lost. The booklet makes light of these risks by conveying the impression that standardised seed is as reliable as standardised widgets.

The booklet and its contents combine images that reflect values of family goodness, loyalty (to New Zealand as a nation), naturalness, wholesomeness, science, technology, masculine responsibility, a mastery of nature, and farming success. The cover picture combines images of naturalness, advanced technology, and machine-like reliability to convey the message that farmers can rely on the company's seeds to achieve their management objectives. The scene of a robust father and his two healthy and alert young sons set against a background of blue sky, sunshine, and vigorously growing healthy maize plants, depicts a safe, healthy, happy and wholesome environment.

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But the written text uses the naturalness of children, sunshine, and growing plants to promote an economic discourse of manufacture and profit. The seeds that are intended to grow are 'forage products'; and the production target is 'the 4% Challenge', a reference to the dairy industry's call for a 4% per annum increase in productivity (Dexcel 2002a).

The vagaries and risks of nature are minimised by referring to the maize plants as '**products**', a term normally applied to inanimate objects, not organisms. It suggests that plants can be made to order and that mastery of nature is complete. It obscures the fact that maize seedlings can fail, that contingencies such as weather, soil conditions, or disease may intervene, that a high-input forage crop such as maize involves environmental consequences and costs. It also obscures the highly interventionist, highly controlled processes that are involved, and suggests that farming in this technocratic way is as healthy, natural, and beneficial as blue skies and sunshine.

The combination of natural and manufactured images encourages the perception that the environment does not exist in its own right but is a medium of production that can be manipulated at will. It promotes the perception that technology holds the answer to farm production problems, and that biology can be controlled and directed by technology as easily and reliably as machines.

Do farmers interpret the booklet this way, one may ask? Perhaps not. I was not able to ask farmers about their interpretation of the booklet, and it could be that I am 'reading into' the imagery qualities (such as naturalness, wholesomeness, and the like) that farmers would not necessarily see. However, I infer from the fact that the booklet is published regularly, that at least some of the messages (of increased farm output, profitability, reliability etc) appear to influence enough farmers to generate sufficient sales to cover the cost of its production.

The booklet plays heavily on the values of family and community loyalty. Together with the claim on the front cover that Genetic Technologies Ltd 'is a 100% New Zealand owned family company', there is a picture of William Yates of the Yates family, General Manager of Genetic Technologies Ltd (agents for Pioneer), in casual family clothing. Family values, and the value of personal face-to-face relationships, are conveyed by pictures of individually named farmers and members of their family (wife or children). These show individual farmers in conventional farm settings,

together with reasons why certain individuals have found Pioneer hybrids worthwhile. The farmer on the front cover is named, as are his two sons, adding to the believability of the message.

This use of imagery relating to family and community values is important in the broader social context of dairy farming in New Zealand because an enduring perception within the farming community is that, 'the heart of New Zealand's dairy industry is the family farm' (NZDB 2001; Yerex, 1989). In addition, the New Zealand dairy industry is based on co-operatively owned dairy factories, and on co-operation between farmers in relation to milk transportation (for example, dairy tankers mean that one farmer's contaminated milk can spoil the milk of all the other farmers on the tanker run), and milk production (all farmers benefit from growth of the industry). The industry supports a network of farmer discussion groups who visit each other's farms and learn from each other. By giving the names of farmers and family members, and by judiciously quoting what farmers have said, the booklet simulates a fellowship with other (generally successful) farmers and conveys a sense of company-client relationships that are as close and trustworthy as those between farming neighbours or friends.

Figure 9.4 shows a small icon of the New Zealand flag on each page of the booklet. The icon conveys the impression that Pioneer is a New Zealand brand, although it is a large multinational corporation with headquarters in USA.

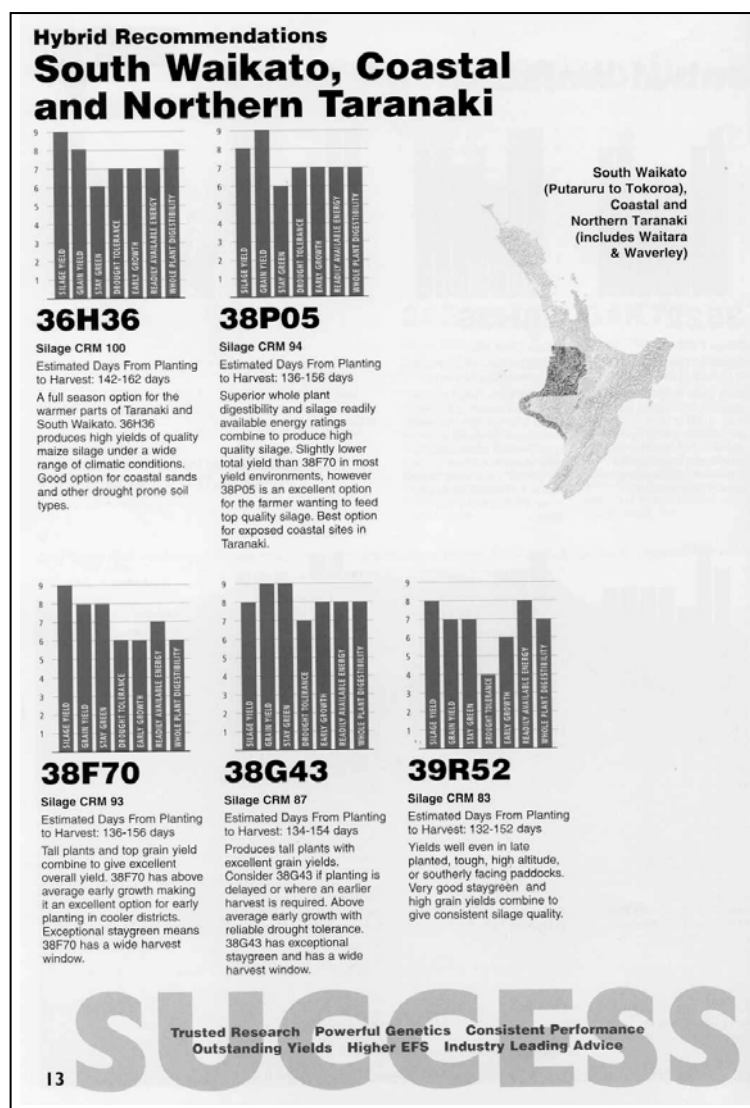


**Figure 9.4** Icon in 'Pioneer Products' brochure for forage crops  
Source, Genetic Technologies Ltd, undated.

Identification with a national icon is concordant with the fact that New Zealand's dairy industry is a national entity owned by New Zealand farmers. New Zealand dairy farmers are intensely proud of their industry and their competitive ability to maintain their position as one of the world's leading exporters of milk products against such international dairy giants as Nestle and Danone. Again, the booklet uses imagery of in-group loyalty to create the impression that New Zealand's farming success is tied to the type of intensive high-tech farming that Pioneer/Genetic Technologies promotes.

Close to the beginning, the booklet advises that, 'In the last three seasons, across all New Zealand trials, Pioneer brand hybrids have delivered an average 945kgDM/ha yield advantage in more than 1100 side-by-side comparisons against all current competitor products' (Genetic Technologies Ltd undated, 3). On the same page it is stated that, 'By following the recommended hybrids for different regions, Pioneer brand maize hybrids and lucerne varieties continue to offer farmers superior yields, quality, and profit potential.' These statements highlight the superiority of science-based plant breeding and technology as a source of profitability and farming success, and downplay the corresponding skills of local farmer knowledge, experience, and all-round farm management. As the illustration on the next page shows, the advertisement provides a formula for 'success'; specifically, 'trusted research, powerful genetics, consistent performance, outstanding yields, higher EFS (economic farm surplus), industry leading advice'.

Nine pages of the booklet are devoted to details about recommended hybrid strains for each of the major farming regions of New Zealand, as shown by Figure 9.5 on the next page. The detailed specifications of different hybrids for different regions convey the message that the company's research and technology have been powerful and thorough (involving more than 1100 side-by-side comparisons), and that control of nature is so complete and precise that it is possible to specify the precise seed strains required by each region, despite environmental differences within regions. By treating variations (of soil, climate, disease prevalence, etc) encompassed within each of these regions as if they did not exist, the maps and tables obscure the importance of environmental variation that is encompassed by places. Individual differences of farms and farming skill are masked by the claim that particular seed varieties have been carefully and scientifically developed for different regions; the maps and charts convey the impression that Hybrid 36H36, like the other hybrids, will do well wherever it is grown in the region. Local environmental variations are not completely ignored (dairy farmers are well aware that each farm is different), but local differences can be accommodated (at a cost) by 'industry leading advice' from the firm's team of expert advisers.



**Figure 9.5** Illustrated advertisement linking seed ‘products’ with ‘success’  
 Source, Genetic Technologies Ltd, undated.

None of the messages conveyed by the booklet include concern for the possible environmental consequences of maize cropping or for environmental sustainability. Fertiliser and insecticide are noted as elements of maize silage gross margin analysis, but there are no references to the possible detrimental environmental consequences of fertiliser and insecticide use or to the soil damage that prolonged cultivation of maize can do (Tivy 1990; Mannion 1991; Ministry for the Environment 1997, Chapter 8).

In summary, this example of farm advertising by Pioneer Brand Forage Products uses imagery to convey the notion that a farmer’s profitability and success is linked to high production and technological sophistication, while it ignores the possible environmental consequences. It encourages farmers to see land, soil, and plants as items of production and prerequisites for profit rather than organic entities with their

own requirements for long term ecological health and sustainability. It highlights the importance of expert knowledge (from people who are paid to focus on a specific aspect and type of farming) while downplaying the value of farmer experience and whole-farm management skills. It promotes a perception of farming (and farming success) as a modular exercise where plants plus chemicals equals kilograms of drymatter for ‘increased liveweight gains’ and ‘Optimised Milk Production’. (We do not hear about cows, except by implication that they are the consumers of the forage products and the producers of milk). The tenor of the discourse is geared to a technologised form of farming that overlooks all elements of the farm environment that are not immediately relevant to ‘yield’ and ‘profit’.

#### **THE ‘DAILY DOCKET’ – A FOCUS ON PRODUCTION**

Milk is picked up from dairy farms once a day. It is piped from a holding tank on the farm into a milk tanker where it mingles with the milk from other farms on the driver’s round. The tanker driver notes the quantity of milk that is taken in, and draws a small sample of the raw milk. The sample is analysed by the milk factory laboratory, where it is tested for contaminants such as sediment, coliform bacteria, somatic cells (an indicator of mastitis), and the presence of colostrum or antibiotics. The next day, the farmer receives a record of the milk that was supplied the previous day – a ‘daily docket’. The docket records the quantity and composition of the milk supplied for each of the previous few days, quality indicators such as the coliform count and somatic cell count, a summary of the amount of milk supplied for the month and the season to date, with a comparison of the same figures for the previous year, the average for suppliers within the district, and the average for the company as a whole<sup>1</sup>.

Farmers get paid for the ‘milksolids’ (milk protein and milk fat) they supply to the dairy factory. They are penalised for watery milk (which requires more processing) and for contaminants in the milk. The payout that farmers receive therefore depends on the quantity, composition, and quality of the milk that goes into the milk tanker. Because the milk from one farmer can contaminate an entire tanker, there are particularly heavy penalties – demerit points - for farmers whose milk exceeds certain levels of contaminant; an excess level of contaminants means that the farmer is heavily fined.

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<sup>1</sup> The version of the daily docket shown in Figure 9.6 was for the New Zealand Dairy Group Company before it amalgamated with Kiwi Co-operative Dairy Company and the New Zealand Dairy Board to form Fonterra. The appearance of the daily docket has changed since the amalgamation but the same information is provided on the new form apart from the fact that the current docket provides information on the previous 5 days, rather than the previous 10 days.

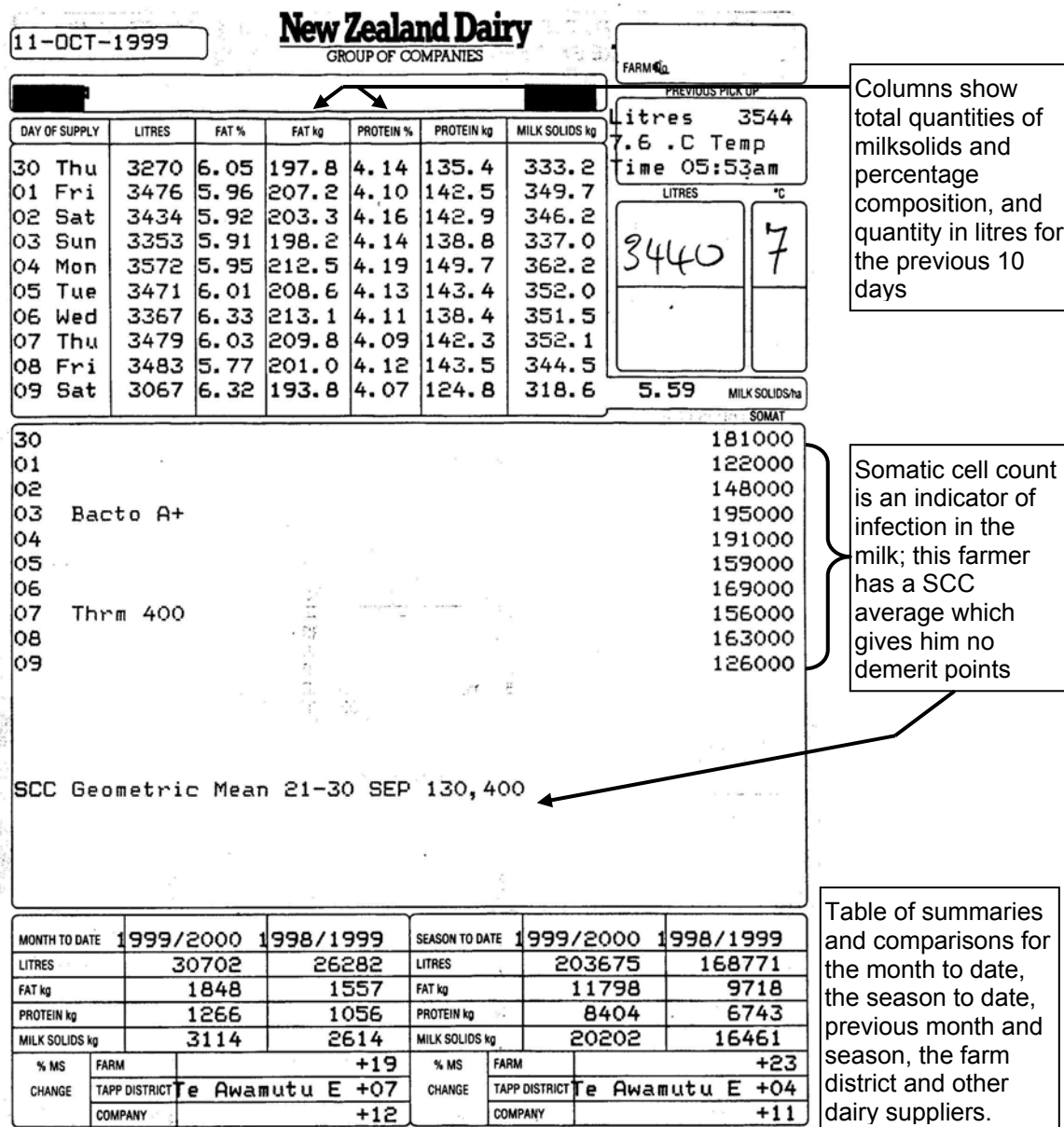


Figure 9.6 A 'daily docket' showing the quantity and quality of milk supplied by the farmer to the dairy factory over the previous fortnight (as in 2000 before the amalgamation of New Zealand Dairy Group with Kiwi Co-operative Dairy Company and New Zealand Dairy Board)

The daily docket is a powerful information feedback loop for the farmer. It ties to the system of reward and penalties that the farmer receives, and provides a rapid indication of problems in one or more different systems of the farm operation, notably animal health, pasture production, machinery operation and maintenance. From the daily docket, the farmer can calculate roughly how much income he or she is likely to receive and whether or not he or she faces an income reduction through penalty deductions.

None of the mainstream farmers I spoke to ignore their daily docket. Even my most expert farmer admitted that she looks at her daily docket regularly and uses it as a management tool. Two other farmers admitted how upset they felt when their daily docket showed a sharp drop in milk production that they could not account for. A sharemilker explained how and why production was such an important element to him and how the daily docket influenced his perceptions and feelings:

**Mairi:** Do farmers look at their daily docket closely?

**J:** Oh I would say so. Yeah. I would say so. The normal drop off [in milk production] is about 10% from November, but this year it was a lot more than that. There was a dry spell at the end of October and then some rain and the grass turned to seed and within about three days production had dropped. And there was nothing you could do about it. And looking at your docket was just terrible. Everyone just went into a depression for about a week. It was incredible, because you thought, “What have I done wrong?” And you had tried so hard to get them there. I think we dropped about 10 or 15% in about 2 weeks. It was a real kick in the guts, actually. It was quite disappointing. And the other thing, you were dropping from a high point. It was a psychological thing. You’re riding this high, and then you drop down to average. The season to date, for this week, we have done 25,500 kgs ms, roughly. The previous guy last year, to the same time had done 23,000kgs.

From his description, it is interesting to note not only how aware he was of rapid changes in production, but how he was able to compare himself with the previous sharemilker.

The daily docket is fundamentally important in the way it focuses the farmer’s attention on aspects of production and away from other aspects of farming. This is encouraged by several features of the docket. Firstly, only information relevant to production is given. There is no equivalent information, for example, on waste outputs generated as a consequence of the production (e.g. the kilograms of nitrogen excreted onto paddocks), or the herbage required to feed the cows. Secondly, the statistical comparisons encourage farmers to compare themselves with other farmers in the district, or with others in the dairy supply area, or with previous farm occupants. This latter point may be significant in the case of sharemilkers who move from farm to farm quite rapidly<sup>2</sup>; they can compare themselves with the previous sharemilker. The comparison invited by the daily docket, however, is exclusively in terms of production regardless of factors such as ease of production in the light of farm

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<sup>2</sup> The normal length of a sharemilking contract is three years, but some contracts may be only a year, while in other cases, the contract may be renewed and the sharemilker remains on the same farm for several contracts.

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conditions or sustainable land management practices. Thirdly, the comparative information provides inexperienced farmers with an average production to which they can aspire, without regard to factors related to long-term sustainability.

It might reasonably be argued that the information provided on the daily docket is relevant to its purpose of informing farmers about their milk production as an element of the contractual obligations between farmer and the dairy company, and that additional information (such as waste outputs) is irrelevant. Farmers are paid for their milk, not for the waste. Dairy companies take responsibility for the quality of the milk they accept, but not for how their suppliers manage their land. Such a view is reasonable and consistent with the prevailing capitalist ethic that manufacturers and industrialists are not obliged to take responsibility for indirect social or environmental consequences of their operations. These become 'externalities', ignored or left to public agencies, such as central, regional or local government.

The key point is that while the daily docket provides a record of production that allows almost immediate management responses from the farmer, there are at present no equivalent indicators for other important aspects of dairying such as soil and water quality, labour satisfaction, or quality of life. Furthermore, there is no obvious reason why the daily docket should provide comparisons with other farms in the district or other suppliers of the milk factory. While these may be of interest to farmers, they seem to encourage a focus on production no matter what the contingent circumstances of local climate, topography and soils.

In short, the daily docket is a form of communication between the dairy company and the farmer that encourages an exclusive focus on milk production. It is important because it is tied directly to the income rewards and penalties for farmers, and because it enables and encourages competition with oneself and with others to improve levels of production. Because it bears no relationship to other aspects of farm management such as type of land, economic efficiency or sustainable land management, these alternative ways of measuring self-performance are easily overlooked by individuals and can become less important as criteria for farming success. It is consistent with a prevailing norm to use kilograms of milksolids per hectare (e.g. 1000/kgms/MS/ha) as a measure of the good farmer, regardless of the topography, climate, soils, or amenity improvements that may be involved.

### THE DAIRY FARMER OF THE YEAR AWARD - FARMING AS A BUSINESS

The Farmer of the Year Award<sup>3</sup> involves a discourse practice, or realm of discourse, where individuals and agencies within the dairy industry identify and publicise the elements of dairy farming 'excellence'. According to one of the two key sponsors at the opening launch, 'The competition gives the industry an opportunity to celebrate and recognise excellence, to encourage on-farm achievement and innovation, and to think outside the square.' (Farmlink 2001a, 8). It is a defining discourse for the industry because it has been constructed by major industry players and is aimed at the majority of dairy farmers in New Zealand (the suppliers of Fonterra Co-operative Group).

The two main sponsors for the competition are WestpacTrust<sup>4</sup> and Fonterra. WestpacTrust is a New Zealand subsidiary of Westpac Banking Corporation of Australia. Although it is New Zealand's largest commercial bank, with nearly 1.3 million customers, it is in strong competition with the Bank of New Zealand and the Australia New Zealand Bank (ANZ) for agribusiness. Secondary sponsors of the competition in 2002 comprised a 'who's who' of New Zealand dairy service industries, including Ballance Agri-nutrients (a leading fertiliser company), Pioneer Brand Forage Products (seed company), Livestock Improvement Corporation (the largest dairy breeding agency), Gallagher Industries (specialising in electric fencing), Dexcel (dairy research and advisory services), Ecolab (a New Zealand subsidiary of a US multinational company which specialises in sanitary and cleaning equipment), Town and Country Agri-centres, a rural merchandising chain. The competition is advertised in the main farming news networks<sup>5</sup>, and is the premier award for dairy farmers in terms of the amount of prize money (\$300,000 in prize money compared with \$60,000 for the 2001/2002 Sharemilker of the Year Award).

Judging criteria for the Award in 2002 involved 5 areas of farm management (Fencepost.com 2002):

1. **Financial performance** (including profitability of farm business, economic farm surplus per hectare, percentage return on capital, total factor productivity)

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<sup>3</sup> The name has subsequently changed to 'Dairy Excellence Awards' and changes have been made in the number and criteria for awards. In 2004 the supreme award is 'Farm Business of the Year Award', with other awards for 'Farm Manager', 'Environment', 'Business Growth', 'Productivity', 'Quality Management,' and 'Human Wealth'. The changes reflect a recent rapid shift within the industry towards greater concern for environmental performance but the emphasis on business and economic efficiency remains a key element of the competition.

<sup>4</sup> Known simply as Westpac since November 2003.

<sup>5</sup> For example it is announced and reported in both the *NZ Dairy Exporter* and the Fonterra-owned web news service *Fencepost.com*

- measure, gain in productivity between years, understanding of productivity, and identifying areas for improvement);
- Financial management, (including knowledge of annual accounts and how they are structured, understanding of indebtedness, term versus current liability structure, annual forecast budget, cash flow budgeting, understanding of cash flow and tax implications);
  - Financial goals;
  - Business growth.
2. **Human resources** - including personal goals, family, community and other interests, industry involvement, communication skills and professional development initiatives, labour productivity, staff management, innovation in staff management, occupational health and safety issues.
  3. **Dairy management** - including awareness of resources available and their profitable utilisation, balancing feed supply and demand, stocking rate issues, production per hectare, use of supplements, pasture management, maintenance and tidiness of property and farm dairy, awareness of sustainability issues in regard to pasture, property and forage management, soils and fertiliser knowledge and use, production per cow, breeding policies and herd testing, herd records and their use.
  4. **Product excellence** - including milk quality performance, knowledge of the grading system, understanding the issues surrounding residues in milk, farm dairy maintenance and hygiene, knowledge of quality management concepts and implementation of a quality management system, understanding of market requirements and their rationale, animal welfare issues and practices.
  5. **Environmental integrity** – including water management, management of waterways and wetlands, where applicable, nutrient management practices, effluent management understanding, practices and outcomes, soil management knowledge and application, waste management issues and application, projects and innovations specifically aimed at environmental outcomes, community/industry involvement in environmental issues.

The language associated with the Award includes metaphors and concepts that are almost wholly related to business. On launching the Award in November 2001, Chris Moller, NZMP Managing Director of one of the two key sponsors, stated that 'Our farmers are world leaders in on-farm productivity and this, along with our quality

focus, gives us a competitive edge in the marketplace' (Farmlink 2001a, 8)<sup>6</sup>. Julian Nalepa, WestpacTrust General Manager stated that the contest 'highlights WestpacTrust's commitment to supporting the dairy industry in both on-farm and business excellence.' (Farmlink 2001a, 8). Award chairman, Fonterra Director Gerard Lynch stated that, 'The key goal is the promotion of dairy farming excellence through the identification of farm enterprises achieving greatness in all areas of their business.'

### **Farming as the business of milk production**

The judging criteria and the language of sponsors and judges for the Award are heavily weighted toward the view of farming as a business. The criteria stated above indicate a depth of concern about business aspects of farm management that is not matched by the other criteria such as dairy management, human resources, and environmental integrity.

The criterion for environmental integrity is highly focused on a narrow range of issues to do with water quality, effluent disposal and soil management. These are elements specifically related to production, but not to a way of life, or even to a way of livelihood. There is no suggestion that 'environment' could include aesthetic elements or concern for heritage, even though many farmers devote time and money to improving the aesthetic value of their property. Aesthetic concerns are evidently not deemed relevant to farming excellence.

Although the elements of the environment identified for the Award are linked to the system of production, the means for addressing the problems are divorced from production; that is, solutions to the problems of production are viewed separately from the system of production that produces them in the first place. For example, although pasture and stock management are critical aspects of environmental management (involving issues such as fertiliser use, stock density, the weight and number of cows on different types of topography) criteria for environmental integrity are kept separate from stock and pasture management.

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<sup>6</sup> During the lead-up time to the 2002 Dairy Farmer of the Year Award, *Farmlink* was a newsletter published by Fonterra and by Global Co, the forerunner of Fonterra for their milk suppliers. In 2002 the internet web news service *Fencepost.com* was taken over by Fonterra and *Farmlink* was discontinued.

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### **The environment as afterthought, not forethought**

The criteria for environmental integrity appear to be predicated on a concern to offset the negative environmental effects of a business system based on milk production. If one were to start with a different metaphor, such as 'way of life', 'stewardship' or 'landcare', it is possible that the criteria might be different. Elements of the environment that might be related to a way of life could include aesthetic or visual amenity, an environment that is healthful to the people and the animals that live there; care and protection of features that reinforce a sense of history, personal or family identity, or attachment to the land (e.g. archaeological features, features of beauty, or recreational pleasure). The way that environment is constructed within the discourse practice of the dairy industry leaders is as an afterthought to production, not a forethought to production.

In short, both the criteria and the language associated with the inaugural Dairy Farmer of the Year Award reinforce a perception of farming as a business, where success relies on profitability and productivity as measured in financial terms. Profit and productivity are by no means necessarily opposed to environmental management or protection of native bush. However, by focusing so exclusively on business criteria and production practices, the competition reinforces attention in one direction and away from other directions such as a quality way of life or a quality environment.

It should be noted that environmental concern within the dairy industry has increased dramatically within the past two or three years, and these shifts will no doubt be reflected in the farm award system and farming practices in future. But it is hard to imagine a deep-seated shift in environmental attitudes and concerns while the primary focus remains on profit and productivity, and farm income remains tied to production of milksolids. Despite a more sophisticated concern for business efficiency, the primary concerns that drive the industry remain closely related to the productivist ethic and economic reward system that have operated in the past. This ethic and reward system is a fundamental reason for the agricultural development and intensification that has resulted in the widespread loss of native wetland and forest within the Waikato.

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## CONCLUSION

This chapter has sought to illustrate that ‘discourse’, in the form of advertising blurbs, images, information memos and prize-giving performance targets can be powerful forms of communication between farmers and the institutions that shape the industry. They convey messages which suggest that milk production is the natural objective of dairy farming, that farming is primarily a business (e.g. rather than a livelihood or a way of life), and that business methods of technological and economic efficiency are key avenues to farming success. To the extent that the environment is an issue, it is viewed mainly as a problem that impacts on consumer perceptions of the industry and industry relations with the community, and it can be managed by technological means that do not involve any change in the production/profit focus. These messages come from elements of the dairy sub-culture that are economically and politically powerful: Fonterra and agribusiness firms that produce or sponsor the messages include the institutions that determine a farmer’s livelihood.

Discussion of the evidence has been based on examples of three different ‘texts’ containing messages that a majority of dairy farmers receive on a regular basis. The messages, it is argued, have power both because of what they say and what they leave out, and because of the context in which they are presented and interpreted by farmers. The advertisement by Pioneer Brand Forage Products conceals or downplays the environmental risks and environmental damage that can occur from high-input maize cropping, and highlights alternative values of productivity, fertility, healthfulness and abundance. The daily docket focuses attention on milk quantity and quality by providing a direct and effective ‘feedback’ loop which farmers can (and do) use as a management tool. Its power lies in the fact that it focuses attention on production (which in turn is tied to livelihood) at the same time that there are no such counter-feedback loops for environmental management. The Farmer of the Year Award, sponsored by major agri-service industries, including Fonterra Co-operative, reinforces the values of productivity and profit pursued in a businesslike manner. It is a widely publicised event that serves as a model for progressive farmers. While productivity and profit are not necessarily opposed to environmental care or biodiversity protection, the weight given to these values significantly outweighs alternative values that might foster concern for wider environmental issues or long-term considerations of ecological sustainability.

Notwithstanding the power of language and discourse as a means to shape cultural values, one of the arguments of this thesis is that in the every-day world of farmers

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and farms, the material reality of place, persons, and material actors is also significant. My aim in this chapter has been to illustrate how language and discourse can shape culturally shared attitudes toward land and the environment. But I do not want the reader to forget that the Waikato landscape is not ‘wall-to-wall’ grass and cows; it is not totally devoid of native habitat remnants. There are other elements in the ecological brew that creates the landscape, and I shall return to these in Chapters 11 and 12.

# ***CHAPTER 10***

## ***THE POWER OF THE***

### ***MEDIA: A CONTENT***

#### ***ANALYSIS OF THE DAIRY***

##### ***EXPORTER***

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The previous chapter presented an interpretive analysis of three significant New Zealand dairy farm communication forms – ‘texts’ – selected because they are representative of the communication to which farmers are regularly exposed. The texts are associated with three agencies in the dairy industry – an agricultural seed company, the dairy factory which processes their milk, and a farm performance competition run by major dairy industry organisations – that have power to influence the actions and decisions of dairy farmers. That chapter sought to highlight key messages directed at farmers by texts that are significant to them. The analysis indicated that efficient production is presented as a prime farming goal in ways not significantly countered by concern for environmental constraints. This is true even though recent moves within the dairy industry have incorporated environmental management as an element of farming excellence.

The purpose of this chapter is to provide a quantitative analysis of the content of a popular dairy farmer magazine in order to evaluate the interpretive analysis of the last chapter in the light of quantitative evidence. The chapter is part of the research design outlined in Chapter 6, which gives a brief description of the aims and purposes of content analysis. The chapter presents an analysis of 200 articles from the *NZ Dairy Exporter*. The analysis provides a summary of the articles by topic as an indication of the relative attention given to different themes by the dairy farming media.

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### CHOICE OF ANALYTICAL UNITS

A wide array of information and news material is available to New Zealand dairy farmers. It ranges from daily notices of milk production, through herd testing results, to advertising pamphlets, national and rural newspapers (including the *New Zealand Herald* and the *Waikato Times*), magazines, videos, and highly sophisticated internet sites. The plethora of information sources means that the business of rural and farm publications is highly competitive. So much so that during 2001 one of New Zealand's longest running farm publications, *The New Zealand Farmer* stopped publishing.

Print form was chosen as the source of samples for several reasons. Firstly, farmer magazines and newspapers have a long history in New Zealand and receive wide distribution; secondly, limitations in rural telecommunications technology mean that some farmers do not have fast, ready access to internet sites (or have not done so until recently); and thirdly, the printed medium is easier than internet or video to retrieve and re-examine.

A number of farming publications were considered for the analysis, including: *Straight Furrow*, published twice monthly by NZ Rural Press, with headquarters in Auckland and distributed free to 90,000 farms and homes. It is aimed at the general farming community throughout New Zealand but particularly pastoral farmers. It does not provide the breadth of special interest information and news for dairy farmers that other publications offer.

*Coast and Country*, is a newspaper based in Tauranga with a readership in rural Waikato and Bay of Plenty. It has a strong regional content of events, personalities, activities and concerns that relate to the communities of interest in its region. It is a rural rather than a farming magazine and dairy farmers are only one of several interest groups it serves.

*Rural News* is also aimed at the general farming community. It is published twice monthly and available by subscription. It carries articles of general farming interest, similar to *Straight Furrow* but touts itself as 'The business of farming'.

*Farmlink* was a newsletter published briefly by Fonterra and its predecessor, Global Co. and sent directly to milk suppliers. The newsletter was discontinued shortly after it began when Fonterra took responsibility for the internet farm news

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agency *Fencepost.com*. *Fencepost.com* is an agricultural website that provides news, views and discussion groups for farmers generally, but with special access provisions for Fonterra shareholders and milk suppliers. It is an arm of Fonterra Shareholder Services and provides direct communication links for Fonterra milk suppliers. Shareholders and milk suppliers can obtain confidential information about the company and about farming including milk supply statistics. Although an excellent source of information for and about farmers and farming, the content changes daily (sometimes hourly) and does not lend itself easily to sampling procedures that enable easy verification.

The *New Zealand Dairy Exporter* is a farming magazine published from Wellington. It specialises in dairy farming and was chosen as the source of magazine articles because it survives on subscriptions. I assumed that, in the highly competitive media market its survival is likely due to the fact that it closely reflects the interests, concerns, attitudes, values, and assumptions of dairy farmers. Furthermore, as an independent publication it is not tied to the views of a particular sponsor and does not need to reflect the views of industry leaders, although it may well do for other reasons than financial independence. Established in 1925, it claims to present ‘an independent view of New Zealand’s dairy industry,’ and to be ‘NZ’s leading dairy farming journal’. According to the magazine’s internet homepage (NZ Dairy Exporter, <http://www.dairymag.co.nz/frame.htm>) a 2001 survey of rural readers by Colmar - Brunton found that ‘89% [of dairy farmers] read the Exporter’, and ‘69% of readers pick up each issue at least 3 times’. In short, the magazine markets itself on the claim that it is read by nearly 90% of dairy farmers, and is read regularly by more than two thirds of New Zealand dairy farmers. Since the magazine is by subscription, the readership data suggest that the magazine is considered relevant by a high proportion of dairy farmers across the country.

A random selection of 200 farm feature articles was drawn from issues published between 1999 and 2002. The total strikes a balance between the time available for analysis and a sample size likely to allow relatively robust estimates of frequency distributions. The spread over the three years was intended to reduce the effect of topical issues such as the restructuring of the dairy industry, and the New Zealand-wide debate on genetic modification which occurred during this time.

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### **CODING AND ANALYSIS**

As with other research based on quantitative data, content analysis is concerned with validity, objectivity and reliability (Babbie 1992; Neuendorf 2002; Riffe et al. 1998; Sarantakos 1993; Weber 1990). It is a method that seeks to ensure that the procedures used will achieve what was intended, and to do so relatively impartially and in a value-free fashion, so that any other researcher would achieve the same or similar conclusions were they to follow the same procedure.

This largely relates to the process of establishing robust categories of data, and identifying stable codes by which to sort and analyse the data. Babbie (1992, 317), states that, 'content analysis is essentially a coding operation'. Categories and their codes will depend on the research objectives, in this case production, environment, and related themes.

The scope and complexity of content analysis can vary from the simple and straightforward, to extremely complex and sophisticated (e.g. Ferre and Hall 1990). Relative to the complexity and sophistication of some studies, the analysis for this research was simplified, but by no means straightforward.

The process involved the following stages:

- Consider the main variables that need to be coded on the basis of hypotheses indicated earlier;
- Number all articles in 30 issues of the *Dairy Exporter* between 1999 and May 2002 (comprising a total of several thousand);
- Use *Excel* software for generating random numbers, select 200 articles;
- Systematically go through each of the two hundred articles and write a brief summary of key words and concepts relating to the research;
- Develop preliminary codes and criteria, and apply them to the content of the articles;
- Refine variables and codes in the light of repeated examination and analysis of articles. The codes were designed to allow someone unfamiliar with the data to understand quickly what they referred to (so that the coded items could be checked by someone other than myself). Thus 'bus' is short for 'business' and 'pdcvty' is short for 'productivity'. Appendix 5 shows the codes and a the summary of articles.

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- Convert these codes to a briefer version for *SPSS* tables (so that the *SPSS* tables were less bulky and I could see the data at a glance), construct a data file in *SPSS*, and input the coded variables from the table of articles. All the data for this analysis was nominal.
  - Use *SPSS* to provide descriptive analysis of the nominal data.

I identified the following main categories or themes: 'Environment', 'Production', 'Farm Management and Business', 'Human Aspects', 'Industry', and a residual category, 'Miscellaneous'. '*Environment*' was assigned to any item that implicitly or explicitly referred to an element of the environment, including water, soils, topography, climate, pests, weeds, disease, scenery and native vegetation. '*Production*' as a theme involves any item that used the term 'production' or referred to quantities of milksolids. '*Farm management and business*' refers to any item that describes or advocates on-farm management practices or the farm as a business enterprise. It includes personal stories of individuals, couples, families or groups of families managing their own farm. '*Human aspects*' applies to any item with human experience as a focus including articles about education, learning, work conditions, and occupational health, but does not include stories of people managing their own farm. '*Industry*' applies to items about the organisational and institutional aspects of the dairy industry including marketing, manufacture, governance, and the agencies involved in research and regulation (e.g. Dexcel, Fonterra, Animal Health Board, Ministry of Agriculture and Forestry). '*Miscellaneous*' applies to any item of general news (such as reports of visitors to New Zealand, or New Zealand farmers visiting overseas, dairy events such as conferences), items about cattle breeds and breed societies, technology, scientific events and discoveries, (including several on the topic of genetic modification as it applies to the dairy industry), and any other item that could not be assigned to the other five categories.

'Production' was distinguished from 'profit' and 'productivity'. 'Profit' related to any item that explicitly addressed the issue of farming profitability. It was distinguished from 'farm management and business' because while the latter might discuss items of business management such as principles of farm accounting, farm partnership agreements, or economically optimum stock feeding strategies, the items categorised as 'profit' made explicit reference to profitability

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as an objective. 'Productivity' related to any item which made a distinction between production and productivity.

The themes of 'production', 'farm management', 'human aspects', and 'industry' emerged clearly from the published articles, the subject matter of most falling easily into one or another of these categories. The explicit theme of 'environment' was not so easy to identify. It was seldom the focus of an article, and was often noted only in passing. For example if an article was about animal health, I inferred the environmental factor as fungal disease (e.g. Article 173 about the introduction of new grass cultivars to reduce the incidence of endophytes as a cause of facial eczema). Similarly, I inferred an environmental factor from articles about summer drought; winter feed shortages, or soil and water limitations for production. The reason for coding 'environment' at these times is that it was seldom mentioned except indirectly as a problem. For example, groundwater pollution and weeds are noted because they are identifiable problems, but the mild, moist climatic conditions that make New Zealand such a globally competitive dairy producer were seldom mentioned, and then usually in relation to mud and poor drainage). An exception to this was in articles about farmers who had moved to the South Island, when superior environmental conditions for dairying were noted.

Coding was time-consuming, and involved judgements, despite the argument that content analysis is an objective procedure for quantifying content. I discovered that it involves a high order of qualitative judgement about themes, variables for coding, and criteria for coding. The process involved four questions:

- What is this article mainly about? (e.g. is it mainly about the environment, farm management, the dairy industry, human aspects of farming, some other aspect not otherwise mentioned, or a mixture of these?)
- Does it refer to the environment in any way? (e.g. Should a brief reference to soils, the weather, weeds, or bovine diseases be recorded or ignored?);
- Does it refer to production in any way?
- Are there other values or attitudes expressed in the article that relate to environment or production?

To the greatest extent possible, I based coding on *manifest* content, rather than *latent* content. Manifest content is the easily identifiable, apparent content of an

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article about production, industry, human welfare, and so forth. However, with respect to environment, I often had to note indirect or latent content: the environment as an inferred element, such as the weather and daylight conditions related to time of year, or the organisms responsible for animal health, or the biological limitations of bovine physiology.

The key consideration behind my decisions about how and what to code was the need for simplicity and clarity. My aim was to reduce the element of qualitative judgement involved in deciding whether a theme or topic was or was not present. I also tried to clarify the listing criteria for each coded item. For example, any reference to soil, water, topography, climate, natural vegetation, weeds, pests, diseases, visual outlook or scenery were treated as environmental, while any reference to milksolids was treated as production, and articles that referred to stock health but not milksolids were treated as a separate concern. All environmental items (e.g. soil, weather, disease) were grouped as one category because there were no theoretical grounds for excluding any of them or for creating sub-categories. Had they been coded separately, the numbers of most of them would have been very small and the coding process excessively time-consuming.

#### **LIMITATIONS OF THE ANALYSIS**

Content analysis allows coding and recoding with reference to fixed documentation, thus allowing another researcher to independently review analysis of the same documents. It also has weaknesses, including (Sarantakos 1993; Babbie 1992):

- The selected documentary evidence (i.e. *Dairy Exporter* articles) may not provide an accurate or comprehensive reflection of the culture and practices of the readers (in this case dairy farmers). For example, it is unlikely that the *Dairy Exporter* chose average or poor farmers for their personal stories, or farmers who remain on the farm because they lack the skills for any other job. There are significant elements of dairy farm culture that do not get reported because they may be taken for granted, are not considered newsworthy, are ethically or morally unacceptable, or do not fit the approved conventions.
- Documentary evidence cannot adequately convey the experiential aspects of farming, or the relationships between farmers and their farms;

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- Analysis may sometimes involve a ‘forcing’ of conceptual categories onto a flow of reported words and their meaning. The conceptual categories of the analyst may distort or not accurately reflect the meanings of the readers. For example, the category of ‘environment’ for this research includes an array of phenomena but I am not certain that farmers see the environment in the same way. I have distinguished between the terms ‘production’, ‘profit’ and ‘productivity’ because at least some members of the dairy industry clearly make the distinction. But from the way the terms are used interchangeably by some members of the dairy community, it seems that they are not distinguished in this way by everyone.
  - Even if the conceptual categories are valid for purposes of the research, there may be inconsistencies in coding.

The nature and size of this survey resulted in the following constraints:

- The categorical nature of the data, coupled with the low incidence of environmental themes, precluded clear statistical correlations between elements of the environment and other variables. For example, it was not possible to identify whether a concern for the environment is more likely to be linked to a focus on profit than a focus on production. Similarly, it was not possible to decide if there is a correlation between environmental care involving soil and water on the one hand (these being linked to production) and care for indigenous vegetation and biodiversity on the other.
- The timeframe of the sample was too short to show clear evidence of change over time. The dairy industry has undergone rapid change since 1990 and in part this involves acceptance that the ‘clean, green’ image of New Zealand’s dairy produce must be backed by improved environmental practice. No relationship between time and the frequency of environmental themes can be identified for the three years covered by the sample, but a deeper analysis might have revealed subtle changes such as a move from the environment as enemy, to the environment as an element requiring care.
- Related to the previous point, coinciding with the formation of Fonterra in 2001/02, the dairy industry has undergone significant change in environmental attitude and approach since the sample frame of the articles (1999 to 2001). It is likely that a similar random sample of 200 articles from 2000 to 2003 would include a higher proportion of articles specifically focused on environmental issues.

In short, the evidence advanced here is suggestive rather than conclusive. However, the aim of the research was not to provide a convincing demonstration of links between productivist values and environmental perceptions or concerns. Rather, the analysis is part of an overall argument which suggests that a prime focus on production and economic efficiency draws attention away from land management practices which might tolerate or assist native forest survival. Because the links between productivist agricultural practices and loss of native biodiversity are complex, it is not easy to identify definitive correlations. Hence the analysis is part of an overall research design that involves multiple methods. Following the theoretical arguments in Chapter 4 about language and discourse, the suggestion in this Chapter is that one way by which dairy farm culture encourages productivist practices to the neglect or detriment of environmental qualities is by means of dairy farming media which highlight production and profit-making while ignoring or down-laying the associated environmental consequences.

## RESULTS AND DISCUSSION

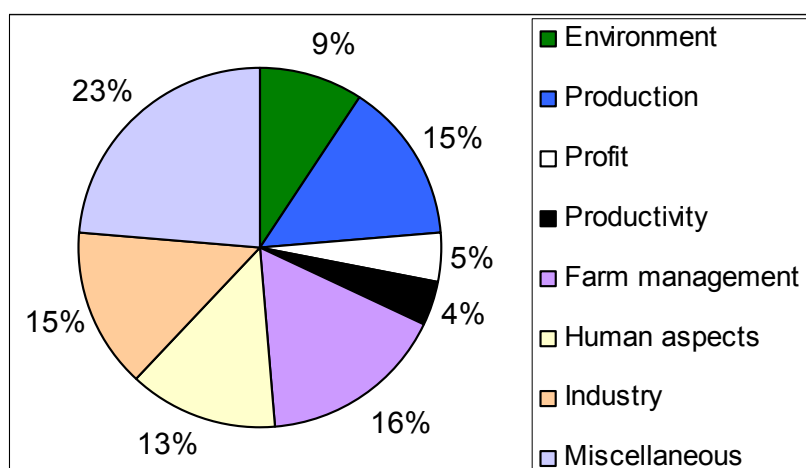
Table 10.1 summarises the frequency of references to different themes in the articles. Excluding the largest category, ‘miscellaneous’ which covers a diversity of topics (from articles of general news interest, to the merits of different cattle breeds, to the issue of genetic modification) ‘farm management’ is the theme with the most references, followed by ‘production’ and ‘industry’.

**Table 10.1 Frequency of theme references in sample of articles**

Theme references	Frequency
Environment (items which mention or imply an environmental element)	38
Production (items specifically concerned with milk production)	65
Profit (items explicitly concerned with profitability)	19
Productivity (items that specifically mention productivity)	15
Farm management (e.g. management of stock, pasture, farm finances)	73
Human aspects (e.g. work relations, education and training, health)	57
Industry (e.g. items about manufacturing and marketing, industry governance and dairy organisations )	62
Miscellaneous other (e.g. general news, dairy events, reports about dairy technology and science)	104
Total references	395 <sup>1</sup>

<sup>1</sup> The total references include multiple themes in a single article, hence it exceeds 200.

Figure 10.1 depicts this information as a percentage of the total.



**Figure 10.1 Proportion of theme references in sample of articles**

Although the largest number of references in Table 10.1 relates to the theme of farm management, closer examination of the data indicates that production is a key value. Table 10.2 shows a cross tabulation of references to farm management and production. The analysis indicates that farm management as a theme is closely linked to the theme of production. Fifty one (70%) of the 73 articles on farm management mention production. The Chi square 'p' value of .00 indicates that the correlation is statistically significant<sup>2</sup>.

**Table 10.2 Cross correlation of articles mentioning themes of farm management and production**

Articles	Mention of production		No mention of production		Total Articles
	Number	Percent	Number	Percent	
Mention of farm management	51	70	22	30	73
No mention of farm management	14	11	113	89	127
Total articles	65		135		200
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	73.1553	1	.00		

From Table 10.1 it is interesting to note that the number of references to production outweigh the number of references to profit more than three times (65 compared with 19) and references to 'productivity' more than 4 times. Despite the emphasis on 'productivity' (i.e. efficiency of production) by key industry

<sup>2</sup> The closer the 'Asymp.Sig' or 'p' value is to zero, the greater the chance of a significant relationship between the variables. A value greater than .05 indicates no significant relationship, while a value less than .05 suggests that there is almost certainly a significant relationship.

institutions such as Dexcel, it is significant that the varied contributors to the *Dairy Exporter* continue to discuss ‘production’ rather than ‘profit’ or ‘productivity’. The high frequency of the production theme compared with profit and productivity, suggests that production for its own sake appears to be a significant interest for readers and contributors to the *Dairy Exporter*, or is conflated with profit. This reinforces earlier arguments in this thesis that New Zealand dairy farmers tend to see little or no difference between production and profit on the one hand, and productivity on the other.

Analysis of attitudes to production indicates that it was more likely to have positive rather than negative associations (94% compared with 6% of the references respectively). Table 10.3 shows attitudes to production as reflected by the positive or negative associations with which they are linked.

**Table 10. 3 Attitudes toward production reflected in article sample**

<b>References to Production</b>	<b>Frequency Percent</b>	
Production is a positive (e.g. linked to farming ability and/or success)	61	94
Production is a negative (e.g. linked to pollution, damage or waste)	4	6
<b>Total references to production</b>	<b>65</b>	<b>100</b>

Article 69 (see Appendix 5) reports a farm couple who ‘consistently achieve Economic Farm Surplus of \$2000/ha with a goal of reaching \$2,400/ha by year 2002’. The article gives a detailed description of how the couple make hay to extend milk production using a cheap feed source. This article links extended production with profitability and is typical of many that describe the efforts of individual farmers and farming couples. In a similar vein, Article 186 (see Appendix 5) reports, ‘Adrian and Pauline Ball are on course for 1500kgMS/ha and better than 440kg/Ms/cow over 12 months on their 6 year dairy conversion at Tirau’. In this example production is assumed to be desirable in its own right.

As the examples of Articles 69 and 186 demonstrate, production is sometimes linked with personal stories. Table 10.4 presents a cross tabulation showing that of the 40 articles recording a personal human story, 29 (72.5%) included the theme of production. The Chi square ‘p’ value of .00 indicates that the link between personal human story and a production theme is statistically significant.

**Table 10. 4 Cross tabulation of articles mentioning production and a personal story**

Articles	Personal story		No personal story		Total
	Number	Percent	Number	Percent	
Production mentioned	29	72.5	36	22.5	65
No mention of production	11	27.5	124	77.5	135
Total	40	100	160		200
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	36.5	1	.00		
Continuity Correction	34.2	1	.00		

It is a linkage which might help the reader identify with the productive enterprise of those in the story, making the production process more 'real' or achievable. During field study of five farm families, one respondent mentioned that the most interesting and valuable thing about the *Dairy Exporter* was the personal stories about individuals and families.

Table 10.5 indicates that there is a strong link between production themes and expert advice to farmers<sup>3</sup>. It shows that 59% of the articles that report expert advice on farm management (19 of 32 articles) have links to the production theme. The result is statistically significant with a Chi square 'p' value of .001<sup>4</sup>, and supports the proposition that production is a factor promoted by those of the dairy industry who provide expert advice to farmers.

**Table 10.5 Cross tabulation of articles mentioning expert advice and production**

Articles	Reports an expert		No expert report		Total
	Number	Percent	Number	Percent	
Mentions production	19	59	46	27	65
No mention of production	13	41	122	73	135
Total	32	100	168	100	200
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	12.5	1	0		
Continuity Correction	11.1	1	0.001		

Turning to the analysis of environmental references, the number and tone of references to production contrasts strongly with those of references to the

<sup>3</sup> The expert advice was from people such as veterinarians, scientists, Dexcel farm consulting officers, and farm service specialists.

<sup>4</sup> The 'p' value of .001 indicates that the chance of no relationship between the two themes of production and expert advice is equal to or less than one in a hundred.

environmental themes. The environment was mentioned by 19% of articles (38 of the sample) compared with 31% that mentioned production and 36% that mentioned farm management, and references to environment were markedly less noticeable than those to production. Only three of the 200 articles could reasonably be described as having the environment as their main focus. Article 19 reports an address by a soil scientist that NZ soil management is currently unsustainable, Article 41 is about a farming system designed to reduce the environmental impacts of chemicals, and Article 60 is by an environmentalist who urges sustainability.

Table 10.6 shows that when environment is mentioned, it is more often than not regarded as a problem. Almost a third (31% of references or 22 out of 52) were couched in terms of the environment being an adversary or a problem whereas only 11.5% (6) cast the environment as something to be valued in its own right.

**Table 10.6 Attitude to the environment by frequency and percent of references**

References to environmental items	Frequency	Percent of references
Environment is valued	6	11.5
Environment is a problem	22	42
Environment needs care	7	13.5
Environmental limits can be overcome	17	33
Total references to environment	52	100
Total articles with an environmental reference <sup>5</sup>	38	

Article 18 (Appendix 5) is an example of an article which portrays the environment as an adversary which the couple at the centre of the story have overcome by struggle, hard work and persistence. Article 119 recounts another personal story of a couple who battle to overcome the vagaries of weather. They aim to manage unpredictable variations in weather and pasture response by 'strategic use of supplements, particularly for summer dry'. Article 135 tells the story of a couple who move 'From adversity to bounding productivity' by turning 'rocky lahar country into farmland' and thereby 'achieve the industry's 4% productivity improvement a year goal, year after year over a 12 year-period'. The article recounts that, 'With a bulldozer and drain digger, Neville and Beverley stripped off the topsoil, flattened the hills one at a time and recovered them with

<sup>5</sup> Some articles had references to the environment that related to different sub-themes. For example, an article might include a reference to the environment as a problem and as a limit that can be overcome by good management or technology.

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topsoil. The rock was used for lanes or filling in the holes and swampy areas. It was back-breaking . . . but the tract was turned into a productive part of the farm.’ When the environment was perceived as an issue, it was quite often considered something that could be overcome by science, technology and appropriate management. One third of references to the environment were couched in terms of a problem that could be overcome by capable and knowledgeable farmers. Article 24 portrays a farm operation that has overcome the environmental limits in Hawkes Bay of surface water shortages and effluent disposal by management and science. Article 75 illustrates the technical optimism of many when it reports the views of a farm consultant that climate change and changing economic conditions require farmers to ‘be in charge of change, sit down and draw up the master plan for the new technology’ that will allow them to ‘be in the driver’s seat’.

Only 7 articles mentioned the environment as needing care, and of these, most are concerned with soil management and fertiliser use. Article 19 is a report of the address by a scientist advocating sustainable soil management; Article 41 reports a fertiliser company chief executive on the need for strategic use of fertiliser; Article 44 is a report of the winners of the Waikato Farm Environment Award; Article 158 reports the release of a code of practice for fertiliser manufacturers; Article 166 discusses research to improve the efficiency of white clover as a source of nitrogen; and Article 189 is the story of a small-size dairy farm owner ‘environmentalist, fisherman, sports coach and ceroc dancer’.

### **CONCLUSION**

In conclusion, this analysis of a sample of articles from a popular dairy farmer magazine suggests that production is of significant interest to dairy farmers and their expert advisers. The concern with production is linked to all aspects of farm management as well as to notions of personal and career success as a farmer.

Environment is seldom separated from issues of production; when elements of the environment are noted or discussed, it is almost always in terms of their relevance for production. Very few articles in the sample refer to the environment as the place where farmers live even though anecdotal evidence from the field study suggested that the outdoor rural life was a chief reason why many farmers prefer their way of life to a career in the city.

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While dairy industry leaders talk about productivity, and many farmers are concerned with profit, production is more important as a value than either profit or productivity. This may be because information feedback from stock and pasture management to milksolids as the basis of payment makes production a clear indicator that the farmer is doing a good job.

Farmers' perceptions of the environment are skewed toward its productive significance, with little overt attention to its aesthetic or lifestyle elements. Where concerns about the environment are raised in published articles, they tend to be narrowly related to production and marketing (e.g. soil health and fertility, clean water, animal health). None of the sample articles mentioned native vegetation or biodiversity, and very few mentioned scenery, a quiet atmosphere or open space.

The results of this analysis of articles from a popular dairy farmer magazine suggest that:

- Environmental elements will be represented mainly in terms of their relevance to economic production or business profitability (for example, soil, water and climate).
- Environmental resources will seldom be represented in terms of non-economic values such as amenity, environmental sustainability or intrinsic value.
- Environmental phenomena that limit production or profit will tend to be posed as problems to be overcome (i.e. as adversarial challenges) rather than reason for non-production or non-material goals.
- Environmental elements will often be linked to images of personal struggle and conquest.
- Environmental 'problems' or restrictions to production can be removed or reduced through application of science and technology, and human ingenuity.
- Industry experts and farm advisors are more frequently associated with themes of production than those of environmental care.
- When experts or advisors are associated with environmental issues, their advice is likely to be related to environmental issues which relate to production (such as soil and water management).

# ***CHAPTER 11***

## ***SYMBOLIC ORDER AND***

### ***MATERIAL AGENCY: A***

#### ***CULTURAL ECOLOGY OF***

##### ***NATIVE FOREST SURVIVAL***

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This penultimate chapter aims to answer the research questions posed at the beginning of the thesis by integrating the insights gained from the Waikato case study. Chapter 12 then takes the conclusions from the Waikato case study and suggests the broader relevance of the findings for conservation of native biodiversity in farmed landscapes elsewhere in the world. This chapter, therefore is a ‘rounding off’ of the New Zealand example, while the next chapter suggests how the New Zealand example can add to the broader literature on conservation of native biodiversity in landscapes of industrial agricultural production.

The questions posed in Chapter 1 were:

*Why is there so little native vegetation left in the Waikato? and,  
Why is there any native bush left standing?*

Briefly, the answer to these two questions is that ‘symbolic order’, in the form of cultural perceptions of what is important, ‘real’, necessary, and desirable, shapes the practices that ‘construct’ a landscape dedicated to production for profit. But the biophysical reality of places (‘material agency’ or physical circumstance)

binds farmers and the land into relationships that have an independent influence on the evolution of local and regional landscapes. Farmers and their farms constitute interacting elements that form ecosystems which are as much social and cultural as they are biophysical, and which are locally various according to particularities of place. Dairy farms are elements of a landscape that is not solely the outcome of a political economy of dairying, but an evolving system that involves natural and cultural elements in an inextricable mix.

The first part of this chapter examines the central argument and propositions stated in Chapter 1 in the light of the research reported in this thesis. The next part examines the evidence for differences between farmers with remnant forest and those without. It concludes that there is little difference between them, except in their weighting of priorities and their relationship with their farm. The next section 'Material agency and the power of place', argues for the power of material conditions in shaping landscape and environmental interactions between farmer and farm. It suggests a model of how farmers and land managers might differ in the way they receive and process information that comes to them from on-farm and off-farm sources. The conclusion summarises some thoughts about the emergent evolution of landscapes and the survival of remnant native habitat.

#### **SYMBOLIC ORDER AND THE POLITICAL ECONOMY OF THE WAIKATO DAIRY INDUSTRY**

In Chapter 1, it was proposed that *'commercial (dairy) farmers ignore or oppose protection or retention of native forest habitat because they are primarily driven by a production ethic and by cultural institutions and values systems that militate against the expression of alternative land management values such as stewardship and landcare.'*

That statement needs to be considered in the light of the thesis research. In Chapter 1 the concept of 'productivism' and 'productivist' was discussed in the light of UK academic literature and New Zealand experience. I included the definition of Lowe et al. (1993, 221) that productivism is 'a commitment to an intensive, industrially driven and expansionist agriculture with state support based primarily on output and increased productivity'. A summary of the main elements of the concept was presented based on Wilson's (2001) review of the UK literature. I indicated that New Zealand dairy farming illustrates many of the characteristics identified by Lowe et al. and Wilson, except for a lack of state support. In the light of this thesis, I would also suggest that productivism as it

applies to New Zealand dairy farming includes strong commitments to economic and practical efficiency and to profit as an indicator of appropriate (i.e. economically rewarding) production. Hence the 'production ethic' in New Zealand terms is one which does not simply mean production as an end in itself, but production compounded by efficiencies of management, technology and skill. Production and 'profit' are two closely interrelated concepts in the New Zealand dairy context, with profit as an indicator of efficient and economically rewarding production.

Chapter 3 described the socio-political and economic conditions that encourage farmers towards a productivist perspective. It noted that the model Waikato/Bay of Plenty dairy farm in 2001/02 received 89% of its gross revenue from milksolids and most of the remainder from the sale of calves and cull cows. Figure 3.2 (Chapter 3), showed that in the 22 years since 1980, there has been a steady decline in the real value of the dairy payout. In 1985, the Fourth Labour Government withdrew almost all forms of support for agriculture and left the industry completely exposed to the competition of overseas markets. As shown by Figure 3.2, the impact on dairy farm incomes was a drastic reduction. Thus, to maintain income over the 20-year period, farmers (and the dairy industry as a whole) have had to become more efficient producers of milk and more innovative in adding value to milk as an industrial product. Chapter 3 described the international context of the New Zealand dairy industry as one in which New Zealand dairy farmers face a rapidly changing, highly competitive global commodities market of large producers and giant retail supermarket chains. Farmers in North America and Europe are highly subsidised and protected from foreign market competition. New Zealand industry leaders express attitudes and values that indicate a strong commercial focus, competitive striving, economic rationalism and scientific and technical optimism; these are values that have kept the industry ahead of the long-term cost-price squeeze.

A statement of 'strategic themes' by Fonterra gives as its first priority, to be 'Lowest-cost supplier of commodity dairy products' (Fonterra 2003d). It justifies that statement with the explanation that 'Our position as the lowest cost supplier is our most important competitive advantage. Our future success depends on our ability to protect this position.' In order to maintain this position the industry needs to 'achieve a performance improvement across the entire Fonterra value chain of at least 3% every year.' Dexcel's most recent 'Statement of intent to

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Stakeholders' (as at January 2003) gives the organisation's strategic intent, 'To provide leadership and co-ordination in farm systems, practices, people and policies to meet the industry's productivity target' (Dexcel 2003). 'Productivity' is a concept of the dairy industry that expresses the aim to improve the ratio of output to input. Although the ratio can involve less input for the same unit of output, in practice it is generally portrayed as more output per unit of input. By implying that more output per unit of input is a 'good' (it is a 'target'), the concept encapsulates the link between production and profit<sup>1</sup>. In short, the leading institutions of the industry emphasise the importance of production efficiency gains by dairy farmers, coupled with an undercurrent of threat that if the gains do not happen, then the industry will decline along with farmers' income.

Profit and productivity do not necessarily militate against the expression of alternative land management values such as stewardship and landcare. Many farmers express concern for alternative values, and this translates to practical management. The survey research reported in Chapter 8 indicated that 43% of farms retained some form of native vegetation and one fifth had remnant forest that was protected from stock. These findings mean that the central argument stated in Chapter 1 (and repeated at the beginning of this chapter) is too sweeping and over-generalised; many farmers **do** attempt to incorporate alternative values into their farm management, but for the majority, alternative land management values are subject to an over-riding concern with production for profit.

Chapters 9 and 10 suggested how the imperatives of production and profit are transmitted to farmers by 'discourses' that involve communications from powerful institutions of the industry such as the milk factory (by means of the milk payment system and the daily docket), agricultural supply companies (such as Pioneer Seeds), the wider industry (through such events as the Dairy Farmer of the Year Award), and farm magazines (such as the *Dairy Exporter*). The documents examined for both chapters suggest that much of the farmer literature emphasises production as an end in itself, regardless of profit or productivity. As shown by the results of the content analysis presented in Chapter 10, production

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<sup>1</sup> I have been unable to find any short, sharp definition by the industry, but numerous articles and pamphlets by dairy industry officials describe what the concept means in practice by discussing means to reduce the cost of input factors and increase output factors. An example is an explanation under the heading 'Productivity – A measure you have used for years without knowing', by D. Winkler on the Dexcel web page [http://www.dexcel.co.nz/library\\_doc.cfm?id=18.cfm](http://www.dexcel.co.nz/library_doc.cfm?id=18.cfm) (23/1/03).

themes outnumber profit or productivity. 'Productivity' is a word that has entered the discourse within the past five years and is not much used by farmers in ordinary conversation. It is used mostly in semi-official statements by industry organisations and their representatives, and it reflects a shift in emphasis within sectors of the dairy industry from a producer viewpoint to a business and marketing perspective. While farmers (as producers) are still mainly focused on the means of production, those most in touch with the manufacturing and marketing of milk products are aware of the need for the New Zealand dairy industry to maintain its low-cost advantage throughout the value chain and are seeking to promote a modified concept of production that incorporates economic efficiencies.

Just as there has been a shift in thinking from production to productivity within the industry, there has been a growing realisation that environmental issues impact on the market image of the industry and need to be addressed. The Dairy Farmer of the Year Award includes a management component concerned with 'environmental integrity'. The issues addressed by the Award are closely linked with production and market perceptions, including water management, waste and effluent disposal, nutrient management (i.e. fertiliser application) and soil management. The concern appears to be less one of broad environmental care than a response to the effects of (intensified) production and the threat of consumer resistance. This reflects the industry's need (as a marketing organisation as well as a producer co-operative) to pay attention to consumers and members of the public, and the importance of maintaining New Zealand's 'clean and green' image. In short, the empirical discoveries of Chapters 9 and 10 tend to reinforce the claim that significant cultural institutions of dairy farmers emphasise values that promote economically efficient, profitable production to the relative neglect of, or at the expense of, non-economic, non-material environmental values such as native habitat protection.

In addition to the central argument just discussed, Chapter 1 presented a series of related propositions and these will now be assessed in light of the research:

*Proposition 1*

*Dairy farmers depend on a culturally constructed knowledge about land management and environmental relations that is primarily focused on quantitative production values. Non-production values or non-quantifiable values (such as*

*ecosystem services of native biodiversity) are not expressly noted by dairy industry literature, and not recognised by most farmers.*

The proposition needs qualification in the light of empirical evidence. Although a majority of dairy farmers in the Waikato may be heavily influenced by culturally transmitted knowledge that is strongly oriented to production, it is not true of all. The interviews with conservation farmers (in Chapter 7), and the results of the questionnaire survey suggest that individuals vary considerably in their weighting of management priorities, and in the extent to which they focus on production to the exclusion of other values. For most farmers farm management is an ongoing effort to keep a balance between profit (i.e. economically rewarding production), care of stock, care of the land, and personal enjoyment or satisfaction.

From the perspective of the survival of native habitat, the problem is not so much that farmers are focused on profitable production to the exclusion of non-production values or non-quantifiable ecosystem services. It is that non-production values or non-quantifiable values (such as ecosystem services or native biodiversity) are not expressly noted by dairy industry literature, and not recognised by most farmers. There are few cultural norms and practices that provide farmers with the incentives or the information to look beyond profitable production. Farmers are influenced by information about the consequences of their management. Most of the information loops of which they are part are ones to do with production (e.g. the daily milk docket) or that allow them to assess threats to production (e.g. bacterial milk counts, facial eczema counts, pasture growth rates). They seldom receive information about the consequences of their management practices for surface or ground water, or the consequences of habitat loss for native plants and animals.

*Proposition 2*

*'Production' is a key value that influences dairy farmers, as distinct from 'profit' for example, or other possible land management values such as 'sustainable production', 'stewardship', or 'environmental care'.*

This proposition and the definition of productivism need to be revised in the light of empirical evidence. As already indicated, production is indeed a key value, but for many farmers it is tempered by a concern with efficiencies of management, technology and skill, and economic reward. Both the participant observation fieldwork and the questionnaire indicated that production is of major importance as a value, particularly as it is the basis of farm income and a key indicator of success as a farmer. Individuals interviewed during the fieldwork repeatedly indicated the importance of their daily milk production tally, and their effort to keep production high. One of the five farm families talked proudly of being in the top 10% (meaning the top 10% of production) and explained that their aim was for 1,000kg per hectare of milksolids (against the average for their district of 839kg per hectare). Another explained that profit was the important side effect of her aspirations for production. Two others explained how disappointed they felt when their herd's production fell sharply after the October peak. But the economic necessity for the New Zealand dairy industry of maintaining a low cost structure means that production is always subject to cost efficiencies. Thus it is probably more accurate to describe the central value for Waikato dairying as productivism that incorporates commitment to economic and managerial rationality rather than production by itself.

Protection or maintenance of remnant forest may be accepted to the extent that it is consistent with efficient low cost production. However, a major constraint on survival of farm forest is that it requires active protection from access by stock and invasion by pests and weeds. Many dairy farmers do not have the motivation or spare resources (of time and labour) to undertake the extra effort required to ensure this protection.

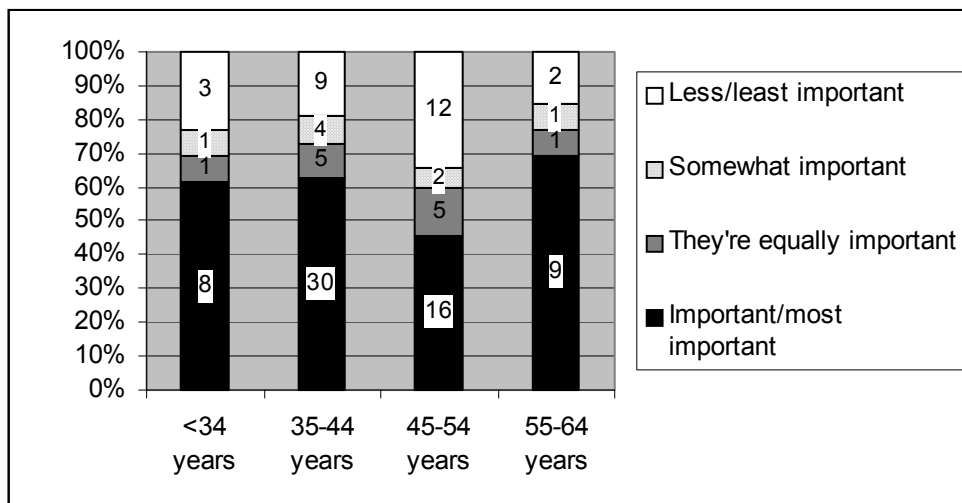
### *Proposition 3*

*The culturally shared criteria of 'production' encourages farmers to maximise production of milksolids per hectare and incidentally promote a style of farming that maximises environmental damage.*

Again, this proposition needs to be qualified, firstly, with the qualifier 'profitable' or economically efficient production, and secondly with an acknowledgement that not all farmers maximise milksolids per hectare. An analysis of management priorities by age of respondent throws up differences between age groups. Figure 11.1 shows responses, by age category, to profit as a management priority.

Farmers in the 45-to-54 years of age group were least likely to rate profit as the 'most important' priority, and most likely to rate it as 'less' or 'least important'. Younger and older farmers, on the other hand, were more likely to rate 'profit' as most important, but for different reasons. The pattern is consistent with that shown by Figure 8.9 in Chapter 8 which relates age to presence of remnant forest on the farm. Figure 8.9 showed that farmers in the 45-54 age group were most likely to have bush on their farm.

The results suggest there may have been a generation-related shift in emphasis, with an older generation placing greater priority on production for its own sake, a post-1985 generation placing greater weight on profit, and a middle generation of farmers in the 45 to 54 age category who do not share the 'production-for-its-own-sake' of their fore-runners and do not face the same pressures for economic efficiency as younger farmers.



**Figure 11.1** Frequency of responses to 'profit' as a management priority, by age of respondents.

Thus, in relation to Proposition 3, criteria for production appear to vary by age group and to be felt most strongly by older farmers. Farmers in the 55 to 64 age-group are inclined to value production for its own sake (as a moral good in its own right), and farmers under 44 are likely to link production with profit. These age differences could be related in part to different stages of the family and life cycle and generational differences. Stages of the family cycle include differences in financial constraints, with younger farmers facing greater debt burdens. Generational differences include differences in the perception of native forest and the perception of production. Older farmers are more likely to regard native

forest as an indicator of an untidy, unproductive farm or lazy farmer, and to regard production as a moral good in its own right (e.g. 'feeding the hungry').

*Proposition 4*

*The focus on 'production' as a key farming value is promoted by all sectors of the dairy industry, and this widespread promotion reinforces the concept as a key land management consideration for farmers. (For example, dairy farmers depend on and trust scientific research and information-based industries that are primarily focused on production values and criteria of worth).*

Chapters 9 and 10, in particular, relate to the above proposition, but Chapter 3 also reported goals of significant dairy industry organisations and the values, attitudes and concerns of dairy industry chiefs. The results of analysis of texts and magazine articles reported in Chapters 9 and 10, and the values and concerns of industry chiefs reported in Chapter 3 lend support to the above proposition.

*Proposition 5*

*The focus on 'production' is not significantly countered by alternative key values that support or contribute to environmental awareness or sensitivity.*

Again, this proposition needs to be qualified. As indicated by the Dairy Farmer of the Year Award discussed in Chapter 9, there is a realisation within the industry that environmental issues related to water pollution and soil and animal welfare need to be addressed for reasons of market pragmatism and efficiency of production. Within the last few years, several major dairy organisations have introduced environmental objectives or issues to be addressed (Dexcel 2003). Fonterra has instituted a voluntary programme of environmental management that aims to encourage their suppliers to improve their environmental performance, particularly in relation to water. The 'Market Focused Programme', 'is designed to focus the dairy industry's attention on the perceptions of consumers around the world, and to protect New Zealand's clean, green image' (Fonterra 2003b).

This response is an indication that other values **can** support or contribute to environmental awareness, but many environmentalists would be sceptical about the depth of support that such values can provide, particularly for broader

environmental goals such as survival of remnant forest and conservation of native biodiversity (for example, see Pickering 2002; Salmon 1999a and 1999b; Stuff 2001). Given the breadth and complexity of environmental issues, many environmentalists question whether it is possible to halt environmental trends in the face of the industry commitment to a 4% annual gain in productivity.

*Proposition 6*

*The productivist values and institutional arrangements which drive land management objectives by Waikato dairy farmers discourage land management practices that enable native ecosystems and habitats to survive.*

The evidence supports this proposition for Waikato dairy farmers as a whole, but not for individual farmers. That forest remnants persist on land that is capable of milk production indicates that a minority of farmers resist the dominant norms and values, and have clearly done so in the past (for there to be any native forest left standing). For every remnant that currently survives on land capable of milk production, there is a line of farmers going back more than a century who have resisted the pressures of bank mortgages, government incentives, and community opinion, to clear native forest. Despite their resistance, Chapter 2 demonstrated that the long-term consequences of agriculture and dairying in the Waikato have been highly damaging for native biodiversity. Overall, the land below an altitude of 200 metres has been almost totally transformed from native to exotic. At these elevations, wetlands have been drained, rivers, lakes and streams have been polluted by agricultural run-off, and forest has been transformed to pasture. For much of the region the only surviving native plants and animals are those that can withstand disturbance and competition from exotic species, or are on the path to local extinction.

In general, economic efficiencies continue to take precedence over ecological efficiencies. Despite recent moves by Fonterra and Dexcel to note environmental concerns, environmental values generally and biodiversity in particular are not perceived to have intrinsic worth; rather they are perceived to be necessary for reasons of market economics. Farmers are constantly reminded by the industry of the need to increase the ratio of output to input but there are few such reminders about environmental care. Table 8.7 (Chapter 8) indicated that a minority of farmers perceive that protection of native forest has environmental values (e.g. protection of soil and water, wildlife habitat). Even if they value

native forest for aesthetic reasons, few have the knowledge or motivation to provide appropriate management and resources (of labour, time, and money). Thus we can say, based on the empirical evidence of Chapter 2, that the *cultural institutions and value systems that characterise Waikato dairy farmers discourage land management practices that enable native ecosystems and habitats to survive.*

#### **FARMERS WITH AND WITHOUT BUSH ON THEIR FARM: IS THERE A DIFFERENCE?**

Despite the above conclusion, the survey questionnaire indicated that 19% of dairy farms had remnant native forest that was protected from stock. Furthermore, the Queen Elizabeth II Trust cannot cope with the number of applications to covenant land (QEII 2002). Such evidence, as well as the evidence from the interviews for this research with ‘conservation’ farmers (in Chapter 7) indicates that there are farmers prepared to incur significant effort and cost to protect native forest on their land. But the difference between these and more conventional farmers is not so much related to the presence or absence of remnant forest on their property as to different philosophies of farming and relationships to the land.

The difference is not that the farmers with bush deliberately protect or retain remnant forest while those without have simply removed it. Rather, there are different approaches to farming based on a multiplicity of personal goals and different weightings for their management objectives. Some farmers tend to ‘farm to the land’ – paying attention to the capabilities of the land, managing stock within the constraints of contour, soil, drainage and aspect, and seeking the balance between production and environmental amenity. Other farmers tend to ‘farm to the book’ and regard the land as a factor of production. The former have developed ties of attachment to the farm as a place to live as well as a business and a source of income. The latter are more inclined to see the farm primarily as a business.

Profit and production are important to both types, but those who farm to the land are more likely to be guided by local and personalised standards of production according to the conditions of the farm. They are also more likely to retain and protect bush on their land. It is significant that owner/managers are more likely to have remnant forest on their farm than either sharemilkers or owners who are not managing the farm (Figure 8.19). It is also significant that farmers in the 45 to

55 age range are more likely to have bush on their property than younger farmers. Owner/occupiers, and farmers in the 45 to 55 age range have more incentive and a greater capacity to assign a higher priority on the amenity values of their farm than younger farmers, sharemilkers or absentee owners.

It is worthwhile comparing Waikato dairy farmers with farmers described by Fairweather and Keating (1994) in their study of the management styles and philosophies of farmers in the Canterbury region (noted in Chapter 2). They distinguished three types of farmers whom they called 'the dedicated producers', the 'flexible strategists' and the 'environmentalists'. The dedicated producers emphasize planning and financial management and are production oriented. Flexible strategists see their lives as having many facets of which the farm is only one (Fairweather and Keating 1994, 192). They look beyond the farm for effective marketing and for off-farm activities, seek to reduce workload, diversify assets, and take a proactive response to the environment. Good financial management and sound business practices are as important to these farmers as they are to dedicated producers, but flexible strategists see the (farm) business as a means to a desirable lifestyle. For environmentalists the primary goal is 'having a good lifestyle', but the environmentalist is motivated by concern about the environment rather than marketing farm produce (Fairweather and Keating 1994, 195). According to Fairweather and Keating (1994, 197), each of the three management styles has a different prioritising of goals and each exemplifies different understandings of business and way of life:

All types are business-oriented in that they want to be able to stay in business. However, none sees profitability as an end in itself... The dedicated producer and the flexible strategist both have rational business goals and value making money, but the means of achieving these goals are quite different. One looks to the farm and emphasizes production while the other looks off the farm and emphasizes marketing. The environmentalist accepts that a business orientation is required in order to remain in farming and maintain a valued lifestyle. . . . Family is central to the farming way of life in all three types. However, dedicated producers organise their lives around working hard together with family members on the farm. In contrast, flexible strategists try to work "smart" to free themselves to enjoy off-farm pursuits with family. For environmentalists, farming is a means to earn a livelihood while being close to nature with their family.

In the context of Waikato dairy farmers, it is clear that there is a comparable group to Fairweather and Keating's 'dedicated producers'. These are the farmers

who place a very high priority on production, profitable or otherwise. However, farmers with bush do not correspond exactly to ‘flexible strategists’ or ‘environmentalists’. The majority would fit more or less closely with ‘flexible strategists’ but have a greater commitment to the farm and to farming as a lifestyle rather than as a source of income. From my reading of Waikato dairy farmers, those who have developed close ties to their farm and ‘farm to the land’ take a pride in developing the farm as a productive, healthy, and beautiful place to live as well as a source of livelihood. Compared to the flexible strategists described by Fairweather and Keating they are more committed to the farm as a home and a way of life. Dairy farmer owner/operators do twice-a-day milking for much of the year and are involved with a management regime that requires close matching of the needs of livestock and pasture on a daily basis. It seems reasonable to infer that intensive engagement of this kind would encourage commitment to the farm as a place to live as well as a source of livelihood.

In Chapter 6, (Figure 6.2) I suggested that there was likely to be a continuum between conservation farmers at one end, and conventional farmers at the other. I assumed the presence or absence of remnant forest would indicate position on the continuum, and that farmers at both ends would be different in their values, priorities and farming philosophy. Evidence from the field studies, interviews, and questionnaire survey, indicated that the similarities of values are greater than the differences. Different priorities **do** influence management styles, but presence or absence of native forest is not an indicator of environmental or conservationist priorities. There are ‘conservationist’ farmers who do not have native forest, and there are forest remnants that persist in spite of the priorities of the landowner. This point thus leads to the second over-arching research question of the thesis: ‘Why is there any native bush left in the Waikato?’

#### **MATERIAL AGENCY AND THE POWER OF PLACE**

The short answer to the first research question, ‘Why is there so little native vegetation left in the Waikato?’ is that the majority of farmers are driven by productivist values and concerns that give little encouragement to retention or protection of native forest remnants. Chapter 8 showed that a majority of farmers with native bush on their land allowed stock access. For those farmers, the bush was not sufficiently valued in its own terms to outweigh its value for stock shelter or to justify the effort of appropriate management. Destruction of native forest for farm development, coupled with neglect of surviving fragments, means that most

of the Waikato lowlands and Hauraki Plains have been transformed from a mosaic of wetland and native forest to pastoral agriculture.

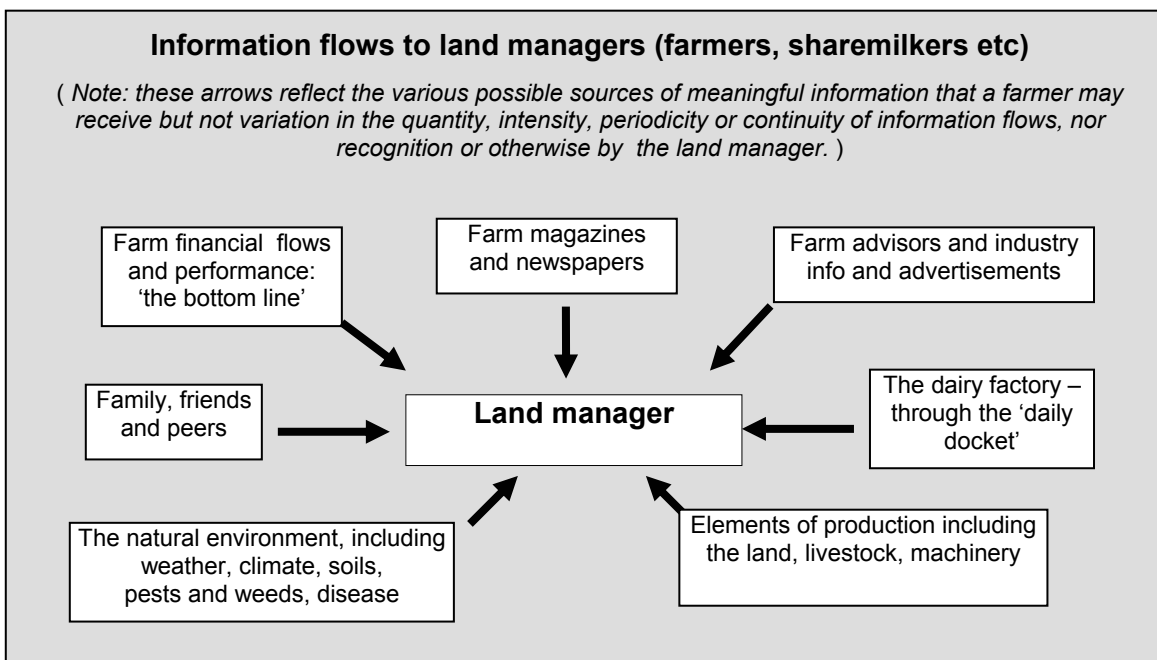
In answer to the second question, one way of understanding how the bush survives is to think of farmers and their farms as mini-systems in which the participants ('actors' or agents) are not just the farmer with his or her mental and material links to the dairy industry, but an interacting collectivity of human and non-human agents (cultural, social, biological and materially physical). The interaction can be thought of as involving a series of information flows or a 'socio-biophysical discourse'. Chapter 4 presented symbolic interactionist and critical discourse perspectives that argue that an individual's understanding of the world develops through interaction with others and is strongly influenced by language. In Chapter 5, ideas from actor-network theory and the ecological anthropologist Tim Ingold were presented to extend the ideas presented in Chapter 4. Actor-network theory posits that the physical world - the world of objects and 'things' - shapes social action and that agency is dependent on relationship. As individuals, our actions are not just shaped by what other people tell us to do, or even what our inner cultural templates make us think we should do, but by what the objects of the physical world allow or require us to do. A farmer may have a milking shed that allows him or her to milk low or high numbers of cows per hour, and the farm may have a soil, contour, and aspect that enables high or low production of milksolids per hectare per annum. Either possibility has consequences for management by the farmer. In terms of relationship, what the farmer decides to do in part depends on his or her relationship to the farm (is he or she owner or sharemilker, does he or she expect to inherit?). Thus actor-network theory argues that the details of place and relationship are important to understanding social action. Ingold argues, furthermore, that people are physical as well as cultural, and that they learn by sensory-physical engagement with their surroundings as well as language; they learn by doing as well as talking.

Both perspectives cast light on how the landscape evolves and why forest remnants persist. On the one hand, social and cultural institutions (such as milk factories, Fonterra and Dexcel, and agricultural services) influence the thinking and perception of farmers. On the other, farmers engage in a daily round of interaction with the environment that involves sensory-physical learning from information flows between the farmer and the living and non-living agents on the farm. One of the farmers in my study, for example, decided to leave an area in

wetland when he learned that no matter how many times he tried to drain it, the water came seeping back from another direction. The information flows are not so much counter to those of the politically dominant institutions, as additional to them.

Information flows are fundamental to the way that many dairy farmers understand their environment and prioritise their land management decisions. Fieldwork showed that farmers were constantly making decisions in response to information from their natural and physical environment as well as information from the human world. Some responded by following conventional practices, some by following judgement based on personal experience, and some by following environmental values.

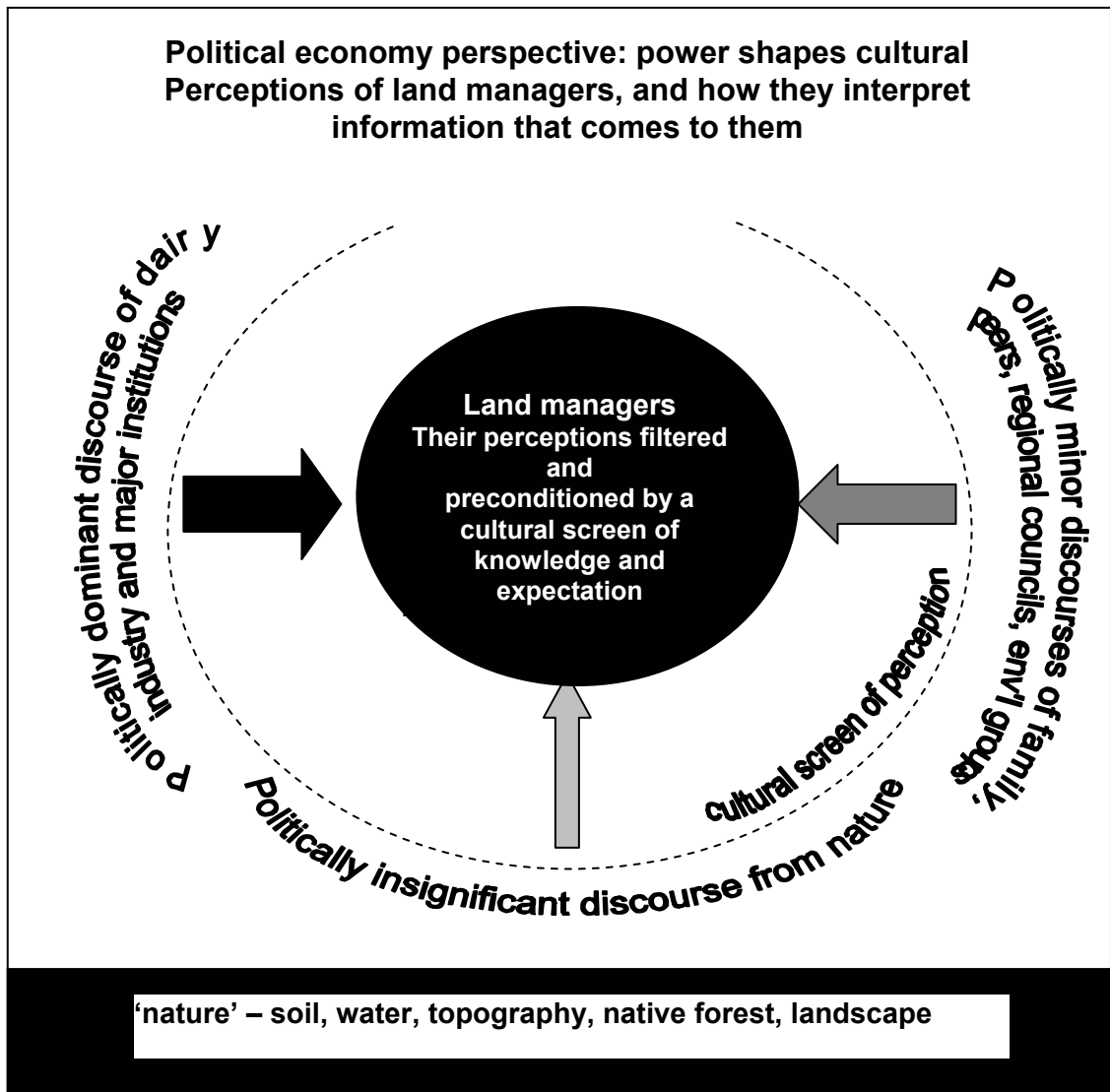
The following three diagrams illustrate the relationship between information flows and knowledge recognised by the farmer. They relate partially to the model of discourse presented by Fairclough, but also to my view that minority discourses and the 'voices' of nature are relevant to an understanding of why not all farmers follow mainstream practices. If nature can be regarded as an agent of discourse, then the messages from cows, pastures, weather, vegetation, topography, and so forth, also influence the land management of farmers.



**Figure 11.2 Sources of information flow to farmers as land managers**

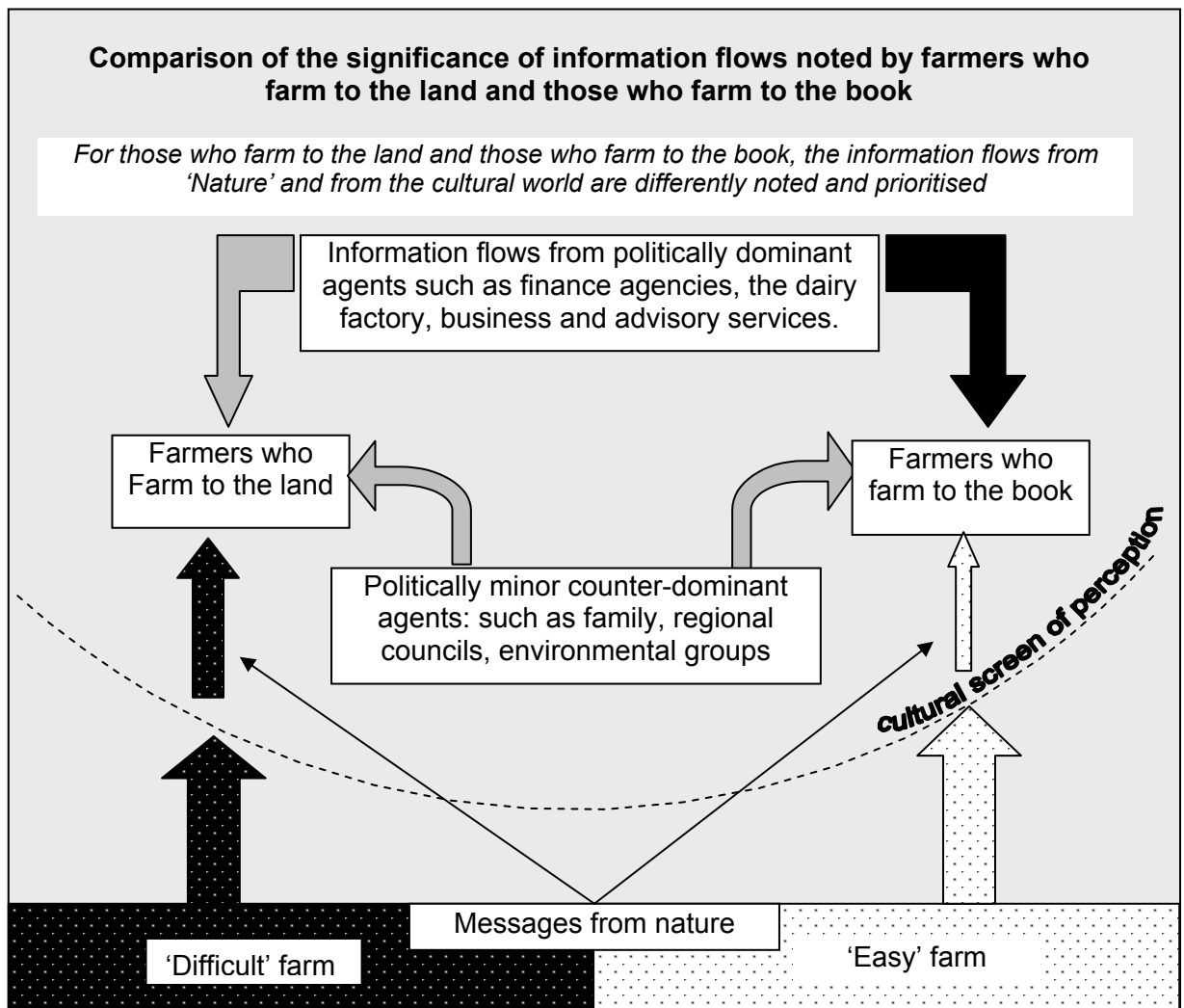
Figure 11. 2 shows the possible flows of information to the farmer from different elements that influence management. The flows include signs from 'nature' (e.g. weather, temperature, soil), and elements of production (e.g. livestock, machinery), as well as communication from friends, family, peers, service providers, financial institutions, and the dairy factory. They are unweighted in the diagram because they may or may not be noted by the farmer, and their importance will vary with circumstances such as the financial position of the farmer and the difficulty of the farming situation. They are the 'text' of a discourse that involves the farmer and the farm.

Figure 11.3 presents several different discourses that can involve the farmer and farm, including a politically dominant discourse involving the major institutions of the industry; one or more politically minor discourses, involving institutions such as family, community, and regional government, that have less power within the industry; and information from sources that are politically irrelevant because they have little or no power within the industry. The diagram includes a 'cultural screen' that filters the perceptions of the farmer/land manager. It is the system of thought and judgement that the manager acquires as member of the farming community. It does not **determine** perceptions, but means that some information flows will be noticed and interpreted as significant while others may be overlooked or judged irrelevant. Information from powerful agencies is likely to be sharply noted by (most) land managers because the consequences of ignoring it may be detrimental to the farm enterprise; that from less powerful agencies tends to be noted less; and flows from politically insignificant agents tend to be noted least because the consequences of ignoring them are not immediately detrimental or obvious. This is particularly so given that the feedback for production is generally positive and immediate, while environmental feedback tends to be subtle, long-term, or to have effect beyond the farm (e.g. native habitat loss is a loss for the regional community rather than the individual farm).



**Figure 11.3 Political economy model of the information flows recognised by land managers, where power influences the weight of the information perceived**

Figure 11.4 models possible differences in the way that ‘farmers who farm to the land’ and those who ‘farm to the book’ deal with the information flows that they receive. To survive in business all farmers must pay attention to the politically dominant information flows, but economic, social and environmental circumstances differ for each farmer and there is considerable variation in the attention that different farmers pay to different information flows. Conservation farmers or those who ‘farm to the land’ may be less constrained by economic circumstances than those who ‘farm to the book’, or they may have ‘difficult’ farms which require them to pay more attention to the messages from ‘nature’ for their operational success.



**Figure 11.4 Comparison of information flows noted by conventional and conservation farmers**

The physical characteristics of the farm (and perhaps the forest itself) are important elements of the discourse in Figure 11.4. The survival of a forest remnant is not only the consequence of the current farmer, but of a succession of farmers over decades. This fact means that the forest has survived in spite of the social and economic vicissitudes of the farmers who have occupied the farm over time. It means either that there are farming families that have maintained an ethic of conservation from generation to generation (which was empirically not true in every case) or that the landscape 'speaks' and successive farmers have been 'reading' the landscape. These have been farmers who 'farm to the land' rather than 'farm by the book'.

In short, I would argue that the material specifics of place are as important as cultural values and institutional norms in accounting for the survival of native forest in a production landscape. Having said this, the ecological purist would rightly notice that a great many of the farm forest remnants are highly modified from their pre-European state. The ecological purist could rightly ask: 'But what is it that is surviving? Can it truly be called native?' And at this point, I come back to the notion of landscapes as emergent systems. The landscape of lowland Waikato is emerging as a synthesis of elements, some native, and many exotic. Culturally determined notions of appropriate land management by farmers are a major force shaping the landscape but cannot exclude the independent influence of biophysical agents. The biophysical world influences human behaviour by making some things possible, others impossible, and yet others possible only at great cost. In many circumstances nature follows laws and processes which are independent of human action, or which operate at scales and timeframes that are beyond the lifetime and life-world of human beings.

A short answer to the second research question, 'Why is there any native bush left standing?' is that the trio of farmers, land and forest comprises the elements of locally specific interactive systems. Each farm is a bio-cultural unit of human, cultural, non-human and biophysical elements that interact and mutually respond. The conditions that allow or encourage survival of remnant forest are specific to each farm (and farmer) and vary over time. They tend to involve similar circumstances from farm to farm (e.g. steep topography or difficult farming conditions) but the circumstances are not in themselves determinants of forest survival. Although each farm is a bio-cultural unit, it is not autonomous or separate from other farms and elements of the landscape. In fact, to the contrary; farms and farmers are linked to each other and to society at large through political-economic relationships and through ecological processes that extend to global interactions (including global ecological processes such as the spread of biological organisms through global trade and transportation networks). However, the force and effect of these global and regional relationships and processes are 'played out' at the local level in ways that may be unique to each locality and unpredictable in their consequences for the landscape as a whole.

## CONCLUSION

The conclusions that flow from the understandings described in this chapter can be summarised as follows:

- Political economic pressures in a globalised market economy operate against survival of native biodiversity in production landscapes such as the Waikato.
- Local conditions of topography and idiosyncratic human decision-making can sometimes assist the survival of native habitat.
- A majority of farmers in the productivist culture of Waikato dairying are profit oriented, but also seek to balance profit with care of stock, personal enjoyment, care of the land, and development of their farm as a pleasant and enjoyable place in which to live.
- Information flows from both the human and biophysical worlds are critical in the way farmers make decisions about their land management.
- Each farm is a bio-cultural unit that develops from the interactions of the farmer and biophysical elements, human and non-human, in place and over time.
- Regional and global relations and processes affect the local, but do so in ways that are more or less unique to the local, with unpredictable consequences for the landscape as a whole. For example, while all dairy farmers are paid on the basis of a price for milksolids that depends on global market forces from year to year, the impact of a particular level of payment on a particular farm depends on the circumstances of the farmer (such as level of indebtedness, stage of the family cycle, and personal attitudes and values), and characteristics of the farm (for example, 'run-down' or highly developed).
- Place matters. The particularities of place create unique patterns of interaction and relationship between farmer and landscape, between the human and the non-human, and between one farm and the next. Just as every ecosystem is a community of co-evolved plants and animals, so each farm is to a greater or lesser extent the product of an historical sequence of interacting phenomena, human and non-human; the presence or absence of native bush is an outcome of this historical sequence. The political ecology and social constructionist perspectives can suggest why there is so little native habitat left in the Waikato, but it is the specifics of place and the interactions of individuals and the land that suggest why there is any native forest left standing.

- The Waikato landscape is more than a cultural or social construction; it is an emergent system, evolving out of the interplay of local, regional and global human and non-human elements over time. The shape of the landscape at any one time is a consequence of the dynamics of different elements of the system (e.g. the price of milk, the introduction of a new pest or weed, or the establishment of a new relationship between members of the biotic community). The survival of remnant forest within this landscape is an outcome of the values and objectives of the farmer, but also of such factors as topography, local climate, weed invasion, and other environmental conditions.

# ***CHAPTER 12***

## ***A POLITICAL ECONOMY OF BIODIVERSITY LOSS AND A POINTER TO ITS SURVIVAL***

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As outlined in Chapter 1, the aim of this thesis was to understand the cultural processes that have driven the clearance of native forest for agriculture in the Waikato, and the circumstances (cultural and biophysical) that have allowed fragments of forest to remain. The main underlying motive has been concern at the globally widespread disappearance of biological diversity in the face of modern agriculture. Biodiversity in the context of this thesis refers to the diversity of **native** ecosystems, species and habitats, that is, those which have evolved in place. It does not include diversity resulting from the introduction of species associated with modern agriculture.

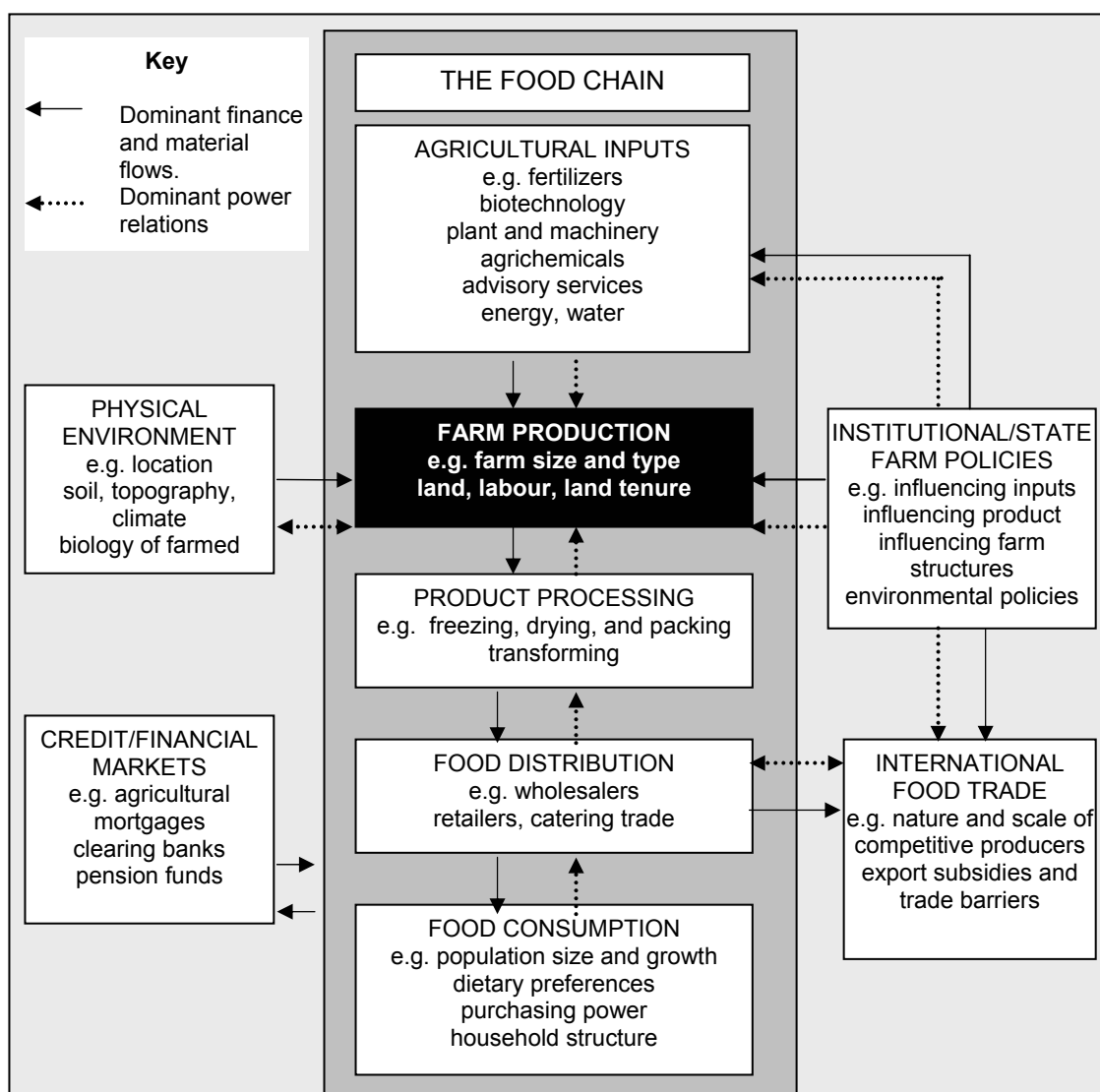
This final chapter places the findings from the Waikato case study in an international context. It discusses Waikato dairy farming as an example of western industrial agriculture and highlights similarities in processes of indigenous habitat loss and loss of traditional farming landscapes that have occurred elsewhere. It suggests that the political economy of industrialised agriculture entails a discourse which promotes values and ideals of economic efficiency, technological capability, and standardised land management. These ideals are antithetical to local heterogeneity and the survival of native biodiversity. Most dairy farmers are embedded in the discourse in ways that make it difficult

for many of them to notice or pursue alternative relationships to nature. Farmers who resist the dominant discourse are those with resources that enable a degree of independent livelihood, and commitment to non-productivist values such as family heritage, or recreational or aesthetic enjoyment. The chapter suggests that **a counter to the political economy of productivist food production is local diversity of places and people – place-based differences that arise from the combination of multifarious human values and local variation of landscape and biophysical circumstance.** The chapter (and the thesis) finishes with a suggestion that policies for conservation of biodiversity in production landscapes need to support local diversity and increase the odds in favour of serendipity. Serendipity, in this context, is the fortuitous coincidence of heterogeneous farmer interests and landscape diversity.

#### **WAIKATO DAIRY FARMING AND WESTERN INDUSTRIAL AGRICULTURE**

Bowler (1992, 11-13) has summarised the characteristics of industrial agriculture in westernised countries as a process by which farming becomes increasingly subject to industrial modes of food production. It involves the creation of economies of scale, increased reliance on purchased inputs from other sectors of the economy (e.g. machinery, fertilizers, feed, agri-chemicals), resource substitution (capital for land and labour), the implementation of organisational features associated with the business firm, specialization of the labour function, and mechanisation of the production.

Figure 12.1 shows the elements of an industrial food chain from production unit (i.e. farm) to consumption unit (i.e. household), with the elements that impact on the system. The diagram shows farms to be tightly embedded within an infrastructure of agricultural supply firms, food processing industries, food distribution systems, and consumers. An important detail to note is the presence and direction of the arrows. They show the prevailing direction of material and financial flows and dominant power relations. Farms receive material resources and finance from the natural and human environment, and export materials to the industrial food processing system. In terms of dominant power relations, they are subordinate to agricultural input firms, institutional and state farm policies, and the food processing system, but have power to influence the physical environment as well as being influenced by the physical environment.



**Figure 12.1 Elements of an industrial food chain (adapted from Bowler 1992, 12)**

Waikato dairy farming and the structure and functioning of the New Zealand dairy industry reflect most of the characteristics described by Bowler. Farms and farm management are closely integrated with the industrial processing of milk into milk products. This integration involves a capital-intensive technological infrastructure of milking machinery, milk cooling vats, milk tankers, and milk testing and recording systems. Production is highly specialised and dependent on external inputs of fertiliser, trace elements, and animal health products. It is based on a scientifically advanced and technologically sophisticated system of animal breeding and breeding records, and production-focused research. Despite state deregulation of the agricultural sector in 1985/86, dairy farm production remains highly regulated by regulations to do with animal health, milk hygiene, occupational health and safety, environmental standards, and financial recording

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systems. The industrial milk processing factories are closely tied to global food distribution systems, and influenced by consumer preferences in the international markets to which New Zealand exports its dairy produce. Fonterra has 25 manufacturing plants in New Zealand and 35 in other countries, with customers and consumers in 140 countries (Fonterra 2003c). In relation to the state, the New Zealand farm sector has been heavily affected by state policies throughout its history, whether those policies were intended to bolster agriculture or to remove all supports and deregulate the sector (Le Heron 1996; Cloke 1996). In short, Waikato dairy farming and the New Zealand dairy industry is characteristic of farming in most western industrial economies, including Canada, the USA, Western Europe and Australia (Le Heron 1996; Le Heron and Roche 1997; Millward et al. 2000; Potter 1998b; Watts and Goodman 1997).

Many of the processes that characterise industrial agriculture involve management practices that cumulatively undermine local social and biophysical diversity, and in doing so, undermine the survival of indigenous habitat and species. For the UK, Benton et al. (2003) have identified specific practices that reduce heterogeneity of agricultural landscapes. They include consolidation of farm units so that land is increasingly dominated by fewer and larger farm units and hence larger contiguous areas under common management; reduction in the botanical and structural variety of crops and grasslands grown on a single farm; loss of semi-natural habitats such as ponds, uncropped field margins and scrub; simplification of crop rotations; reduction in species variety by weed removal and sowing pasture with a limited number of herbage varieties. Similar conclusions have been expressed by Stodate et al (2001) for Europe more broadly. Many similar features apply to Waikato dairy farming, including the enlargement of farms, reduction in species variety by weed removal and reseeding pastures with a limited number and variety of pasture species or forage crops; drainage and elimination of semi-natural wetland areas such as soaks and seepages; removal of bush and scrub.

Commodification of land as a medium of production means that land tends to be viewed and managed primarily for its commercial value as opposed to other values such as cultural or natural heritage, personal or group identity, recreation and enjoyment, or quality of life. Cronon (1983, 161) has argued that the changes brought to the New England countryside by the advent of European

settlement (directly or indirectly) included deforestation, drying out of soils, changes in drainage patterns, water and wind erosion, loss of animals (wolves, bears, deer, turkey), changed composition of forests:

Ultimately, English property systems encouraged colonists to regard the products of the land -not to mention the land itself- as commodities, and so led them to orient a significant margin of their production toward commercial sale in the marketplace. The rural economy of New England thus acquired a new tendency toward expansion. The dynamics which led colonists to accumulate wealth and capital were the most dramatic point of contrast between the New England economy of 1600 and that of 1800. . . New England ecology was transformed as the region became integrated into the emerging capitalist economy of the North Atlantic. Capitalism and environmental degradation went hand in hand.

More recently, Strang (1997) has contrasted the differences between cattle pastoralists and Australian Aboriginals in their perceptions of, and relationships with, land and the environment. Where Aboriginals view the land as a source of personal and group identity and spiritual renewal, cattle pastoralists evaluate the same land in terms of its production value for cattle. As a production medium for cattle it suffers many inadequacies (such as lack of water, inadequate pasture and the like) which need to be modified and transformed. As a source of identity and spiritual renewal, it is sufficient as it is. In the Waikato, dairy land is valued on the basis of its production of milksolids per hectare over the previous three seasons, plus commercially valuable improvements such as buildings, structures, and plantation pines. Non-commercial features such as the presence or absence of native vegetation are not valued, although for taxation purposes they may be rated as if they were fully productive (thereby incurring an incentive to make them productive by converting the native vegetation to pines or pasture). Many farmers view the semi-natural features of the land as an impediment to production and a challenge to their ability as farmers.

The loss of native biodiversity that has occurred within the farmlands of the Waikato parallels that which has occurred in other parts of the developed world. Thus Australia's State of the Environment report (DEST 1996, 4.7) lists agriculture as the activity which threatens the largest number of native Australian plant species, followed by grazing and weed competition. For the most agriculturally productive areas of Australia the report notes that

. . . much of the remnant native vegetation is privately owned and is not regarded as part of the Crown conservation estate. Significant

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numbers of endangered or restricted species live on these privately owned remnants and so sympathetic management is required to ensure their survival (DEST 1996, 4.13).

New (2000) discusses the causes of native biodiversity loss in South Australia. He notes that the greatest loss of terrestrial and freshwater native species is due to the removal of native vegetation 'and the associated depletion of land quality, with direct effect on included freshwater systems by erosion, changes to drainage patterns, chemical run-off, and other factors' (New 2000, 220). For the UK, Pretty et al. (2000, 125) note that

. . . modern farming has had a severe impact on wildlife: 170 native species have become extinct this century, including 7% of dragonflies, 5% of butterflies and 2% of fish and mammals. In addition, 95% of wildflower-rich meadows have been lost since 1945; 30-50% of ancient lowland woods; 50% of heathland; 50% of lowland fens, valley and basin mires; and 40% of hedgerows.

The UK Biodiversity Action Plan notes that 'agricultural intensification is one of the main factors affecting wildlife and landscape changes in the last 50 years' (UK Government 1994, 53). The North American Trilateral Commission for Environmental Cooperation (CEP 2001, 6) notes that tall grass prairie in North America has been reduced to 1% of its former extent, and mixed and short grass prairie to 20 to 30% of its former extent. The report notes that one of the threats to Canadian prairie grassland is the aim of the Canadian Agrifood Market Council of Canada to provide 4% of global market share (CEP 2001, 9). As with Canada, disappearance of native prairie grasslands in the United States has been mainly a consequence of agricultural development and agriculture continues to provide the greatest source of threat. Threats to native prairie grasslands in the US include habitat fragmentation, exploitation of aquifers, invasive species, pollution due to animal feeding operations, removal of fire as an ecological agent, oil and gas exploitation, and mechanical removal of vegetation (CEP 2001, 10).

Although the Waikato case study has discussed biodiversity loss in terms of native habitat and species, similar processes appear to apply to loss of traditional farmed landscapes. Traditional or 'cultural' landscapes in the European context include areas of low-intensity grazing (such as heaths and moorlands), low intensity arable farming, traditional olive groves, and distinctive features of farmed landscapes such as ponds, hedges and stone walls. The disappearance of traditional forms of agriculture and cultural landscapes has been of great

concern to Europeans (Buller, Wilson and Holl 2000; Potter 1998a, 1998b). With respect to cultural landscapes, Stoate et al. (2001, 339) note that 'Landscape diversity has declined in Europe during the period of agricultural intensification with a tendency for the most progressive farmers to create the simplest landscapes.' A report for the Council of Europe (CoE 2001-13, 3) explains that,

. . . agriculture is regarded as one of the key driving forces impacting on biological and landscape diversity in Europe, both positively and negatively. It is the economic sector that has over the past millennia designed the European cultural landscape and its associated biodiversity. It is also the sector which, since the mid 19<sup>th</sup> century, has had the greatest negative impact on biodiversity and landscapes.

Thus the political economy processes that destroy native habitat on private farmland in the Waikato appear to parallel those that destroy traditional low intensity farming methods in Europe and perhaps Third World countries.

#### **PRODUCTIVIST DISCOURSE AND PERCEPTIONS OF NATURE**

A key finding of the Waikato case study is that the majority of dairy farmers are embedded within a productivist discourse and set of cultural practices that make it hard for them to see their farms as other than a medium for production. As the medium for production it is also the route to social success and professional recognition as a competent and successful farmer. The concept of discourse is important to note because it emphasizes the symbolic element of the farming condition. As we saw in Chapter 4, language is a highly important determinant of the way we think and perceive reality. While it may not shape biophysical reality, it provides a medium for knowledge and thought and a means for learning and sharing experience. To say that farmers are embedded in a discourse is to say that they live within a conceptual world that influences the way they perceive their environment, their objectives, priorities and the way they identify land management options. The symbolic element of discourse (shaping the very tools of thought) means that individuals may not even be aware of alternatives to the politically dominant sources of knowledge and ways of seeing. In the Waikato, for example, the generally accepted criterion of what it is to be a good farmer, regardless of the characteristics of land or stock, is defined by a dominant discourse that emphasises production of milksolids per hectare and a 4% per annum increase in 'productivity'.

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The Waikato case study (Chapters 4, 9 and 10) sought to illustrate how the discourse that dominates the dairy farming media emanates from industry leaders and powerful agricultural organisations (such as agricultural research institutions, supply firms, and banks) which strongly influence the way that farming practices and priorities are perceived. Thus farming is predominantly perceived as a 'business'. It involves management of production resources (land, stock, plant, capital) in accord with a marketing imperative to maintain a low cost structure relative to New Zealand's global competitors. The discourse emphasises values consistent with the place of New Zealand dairying in a competitive global marketplace. While the productivist ethic in New Zealand may be more than usually focused on profit as an ultimate objective (see Chapter 1) it shares many of the same characteristics of productivist farming described by UK academics (Ilbery and Bowler 1998; Walford 2002; Ward and Lowe 1994; Wilson 2001). These include a high value on production as a virtue in and of itself; a high value on economic efficiency involving maximum monetary return for investment of time, energy, plant and equipment and human knowledge and skill; and a high value on science and technology as a means to improve production outputs.

The ways in which farming media may buffer farmers from counter-productivist environmental discourse is illustrated by McHenry (1996), in her analysis of the way environmental issues are depicted by a German farming newspaper. McHenry notes that environmental problems were frequently denied or downplayed by the German farming media. She notes a general underestimation of the potential ecological damage caused by farming and a tendency to assert that while problems might be found elsewhere, they are not found in the locality or region under discussion. Or else the view might be expressed that while one or two farmers might be a problem – like the few 'dirty dairy' farmers of New Zealand – most were following sound environmental practices. Just as Waikato dairy farmers have accused Hamilton City of polluting the Waikato River (Boyes 2001), so McHenry found that the discourse recorded in the German farming newspaper was inclined to assign the blame for environmental problems to other members of society. She concludes that,

It seemed to be the inherent conflict between productive or exploitative agriculture and conservation that made farmers react against environmental issues and portray them as either unreasonable or impractical. Where no conflict was evident, then

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the farmer's views are more likely to coincide with those of the general public or conservationists (McHenry 1996, 385).

In short, the way that environmental issues are depicted by the German newspaper examined by McHenry serves to trivialise their significance except where they serve the interests of farmers (for example, with regard to renewable resources or protection of the cultural landscape). This is similar to the New Zealand news media when it notes environmental issues that threaten the commercial welfare of the industry but otherwise gives little attention to environmental elements or depicts them as a challenge to be overcome by technology and management 'know-how'.

It is clear, however, that farming discourses are affected by discourses within the wider society. A number of studies have shown changes in conservation behaviour by farmers over the 1980s and 1990s as British consumers expressed more and more anti-farming feeling in the wake of issues such as Bovine Spongiform Encephalitis (BSE or 'Mad Cow' disease), damage to the countryside from farming practices, and the cost of farm subsidies (Macdonald and Johnson 2000; Ward and Lowe 1994). Ward and Lowe point out that changes in the way farmers view environmental management practices suggest a complex interplay of economic factors and social change. Farmers are not divorced from the discourses that take place in the wider rural society, and are influenced by social attitudes that condemn the environmental damage caused by productivist farming practices. In the view of Ward and Lowe, (1994, 183):

Social change must not be viewed as exogenous to farming, for farm households form an integral part of rural society. It is a dialectic between the economic and the social which contributes to the transformation of agrarian values and fosters an openness to new values. . . . New groups with different perspectives on rural environmental management are establishing themselves in the heart of localities once dominated by the farming way of life. At the same time, and in part as a result of such rural social change, regulatory policy has required that farmers incorporate a greater concern for reducing environmental risks into their routine farming practices. Complex sets of influences are bearing down on how farmers understand pollution, what counts as 'good farming' and their own farming strategies.

We can say, in other words, that the farmers described by Ward and Lowe have been influenced by a host of factors acting together, including a nation-wide discourse about the damage that farming has caused the British countryside.

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Bager and Proost (1997) reinforce the observations of Ward and Lowe about the complexity of inter-relationships between environmental and farmer discourses. They note how there have been changes in the environmental attitudes and behaviour of farmers in Denmark and the Netherlands, but these changes are by no means a direct reflection of the discourses of pro-environmental lobby groups or policy makers. They point out that the environmental attitudes and behaviour of farmers is influenced by socio-political processes **within** the farming community. They write,

. . . it is this internal socio-political process combined with individual reflection which governs the attitudinal process, rather than exogenous pressure from environmental groups, the media, politicians, etc. Such pressure may push the internal socio-political process off the ground, as clearly has been the case in the agro-environmental debate, but it does not determine the outcome. (Bager and Proost 1997, 85)

This has been clearly the case in the Waikato dairy example, where the counter discourses of environmentalists, central and regional government agencies, and consumer groups have persuaded the dairy industry to acknowledge the environmental issues and place greater emphasis on environmental management as an element of farm management. But the manner in which this has been done remains productivist; the industry has linked environmental management to those aspects that relate most directly to production and market competitiveness (water quality and animal welfare).

The discourse within which farmers are enmeshed is all the more difficult to see beyond because it is reinforced by elements of social and economic reality. Thus in the New Zealand case, farmers are paid in accord with their production of milksolids. In the European case, the agri-environmental reforms of recent years have sought to 'decouple' payment from production, but production and source of livelihood are still very strongly linked in practice. Both in New Zealand and in the European case, the environmental consequences of farming are often not immediately obvious to the farmer, either because they occur elsewhere (e.g. downstream) or are the subtle, slow and cumulative result of many farmers over time.

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**PLACE MATTERS: DIVERSITY ARISES FROM UNIQUE CIRCUMSTANCES IN PLACE, OVER TIME**

The Waikato dairy farming case study indicates that for survival of native biodiversity, place matters; the local particulars of people and place make a difference and may counter the political economy effects of industrialised, commercial agriculture. Local circumstances matter in both human and non-human terms.

In non-human terms conditions of topography, location and history can impede the force of political economy and assist the survival of native habitat and/or traditional farming methods and agricultural landscapes; in effect, each farm is an evolving bio-cultural unit of human and non-human elements, influenced by external events and processes (the political economy pressures) but almost unique in the 'mix' of interactions on the ground. The survival of native forest and the size, shape, composition, and ecological functioning of each area is a consequence of factors such as local topography, climates, soils, location, and the knowledge, attitudes, values, objectives and social circumstances of the farmer.

In human terms, the individual attitudes of the farmer/land owner are important. Waikato farmers vary in their commitment to environmental conservation and their willingness to commit time and resources to conservation management. Perhaps 20% of Waikato farmers are willing to protect bush without any public support whatsoever and in the face of considerable disincentives. Stated reasons for retaining or actively conserving native bush ranged from the pragmatic ('easier to fence it off than fight it') to aesthetic enjoyment ('improves the look of the place'), family heritage or tradition ('we scattered my father's ashes there'), and symbolic or spiritual reasons.

The importance of farmer attitudes and values for conservation, and the degree of individual variation between farmers, has been well documented from studies elsewhere. Newby et al. (1977 as cited by Gasson and Potter 1988, 342) found that family farmers who had a 'low market orientation' were more likely to show favourable attitudes toward conservation and that 'agri-business' farmers with a high market orientation were least likely to view countryside conservation in a favourable light. Potter and Gasson (1988) found that attitude and structural

factors (e.g. financial constraints, size and physical characteristics of the farm) were influential in the preparedness of farmers to withdraw land from production for conservation. Farmers with a positive attitude to conservation and least in the way of structural constraints were prepared to offer more than farmers with positive conservation attitudes but greater structural constraints, or low structural constraints but less enthusiasm for conservation. For a sample of farmers in southwest England, Battershill and Gilg (1997) found that the 'attitudinal dispositions' of farmers were more important in influencing their conservation decisions than structural constraints or opportunities. From a regional survey of UK farmers, Macdonald and Johnson (2000) found that the farmers who enjoyed field sport (shooting or hunting) were more likely to be interested in wildlife values, less likely to destroy wildlife habitat, and more likely to retain or create new habitat. Equally to the point, Macdonald and Johnson found significant variability between regions. 26% of farmers in Dorset had created hedgerows, compared with 48% in the West Country and 51% in Suffolk and Warwickshire (Macdonald and Johnson 2000).

Morris and Potter (1995) in a survey of farmers enrolled in an agri-environmental scheme found that although the majority of those enrolled in the scheme had done so for financial reasons, a minority of farmers they term 'active adopters' showed 'very different attitudes to the scheme and unlike the passive majority, are able to appreciate the larger significance of the scheme' (Morris and Potter 1995, 59-60). These farmers were open to change and to the idea of countryside values outside of farming. Erickson, Ryan and De Young (2002) found that aesthetic appreciation is the strongest motivator for retaining woodlots by landowners in a mid-Western area of USA, followed by protection of the environment. Economic motives were significantly less important. A similar survey of 268 Michigan farmers concluded that 'farmers are intrinsically motivated to practise conservation by such factors as their attachment to their land, rather than by motivations such as receiving economic compensation' (Ryan, Erickson and De Young 2003). Tikka (2003, 276) comments that 'the majority of Finnish forest owners appreciate also non-timber, recreational and amenity aspects of their forests besides monetary income from timber sales and are prepared to set aside areas as key habitat sites or nature reserves without compensation.' And for Austria, Frank and Muller (2003, 265) note that 'owing to the initiatives of private forest owners it was possible to protect important

remainders of virgin forests as early as the nineteenth century. Some of these very important habitats are still under the voluntary protection of the same family.'

Non-material attitudes and values are not always the most important determining factor for farmers who practise conservation measures, however. Cary and Wilkinson (1997) found that for farmers in south-eastern Australia, 'perceived profitability' was the most important factor influencing the use of tree planting and planting of deep-rooted pasture species to retain water.

Conversely, Carr and Tait (1991) found attitudes were equally important in encouraging productivist approaches. They found that 'attitudes to farm productivity, efficiency and tidiness dominated management decisions to the exclusion of wildlife considerations' for those farmers who supported removal of hedges. Walford (2002) found for a group of productivist commercial farmers in the south-east of England that some of the most ambitious had used the 'set aside' agri-environmental schemes (which require farmers to take a proportion of land out of production) as a management tool, for example to provide a crop break before wheat, to take less fertile areas out of production, and to allow weed treatment through herbicide application.

These examples from the literature illustrate that there is a diversity of motivations in respect of environmental/productivist management among farmers. This diversity is both individual and regional. Social characteristics (such as age, experience, economic status, or stage in the family cycle) appear to be predictors of environmental attitudes and behaviour in some areas, but not in others.

#### **POLICY AND CONSERVATION OF NATIVE HABITAT AND TRADITIONAL LANDSCAPES**

There is no shortage of literature on policies for biodiversity conservation within production landscapes (for example, Brunckhorst 2002; Cowell 1998; Doremus 2003; Frank and Muller 2003; Hodge 2001; Ledoux et al. 2000; Macfarlane 1998; Michael 2003; Pierce 1996; Potter and Goodwin 1998; Szaro et al. 1996; Tilzey 2000; Tisdell 1999). Much of the literature expresses a tension between 'bottom-up' versus 'top-down' policy approaches and between different disciplinary perspectives (Macfarlane 1998). 'Bottom-up' approaches are those which leave the primary responsibility for conservation to land managers and/or community groups or local agencies. 'Top-down' approaches, are those which

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seek to bring about protection of specified areas or whole landscapes by the imposition of policies designed to implement an overall plan. Broadly speaking, ecologists and conservation biologists tend to be concerned with integrated, eco-system-based, 'whole-of-landscape' approaches which focus on the maintenance of biological functions across social and political boundaries, or which target areas that are ecologically special such as the habitat of endangered species. Their focus is primarily the biophysical environment and the ecological needs of species and biological communities and systems (Christensen 1997; Cowell 1998; Szaro, Lessard and Sexton 1996). Social scientists (e.g. economists and geographers), on the other hand, tend to focus on the motivational factors that encourage landowners to undertake appropriate conservation action, and the political circumstances that influence development and implementation of conservation policy. Their focus is mainly on people as the prospective conservation managers, and the political and institutional means for enabling solutions.

A key tension between social and natural scientists in the evaluation of conservation policies concerns the criteria for evaluation. Where social scientists may evaluate the success of a programme on the basis of its up-take by landowners, ecologists tend to evaluate effectiveness of programmes in terms of the ecological consequences: does the programme lead to the retention or extension of critical habitat or species populations? In the view of many ecologists, voluntary measures alone cannot be relied upon to ensure the maintenance of critical ecosystem processes or the survival of target species populations. Whereas 'top-down' and regulatory approaches tend to be favoured by natural scientists as a means of targeting ecologically significant areas, they have sometimes been criticised by social scientists for being inflexible, inefficient, and expensive (Ledoux et al. 2000; Michael 2003; Potter 1998a; Tikka 2003)

A number of writers have argued that policy approaches need to recognise that no one formula is better or worse than another. Diversity of policy frameworks and mechanisms are likely to offer greater conservation returns than a uniform approach. Doremus (2003) articulates this well with a summary and evaluation of different policy interventions and the circumstances in which they are likely to be effective. She points out that the effectiveness of different methods depends on their intended purpose and the circumstances that apply to their application.

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For example, while many might consider education or information a lightweight and unreliable means of enlisting conservation behaviour, Doremus cites the example of an effective programme by the Monterey Bay Aquarium to educate consumers about the biodiversity impacts of purchasing different kinds of fish. Threatened or endangered species are listed on a card and posted on the internet. In response, Californian consumers have moved away from consumption of the endangered species, to stocks that are more able to withstand fishing pressures. Equally, incentives to reduce production may be ineffective if the gains from production outweigh the incentive; conversely, an incentive that is less than the production gain may nevertheless be effective if it increases the social standing of the land manager within their community.

Doremus (2003, 226) points out that biodiversity objectives must, of necessity be vague:

An unqualified demand to protect biodiversity is essentially an unrealistic demand to protect the entire natural world. But there is no consensus on where to draw the lines short of that about how much to protect, what aspects of biodiversity to prioritise, whether to focus on a few highly diverse hot-spots or try to maintain a broad distribution of diversity, or the many other details needed to turn the general goal of biodiversity protection into concrete policy.

She advocates a ‘policy portfolio’ approach which recognises that different policy instruments can be tailored to meet different conservation objectives in the light of political realities. Even in the most straightforward cases, where community views are clear and political aims direct, multiple approaches are likely to have advantages over any one single approach. As she explains (2003, 226):

Even with respect to the single goal of biodiversity protection (however defined), because the various conservation strategies have different strengths and weaknesses, combining them can offer important advantages. For example, where either resources or threats can cross property boundaries, property acquisition may need to be combined with regulations or incentives.

She argues that just as an investment portfolio reduces financial risk, a conservation ‘portfolio’ reduces the risk that the policy instruments will be misdirected. In her view,

. . . biological risk threatens both acquisition and regulation strategies. Because so little is known about the biological needs of species or ecosystems, acquisition may target the wrong places. . . . Regulation also carries the risk of incorrect focus; it may target the

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wrong activities, leaving people free to engage in actions harmful to the species (Doremus 2003, 227).

In short, Doremus argues that a portfolio of conservation policies enables a flexible and creative approach to a diversity of geographic situations and politically tenable conservation objectives.

Bager and Proost (1997) report on the effects of voluntary measures (such as information and education) versus compulsory regulation on farmers' behaviour in Denmark and the Netherlands. They found evidence which suggested that farmer attitudes had changed in the past decade and that,

. . . voluntary regulation contributes to the sustainability process in various ways: by creating a forum for dialogue and negotiation between the farming community and society, by providing farmers with information and knowledge for practical action, and by assisting them in their organisation of the socio-political process within the farming community. But compulsory regulation is important too, in that it shapes farmers' techno-economic and legal room for manoeuvre, as well as by triggering off an agro-environmental debate within the farming community, spelling out for farmers what society sees as acceptable and desirable (Bager and Proost 1997, 93).

In relation to the institutional frameworks for agri-environmental improvements and wildlife conservation in the UK, Hodge (2001, 109) argues the need for diverse institutional arrangements to supply 'the diverse range of goods demanded, their public good characteristics and the range of environments within which they are to be supplied'. In his view conservation mechanisms in the UK countryside need to generate 'heterogeneity rather than homogeneity', and he thinks that 'the outcome of diversity may only be possible through a diversity of institutions' (Hodge 2001, 109). Combinations of public and private partnerships and national and local agencies can take advantage of local energies and create solutions tailored to local conditions.

The idea of public and private partnerships is also supported by Pierce (1996). From an empirical standpoint, after examining a range of policy instruments and institutional mechanisms applied in the US, Canada, the UK and New Zealand, Pierce (1996, 227) comes to the view that although governments play a leadership and regulatory role,

. . . it is clear from these examples that many important initiatives are coming from non-governmental organizations and that partnerships between public and private sectors and between private and non-governmental sectors have significant potential to clarify the issues, to establish common ground and galvanize constructive action.

Jennings and Moore (2000) report a comparison of Australian conservation strategies from three levels of institutional policy – national, state and local. They note that the strength of national and state level strategies was their emphasis on maintaining ecological integrity. When these strategies were measured against flexibility and community consultation, the strategies fared less well. Local level plans however allowed for dynamic, adaptive approaches to change, and contributed to sustainability.

Finally, Benton, Vickery and Wilson (2003) have argued strongly in the UK context that biodiversity conservation of native birds and other species depends on habitat heterogeneity and policies to encourage and bring back farmland heterogeneity. They argue that ‘habitat heterogeneity is associated with higher biodiversity in the farmed landscape, whether measured at a small or large scale’ (Benton, Vickery and Wilson 2003, 183). Reversing the British decline in native biodiversity, they suggest, will require policies to encourage diversity of farmland practices from within individual fields to whole landscapes.

#### **CONCLUSION: INCREASE THE ODDS IN FAVOUR OF FORTUITOUS CIRCUMSTANCE**

Based on the Waikato case study and the foregoing literature, a conclusion of this research is that policies for conservation of biodiversity in production landscapes need to increase the odds in favour of local diversity by promoting the coincidence of positive farmer attitudes with diversity of landscapes. Farmers need to be encouraged to adopt conservation options where landscape forms are sub-optimal for intensive production. And in order for this to happen, environmental contributions to agricultural discourses need to be deepened and increased.

The agri-food institutions which drive commercial farm production are unlikely to change their productivist value orientations and discourse. Unless there is strong counter-productivist pressure from consumers and public agencies, or opportunities for significant commercial gain from biodiversity conservation, it is unlikely that farms and institutions which depend on production as a means of

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economic survival can afford to give priority to biodiversity functions over production. Ecologists can reasonably argue that biodiversity policies should target areas on the basis of ecological significance, but the practicalities of market economics suggest that, in most areas, it will not happen. And politically, public funds for the environment must compete with demands for social and community welfare where the voices of people are louder than those of ecosystems and non-human species. Thus policies and incentives which increase the awareness and intrinsic motivation of farmers to retain and protect habitat diversity are a potentially cost-effective means of extending biodiversity conservation in production landscapes. Coleman et al. (1992 as cited by Morris and Potter 1995, 52) have argued that 'policy measures which encourage positive attitudes to conservation will in the long-term be more effective than those that do not, since a positive shift in attitudes will increase the output of conservation goods at any specified level of budgetary cost'.

The Waikato case study suggests that conservation gains for biodiversity can be significantly increased by policies which foster a climate of awareness and concern for biodiversity values and by providing incentives and encouragement for voluntary uptake by individual farmers who are sympathetic in principle (but not yet in practice) to the idea of conserving native habitat.

Morris and Potter (1995) identified a spectrum of participants in UK conservation schemes with 'resistant non-adopters' at one end to 'active adopters' at the other, and 'conditional non-adopters' and 'passive adopters' in the middle. They argued that the most effective conservation policies in terms of value for public expenditure would be to target 'active adopters' and encourage them to take on a role as demonstrators of best practice, but also deploying advice, training and persuasion to encourage 'passive adopters' to become more active adopters.

The Waikato findings are similar to those of Morris and Potter and others, namely that about 20% of farmers showed strong support for conservation; another 40% expressed favourable attitudes but not to the point of foregoing production or spending time and resources on appropriate management; and a minority were indifferent or hostile.

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The Waikato case study example suggested that information or socio-biophysical 'discourse' is an important element in the land management decisions of farmers. Farmers and their farms can be conceptualised as systems and sub-systems of information flow, with information from both human and non-human sources. Information from the land can include biophysical signals that make it easy or difficult, profitable or unprofitable for farmers to follow standard productivist practices. The importance of information to the way that farmers make their decision suggest that information and education can be an important means of promoting positive attitudes and behaviour towards habitat conservation. Farmers may be enormously efficient managers of production but not know how to manage valued ecosystems, landscapes or places appropriately. In the case of native biodiversity, they may know nothing about the plants and animals that public policy makers want to protect; in the case of traditional farmed landscapes as in Europe, or historic sites, they may not have the management knowledge and skill required. Morris and Potter (1995) suggest:

Increasing the frequency of advisory visits to new enrolers [in agri-environmental programmes (AEP)] and linking this to training courses in basic conservation skills and management techniques is thus likely to be particularly important here. The evidence of the survey is that under existing arrangements, information and advice tends to be used reactively, farmers receiving the highest quality advice only if they ask for it. Making regular handholding visits throughout the lifetime of a scheme could increase confidence and help instil the conservation ethic which is presently lacking. . . . The importance of enhancing conservation advice to farmers generally and as part of the AEP in particular is now widely recognised.

The results from the Waikato case study suggest that policies need to increase the odds in favour of the fortuitous coincidence of positive farmer attitudes and knowledge with landscape diversity. Farmers who own land that is sub-optimal for production, or particularly valuable for conservation, can be targeted for particular encouragement. As Doremus also suggests, this can be done by a portfolio of policies that apply at different levels (national, regional and local) and a range of instruments, from education and information to incentives, disincentives, and regulations. Thus as well as targeting individual farmers, it is also worthwhile to foster a climate of opinion within the wider rural community that conservation of biodiversity and habitat heterogeneity are valuable, perhaps fundamental for long-term sustainability. A key element is to promote a

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community-wide discourse that counters the productivist discourse of industry, and promotes alternative values of environmental health, community welfare, and the aesthetic beauty of natural variety and biodiversity.

The circumstances of person and place that make for the survival of native habitat or traditional farming methods are unique in space and time. To a considerable extent, they are the result of fortuitous circumstance. Policy measures to preserve native habitat or traditional farming methods need to reinforce favourable attitudes toward native forest/native biodiversity, (e.g. by emphasizing their public community value and importance for various things, be it national identity or ecosystem services) and reduce the subsidies for intensive production in the face of environmental constraints. Policies need to involve a 'portfolio' of measures that apply both to individual landowners, and to the wider rural community; they need to include information that will provide landowners with the knowledge and skill for appropriate management of heterogeneous habitats; and they need to provide feedback mechanisms for land managers that assist or reward management for non-production values.

# **APPENDICES**

# Appendix 1

## **Copy of the consent form and information flyer sent to participants of the farm family study.**

(Note: The consent form was sent after initial phone contact, to ask if they would be prepared to consider participation in the study, and prior to my first visit. At my first visit to them, I outlined what would be involved for them if they participated, and clarified my ethical responsibilities and their rights to with-hold information or withdraw from the study at any time.)



**The University of Waikato**

Te Whare Waananga o Waikato

*Department of Geography*  
 Private Bag 3105, Hamilton, New Zealand  
 Phone: 07-856-2889; Fax: 07-838-4633

**CONSENT FORM**  
**(For farm unit study)**

1. The title of this research project is "Cultural Ecology of the Waikato Dairy Industry, 1999"
2. The researcher is Mairi Jay, a Ph.D candidate of the Department of Geography, University of Waikato, Telephone: 07-856-2889 x 8834; Fax: 07-838-4633. Her supervisor is Professor Richard Bedford, Division of Cultural and Environmental Studies, University of Waikato, Telephone: 856-2889 x 8690.
3. The overall aim of the study is to learn more about the conditions that encourage or discourage farmers from practices of good stewardship. The particular aim of the farm study is to enable the Mairi Jay to gain a practical understanding of the realities of farm management on a day-to-day basis.
4. Except as you expressly agree, your identity and the identity of your farm will be strictly confidential; except as you allow, it will not be possible to tie information from the study of your farm back to your farm.
5. The study will be for a period agreed by you and the Mairi Jay.
6. A record of the study will be made by Mairi Jay in field notes. These may include diagrams, maps and pictures. Mairi will give you the original notes to examine and approve before she uses them for the study. You are entitled to ask for information to be withdrawn from the field notes and to a copy of the field notes, or any portions.
7. You have the right to withdraw from the research at any time, and to decline to answer any questions that you may be asked.

**I/we agree to participate in this interview and acknowledge receipt of a copy of this consent form.**

**Signed: .....Date: .....**

**Signed: .....Date: .....**

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**CULTURAL ECOLOGY OF WAIKATO'S DAIRY INDUSTRY**  
**Ph.D. THESIS RESEARCH STATEMENT**  
**By MAIRI JAY**  
**June, 2000**



*The aim of this research is to answer the questions: "How and why are some dairy farmers more environmentally friendly than others?"*

*In particular, the research looks at the links between farmer values and land management practices as they relate to conservation of wetlands or native forest. It will look at the issue from a viewpoint which sees the relationship of farmers and their land as part of a farming way of life within the wider culture of New Zealand society.*

Like many other parts of the world that support western-style commercial agriculture, the dairy industry of Waikato seems to show conflict between economic and ecological sustainability.

Although some farmers follow land management practices that are ecologically sustainable, many do not. Some farmers follow a variety of "environmentally friendly" land management practices, including long-term sustainable management and conservation covenants. These farmers 'buck' the system and suggest that values and practices are not the same for all farmers. These farmers show a pattern of land care that other farmers might be persuaded to follow if their circumstances were different.

This research examines a number of propositions about dairy farmers in an effort to discover the circumstances and attitudes that make them more or less sympathetic towards protection of native bush or wetland on their farms.

## **Appendix 2**

**Copy of the introductory letter  
and information flyer sent to  
questionnaire survey participants  
before telephone contact**

Department of Geography  
Te Wāhanga Aro Whenua  
Private Bag 3105  
Hamilton, New Zealand

Mairi Jay, Senior Lecturer  
Coordinator, Postgraduate  
Diploma in Resource and  
Environmental Planning  
Telephone +64 7 838 4046  
Facsimile +64 7 838 4633  
email: [mairij@waikato.ac.nz](mailto:mairij@waikato.ac.nz)  
<http://www2.waikato.ac.nz/geog>



The  
University  
of Waikato  
Te Whare Wānanga  
o Waikato

Dear Mr and Mrs Farmer

### **A REQUEST FOR YOUR HELP WITH A FARM RESEARCH PROJECT**

I am a doctoral student at the University of Waikato, doing research on dairy farmers and their land management as it applies to trees and remnant forest. I am comparing dairy farmers who have native trees or bush on their property, with farmers who don't have native trees or bush on their property. The research is part of a 5-year programme that will help to provide a better understanding of the ways that native trees and bush can help or hinder sustainable land management.

A pamphlet of the research is attached.

I am writing to ask for your help in answering a telephone survey questionnaire. The telephone survey will involve anywhere between a few minutes to half an hour of your time, and all your answers will be confidential. You have the right not to take part in the interview or to withdraw at any time, and you are not obliged to answer any questions that you do not wish to answer.

In the hope that you will agree to take part in the survey, I have a research assistant, Sheridan Smith, who will phone you sometime within the next two weeks.

I would be very grateful for your help.

Yours sincerely

Mairi Jay

Ph.D. Thesis Research Statement  
Cultural Ecology of Waikato's Dairy Industry  
By Mairi Jay  
January, 2001



*The aim of this research is to compare the farm situation and land management of farmers who have trees or remnant forest or scrub on their property with those who don't. The research involves a random survey of dairy farmers in Waikato and the King Country, and a comparison of their type of farm and land management priorities.*

*The survey involves a telephone interview, from 20 to 30 minutes long. Participants in the survey have the right to receive a summary of the results should they wish.*

1. The title of this research project is "Cultural Ecology of the Waikato Dairy Industry".
2. The researcher is Mairi Jay, a Ph.D candidate of the Department of Geography, University of Waikato, Telephone: 07-856-2889 x 8834; Fax: 07-838-4633. Her supervisor is Professor Richard Bedford, Division of Cultural and Environmental Studies, University of Waikato, Telephone: 856-2889 x 8690.
3. Except as you expressly agree, your identity and the identity of your farm will be strictly confidential; except as you allow, it will not be possible to tie information from the study of your farm back to your farm.
4. You have the right to withdraw from the research at any time, and to decline to answer any questions that you may be asked.

# **Appendix 3**

## **Copy of questionnaire for random survey**

**FARM QUESTIONNAIRE****Respondent Number:****Contact Ph. No:****Respondent's Name:** \_\_\_\_\_**Address:****Time and Date of Interview:****Electorate:**

**Comments about the Interview** (TO BE FILLED IN IF THE INTERVIEWER HAS ANY COMMENTS, OR WANTS TO SUMMARISE AN OVERALL IMPRESSION OF THE INTERVIEW OR THE RESPONDENT)

**Wants/does not want copy of results****Is willing/not willing to be contacted again**

INTERVIEWER TO FILL THESE TWO AFTER THE END OF THE INTERVIEW FROM THE ANSWERS TO LAST 2 QUESTIONS

---

INTERVIEWER TO START WITH A WELCOME. READ SLOWLY AND CLEARLY:

Good morning/afternoon/evening. You would have received a letter a few days ago from Mairi Jay at the University of Waikato, asking if you would agree to take part in a research project on dairy farmers. The aim of the research is to compare farmers who have remnant forest or scrub on their property with those who don't. Would you be prepared to take part? (PAUSE AND GIVE RESPONDENT TIME TO ANSWER). Would now be a convenient time for you? (IF YES, PROCEED WITH INTERVIEW, IF NOT, ARRANGE A TIME TO PHONE AGAIN.)

**Is your farm a dairy farm?**

IF NO, THANK THE RESPONDENT AND COMPLETE THE INTERVIEW. IF YES, ASK IF YOU MAY PROCEED WITH THE INTERVIEW QUESTIONS.

=====

**PART A**

INTERVIEWER TO START BY GIVING THE RESPONDENT SOME BACKGROUND INFORMATION ABOUT THE STUDY, TO GIVE THEM AN ORIENTATION. INTERVIEWER TO CIRCLE THE NUMBER OF THE MOST RELEVANT ANSWER, OR JOT DOWN NOTES IF THE STANDARD ANSWERS DO NOT APPLY.

**"I would like to start by asking you some basic questions about your farm and about how long you have been on the farm and your plans for the farm.**

**My first question is:-**

1. Is dairying the only type of farming on this farm?

INTERVIEWER TO CIRCLE THE APPROPRIATE **Code**

Yes 1

No 0

IF NO, ASK WHAT OTHER TYPES OF FARMING OCCUR ON THE FARM.

dairy + dry stock 2

dairy + cropping or horticulture 3

dairy + some other 4

Not stated/missing 98

2. Is dairying the main source of income for the farm?

**Code:**

Yes 1

No 2

Not stated/missing 98

If no, what other sources of income (please describe)

- 3 As far as you know, how long has this been a dairy farm? \_\_\_\_\_

**Code:**

less than 10 years 1

10 years to less than 20 years 2

20 years to 50 years 3

more than 50 years 4

variable 5

NOTE: THE FARM MAY HAVE MOVED IN AND OUT OF DAIRYING (FROM DAIRYING, TO DRYSTOCK AND BACK TO DAIRYING). IF THIS IS THE CASE, CIRCLE THE VARIABLE AND PUT THE TOTAL NUMBER OF YEARS AS A DAIRYFARM IF THIS IS KNOWN.

4. Considering the contour of your farm, which of the following statements best describes your farm?

**Code**

Mostly flat on silt, sand, clay or loamy soils 1

Mostly peat 2

Mostly rolling 3

Mostly flat or rolling with some steep bits 4

Other eg gully (please describe) 5

5. Does your farm contain any stands of native trees, bush or scrub?

**Code**

Yes	1	
No	2	

If yes, could you please describe

NOTE: IF THE FARMER ANSWER'S 'YES' ASK THE FARMER TO BRIEFLY DESCRIBE AND THEN SAY, **“Thankyou, later in the questionnaire I would like to ask you more about your remnant forest or trees, but for the moment, I would like to continue asking general questions about the farm and your farming philosophy.** IF THE FARMER ANSWERS 'NO' CONTINUE WITH THE QUESTIONNAIRE BUT OMIT PART B WHICH IS ALL ABOUT THE TREES, BUSH OR SCRUB.

6. What is the total area of the farm ? \_\_\_\_\_ (WRITE DOWN EXACT AREA IN ACRES OR HECTARES, WHATEVER THE FARMER STATES AND CIRCLE APPROPRIATE CODE )

Less than 60ha (<148 acres)	1
61 to 100ha (149 – 247acres)	2
101ha to 160ha (248 – 395 acres)	3
> 160ha (> 395acres)	4
Don't know/can't remember	97

7. What is the effective milking area of the farm, **not including your farm buildings?** \_\_\_\_\_ (INTERVIEWER TO WRITE DOWN EXACT AREA IN ACRES OR HECTARES, WHATEVER THE FARMER STATES, AND CIRCLE THE APPROPRIATE CODE NUMBER).

60ha or less (<148 acres)	1
61 to 100ha (149 to 247 acres)	2
101ha to 160ha (248 – 395 acres)	3
>160ha (> 395 acres)	4

8. How many cows did you milk on the farm last season?

\_\_\_\_\_

Up to 149 cows	1
150 to 199 cows	2
200 to 249 cows	3
250 to 299 cows	4
> 300 cows	5

9. What was your production of milksolids from the farm last season?

Farm Total \_\_\_\_\_

Approximately, what would that be as Kgs per hectare? \_\_\_\_\_

INTERVIEWER NOT TO PUSH THIS QUESTION IF YOU SENSE THE FARMER IS STRUGGLING TO FIGURE IT OUT. I HAVE PUT THE QUESTION IN FOR BACK-UP CONFIRMATION.

9a	Production per cow is close to the regional average	1
	Production per cow is above regional average	2
	Production per cow is below regional average	3

9b	Production per hectare is close to the regional average	1
	Production per ha is above regional av.	2
	Production per ha is below regional av.	3

**Interviewer to code answer in accord with the following standards: S.Ak av / cow is 253kgs.ms/cow; S.Ak av per hectare is 715kg/ms/h; King C. av./cow is 252kgs.ms/co; King C. av/ha is 595kg/ms/ha)**

10 Moving to some questions about your experience with this farm, can you tell me, were you born on this farm? **Code**

Yes 1

No 0

If not, how long have you lived on the farm?

Less than 5 years	2
5 to 10 years	3
10 to 20 years	4
More than 20 years	5

Can't remember 97

11. Are you the owner of the farm?

**Code**

If yes,

Do you manage the farm?

Yes, is the owner and manager

Yes, is owner but not manager

**Code**

1

2

← Yes

If not owner, are you

A sharemilker

A herd manager

Other

**Code**

3

4

5

← No

12. And how long have you been managing it? \_\_\_\_\_ (WRITE  
DOWN NUMBER OF YEARS)

**Code**

< than 5 years 1

between 5 and 10 years 2

between 10 and 20 years 3

more than 20 years 4

Not applicable 6

13. Would you say the level of debt on this farm is

**Code:**

High 1

Medium 2

Low 3

Don't know 97

14. Now, to give me some idea about your future plans for the farm, I would like to know how long you expect to be on this farm. Would it be:

**Code**

Less than 5 years 1

for the foreseeable future 2

until you die or retire 3

to move to a bigger farm 4

**Moving on to some land management questions, I would like to ask you about farm developments that you may have done. Since coming onto the farm, have you done any of the following :**

- 15 Planted trees for non-commercial or amenity purposes** **Code**
- If yes, please explain why (JUST A GENERAL ANSWER WANTED)
- No 1
- Yes, aesthetic reasons 2
- Yes, for stock shade or shelter 3
- Aesthetic and stock reasons 4
- Yes, other reasons/reasons not stated 5
- 16 Planted trees for commercial timber purposes** **Code**
- Yes 1
- No 2
- 17 Planted hedges or shelter belts** **Code**
- If yes, please explain why (JUST A GENERAL ANSWER WANTED)
- No 1
- Yes, for aesthetic/env'l reasons 2
- Yes, for stock shade or shelter 3
- Yes, combination of reasons 4
- Yes, other reasons/reasons not stated 6
- Don't know/can't remember 97
- 18 Removed Hedges or shelter belts** **Code**
- If yes, please explain why (JUST A GENERAL ANSWER WANTED)
- No 1
- Yes, old hedge 2
- Yes, to create more pasture 3
- Yes, stock management 4
- Combination of reasons 5
- Don't know/can't remember 97
- 19 Fenced drains or streams** **Code**
- If yes, please explain why (JUST A GENERAL ANSWER WANTED)
- No 1
- Yes, to stop stock falling in 2
- Yes, to stop stock from eroding banks 3
- Yes, to keep the drains clear 4

---

Yes, for a combination of reasons 5

Other reasons 6

20. If your farm does not have any remnant forest or scrub, would you have liked it when you took over the property?

**Code**

Yes 1

No 2

Neither way/doesn't matter 32

Not applicable (if there is bush on the farm) 96

If yes, why?

If No, why?

**21 Now, to change the subject slightly, I would like to ask some questions about your farming priorities. Would you strongly agree, agree, disagree, strongly disagree, or are undecided about any of the following statements? INTERVIEWER TO READ THESE SLOWLY AND FOR EACH OPTION READ OUT "STRONGLY AGREE, AGREE . . . ETC.)**

	<b>Code:</b>	SA	A	U	D	SD
21a	Farming is about getting as much production of milksolids as possible.	1	2	3	4	5
21b	Personal satisfaction or enjoyment is more important than profitability for success in farming	1	2	3	4	5
21c	My goal is to reduce my workload and improve my quality of life.	1	2	3	4	5
21d	You can't get by without using some urea on the paddocks these days	1	2	3	4	5
21e	Shade trees and shelter belts are more of a nuisance than a benefit for stock production.	1	2	3	4	5
21f	Planning and financial management are the most significant parts of running a farm.	1	2	3	4	5
21g	I would like to conserve the land I farm, but the economics don't allow it.	1	2	3	4	5
21h	Profit is more important than production for success in farming.	1	2	3	4	5
21i	A lot of people put too much emphasis on the business side of farming; it's a lifestyle as much as a business.	1	2	3	4	5

22. For the way they influence your present farm management, please rank the following in their order of importance (from 1, most important to 5 least important). INTERVIEWER TO READ THE ENTIRE LIST AND THEN ASK AGAIN WHICH IS MOST AND WHICH IS LEAST IMPORTANT. RESPONDENT MAY NEED INTERVIEWER TO READ THE LIST SEVERAL TIMES.

Rank: 1= most important; 5 = least important

- 22a Production of milksolids
- 22b Profit
- 22c Enjoyment or satisfaction
- 22d Caring for the stock
- 22e Caring for the land

**Part B (Use a different colour of paper from Part A or C)**

THIS SECTION IS ONLY TO BE ASKED OF FARMERS WHO HAVE INDICATED IN Q 4 THAT THEY HAVE NATIVE TREES, BUSH OR SCRUB ON THEIR FARM.

Now the next few questions are all about the native trees, bush or scrub on your farm, and how they fit with the rest of your farm management. The first question is -

23. What is the approximate total area of native trees, bush or scrub? \_\_\_\_\_  
INTERVIEWER TO RECORD WHETHER ACRES OR HECTARES.

**Code:**

Under 5ac. (2ha)	1
Between 5 and under 10ac (4.05ha)	2
Between 10 and under 20ac (4.05 – 8.1ha)	3
0 acres or more	4
Can't say/don't know	97

24. Talking about the contour of the area of native trees, bush or scrub, is it: **Code:**

Mostly flat or gently rolling	1
mostly steep	2
mostly boggy or swampy	3
other e.g. riparian strip, gully (explain)	4

25. Is the stand of trees, bush or scrub on land that could be used for production?

**Code:**

Yes/Yes in part	1
No	2

26. Do stock have access to the bush?

**Code:**

Yes	1
No	2

27. If yes, are there reasons you have not stopped stock access to the bush?

**Code:**

Yes	1
No	2

If yes, go to next Question

28. If yes, could you please explain what those reasons were. **To be coded later**  
(INTERVIEWER PLEASE NOTE KEY REASONS)


29	Does the bush provide for any of the following purposes?	<b>Code:</b>	
	29a Stock shade or shelter		Yes 1 No 2
	29b Windbreak		Yes 1 No 2
	29c Source of farm timber or firewood		Yes 1 No 2
	29d Improve your property values		Yes 1 No 2 Don't know 3
	29e Protection (of soil or water)		Yes 1 No 2
	29f Wildlife habitat		Yes 1 No 2
	29g Recreation or enjoyment		No 1 Yes 2
	29h Does it harbour problem weeds		No 1 Yes 2
	29i Does it harbour animal or bird pests		Yes 1 No 2
	If yes, explain (INTERVIEWER TO NOTE BRIEFLY WHAT THESE ARE)		

30.	In your time on this farm, have you cleared any remnant forest from the farm?	<b>Code:</b>	
			Yes 1

---

If yes, can you explain what your reasons were at the time?      If no, can you please explain why you didn't?

No      2

**Code:**

Mind a lot,      1  
Mind somewhat      2  
Not mind      3

**Part C (On same colour of paper as Part A)**

INTERVIEWER TO START WITH AN EXPLANATION OF WHY THIS SECTION IS IMPORTANT FOR THE SURVEY:

**Personal characteristics such as age, education, life experience, and family background often influence our values about what is important in life, and the decisions we make about how to do things. It would help me to understand some of your answers to the questionnaire if you could give me some background information about yourself.**

32. How long have you been dairy farming? \_\_\_\_\_ **Code:**
- |                         |   |
|-------------------------|---|
| < than 5 years          | 1 |
| between 5 and 10 years  | 2 |
| between 10 and 20 years | 3 |
| over 20 years           | 4 |

33. Have you always been a dairy farmer? **Code:**
- |     |   |
|-----|---|
| Yes | 1 |
| No  | 2 |

If no, what did you do before you became a dairy farmer?

(INTERVIEWER TO DESCRIBE)

34. Have you worked overseas? **Code:**
- |     |   |
|-----|---|
| Yes | 1 |
| No  | 2 |

35. If yes, would your experience overseas or before you became a dairy farmer influence the way you farm? (INTERVIEW TO ASK ONLY IF ANSWER TO Q34 OR Q35 MAKE THIS RELEVANT)

No/Not significantly 1

Yes 2

If yes, please explain

(INTERVIEWER TO NOTE EXPLANATION)

36. Education and life experience also seem to be a factor in the way that dairy farmers manage their land. I would be interested to know something about your education and life experience. Would you be willing to tell me what is your highest level of formal education. Would it be:

	<b>Code:</b>
Form 4 Secondary School	1
Form 5, 6 or 7 Secondary School	2
Polytech diploma or trade certificate	3
University	4
Other (Please explain)	5

37 Do you attend LIC discussion groups

**Code:**

Yes	1
No	2

38 If yes, would you say you attend

**Code:**

less than 4 times year	1
4 to 8 times a year	2
more than 8 times a year	3

39. Age is often a factor in how people farm because it reflects their stage of life. Within a 10year category, would you mind telling me how old you are? \_\_\_\_\_

(INTERVIEWER TO NOTE AND CODE APPROPRIATELY).

**Code:**

Under to 34	1
35 to 44	2
45 to 54	3
55 to 64	4
65 or over	5

40. Is the respondent-

**Code:**

Male	1
Female	2

My last two questions are coming up:

---

41 Would you like to receive a copy of the results of this survey when they are completed?

Yes 1

No 2

42 Would you be willing for me to phone you again in case there are any points of clarification?

Yes 1

No 2

**Finally, Would you have any comments you would like to offer in response to this questionnaire survey? (INTERVIEWER TO NOTE)**

**Thankyou very much for your time. Your answers will help research into the factors which influence farmers to keep bush and plant trees on their property and which help to encourage sustainable farming practices.**

# **Appendix 4**

## **Summary of results from questionnaire survey**

The following tables are based on an analysis of the questionnaire survey data using *SPSS Standard Version, Release 11.0.0.* (19<sup>th</sup> September 2001). They provide frequency and percentage summaries and comparison of farms (farmers) with bush and farms (farmers) without bush using chi square statistics. For chi square analysis a minimum number of 5 is required for each category of response in order to allow an estimate of significance. Low numbers for some categories of response meant that not all questions could usefully be analysed for comparative purposes. For some questions, data could be lumped together without distorting the meaning of the responses (e.g. as when 'agree' and 'agree strongly' were lumped into the single category 'agree'). In most cases, only questions that provided enough data to allow useful statistical comparisons have been included.

The chi-square statistic indicates the likelihood that the differences noted between farms with bush and those without are significant and are not due to chance variations between observations in a sample. The statistic is based on the assumption that there is **no** difference in the way that two the sample groups (e.g. farms with bush and those without) relate to a variable of interest (e.g. topography). Significance is shown by the 'p'<sup>1</sup> value, identified as 'Asymp.Sig.' in the SPSS tables. The closer the 'Asymp.Sig' or 'p' value to zero, the greater the chance of a significant difference between the 2 samples in the variables of interest. A value of 'Asymp.Sig' greater than .05 indicates no significant difference, while a value less than .05 suggests that there is almost certainly a significant difference in the variables of interest.

Table 1 - Q.3. How long has this been a dairy farm?

Age as a dairy farm	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 20years	5	9	7	10	12
20 to 50 years	19	34	14	20	33
More than 50years	32	57	51	70	83
Total	56	100	72	100	128
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	3.14	2	.21		

<sup>1</sup> 'p' is statistical shorthand for the proportion of area under a normal bell curve.

Table 2 – Q. 4. Considering the contour of your farm, which of the following statements best describes your farm?

Contour of Farm	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Mostly flat	24	43	45	62	69
Mostly rolling	10	18	12	16	22
Flat or rollg+steep	22	39	16	22	38
Total farms	56	100	73	100	129

#### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.37	2	0.07

a - 3 cells (30.0%) have expected count less than 5. The minimum expected count is .87.

Table 3 – Q. 6. What is the total area of the farm?

Farm size by area	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 60ha	10	18	17	23	27
61 to 100ha	12	21	13	18	25
101 to 160ha	11	20	14	19	25
161ha and over	10	18	17	23	27
Missing information	13	23	12	16	25
Total farms	56	100	73	99	129

#### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.86	4	0.76

Table 4 – Q. 8 How many cows did you milk on the farm last season?

Farm size by number of cows	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 149 cows	10	18	12	16	22
150 to 199 cows	18	32	23	32	41
200 to 249 cows	9	16	9	12	18
250 to 299 cows	8	14	11	15	19
More than 300 cows	11	20	18	25	29
Total farms	56	100	73	100	129

#### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	0.73	4	.95

Table 5 – Stock density derived from the ratio of the number of cows to the area of the farm.

Farms by stock density	Farm has bush		Farm has no bush		TT Total
	Number	Percent of category	Number	Percent of category	
Under 2.7 cows/ha	15	27	15	21	30
2.7 to 2.9 cows/ha	11	20	13	18	24
More than 2.9 cows/ha	30	54	44	61	74
Total farms	56	101	72	100	128
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	.83	2	0.66		

Table 6 – Q.9 What was your production of milksolids from the farm last season (per cow)?

Milksolids production per cow	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Average production per cow	20	36	26	36	46
Above average production per cow	31	55	36	49	67
Below average production per cow	5	9	11	15	16
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1.19	2	.55		

Table 7 – Q9 What was your production of milksolids from the farm last year (per hectare)

Milksolids production per ha	Farm has bush		Farm has no bush	
	Number	Percent of category	Number	Percent
Above average production per ha	39	70	52	
Average or below average production per ha and don't know	17	30	21	
Total	56	100	73	
<b>Chi-Square Tests</b>				
	Value	df	Asymp. Sig.	
Pearson Chi-Square	.04	1	.8	
Continuity correction	.000	1	.9	
Likelihood Ratio	.04	1	.8	

Table 8 – Q 10 Can you tell me, were you born on this farm? If not, how long have you lived on the farm?

Time of farmer on farm	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 5 years	16	29	26	36	42
5 to 10 years	17	30	13	18	30
10 to 20 years	9	16	15	21	24
Born on farm or more than 20 years	14	25	19	26	33
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	2.98	3	.39		

Table 9 – Q. 11. Are you the owner of the farm?

Owner/manager status	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Owns	45	80	56	78	101
Sharemilker/herd manager	11	20	17	23	28
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	0.25	1	0.62		
Continuity Correction	0.08	1	0.78		

Table 10 – Q 12. And how long have you been managing it?

Years managing the farm	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 5 years	14	25	23	32	37
5 to less than 10 years	24	43	24	33	48
10 to 20 years	10	18	16	22	26
Over 20 years	8	14	10	14	18
Total	56	100	73	101	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1.58	3	0.66		

Table 11 – Q 14 Now, to give me some idea about your future plans for the farm, I would like to know how long you expect to be on this farm. Would it be:

Future plans on the farm	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Expect to live less than 5 years	16	29	23	32	39
Expect to live for foreseeable future	20	36	29	40	49
Expect to live until retirement	13	23	15	21	28
Don't know, or 'until we move to bigger farm'	7	12	6	8	7
<b>Total</b>	<b>56</b>	<b>100</b>	<b>73</b>	<b>101</b>	<b>123</b>
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	0.90	3	0.82		

Table 12 – Q. 15 Have you planted trees for non-commercial or amenity purposes?

Non-commercial tree planting	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
No	19	34	26	36	45
Yes	37	66	47	64	84
<b>Total</b>	<b>56</b>	<b>100</b>	<b>73</b>	<b>100</b>	<b>129</b>
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	0.04	1	0.84		
Continuity Correction	0.00	1	0.99		

Table 13 – Q. 16 Have you planted trees for commercial timber purposes?

Have you planted trees for timber	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Yes	12	21	11	15	23
No	44	79	62	85	106
<b>Total</b>	<b>56</b>	<b>100</b>	<b>73</b>	<b>100</b>	<b>129</b>
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	0.87	1	0.35		
Continuity Correction	0.49	1	0.48		

Table 14 – Q. 17 Have you planted hedges or shelter belts?

Have you planted hedges or shelter belts?	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Yes	36	64	55	75	91
No	20	36	18	25	38
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1.86	1	.17		
Continuity Correction	1.37	1	.24		

Table 15 – Q. 18 Have you removed Hedges or shelter belts?

Removal of hedges or shelter belts	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
No removal	27	57	36	59	63
Some removal	20	43	25	41	45
Total	47	100	61	100	108
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	0	1	1		
Continuity Correction	0	1	1		

Table 16 – Q. 19 Have you fenced drains or streams

Fenced drains or streams	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
No	27	49	26	40	53
Yes	28	51	39	60	44
Total	55	100	65	100	120
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1	1	.32		
Continuity Correction	.67	1	.415		

Table 17 – Q. 20. If your farm does not have any remnant forest or scrub, would you have liked it when you took over the property?

**If no bush, would you have liked it?**

	Number	Percent
Yes	41	32
No	14	11
Don't care one way or other	16	12
Total	71	55

Tables 18 - 26 – Q 21 Would you **strongly agree, agree, disagree, strongly disagree, or are undecided** about any of the following statements?

Table 18: 21a Farming is about getting as much production of milksolids as possible.

**Production: 2 Categories - Agree/other**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	38	68	54	74	92
Disagree/can't say/missing	18	32	19	26	37
Total	56	100	73	100	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.58	1	.45
Continuity Correction	.32	1	.57
a	Computed only for a 2x2 table		

Table 19: 21b Personal satisfaction or enjoyment is more important than profitability for success in farming

**Enjoyment: 3 categories: agree/disagree/don't know or missing answer**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	34	61	41	56	75
Disagree	15	27	21	29	36
Can't say/missing	7	13	11	15	18
Total	56	101	73	100	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.307	2	.86
Likelihood Ratio	.31	2	.86

Table 20: 21c My goal is to reduce my workload and improve my quality of life.

**Workload - 2 categories**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	45	80	58	80	103
Disagree/can't say/missing	11	20	15	21	26
Total	56	100	73	101	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.02	1	.9
Continuity Correction	.00	1	1.0
Likelihood Ratio	.02	1	.9

Table 21: 21d You can't get by without using some urea on the paddocks these days

**Urea - 2 categories**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	43	77	52	71	95
Disagree/can't say/missing	13	23	21	29	34
Total	56	100	73	100	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.50	1	.48
Continuity Correction	.26	1	.61

Table 22: 21e Shade trees and shelter belts are more of a nuisance than a benefit for stock production.

**Shade and shelter - 2 categories: agree and other**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	6	11	5	7	11
Disagree/can't say/missing	50	89	68	93	118
Total	56	100	73	100	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.61	1	.44
Continuity Correction	.21	1	.64

Table 23: 21f Planning and financial management are the most significant parts of running a farm.

**Planning and Finance: 3 categories - agree/disagree/don't know, or missing**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	38	68	54	74	92
Disagree	10	18	10	14	20
Can't say or missing	8	14	9	12	17
Total	56	100	73	100	129

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.61	2	.74

Table 24: 21g I would like to conserve the land I farm, but the economics don't allow it.

**Conserv-3 categories**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	18	32	31	43	49
Disagree	23	41	29	40	52
Can't say/missing	15	27	13	18	28
Total	56	100	73	101	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	2.1	2	.35		

Table 25: 21h Profit is more important than production for success in farming.

**Profit - 3 categories**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	42	75	46	63	88
Disagree	5	9	13	18	18
Can't say/missing	9	16	14	19	23
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	2.6	2	.27		

Table 26: 21i A lot of people put too much emphasis on the business side of farming; it's a lifestyle as much as a business.

**Lifestyle - 3 categories**

	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Agree	37	66	48	66	85
Disagree	9	16	15	21	24
Can't say/missing	10	18	10	14	20
Total	56	100	73	101	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	.695	2	.71		

Table 27 – Q 22. Comparison of cumulative priority ratings of Profit, Care of Stock, Enjoyment/Satisfaction, and Care of the Land by category of farmers

Management priorities	Priority value	Farm has bush		Farm has no bush	
		No. of farmers	Priority score	No. of farmers	Priority score
<b>Profit</b>					
Most important	5	21	105	29	145
Important	4	5	20	7	35
Somewhat important	3	3	9	5	15
Less important	2	10	20	7	14
Least important	1	2	2	7	7
Can't say	0	5	0	8	0
<b>Total</b>		<b>46</b>	<b>156</b>	<b>63</b>	<b>216</b>
<b>Average priority rank</b>			<b>3.39</b>		<b>3.43</b>
<b>Care of stock</b>					
Most important	5	7	35	17	85
Important	4	13	52	14	56
Somewhat important	3	14	42	12	36
Less important	2	5	10	6	12
Least important	1	0	0	2	2
Can't say	0	7	139	11	0
<b>Total</b>		<b>46</b>	<b>139</b>	<b>62</b>	<b>191</b>
<b>Average priority rank</b>			<b>3.02</b>		<b>3.08</b>
<b>Enjoyment/satisfaction</b>					
Most important	5	8	40	11	55
Important	4	9	36	11	44
Somewhat important	3	7	21	13	39
Less important	2	5	10	12	24
Least important	1	8	8	7	7
Can't say	0	7	0	10	0
<b>Total</b>		<b>44</b>	<b>115</b>	<b>64</b>	<b>169</b>
<b>Average priority rank</b>			<b>2.61</b>		<b>2.64</b>
<b>Care of the land</b>					
Most important	5	4	20	12	60
Important	4	6	24	6	24
Somewhat important	3	8	24	4	12
Less important	2	12	24	15	30
Least important	1	9	9	13	13
Can't say	0	7	0	11	0
<b>Total</b>		<b>46</b>	<b>101</b>	<b>61</b>	<b>139</b>
<b>Average priority rank</b>			<b>2.196</b>		<b>2.279</b>
<b>Production</b>					
Most important	5	5	25	6	30
Important	4	4	16	10	40
Somewhat important	3	4	12	9	27
Less important	2	5	10	7	14
Least important	1	22	22	19	19
Can't say	0	6	0	10	0
<b>Total</b>		<b>46</b>	<b>85</b>	<b>61</b>	<b>130</b>
<b>Average priority rank</b>			<b>1.8</b>		<b>2.1</b>

'Priority value' measures the ratings 'most important' to 'least important', 5 being ascribed to 'most important', '1' being ascribed to 'least important' and '0' ascribed to 'can't say', 'they're all important' or no answer. The priority score was obtained by multiplying the priority value by the number of respondents in each category (bush-no bush) who rated each goal. Thus the priority score of 105 in the category of 'Farmers with bush' for the goal 'Profit' was obtained by multiplying the number of respondents who gave this as their most important value by the priority value '5'. The average priority rank of 3.39 in the 'Farmers with bush' category was obtained by subdividing the total score for 'Profit' by the number of farmers who answered the question (46).

A number of farmers insisted that they could not give a priority rating because in their view, some or all of the goals were of equal importance. These farmers strongly resisted efforts by the interviewer to make them identify a priority ranking. The resistance reflects a reality of farm management that for many farmers it is indeed a dynamic exercise of seeking an ever-shifting balance between one or another of the elements. For most farmers, the importance of each of the elements shifts both on a short-term basis over the year (in accord with the season) and over their own life-cycle (with age, experience, family commitments).

**Part B** THIS SECTION WAS ANSWERED ONLY BY FARMERS WHO INDICATED IN QUESTION 4 THAT THEY HAVE NATIVE TREES, BUSH OR SCRUB ON THEIR FARM.

Table 28 – Q. 23      What is the approximate total area of native trees, bush or scrub?

Area of native forest remnant	Number	Percent
Less than 2ha	33	59
From 2 to 4ha	9	16
From 4 to 8ha	6	11
More than 8ha	7	13
Don'tknow	1	2
Total	56	100

Table 29 – Q. 24      Talking about the contour of the area of native trees, bush or scrub, is it:

Average contour of bush remnant	Number	Percent
Mostly flat/gently rolling	18	32
Mostly steep	21	38
Other (riparian, swampy, gully)	16	29
Total	55	99

Table 30 – Q. 25. Is the stand of trees, bush or scrub on land that could be used for production?

<b>Productive potential of bush remnant</b>	<b>Number</b>	<b>Percent</b>
Bush has production potential	30	54
Bush does not have production potential	26	46
Total	56	100

Table 31 – Comparison of the bush remnants by area and potential for production

<b>Area of remnant</b>	<b>Bush has production potential</b>		<b>Bush has no production potential</b>	
	Number	Percent	Number	Percent
Less than 2ha	18	60	15	58
2-4ha	3	10	6	23
4-8ha	4	13	2	8
More than 8ha	4	13	3	12
Don't know	1	3		
Total	30	99	26	101

Table 32 – Q. 26. Do stock have access to the bush?

<b>Stock access to bush remnant</b>	<b>Number</b>	<b>Percent</b>
Stock have access in part or in total	29	54
Stock have no access	25	46
	54	100

Table 33 – Q. 29. Does the bush provide for any of the following purposes?

<b>Uses of Bush Remnant</b>	<b>Yes</b>		<b>No</b>		<b>Don't know</b>		<b>Total</b>
	Number	Percent	Number	Percent	Number	Percent	
Gives stock shade/shelter	43	77	13	23			56
Provides a windbreak	31	55	25	45			56
Provides timber	4	7	51	91			55
Improves property values	23	41	20	36	13	23	56
Protects soil or water	23	41	32	57			55
Provides wildlife habitat	20	36	35	63			55
Provides recreation	14	26	40	74			54
Harbours weeds	5	10	47	90			52
Harbour pests	12	24	38	76			50

Table 34 – Q. 31 If the stand of native trees, bush or scrub were cut down by your successor to the farm would you

<b>Farmer attachment to bush remnant</b>	<b>Number</b>	<b>Percent</b>
Would mind a lot if bush cut down	27	48
Would mind somewhat if bush cut down	19	34
Would not mind if bush cut down	10	18
Total	56	100

**Part C THESE QUESTIONS WERE ANSWERED BY ALL QUESTIONNAIRE RESPONDENTS**

Table 35 – Q. 32. How long have you been dairy farming x bush/no bush

Length of time as a farmer	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 10 years	6	11	9	12	15
10 to 20 years	13	23	18	25	31
More than 20 years	37	66	46	63	83
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	.21	2	.98		
Likelihood Ratio	.21	2	.975		

Table 36 – Q. 34 Overseas work experience x bush/no bush

Overseas work experience	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Has worked overseas	13	23	18	25	31
Has not worked overseas	43	77	55	75	98
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1.33	1	.51		

Table 37 – Q. 36. Highest level of formal education x bush/no bush:

Highest formal education	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Form 4 high school	8	14	7	10	15
Forms 5,6 and 7 high school	27	48	39	55	66
Diploma, trade or other	13	23	15	21	28
University	8	14	10	14	18
Total	56	99	71	100	127
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	1.76	3	.78		
Likelihood Ratio	2.13	3	.71		

Table 38 – Q. 37 Attendance at farm discussion groups x bush/no bush

Discussion group attendance	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Attends discussion groups	39	70	48	66	87
Does not attend discussion groups	17	30	25	34	42
Total	56	100	73	100	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	.22	1	.64		
Continuity Correction	.08	1	.78		

Table 39 – Q. 38 Frequency of attendance at farm discussion groups x bush/no bush

Frequency of attendance	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Less than 4 times a year	10	26	21	45	31
4 to 8 times a year	20	53	20	43	40
More than 8 times a year	8	21	6	13	14
Total	38	100	47	101	85
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	3.27	2	.195		
Likelihood Ratio	3.32	2	.190		

Table 40 – Q. 39 Age category of farmer x bush/no bush

Age category of farmer	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Under 35 years old	6	11	9	12	15
35 to 44 years old	23	41	30	41	53
45 to 54 years old	22	39	22	30	44
55 to 64 years old	3	5	12	16	15
65 years and older	2	4	0	0	2
Total	56	100	73	99	129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	6.80	4	.147		
Likelihood Ratio	7.84	4	.098		

Table 41 – Q. 40. Sex of the respondent x bush/no bush

Gender of farmer	Farm has bush		Farm has no bush		Total
	Number	Percent of category	Number	Percent of category	
Male	44	79	57	78	101
Female	12	21	16	22	28
Total	56	Count	73		129
<b>Chi-Square Tests</b>					
	Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square	.004	1	.97		
Continuity Correction	.000	1	1.00		

# **Appendix 5**

**Content analysis of sample of  
articles from *New Zealand Dairy  
Exporter***

## DESCRIPTION AND CODING OF ARTICLES

Variable theme	Table code	Code terms	
		SPSS Code	Code description
Environment	E=0	e1	Article makes no mention of environment
	E=+	e2	Environment is valued for itself
	E=P+	e3	Environment is an aid to production
	E=prblm	e4	Environment is a problem
	E=struggl	e5	Environment is a cause of struggle
	E=care	e6	Environment needs care
	E=mgmt	e7	Environmental limits can be overcome by management
Farm Management and Business (farm is focus of article)	F=0	f1	Article makes no mention of farm management or business
	F=B	f2	Farming is a business
	F=mgmt	f3	Article describes farm management
	F=xprt adv	f4	Article reports expert advice on aspects of farm management
Human Aspects Of farming	H=0	h1	No mention of human aspects
	H=edu	h2	Article mentions education, training, learning
	H=welf	h3	Article mentions health, welfare, employment work conditions.
	H=story	h4	Article gives a personal story about individuals or a couple.
Industry	Ind=0	I=0	Article makes no mention of industry aspects
	Ind=info	I=2	Information about marketing, manufacturing, organisation, or governance of dairy industry.
Miscellaneous	News	m	News items of general industry interest.
	Stock	m1	Livestock are main focus of article
	Science	m2	Report on scientific research, info, or viewpoint by scientists
	Tech	m3	Technology mentioned as a significant element
Production as it relates to the farm not the industry as a whole	GM	m4	Genetic modification is a main topic
	P=0	p1	Article makes no mention of production
	P=+	p2	Production portrayed as a positive objective
	P=prblm	p3	Production is portrayed as a problem
	P=strggl	p4	Production portrayed as hard work
	P=success	p5	Production portrayed as source of success
	P=mgmt	p6	Production framed as a management issue
	Pr=+	p7	Profit is explicit as key objective
P=prdcvty	p8	Productivity is explicit as a key objective <sup>2</sup>	

<sup>2</sup> **Prdcvty** – is a term frequently used by those in the dairy industry to mean efficiency of production in terms of output costs, and reflects an explicit goal by many sectors of the dairy industry, such as Fonterra, and Dexcel, and many prominent academics and researchers (from Lincoln, Massey, AgResearch, and the like). It is a more refined notion of production which seeks to improve the value of dairy outputs relative to inputs (such as time, labour, material resources, environmental impacts, and the like).

Article ID	Title of article	Description, key words and phrases	Code
<b>1</b> 74(8): 6 Feb '99	Coping with climate extremes on St Peter's School dairy farm	Personal story about a farm family's production challenges; farm management policies; climate described as a block to production; clover root weevil serious damage 'with an impact on milksolids production'.	E=-prblm; E=mgmt; F=mgmt; H=story; I=0; P=+;
<b>2</b> 74(8): 34 Feb '99	Advice helps brothers make decisions on business basis	Personal story about the diversified enterprise of a family of two brothers and parents, using professional financial advice to make sound business decisions.	E=0; F=Bus; F=mgmt; H=story; I=0; P=mgmt
<b>3</b> 74(8): 64 Feb '99	Biotechnology brings new era in agriculture	Report of industry leader, Dr Paul Donnelly, from Australia on the value of genetic engineering and genetic modification	E=0; F=0; GM; H=0 News; P=+; Science.
<b>4</b> 74(8): 66 Feb '99	Focus must be on world best practice	Address by Dr Warren Parker, GM AgResearch, about necessity for new biotechnologies for plants and animals, to create new opportunities and maintain comparative advantage. "Milksolids per day is a key factor of the business"	E=0; F=0; H=0; News; P=+; Science.
<b>5</b> 74(8): 72 Feb '99	Rivals woo southern belle	Speculative article about restructuring of the dairy industry, with the prospective merger of South Island Dairy Co-op with either Kiwi or NZDG	E=0; F=0; H=0; I=Info (restructuring); P=0.
<b>6</b> 74(8): 73 Feb '99	Eurobond issue for <i>Kiwi</i>	About financial arrangements of Kiwi Co-op Dairies	E=0; F=0; H=0; I=Info; P=0
<b>7</b> 74(8): 76 Feb '99	Partnership property rights asset to NZ rural women	Results of an academic paper on women's property rights, comparing NZ with Asian countries	E=0; F=0; H=welf; I=0; P=0
<b>8</b> 75(5):12 Nov '99	Grill the Grazier – grow your young stock well	Technical advice from agri CO about deciding how to make sure that heifers are properly cared for and well fed by a grazier; discusses contracts, payment systems, communication	E=0; F= Bus; F=xprt adv; H=0; I=0; P=mgmt; Stock (mgmt).

Article ID	Title of article	Description, key words and phrases	Code
<b>9</b> 75(5): 16 Nov '99	Clover dilutes endophyte effects	Report of scientific research on Ryegrass endophyte (a fungus living at base of grass leaf that affects cow health and production). A highly technical description of results of research on cow health related to pasture quality and presence or absence of the endophyte.	E=prblm; F=B; F=mgmt; H=0; I=0; P=mgmt; Science.
<b>10</b> 75(5): 18 Nov '99	Pastoral mix changing, yet agriculture star still far from setting	A news report that Agriculture has grown as proportion of GDP between 86-87 and 97-98. Reports large-scale land use change. Overall outlook for agriculture is "for productivity increases to further underpin farm revenue from improved management systems, genetic selection of animals and pasture, and gains from processing and market efficiencies." (Rob Davison, Exec. Director of Meat and Wool Economic Service of New Zealand.)	E=0; F=0; H=0 I=Info; P=+.
<b>11</b> 75(5): 20 Nov '99	International farmer oversees Kiwi grassland dairying in South Wales	A personal story about a UK farmer who spent time in NZ and has returned to UK (South Wales) to follow NZ dairy farming methods ("low-cost, grass-based large dairy system"). Technical details about herd size and composition, feeding systems etc.	E=0; F=mgmt; H = people; I=0; P=+.
<b>12</b> 75(5): 30 Nov '99	Risk of antibiotics to be assessed	News report that the Animal Remedies Board is to support research into whether there is a link between antibiotics used in food animals and human antibiotic resistance	E=0; F=0; H=welf; I=Info; P=0.
<b>13</b> 75(5): 61 Nov '99	Forage species yield advances	Brief report on a paper by AgResearch scientist at NZ Grasslands association conference on the genetic gain experienced in different pasture species (biomass, yield and quality mentioned as key criteria)	E=0; F=0; H=0; I=0; P=+ Science.
<b>14</b> 75(5): 66 Nov '99	Investors wary of grower control	Report of the views of an investment director about behaviour of Agribusiness investors.	E=0; F=0; H=0; News; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>15</b> 75(5): 68 Nov '99	High hopes for milk and health research centre	Report on the launch of a new dairy science research centre at Massey; path to "mega success" "forefront in enhancing and protecting world health through the development of new milk products"; importance of science for the dairy industry; the wonders of science; need for industrial processing of milk.	E=0; F=0; H=0; I=Info; P=0; Science.
<b>16</b> 75(5): 82 Nov '99	Emotive GM food debate	Report of a representative of the NZ Food manufacturer Federation to the NZ Grassland Association Conference about European concerns about genetically modified food - green movement has "spread misleading information".	E=0; F=0; GM; H=0; News; P=0.
<b>17</b> 75(5): 86 Nov '99	Hard work paved road to success	The personal story of Harry Bayliss, NZDB deputy chairman and his wife. Gradual improvements from 39% sharemilking to ownership of their own farm, and incremental additions thereafter. Current success due to hard work and help from neighbours, and sharing knowledge (in discussion groups).	E=0; F= mgmt; H=story; News; P=+; P=struggl; P=success.
<b>18</b> 75(6): 20 Dec '99	Success with animal health but floods remain a problem	The personal story of a farming couple in their 50s; problems of production encountered and overcome; (flooding, soil fertility, drought, animal health problems due to soil deficiencies), family goals. Flooding blamed on RMA and regional council for not allowing gravel extraction.	E=prblm; E=struggl; F=mgmt; H=story; P=+.
<b>19</b> 75(6): 26 Dec '99	Future sustainable farming – the worm's eye view	Summary of an address by Dr. Ants Roberts, Ag Research, to conference on Aust. and NZ Council for the Care of Animals in Research and Teaching, and NZ Animal Advisory Committee. NZ soil management currently unsustainable; soil fertility; nitrogen cycle in pastures; water quality; soil quality; weed/pest control; biodiversity; greater production from quality land.	E=care; F=0; H=0; I=0; P=+; P=mgmt; Science (protection of soil and water).

Article ID	Title of Article	Description, key words and phrases	Code
<b>20</b> 75(6): 30 Dec '99	Summer: production or survival?	Advice by senior lecturer in Inst. of Veterinary Animal and Biomedical Sciences, Massey, about managing pasture and animal feed requirements during summer dry to maintain production, "Higher production requires more supplement. Lower production incurs increased liveweight loss and over-grazed pastures.	E=prblm (summer drought); F=xprt adv; H=0; I=0; Pr=+; P=mgmt.
<b>21</b> 75(6): 45 Dec '99	Surgical spirit market for Anchor Ethanol	A news report that NZDG subsidiary Anchor is exporting surgical spirit made from casein whey to Hong Kong hospitals.	E=0; F=0; H=0; I=Info; P=0.
<b>22</b> 75(6): 59 Dec '99	Supplying a chain of good linkages	Report of an Australian agribusiness consultant that "successful agribusinesses of the future will ...need to be vertically integrated with good relationships along the length of the supply chain". Competition means change <b>must</b> happen; agribusiness must consider retail sector and food consumption.	E=0; F=B; H=0; I=Info; P=0.
<b>23</b> 75(6): 62 Dec '99	Risk Authority delays decision on human gene in cows' milk	A news report on 3 applications to ERMA for GM research on dairy cows.	E=0; F=0; GM; H=0; News; P=0.
<b>24</b> 75(6): 74 Dec '99	Proving farm's efficient nitrogen conversion wins council consent	Story of a successful resource consent application by <i>Hawkes Bay Dairies Ltd</i> , for effluent disposal for a 1000-cow farm, \$5.5m investment; detailed description of feed management system and scientific analysis of effluent disposal options (no description of the submissions in opposition). "The total consent has cost the business \$250,000 in the past 3 years. We will never get that money back. We should have been able to do it for a few hundred dollars, but we spent 3 years and we still have to consult our neighbours regularly"; worry about conflict with Lifestylers.	E=mgmt (environmental limits can be overcome by tech. and mgmt); F=mgmt; H=story; I=0; P=+; Pr=+.

Article ID	Title of article	Description, key words and phrases	Code
<b>25</b> 75(7): 22 Jan-Feb '00	Are farmers producing the right sort of milk?	Article by Chief exec of NZ Holstein Friesian Assn: "for sustainability of business, it is vital [farmers] produce milk which is of optimal value to processors and marketers". "Key influences on the type of milk a farmer produces are: the payment system; and values for the components in that payment system. The largest dairy companies pay suppliers on a Protein + Fat - Volume basis. Currently protein is worth more than twice the value of milkfat, while volume has a cost of about 4c/litre" "Ideally, farmers should produce milk which suites the requirements of marketers, processors and producers. The philosophy which focuses NZ farmers to be efficient producers of milk may be too simplistic".	E=0; F=0; H=0; News; P=prblm; P=prdcvty.
<b>26</b> 75(7): 36 Jan-Feb '00	Making money from Jerseys	Article by chief exec of Jersey NZ: touting the value of jersey cows for calving ease, fewer feet problems, less pugging pressure, more heat tolerance.	E=0; F=0; H=0; I=0; Pr=+.
<b>27</b> 75(7): 44 Jan-Feb '00	Short rotation pastures will benefit clover	Scientific advice from Dr Jim Crush of AgResearch about pasture management and crop/pasture rotations; short pasture rotations interspersed with crops give more flexibility against pest invasions.	E=prblm; E=Mgmt; F=xprt adv; H=0; I=0; P=mgmt; Science.
<b>28</b> 75(7): 62 Jan-Feb '00	Autumn calving may be better than spring calving with a dry summer	Scientific advice from Carcia et al of No1 Dairyfarm, Massey: milksolids production related to different calving times. With winter premium of 27c/litre, autumn-calved system was more profitable than spring calving.	E=prblm; E=mgmt; F=xprt adv; H=0; I=0; Pr=+; P=+; P=mgmt.
<b>29</b> 75(7): 66 Jan-Feb '00	Autumn staff start could reduce stress of recruitment and spring	An article about labour employment customs with a suggestion for changes in custom to reduce stress for new staff.	E=0; F=xprt adv; H=welf; I= info; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>30</b> 75(8): 18 Feb-Mar '00	Fine-tuning on-farm feeding for specific milk attributes	Report of scientist Norm Thomson on research by the Dairying Research Corporation to alter the constituents of milk for consumer markets; cow nutrition; specialist herds and small dairy factories. Milkfat and milk flavour can be modified by feed.	E=mgmt (cow biology can be overcome by tech and mgmt.); F=0; H=0; News; P=0; Science.
<b>31</b> 75(8): 23 Feb-Mar '00	Minimising that post-peak depression in production	Advisory Consulting Officer, explaining reasons for severe drop-off in milk production through November 2000. What causes drop in production? What can be done to minimise this production loss? Recites results of research to explain his reasons. "The up to 10kg milksolids per cow lost during a typical November slump in milk production is never recouped".	E=prblm (nature is a constraint to production); E=mgmt; F=xprt adv; H=0; I=0; P=+; Pr=+.
<b>32</b> 75(8): 36 Feb-Mar '00	35-year veteran sees CO as 'a GP'	Personal story about the 35-year career of an LIC (now Dexcel) consulting officer; describes changes in dairying during his service. "Key component is the discussion group"; "Its not just about cows and grass, but a place to introduce new ideas. What is important is getting people to be interested enough to make and assessment and see how it applies to their situation."	E=0; F=0; H=welf; H=edu, (values of co-operation, group discussion; H=story; I=0; P=0.
<b>33</b> 75(8): 54 Feb-Mar '00	Longevity to replace survival	Report suggesting that 'longevity' should replace 'survival as a criterion for BW (Breeding Worth).	E=0; F=0; H=0; News; P=0.
<b>34</b> 75(8): 46 Feb-Mar '00	SIDE going to Southland	Report of the 2 <sup>nd</sup> South Island Dairy Event.	E=0; F=0; H=0; News; P=0.
<b>35</b> 75(8): 56 Feb-Mar '00	Lincoln trials into leaching of nitrogen	Report of trials by Lincoln University on contamination of groundwater by nitrate leaching; nitrate leaching a problem (environment a constraint that limits production).	E=prblm; (soil and water); E=mgmt; F=0; H=0; I=0; P=0; Science.

Article ID	Title of article	Description, key words and phrases	Code
<b>36</b> 75(8): 67 F-Mar '00	Farmers take punt in public company	News report NZ farm advisers helping to advise Irish farmers how to improve their profit.	E=0; F=0; H=0; News; Pr=+.
<b>37</b> 75(8): 102 F-Mar '00	Prices up for elite <i>Expo</i> offering	News report of NZ Dairy Expo 2000; attendance figures, prices for livestock, winners of skills contests.	E=0; F=0; H=0; News; P=0.
<b>38</b> 75(9): 42 Mar-Apr '00	Autumn: time to get rolling	Advice from P Matthews, Inst. of Vet, Animal and Biomedical Sciences, Massey about autumn animal and pasture management to gain as much production as possible; discusses strategies to achieve max. production of milksolids through autumn; recommends application of 60kg urea/ha in late March".	E=prblm (autumn limits pasture production); E=mgmt; F=xprt adv; H=0; I=0; P=+.
<b>39</b> 75(9): 62 Mar-Apr '00	Enthusiasm, luck, good staff spell success for large-herd sharemilkers	Story of a successful sharemilker couple who have just achieved their first farm ownership goal; "story of progress through the sharemilking orders to farm ownership"; Progress based on luck, willingness to learn, good staff, and hard work. Luck only part of it: ("... as most of us know, to a large extent we make our own luck."), Staff relations as a team. Environment not mentioned except "excellent growing season" and weed and pest problems (i.e., as a mixed blessing to be optimised by good management).	E =P+; E= mgmt; F=mgmt; H=story; P=mgmt; P=success; Pr=+.
<b>40</b> 75(9): 79 Mar-Apr '00	Accountant: 'Payout should be \$4'	Report of a dispute between Kiwi Dairies and Taranaki farm accountant David Russell about the payout that farmers should get "based on a reasonable assessment of the facts".	E=0; F=0; H=0; News; P=0.
<b>41</b> 75(9): 85 Mar-Apr '00	Organising organics	Proposal by Dr Bert Quin, of "fertiliser importer <i>Summit-Quinphos (NZ) Ltd</i> and former MAF chief scientist for soil fertility at Ruakura": proposed adoption of a farming system called <i>Organza</i> that will allow antibiotics, potash, phosphorus and nitrogen on a controlled basis. (Strategic use of chemicals to minimise environmental impacts).	E=care; F=xprt adv; H=0; I=0; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>42</b> 75(9): 94 Mar-Apr'00	Massey Conference spotlights profitability	Report of a farmer's conference to come.	E=0; F=0; H=0; I=0; News; Pr=+.
<b>43</b> 75(9): 96 Mar-Apr'00	US dairy aid does NZ no favours	Pessimistic report of the impacts on world prices (and implications NZ dairy industry returns) of an increase in US support for its dairy industry.	E=0; F=0; H=0; I=info; P=0.
<b>44</b> 75(10): 8 Apr-May '00	Winning formula for environment and profits	Personal story of the couple who won best dairyfarm in Waikato Farm Environment Award for 2000. Management not only environmentally friendly and low stress, but "profitable". "These awards are judged on commercial as well as environmental criteria. Inness and Mandy have made no compromises in either area. This attractive, well-wooded farm is not only friendly to the environment; it produces bottom-line profits that sustain the family-first lifestyle chosen by this couple".	E=care; F=mgmt; H=story; I=0; P=mgmt; Pr=+.
<b>45</b> 75(10): 21 Apr-May '00	Lifting performance to level achieved by the top 10%	Advice from a sharemilker about economic opportunities of share-milking; compares differences between top 10% of sharemilkers and the rest. "The top 10% of sharemilkers have a return on capital of 20%. A sharemilker starting with a net worth of \$250,000 could grow that to \$555,000 within 5 years". Differences reflect "poor physical performance, lax financial management, poor farm quality or infrastructure, an unsuitable contract and/or too small a scale of operation".	E=0; F=B; H=0; I=0; P=mgmt; Pr=+.
<b>46</b> 75(10): 26 Apr-May '00	On a Mission, migrating south	Personal story of the 2000 winners of Auckland-North Waikato Sharemilkers of the Year Award. The couple are moving to Southland encouraged "by Southland's dairying potential and prospects of good operators." "People down there are growing huge equity. We want to do the same".	E=0; F=B; F=mgmt; H=story; I=0; P=success.

Article ID	Title of Article	Description, key words and phrases	Code
<b>47</b> 75(10): 35 Apr-May '00	Tandem strengths for teamwork	Story of winners of Hawkes Bay-Wairarapa Sharemilkers of the Year. The couple "combined both Andrew's stock management and physical farming skills and Kathleen's book/record keeping talents to come up with a winning diary farming combination".	E=0; F=mgmt; H=story; I=0; P=+ P=success.
<b>48</b> 75(10): 47 Apr-May'00	60ha focus for Massey	Report of an up-coming Massey Dairyfarmers Conference; focus of conference to be "the 60ha dairyfarm of the future and the future of NZ dairying".	E=0; F=0; H=0; News; P=0.
<b>49</b> 75(10): 86 Apr-May '00	NZDB testing organic butter potential in UK	A report about the launch of organic butter in UK by NZDB.	E=0; F=0; H=0; I=Info; P=0.
<b>50</b> 75(10): 98 Apr-May '00	'Milky way' bioscience initiatives to maintain competitive advantage	An article by <i>Dairy Exporter</i> editor about the launch of <i>ViaLactia</i> , a NZDB subsidiary established to manage industry investment in bioscience and associated intellectual property. 3 major research programmes: bovine genes; forage technology to overcome limitations to N Z's traditional pasture systems; processing microbiology for enhanced dairy products.	E=0; F=0; H=0; I=Info; P=prdcvty.
<b>51</b> 75(11): 42 May-Jun '00	Characteristics of successful farmers	An article by an Agriculture New Zealand diary consultant on the personal characteristics that make for farming success. Emphasises the importance of success in both personal and business goals; that the most successful are characterised by having clear goals, communication skills, commitment to achieving their goals, and courage.	E=0; F=0; H=welf; I=0; P=0.
<b>52</b> 75(11): 50 May-Jun '00	Packaging a farm worker's salary	An article about ways of working out a farm worker's salary that takes into account the peaks and ebbs in workload through the farming year. Salary needs to be a basic package that includes base salary, accommodation, and 'other' (e.g. milk, meat or clothing); needs to be transparent and fair.	E=0; F=B; H=welf; I=0; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>53</b> 75(11): 67 May-Jun '00	Pre-calving ration	A very short report on advice from Dr Ian Lean of Bovine Research Australia on composition of feed to give to cows before calving.	E=0; F=xprt adv; H=0; I=0; P=0 Stock (animal health).
<b>54</b> 75(11): 71 May-Jun '00	Growing global demand	An article that reports on the growing demand worldwide for colostrum for a "growing range of health supplement tablets, food bars and powders." Gives information on Hautapu dairy near Cambridge as the factory that processes colostrum – H has "one of the world's most sophisticated dairy manufacturing facilities" plus its own research and development staff and sales and marketing team.	E=0; F=0; H=0; I=Info; P=0.
<b>55</b> 75(11): 82 May-Jun '00	Flagship industry vital to nation	Exporter interviews ACT list MP Stephen Franks, commercial lawyer, who spent months working for NZDB on the Merge Co proposal. Argues it is "vital to retain this flagship industry for NZ earning solid profits from overseas markets when the national ethos is to spend more than we earn, funding the difference by selling assets".	E=0; F=0; H=0; I=Info; P=Pr=+.
<b>56</b> 75(11): 84 May-Jun '00	Price, perception, purchaser power	Advice and comment by Marise James, Taranaki accountant, and sharemilker on the position of the NZ dairy industry in the global market place; "Ultimately price is the most important issue in selling NZ dairy products to overseas," but consumer "concerns about safety, animal welfare and environmental issues will often dictate how the buyer exercises that choice".	E=0; F=0; H=0; I=Info; P=0.
<b>57</b> 75(11): 92 May-Jun '00	NZDB deal with Bonlac welcomed	Report about a heads of agreement between NZDB and Bonlac Foods of Australia; concerns expressed by some, but " <i>all around the world businesses are globalising . . . we must combine to counter these trends and potential threats.</i> " said NZDB Chairman Graham Fraser.	E=0; F=0; H=0; I=Info; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>58</b> 75(11):126 May-Jun '00	Equity partnerships expansion vehicle	Story about a couple who have own farm, but extended their ownership through equity partnerships to 3 other farms. "We were financially constrained on our own and the perceived gains from moving were not justified when we considered the family upheaval and the size and type of farms on the market at that time. It offered the least family disruption, retained our solid income base, and gave us the opportunity to work with other people and to learn new farming methods in a different district." Article discusses the mgmt and position of farm manager; imp. of common vision with partners; informing company shareholders.	E=0; F=B; F=mgmt; H=story; I=0; P=+; P=mgmt.
<b>59</b> 75(12): 13 Jun-Jul '00	Scientists sceptical of GM commission	Report of a Massey Dairyfarmers Conference on issue of Royal Commission into Genetic Modification. Quotes Kevin Marshall, group general manager, R & D, NZDB: "Bioscience offers the opportunity to produce forages to break through the feed barrier" "The 4% increase in productivity gain won't be achieved without bioscience or something equally dramatic." Marshall quoted at length, all to the effect of the necessity for GM. (Nature is a barrier to be overcome by sc and tech.)	E=prblm; E=mgmt; F=0; GM; H=0; I=news; P=prdcvty; Science; Tech.
<b>60</b> 75(12): 30 Jun-Jul '00	Sustainable land use principles	Gordon Stephenson, farmer and conservationist: "They're not making any more land: we must be careful with what we have . . . rarely any conflict between profit and environmental management. . . Though profit may have to take precedence in the short-term -1 or 2 years- profit will move into decline if the issues of sustainability are not addressed".	E=care; F=0; H=0; I=0; P=prblm; Pr=+.
<b>61</b> 75(12): 40 Jun-Jul '00	Managing people and relationships	Report of a survey by Shelley Dew-Hopkins and David Tweed, Massey on issues related to farm labour; problems of attracting and retaining young people into farming; problems of managing relationships with contractors, using farm servicing businesses; listening, managing staff.	E=0; F=0; H=welf; I=Info; P=0.

Article	Title of article	Description, key words and phrases	Code
<b>62</b> 75(12): 45 Jun-Jul '00	Extracting more value from plant investment	Dion Silich, farm manager for <i>Wastelands Park</i> which will use 2 rotary dairies to milk 3400 cows: "Technology will provide the answer to extracting more value from the investment in farm dairies".	E=0; F=0; H=0; I=0; P=mgmt; Tech.
<b>63</b> 75(12): 94 Jun-Jul '00	Board's end-of-season \$3.35 best in 4 years	Report on the end-of-season payout to farmers by NZDB.	E=0; F=0; H=0; I=Info; P=0.
<b>64</b> 75(12): 97 Jun-Jul '00	Tatua firm in going alone	Report that the small Waikato dairy Tatua Co-op Dairy Co is firm that it will not become part of the mega merger between Kiwi Co-op Dairy and NZDG - for reasons of "commercial self-interest"; key concerns of the co include techno innovation, customer contact, knowledge-based innovation, intellectual property in speciality products. "We are under no illusions that to remain separate we much perform. Prosperity is the best protector of loyalty".	E=0; F=0; H=0; I=Info; P=0.
<b>65</b> 75(12):108 Jun-Jul '00	Mainland Application gives Market Snapshot	Control of domestic milk retailing by supermarket chains removes the monopoly power of NZ Dairy Foods and Mainland Milk products.	E=0; F=0; H=0; I=Info; P=0.
<b>66</b> 75(12):131 Jun-Jul '00	Shortage of local CMRs sees import powders gain foothold	News report by Chris Newton, animal nutrition manger for NZ Dairy Ingredients Ltd, that higher prices for calf milk replacers likely to remain. Advice for calf rearers.	E=0; F=xprt adv; H=0; News; P=0.
<b>67</b> 75(12):135 Jun-Jul '00	Dairy calcium for bone health	Report by an American nutritionist that dairy calcium is important source of bone health in humans.	E=0; F=0; H=welf; I=0; News; P=0.
<b>68</b> 75(12):149 Jun-Jul '00	Israeli visitors	Report on a visit by Israelis to look at statutes related to the diary industry in NZ.	E=0; F=0; H=0; I=0; News; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>69</b> 76(1): 20 Aug '00	Yes, cows can milk on hay	Story of a husband-wife farm couple who "have implemented a farming system that is simple, profitable and enjoyable to work in." "They consistently achieve <i>Economic Farm Surplus</i> of \$2000/ha with a goal of reaching \$2400/ha by year 2002". Detailed description of how the couple make hay to extend milk production using a cheap feed source.	E=0; F=mgmt; H=story; I=0; P=+; P=prdcvty.
<b>70</b> 76(1): 24 Aug '00	Need for 'new ark' strategy amid impact of changes	Report on the impacts of climate change, from a convention of NZ Instit. of Agricultural Science and NZ Society for Hort. Sc. at Massey: "NZ farmers, regional and district councils, iwi resource managers and those involved in land-based industries will have to learn to manage for both a warmer climate and the possibility of ongoing catastrophic events, such as flooding or drought . . .". (Environmental change a source of uncertainty and disruption.)	E=prblm; F=0; H=0; I=0; News; P=0; Science.
<b>71</b> 76(1): 36 Aug '00	Profitability turns around popularity	Retiring president of NZ Jersey Cattle Breeders Assn: increasing popularity of Jersey's due to merits of the breed, improved breeding, more marketing and targeted marketing (of semen sales); there are major challenges facing breeders; need to protect intellectual property.	E=0; F=0; H=0; News; P=+; Pr=+ Stock (breeds).
<b>72</b> 76(1): 41 Aug '00	Feed grain to tap cows' potential	Report of an Australian dairy scientist that NZ farmers do not feed their cows enough to maximise their genetic potential. Underfeeding reduces their milk production and fertility. Slates the "low-cost mentality" advocates the use of supplements such as grains and grain-based dairy feeds.	E=0; F=xprt adv; H=0; I=0 P=+; Science; stock (animal health and welfare).
<b>73</b> 76(1): 49 Aug '00	Caution before sunrise euphoria	Article by Warren Parker, Science GM, AgResearch, generally opposed to organics and in favour of conventional methods. Equates enthusiasm for organics with fashion for goats, emus, and ostriches; urges caution.	E=0; F=0; H=0; I=0; P=+; Science.

Article ID	Title of article	Description, key words and phrases	Code
74 76(1): 66 Aug '00	Sheep/beef recovery predicted to continue	Report of Meat and Wool Economic Service that export earnings from meat and wool are predicted to rise.	E=0; F=0; H=0; News; P=+; Pr=+.
75 76(1): 76 Aug '00	Be in charge of change	Farmwise consultant Paul Exton, from Matamata talks about how to assess the need for new technology: "to be in charge of change, sit down and draw up the master plan for the new technology". Farmers will continue to face two major challenges -climate and economic conditions that will require them to make change. "Change will happen so it is best to be in the driver's seat".	E=prblm (Environment as climate change is a challenge) F=B; F=xprt adv; H=welf; I=0; P=0.
76 76(1): 82 Aug '00	Separation of NZDB's industry good and marketing structures	Report concerning the restructuring of Dairying Research Corporation and Livestock Improvement Corporation as a consequence of the wider restructuring of the dairy industry (with amalgamation of NZ Dairy Board, Kiwi Dairies and NZDG into Global Co). Dairy research functions of DRC and farm advisory services of LIC to amalgamate into a Centre of Excellence (subsequently named Dexcel) combining research and farm advisory services.	E=0; F=0; H=0; I=info; P=0.
77 76(1): 87 Aug '00	Unit contract system of milk supply	Article that discusses a way of allocating milk supply contracts among farmers as shareholders of the co-operative company	E=0; F=0; H=0; I=Info; P=0.
78 76(1): 93 Aug '00	<i>Kiwi</i> pre-empts rival with \$3.82	Report on the payout to farmers by Kiwi Co-operative Dairy in 1999-2000; the payout is higher than that for NZDG, the rival company; description of the different components of the payout.	E=0; F=0; H=0; I=Info; P=0.

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<b>79</b> 76(1); 94 Aug '00	Portal plugs into fencepost theme	Report about the creation of <i>fencepost.com</i> by Kiwi Co-op Dairy, to communicate with its farm suppliers. "The serious side to <i>fencepost.com</i> is assisting farmers to achieve the 4% per annum productivity gain set by the industry".	E=0; F=0; H=0; I=info; P=0; Tech.
<b>80</b> 76(1); 98 Aug '00	Harness profit, keep control	Advice by farm management consultant that farmers should remain financially cautious in the face of higher financial returns, Potential euphoria of improved results should not make farmers less vigilant in cost control.	E=0; F=B; H=0; I=0; P=0.
<b>81</b> 76(2); 32 Sept '00	Needed - the courage to make changes	Story of farmer and NZDB director Earl Rattray and family; most of the article is views of Rattray on situation of NZ dairy farming and what it must do to survive in competitive global world.	E=0; F=B, H=story; I=0; News; P=prdcvty.
<b>82</b> 76(2); 44 Sept '00	Home advice from abroad	Report by LIC Advisory consulting officer John Wells of an interview with Dr John Roche, Irish dairy scientist who joined Dairying Research Corporation from Ireland: discussion about grass farming, merits of grass and silage as a feed; nutritional requirements necessary to get best production from cows.	E=0; F=xprt adv; H=0; I=0 P=+; P=mgmt; Science; Stock (nutrition).
<b>83</b> 76(2); 50 Sept '00	Broader definitions for 'young farmer'	Report of a discussion of definitions of 'young farmer' sparked by the winner of a <i>Young Farmer of the Year Award</i> who was a lawyer. The contest manager quoted: "Farming is attracting a new breed of people bringing with them new and fresh ideas along with business skills applicable to all farming enterprises. . . In the 21 <sup>st</sup> century the farm office will replace the woolshed and the cowshed as the most important building on the farm. . . to be successful in the future and compete in a competitive global marketplace, we need a knowledge industry so that all sectors in the chain of production (processing, distribution and marketing) understand the needs of their customers and work as a team to deliver maximum profits back to all team members. "	E=0; F=B (integrated production - metaphor of farming as a manufacturing industry); F=xprt adv; H=story; News; P=mgmt.

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<b>84</b> 76(2): 64 Sept '00	Cow management vital to exploit systems	A report about the benefits, problems and potential of automatic milking machines based on a report on automatic milking published in <i>Bulletin of the International Dairy Federation</i> ; problems of dairy hygiene, animal health and animal management.	E=0; F=0; H=0; News P=+; Science; Tech.
<b>85</b> 76(2): 106 Sept '00	Change in culture faces corporation	Report of a talk by CEO of LIC - "the future hinges on genomic data, not the herd test data and other phenotypic information of today" "Biotechnology is the key to all out futures" - the change in culture required is "the need to be innovative" ; discusses the successes and strengths of LIC and its "contribution to farm wealth"	E=0; F=0; H=0; I=info; P=+; P=mgmt; Science; Tech.
<b>86</b> 76(3): 20 Oct '00	'Lactation length' logical inclusion in smarter SR	Article by Chris Glassey, technical support analyst, Consulting Officer Service: "Greater precision in determining stocking rates for individual farms is required if farmers are to succeed in improving their productivity . . ." The article is about deciding the right stocking rate for the farm based on amount of feed the farm can grow, minimising production losses from dry cows, cull cows, etc. "optimum stocking rates for maximising <i>Economic Farm Surplus</i> ".	E=0; F=xprt adv; H=0; I=0; P=+; P=prdcvty = +; stock (stocking rates).
<b>87</b> 76(3): 36 Oct '00	Jersey star from the South	Story about a farming couple who have moved from Taranaki to Southland and their high production cow featured in promotional advertisements. Compares dairying in T. and S. "Unlike Taranaki where hot days slow growth, Southland's longer daylight hours mean the cows are eating for more hours in the day.	E=P+; F=mgmt; H=story; I=0; P=+.

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<b>88</b> 76(3):43 Oct '00	CO Service adapts to new era in technology transfer	Article is about the role and effectiveness of farm consulting service given the changes in farming (e.g. e-technology, larger farms). Quotes Consulting Officer Service GM Peter Bodeker, as saying "Localised research, localised solutions and local discussion groups will provide the keys to the future of the <i>Consulting Officer Service</i> ". An LIC survey of farmers found "Farmers were being 'swamped' with information and needed help in sorting out what was best for them; farmers wanted small discussion groups with likeminded people to bounce ideas off and gain motivation; farmers needed independent advice." Quotes Bodeker as saying "farmers preferred methods of learning are via: discussion groups; from fellow farmers; field days/seminars; on-farm professionals; <i>New Zealand Dairy Exporter</i> , Farm Adviser and the Internet" ( <i>Note: COS is the farm advisory service of LIC and Dairying Research Corporation</i> ).	E=0; F=0; H=edu (effective advisory services; appropriate information services); I=info; P=prdcvty.
<b>89</b> 76(3): 47 Oct '00	Proposing 'available pasture' as measurement method	Article by M Blackwell, Info Mgr, Consulting Officer Service: about ways of estimating feed available for cows by measuring the amount of pasture; discusses pasture assessment systems	E=0; F=xprt adv; H=0; I=0; P=+; Prdcvty = +.
<b>90</b> 76(3): 54 Oct '00	8-day CIDR treatment raises pregnancy rate	An article by S McDougall, Animal Health Centre, Morrinsville, about methods to improve successful conception in cows.	E=0; F=xprt adv; H=0; I=0; P=0; Science; Stock (mgmt and reproduction).
<b>91</b> 76(3): 70 Oct '00	Order in spring for autumn need	Article by P Gault, Consultant, Agriculture NZ ; gives advice about cost of maize silage, how to order from a contractor ahead of time, and how to use maize as a surplus feed	E=0; F=xprt adv; H=0; I=0; P=+; Pr=+.

Article ID	Title of article	Description, key words and phrases	Code
<b>92</b> 76(3): 94 Oct '00	NZDG, Kiwi 'making headway'	A report on a shareholders annual meeting of NZDG; reports NZDG chairman that there has been progress in talks between Kiwi Co-op Dairy and NZDG about amalgamation; reports concerns of NZDG shareholders at low payout and underperformance.	E=0; F=0; H=0; I=info; P=0.
<b>93</b> 76(4): 8 Nov '00	High property rates push cows out and kiwifruit in.	A story about a farming couple in the Bay of Plenty; husband is the "4 <sup>th</sup> generation on the family dairyfarm"; kiwifruit production is pushing up price of land, and "with some sadness as dairy farmers foremost, Graeme and Karen opted for a large-scale kiwifruit orchard and a 'strategic withdrawal' from dairying"; "the bottom line is that milksolids income last year was around \$4000/ha. Kiwifruit gross returns are 10 to 15 times more" "ROI is king. Kiwifruit wins. Inputs seem high but are relative. Half of diary income goes in production costs, a quarter in financing, and the balance after tax is profit. Much the same split applies in kiwifruit, but on far greater returns per hectare."	E=0; F=mgmt; H=story (and Family heritage); I=0; Pr = +.
<b>94</b> 76(4): 13 Nov '00	Milk and potatoes	Report of sale of 1744ha for \$34.25 million from Tasman Agriculture Ltd to Alan Pye. Pye wants to integrate potato growing with dairy unit to have a rotation of potatoes, cereal and pasture, to "increase the economic use of the property while renewing pastures for dairying".	E=0; F=B; H=0; News; P=mgmt; Pr=+.
<b>95</b> 76(4): 15 Nov '00	Productivity jumps through radical farming innovation	Article by W Parker, Science GM, AgResearch. Year-on-year 4% productivity gains "requires things to be done differently". Quotes the example of Olympic high jumping as an illustration: "jumps in performance will come from new component technology" e.g. possibly biosensors, robotic milking and biotechnology.	E=0; F=0; H=0; I=0; P=prdcvty; Science; Tech.

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<b>96</b> 76(4): 22 Nov '00	Mating: Treating cows not seen in-heat	Report of research by Dairying Research Corp about how to treat cows that are not cycling or are cycling but not showing signs.	E=0; F=xprt adv; H=0; I=0; P=0; Science; Tech.
<b>97</b> 76(4): 32 Nov '00	<i>Oma breeds on at 27</i>	A story about a very unusual cow owned by a Southland couple; she is 27 year old and still calving.	E=0; F=mgmt; H=story; I=0; P=0; Stock.
<b>98</b> 76(4): 56 Nov '00	Hand-on tutor inspires young folk	Story about a farm training tutor who believes in teaching by personal example - believes that "there's good money in paying staff well; better people, better trained do a better job. "A big part of this job is building their confidence. So yes, I like to reinforce them by telling them good things bout how they're doing".	E=0; F=0; H=welf, edu (and quality of life); P=0.
<b>99</b> 76(4): 70 Nov '00	<i>Kiwi southern expansion puts pressure on NZDG</i>	Story of competition between Kiwi Co-operative Dairy and NZDG for farmers in the South Island.	E=0; F=0; H=0; I=info; P=0.
<b>100</b> 76(4): 72 Nov '00	Demystifying those AA's and BB's	Article by M Boland and J Hill, NZ Dairy Research Institute explaining the genetics of milk proteins that relate to casein and cheese manufacture.	E=0; F=0; H=0; I=0; P=0; Science.
<b>101</b> 76(4): 76 Nov '00	BZDB eyes high-value niche markets	Dairy board has adopted a strategy of marketing NZ brand organic dairy produce in N Am. Europe, and Japan, based on studies which suggest "organic dairy products will be a profitable long-term niche market worth up to \$200m a year within 5-10 years."; discusses need to build markets, problem of establishing certification process, on-farm R&D programmes to create farm mgmt systems to minimise production losses on conversion.	E=0; F=0; H=0; I=Info; P=0.

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<b>102</b> 76(5): 8 Dec '00	Sharing the good news about milking shorthorns	A story about a herd of 700 dairy shorthorns north of Hamilton and the farm manager and his wife; discusses production increases with autumn and spring calving and year-round milking, animal health, use of supplements, fertiliser applications; staff management.	E=0; F=mgmt; H= People; I=0; P=+; Stock.
<b>103</b> 76(5): 14 Dec '00	Enhancing immunity	Report about a research project at Massey into a potential new dairy product based on milk containing a form of bacteria that boosts the human immune system.	E=0; F=0; H=0; News; P=0; Science.
<b>104</b> 76(5): 31 Dec '00	Cow-friendly race helps herd to hoof it along	Article on the negative effects of lameness in cows. Advice from C Pederson, chairman of Dairy Farmers of NZ that redesigning and resurfacing farm tracks to prevent lameness among cows is one of the best investments.	E=0; F=xprt adv; H=0; I=0; P=+; stock (animal welfare).
<b>105</b> 76(5): 32 Dec '00	Ice-cream a sticky success	Report of Massey University Food Awards, Kiwi Dairies <i>Memphis Meltdown</i> as top ward winner.	E=0; F=0; H=0; News; P=0.
<b>106</b> 76(5): 79 Dec '00	Top Massey student	Report of Massey " <i>Agricultural Student of the Year</i> ". Gives background on the (female) student and her ambitions.	E=0; F=0; H=edu, People; News; P=0.
<b>107</b> 76(6): 38 Jan '01	UK semen imports allowed, embryo imports on hold	MAF allows importation of semen, but not embryos as a consequence of BSE (bovine spongiform encephalopathy) in UK and EU.	E=0; F=0; H=0; News; P=0; Stock (health, breeding).

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<b>108</b> 76(6): 56 Jan '01	New era alliance	Report on the alliance between NZDB and Australian <i>Bonlac</i> .	E=0; F=0; H=0; I=info; P=0.
<b>109</b> 76(6): 57 Jan '01	<i>National Foods left at the altar</i>	Report that Australia's largest dairy co-operative has rejected a merger proposal from National Foods, Australia's largest marketer of fresh milk; implications for NZ.	E=0; F=0; H=0; I = Info; P=0.
<b>110</b> 76(7): 33 Feb '01	Ag ITO's CEO	Report about the new CEO of the Agriculture Industry Training Organisation. Gives background.	E=0; F=0; H= People; I=info; P=0.
<b>111</b> 76(7): 45 Feb '01	Riddle yields to French persistence	A report about the research of a French scientist who discovered reasons why high producing ryegrass does not persist as well as lower producing grasses.	E=0; F=0; H=0; News; Science; P=0.
<b>112</b> 76(7): 58 Feb '01	New Deputy CEO is used to the fast lane	Introduces the new deputy CEO of Dairy Research Institute; gives background, "his career has been marked by outstanding research achievements"; mentions his sporting achievements, his new son (and difficulty of getting a good night's sleep), ambitions for the NZDRI, links with other research institutions.	E=0; F=0; H=story; I=Info; P=0; Science.
<b>113</b> 76(7): 60 Feb '01	Need to redress education imbalance	Report that NZ Co-operatives Assn is working with Canterbury and Lincoln to develop education programmes; discussion about co-operatives generally.	E=0; F=0; H=0; I=Info; H=edu; P=0.
<b>114</b> 76(7): 76 Feb '01	Over-stating GM risk led to NZ dairy industry's cautious approach	A report on NZDG submission to Royal Commission on GM; the report cites examples of beneficial use of milk products from genetically modified animals, and the benefits for NZ dairy industry of genetically modified 'products'.	E=0; F=0; GM; H=0; News; P=0; Science;

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<b>115</b> 76(8): 21 Mar '01	Tauranga pivotal to economies	Port of Tauranga is handling 65% of NI dairy exports; Tauranga serves the dairy heartland of Waikato and Bay of Plenty.	E=0; F=0; H=0; News; P=0.
<b>116</b> 76(8): 40 Mar '01	Bureaucracy stifling biological research	Detailed report on the pro-GM views of U of Otago Prof. Ian Stuart McLennan to Royal Commission on GM that NZ biological research is being stifled by slowness of bureaucratic decision making, costs of applying for permits and maintaining records relating to use of GM organisms.	E=0; F=0; GM; H=0; News; P=0; Science.
<b>117</b> 76(8): 42 Mar '01	Australia pioneering in biotech	Report that " <i>Innovative Dairy Products</i> will undertake research into cow clones and new dairy products with the aim of making Australia a world leader in biotechnology.	E=0; F=0; H=0; News; P=0; Science; Tech.
<b>118</b> 76(8): 80 Mar '01	'Detriments' outweigh benefits	Report on the merits and problems of a dairy industry merger by Prof. Neil Quigley Executive dean of the Faculty of Commerce and Admin, Victoria U.	E=0; F=0; H=0; I=Info; P=0.
<b>119</b> 76(8): 84 Mar '01	Opting for fuller feeding all season	Story of dairy farm couple who "seek maximum return from their investment with good per cow production"; "strategic use of supplements, particularly for summer dry. "Nick sees shortcomings with pasture in Waikato as long as summer dry spells become the norm rather than the exception"; weather and pasture responses viewed as unpredictable; "drought over two recent summers knocked back the farm's production".	E=prblm; E=mgmt; F=mgmt; H=4; I=0; P=+; Pr = +; P=mgmt (summer drought seen as a challenge that can be minimised by careful management.)
<b>120</b> 76(9); 77 Apr '01	No export permits needed after year	Report by Global Dairy Co John Roadley that export permits will no longer be required by dairy manufacturers such as Kapiti Cheese.	E=0; F=0; H=0; I= Info; P=0.

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<b>121</b> 76(9): 80 Apr '01	View that Irish 'revolution' has failed; warning NZ about the Irish plc	Two related articles about the dairy industry in Ireland and the failure of corporatisation of the Irish dairy industry has not been good for farmers, because of differing interests of two groups of shareholders –farmers on the one hand who want to maximise milk prices, and business shareholders who want to maximise profits and dividend streams. Irish farmers want to return to co-operative ownership; Quotes EO of Irish Farmers Association “strong farmer representation is absolutely vital;” “You have to be absolutely certain you do not forgo control”.	E=0; F=0; H=0; I=Info (governance); P=0.
<b>122</b> 76(9): 110 Apr '01	What MJME means for milk output	Ruminant nutritionist S Westwood of Wrightson Research explains <i>Megajoules of Metabolisable Energy</i> (MJME) – a term that takes the place of drymatter to predict animal performance.	E=0; F=0; H=0; I=0; P=+; Science; Stock (animal health).
<b>123</b> 76(9): 116 Apr '01	A cow needs to be happy to be productive	Australian scientist Prof. Paul Hemsworth, of Animal Welfare Centre, University of Melbourne argues “In addition to grazing, drinking and eliminating, dairy cattle also require time for comfort behaviours such as resting, sleep, shelter seeking, licking, nibbling, scratching, rubbing and mutual grooming” ; notes that intensive grassland systems can reduce the capacity of animals to engage in these activities; increasing intensification may generate animal welfare problems; discussion of stress in animals that can't meet their biological and psychological needs.	E=0, F=xprt adv; H=0;I=0; P=mgmt; Science; Stock (animal welfare).
<b>124</b> 76(10): 13 May '01	TB cut: AHB asks farmers to pay more	Animal Health Board's proposed National Pest Mgmt Strategy for TB proposes to cut national herd infection rate, with contributions from central govt, beef, dairy, deer and regions.	E=0, F=0, H=0; I=info; P=0; Stock (animal health, biosecurity).

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<b>125</b> 76(10):102 May '01	Updating Economic Values for Animal Evaluation	The article advises how to evaluate the value of extra supplementary feed relative to the price return on milk; the principle is "the higher the payout, the higher the values of feed, whether it is purchased or home-grown. (M. Montgomerie, Manager, Animal Evaluation Unit, Hamilton.	E=0, F=B; F=xprt adv; H=0; I=0; P=+.
<b>126</b> 76(10):112 May '01	Ringing the bell amid 'info overload'	Report of research by Dr Claire Massey of Massey University PGSF " <i>Building Competencies in Technological Learning</i> " about information overload among farmers, and how they get the information they need.	E=0, F=0; H=edu; I=0; P=0; Science.
<b>127</b> 76(11): 14 Jun '01	Transition choices	Different methods of transferring cows from spring to autumn calving described by a Northland dairyfarmer and consultant; discusses mating strategies relative to time of year, and milking season.	E=0, F=xprt adv; H=0; I=0; P=0; Stock.
<b>128</b> 76(11): 32 Jun '01	Event caters to Southern needs	Report about South Island Dairy Events Conference to link researchers with farmers and educators; Workshops include Business structures, "people productivity", irrigation, and nutritional effects on lameness.	E=0; F=0; H=edu; News; P=Prdcvty.
<b>129</b> 76(11): 46 Jun '01	Arable farmer reassigns 240ha with top southern sharemilkers	Story of a Canterbury farming couple converting the family farm from arable to dairy, and sharemilker couple; environment mentioned incidentally - the conversion is on freer draining soils, an area which by its shape and layout lent itself naturally to conversion; "Dairying is a very good use of land and water in this area. It is becoming an important dairying area and is one of the highest-producing areas in NZ".	E=P+; F=B; F=mgmt; H=story; I=0; Pr=+.

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130 76(11): 62 Jun '01	Rotating responsibilities means no person is indispensable	Story of a 1750-cow dairy farm in South Island managed by 5 couples as shareholders. Staff are "a team"; a "no 'pecking order' approach"; everyone has shared responsibilities; discussion of staff and farm management; multi-skilling of staff, staff training, a monthly farm report for staff "detailing production targets and actuals, costing for purchases and sales, livestock, irrigation, rainfall and other data. This keeps all fully informed and helps them understand the operation that they are helping to drive".	E=0; F=mgmt (staff and farm management); H=edu, (and relationships); I=0; P=+; P=mgmt.
131 76(11): 76 Jun '01	CEO reflects on 9 years at top and path forward for NZ dairy	Interview with Warren Larsen, CEO of NZDB before it was amalgamated with NZDG and Kiwi. Larsen an advocate of amalgamation. "I've always believed in the <i>Global Dairy Company</i> concept. . . the competition for NZ is NZ versus the Rest of the World"; believes "vision" is necessary for business success; leadership more important than management; business needs "a culture of achievement"; Sees the creation of trans-Tasman and trans-national dairyfarmer cooperatives. To be successful Global Co must "focus our organisation on customers and markets, first, second and third. Only by doing that can we make the right decisions in the interests of farmer shareholders."	E=0; F=0; H=story; News; P=0.
132 76(11): 79 Jun '01	Pioneering scientist lost to Australia	Reports loss of an AgResearch scientist to Australia because of frustrations at delays in approval for GM research.	E=0; F=0; GM; H=0; News; P=0; Science.
133 76(11):106 Jun '01	Bring corporate evaluation tools inside the farm gate	Dexcel Consulting Officer gives advice on investment, and how to assess assets and liabilities related to herd and farm management: herd size, production per cow, plant and machinery, cash flows, income, expenses, investment options. "We need to analyse investment decisions better by using tools commonly used in the business world. When examining investment option, place a value on the time and money invested in your businesses".	E=0; F=B; H=0; I=0; P=0.

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<b>134</b> 76(11):120 Jun '01	Call to counteract milk drinking decline	Report of a talk by nutritionist Dr Carol Wham that the consumption of milk by young people in NZ is declining and that this decline needs to be counteracted by milk industry in collaboration with M of Health.	E=0; F=0; H=welf; I=0; News; P=0; Science;
<b>135</b> 77(1): 8 Aug/01	From adversity to bounding productivity	Story about a farm couple who moved from high debt, adverse topography, and physical ill health to success. "For years he had lacked sleep, living by the alarm clock as he turned rocky lahar country into farmland. But this drive has seen the couple achieve the industry's 4% productivity improvement a year goal, year after year over a 12-year period"; to increase area of the farm, "they bought 47ha of 'very undesirable' gorse-covered, lahar-mounded, swamp valley country next-door. "If it wasn't hell, it was the closest thing to it" Neville says. Over the next few years, with a bulldozer and drain digger, Neville and Beverley stripped off the topsoil, flattened the hills one at a time and recovered them with topsoil. The rock was used for lanes or filling in the holes and swampy areas. It was back-breaking . . but the tract was turned into a productive part of the dairyfarm".	E=struggl (environment is an adversary that can be overcome by hard work and determination); F=mgmt; H=story (+Family values, husband-wife partnership); I=0; P=struggl (hard work can overcome adversity and achieve productivity); P=success.
<b>136</b> 77(1): 23 Aug/01	Pa site restored	Report on the unveiling of Mangaharakeke Pa site at Te Rapa dairy factory by NZDG chairman, as culmination of 5 years work by NZDG and Nga Mana Toopu o Kirikiriroa.	E=0, F=0; H=0; News; P=0.

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<b>137</b> 77(1): 38 Aug '01	Farmers 'scoring skinny cows too high'	A report on farmers estimates of cow condition; finding is that farmers over-score the condition of cows. Conclusion of former tutor at Waikato Polytech, Clive Dalton, is that majority of farmers cannot correctly score the condition of cows, and the 4% annual increase in efficiency could be achieved by getting farmers to condition score correctly.	E=0; F=0; H=0; I=0; P=Prdcvty; Stock (animal welfare).
<b>138</b> 77(1): 50 Aug '01	New president takes helm	Report about the newly elected president of the Ayrshire NZ breed society; discussion about successful breeding, genetic gains, sales of Ayrshire herds.	E=0; F=0; H=0; News; Stock (breeding).
<b>139</b> 77(1): 53 Aug '01	'Not valued' perception	Report of the views of Prof Frank Griffin, Dept of Microbiology Otago, that news media misreport scientists and science.	E=0; F=0; H=0; News; P=0; Science.
<b>140</b> 77(1): 90 Aug '01	Corporate office in Auckland	Announcement that headquarters for Global Dairy Company will be Auckland.	E=0; F=0; H=0; I=Info (restructuring); P=0.
<b>141</b> 77(1): 91 Aug '01	'Culture' defined	Comment by John Roadley, chairman of Global Dairy Company that the people involved in the restructuring of NZDG, NZDB and Kiwi are "calibre people . . . breaking their necks to get on with it and be a more functional organisation. . . they've already decided what the culture's going to be. It's around leadership style – the way the board leads the organisation. If you want to start defining culture, that's where it starts from".	E=0; F=0; H=0; I=Info (restructuring); P=0.
<b>142</b> 77(1): 98 Aug '01	Regulations until competition develops for processing milk	Report of the Dairy Industry Restructuring Bill 2001 considered by Parliament's Primary Production select Committee – that regulations will remain until there is a level of competition in the market for processing raw milk in each of the N and S Islands. Regulatory regime will have a sunset clause.	E=0; F=0; H=0; I=Info (restructuring); P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>143</b> 77(1): 104 Aug '01	Election of Global Co. 'watchdog' council	Report on the formation of a 46-member Shareholders council of farmer representatives to work with Global Dairy Company directors and executives. "The council is not part of GDC governance structure, but will appoint the value and milk commissioner, and provide experience to future GDC directors.	E=0; F=0; H=0; I=Info (governance); P=0.
<b>144</b> 77(2): 8 Sep '01	Beauty and development in Coromandel dairyfarm	Story about a farm family in a "beautiful valley in northern Coromandel looking out on the Mercury Islands; "a conversion unit hitting mature production after 6 years"; are moving from Jerseys to 'Kiwi cows' "because they believe the Friesian-Jerseys hold on better when the hills dry out. Whangapoua has a fearsome summer dry, lasting up to 3 months, and Jersey-based cows bounce back better than bigger-framed cows from milking 3 times in 2 days to twice-daily milking. Conversely, the grass keeps growing through winter"; description of the soils and topography of the farm; "building soil fertility has been a priority" fertiliser applications are on basis of annual soil tests with some herbage tests to check on plant nutrients and trace elements. "Pasture utilised would be higher but for the wildlife. Wild turkeys, pheasant, geese and pigs all add to the rural ambience, but because they number in the hundreds, eat significant grass; milksolids at 788kgMS/ha, and 263kg MS/cow. "M and F have strong ideas about conservation and the value of trees, no only plantation pines. Main races are around the farm as well as through the middle, making for some attractive winding bits that serve to slow the cows and other traffic down so that they enjoy the walk. M and F "have invested heart and soul in this farm, which is shaping up well after a huge amount of work". M F bought the farm because "we thought it was the most beautiful farm we'd ever seen".	E=+; E=P+; E=prblm; F=mgmt; H=story; I=0; P=+; P=mgmt (Production is important, but so is conservation. Setting is perceived as an advantage; weather is both "fearsome" and bountiful; a story about adaptation to the local environment).

Article ID	Title of article	Description, key words and phrases	Code
<b>145</b> 77(2): 13 Sept '01	NZ's genetic system faces shift in focus	Speech by Prof D Garrick of Massey: NZ's system of genetic improvement in dairy herds is near its end because of changes in the industry. These include technology (e.g. intro of in-line milk metering and electronic SCC devices, sexed semen or cloning), greater complexity in milk payment systems to reflect milk composition (e.g. A2 milk), and changing farmer attitudes toward herd testing (e.g. owners of big herds interested in farm profits rather than per/cow production). Markets will greatly influence the future technology of genetic improvement.	E=0; F=0; H=0; I=Info; P=0; Stock (breeding), Science; Tech.
<b>146</b> 77(2): 42 Sept '01	Precondition cows before transportation	Concern that lactating cows that are transported to the South Island are properly prepared and cared for. They need a vet certificate and they need to be fed, watered and milked.	E=0; F=xprt adv; H=0; I=0; P=0; Stock (animal welfare).
<b>147</b> 77(2): 45 Sept '01	Phantom pregnancies frustrate farmers	Article by Dr J Macmillan, U of Melbourne on problems relating to fertility of cows. The article describes research related to fertility and breeding and consequences for farmers. The biology of cows means there is a trade-off between production and fertility; phantom cows more likely to be animals that are not quite ready to conceive naturally. "They are working too hard for 'the man' and not looking after themselves. That is why they include later calvers, treated and untreated non-cyclers, thinner cows and low milk protein cows".	E=0; F=0; H=0; I=0; P=0; Science; Stock (breeding; animal welfare).
<b>148</b> 77(2): 71 Sept '01	'Separate database ownership, service provision'	Report of submission to Primary Production Committee by Dairy Farmers of NZ that herd database should not be owned by LIC. DFNZ wants contestable herd testing without requirements to meet database needs. These should be funded by the industry good body. There is a trend among large-herd owners away from herd testing and DFNZ believes the <i>Industry Restructuring Bill</i> does not meet their need for a cheaper system. Sharemilkers, in contrast, want LIC to own the database.	E=0; F=0; H=0; I=Info; P=0.

Article ID	Title of article	Description, key words and phrases	Code
149 77(2): 82 Sept '01	Global Co. Shareholder representatives elected	Report on the election of shareholder representatives for Global Co Shareholders Council. Successful representatives named for each ward. "The council's key role is to monitor the company's performance and be an advocate for shareholders' interests". The council will receive and review the board's statement of intentions and report to shareholders on company performance against those intentions".	E=0; F=0; H=0; I=Info (governance); P=0.
150 77(2): 102 Sept '01	Co-op. Is bioactive in health arena	Article about goat milk and its use as an alternative to cow's milk.	E=0; F=0; H=0; News; P=0.
151 77(2): 103 Sept '01	Awards put seal on <i>Gourmet</i> quality	Report of an award to Dunedin's <i>Gourmet Ice-cream Co</i> which is seeking more niche markets.	E=0; F=0; H=0; News; P=0.
152 77(2): 110 Sept '01	Colostrum vital for calf survival and growth	Report on the result of 5-year research project studying the effect of colostrum on the survival and welfare of calves. "Calves that get no colostrum die in significantly greater numbers than calves fed colostrum.	E=0; F=0; H=0; I=0;P=0; Science; Stock (animal welfare).
153 77(3): 14 Oct '01	Winning formula for Young Farmer of the Year	Personal story of the 27-year old YFY Gene Roberts, sharemilker. Aiming for 1200kg - 1300kg MS/ha. "Challenges include: keeping the peat paddocks producing in summer dry nursing soft soils through wet weather; and dealing with old stumps that keep rising to the surface in developing paddocks"; describes Gene's background, the YFY competition; staff management philosophy; aims for the farm . "Peat soils can grow plenty of pasture. . . but they are vulnerable in extreme dry and wet weather', Gene says".	E=struggl; F=mgmt; H=story; I=0; P=+.

<b>Article ID</b>	<b>Title of article</b>	<b>Description, key words and phrases</b>	<b>Code</b>
<b>154</b> 77(3): 19 Oct '01	Giant stump chomper takes field	Report about a 900 horsepower, 15-tonned machine that will "chomp its way through a hectare of stumpy ground in 5 hours".	E=struggle; E=mgmt; F=0; H=0; I=0; P=0; Tech.
<b>155</b> 77(3): 32 Oct '01	Milk-based CMRs preferable to alternatives	Report of the views of a vet specializing in calf rearing that Fonterra as a monopoly must make sure there is adequate milk available for calf rearing; that milk substitutes are not as good.	E=0; F=xprt adv; H=0; I=Info; P=prdcvty; Stock (animal health); Science.
<b>156</b> 77(3): 58 Oct '01	Half of farmers have no coaching	Kerry Ryan of Dexcel Consulting Officer Service reports that half of all farmers use no consultants or consulting services "Rather than competing, off-farm professionals should join forces to prove a full range of advisory, financial and legal services to the farmer" "farm consultants are the general practitioners, looking at the farm from grass to staff relationships etc.	E=0; F=B; F= xprt adv; H=edu; I=0; P=0.
<b>157</b> 77(3): 60 Oct '01	US expert reviews SCC controls	Advice by US expert, Prof. Larry Smith of Ohio Stat U. Agri. Res. and Development Center on SCC standards for the industry; predictions about future targets for SCC (200,000 and less compared with present 400,000SCC limit) and calf care.	E=0; F=0; H=0; I=Info; P=0; Science; Stock (animal welfare),
<b>158</b> 77(3): 71 Oct '01	Code of practice for fertiliser use	Report of the release of a Code of practice for fertiliser use by the Fertiliser Manufacturers Research Assn. The Assn says "the code will help farmers to farm scientifically while being environmentally conscious".	E=care; E=mgmt; F=0; H=0; I=Info; P=0.
<b>159</b> 77(3): 74 Oct '01	More support for 'real value' milk campaign	Report on growing support to pay farmers according to the real value of milk at different times of year. The proponents argue that real value market signals would persuade farmers to concentrate on producing the greatest possible value of milk, rather than the highest total production". Present system has driven up the peak and encouraged conversion of short-season land. Farmers would shift production from peak to shoulder months; improve milk quality (because less early lactation milk).	E=0; F=bus; F=xprt adv; H=0; I=0; P=prblm; P=prdcvty.

Article ID	Title of article	Description, key words and phrases	Code
160 77(3): 92 Oct '01	Cherry picking herd testers not wanted	Article about herd testing system; LIC submission to Primary Production Select Committee advocating maintaining the current nation-wide, uniform, consistent national herd data base and herd testing system.	E=0, F=0; H=0; I=Info; P=0; Stock.
161 77(3): 98 Oct '01	Fonterra Co-operative Group, Introducing Fonterra	Report announcing the name Fonterra for Global Dairy Co; introductions to key senior executive officers of the merged company.	E=0; F=0; H=story; I=Info (restructuring) P=0.
162 77(4): 27 Nov '01	Peak .....Persistence.....Profitability	Advice from Dr John Rocke, Dexcel, Hamilton on how to minimise the decline in milk production per cow after the seasonal peak. Discusses the nutritional variability of pasture and impacts on milk production. "Both peak milk yield and persistency of lactation are important determinants of total milksolids yield".	E=0; F=xprt adv; H=0; I=0; P=+; Pr=+; Stock (nutrition).
163 77(4): 97 Nov '01	Alliance was Bonlac's crowning achievement	Report on the performance of Australian dairy firm "Bonlac" which became partly owned by NZDB (subsequently Fonterra).	E=0; F=0; H=0; I=Info; P=0.
164 77(4): 104 Nov '01	Two key documents to guide equity ownership dairy farms	A discussion about trends in farm ownership "the enormous changes in the dairy industry mean the days of the traditional family-owned dairy farm might be numbered. In its place, we will increasingly see . . . the corporate dairy farmer. Rising land and herd prices, trends towards larger herds and the cost of having to purchase shares in Fonterra Co-operative Group make it increasingly difficult to achieve dairyfarm ownership via sharemilking".	E=0; F=B; H=0; I=Info; P=0.

Article ID	Title of article	Description, key words and phrases	Code
165 77(5): 8 Dec '01	17-year-old took different route to dairy ownership	Personal story of a 33 year old farmer who built his way up to farm ownership by hard work and determination after leaving school at 15. He bought a one-truck spray business at 17 and began a farm spraying business, then bought land and stock in incremental steps until they reached current level of 60ha + 123 ha and 500 cows through 2 dairies.	E=0; F=B; F= mgmt; H=story, I=0; P=+; P=mgmt; P=Success.
166 77(5): 15 Dec '01	Environment Awards in 3 regions	A report about the expansion of the Farm Environment Awards started in Waikato. Mentions the various sponsors supporting the award. "MAF's sustainable farming fund has granted the FEA Trust \$271,000 for extension".	E=care; F=0; H=edu; I= info; P=0.
167 77(5): 23 Dec '01	Year-round milking solves problem of induction	Farm story of mid-Canterbury dairy farm couple with 2,400 cows. The cows are divided into two herds, each herd split into 2 calving dates, and milked 300 days, year round. Advantage of split herds is that late-conceiving cows do not have to be induced; can simply join the autumn calvers.	E=0, F=mgmt; H=story; I=0; P=+; Stock (management).
168 77(5): 52 Dec '01	Researchers rally to revive clover	An article about the merits of white clover for pasture (as a nitrogen source) and for animal nutrition. Discussion about the research that it going on to retain and improve white clover; possibility of genetic engineering.	E=0; F=0; H=0; I= 0; P=+; Science.
169 77(5): 78 Dec '01	Priority setting for industry good	Report on the research funding source and funding priorities of <i>Dairy InSight</i> and <i>Dexcel</i> as farm production research and extension agencies.	E=0; F=0; H=0; I=Info; P=0; Science,
170 77(5): 80 Dec '01	Committed CO service to Northland	An obituary about a Northland farm consulting officer	E=0; F=0; H=story; I=0; News; P=0.

Article ID	Title of article	Description, key words and phrases	Code
171 77(5): 81 Dec '01	JV Passage to India	A report about a joint venture business deal between NZ Milk and Britannia Industries, a firm "which owns one of India's strongest food brands".	E=0; F=0; H=0; I=Info P=0.
172 77(5): 83 Dec '01	Import risk management	Report of a speech by Dr Noel Murray of MAF Biosecurity authority on risk assessment; discusses the issues involved in risk assessment.	E=0; F=0; H=0; I=Info (biosecurity); P=0.
173 77(5): 104 Dec '01	New AR1 pastures need care	Article by Dexcel scientist Dr Stephanie Bluett, on the potential of new ryegrass cultivars to reduce risk from wild endophyte. Details on pasture and herd management to reduce contamination of new cultivars by wild endophyte.	E=mgmt; F= xprt adv; H=0; I=0; P=+; Science.
174 77(5): 110 Dec '01	Need to mediate in heated GM debate	"The need to find solutions to defuse the polarised and heated genetic modification debate emerged as a key factor at the <i>Agribusiness and Food Congress</i> in Christchurch.	E=0; F=0; GM; H=0; News; P=0.
175 77(6): 31 Jan '02	Destruction of 735 exposed calves	Report of a group of calves that were exposed to an exotic disease, goat <i>Mycoplasma</i> . Details the response of MAF Technical Advisory Group, and MAF Biosecurity Authority.	E=0; F=0; H=0; I=Info (Biosecurity); P=0; Stock (animal health).
176 77(6): 40 Jan '02	Water certainty in jeopardy for Rangitata schemes	"Suggestions of raising the minimum flow on the Rangitata River could result in Mid-Canterbury dairy farmers facing water restrictions right at the times they need it most" - the story of a farming couple and how they will be affected if restrictions are placed on the amount of water that can be take for irrigation.	E=struggle F=mgmt; H=story; I=0; P=+.
177 77(6): 46 Jan '02	Dr Roger Marshall	Obituary of "one of the world's leaders in leptospirosis research".	E=0; F=0; H=story; I=0; News; Science.

Article ID	Title of article	Description, key words and phrases	Code
<b>178</b> 77(6): 48 Jan '02	Building skills a handy asset	Farm story of a farm couple. Descriptions of personal background of each partner, their incremental steps towards herd and then farm ownership; description of stock management.	E=0; F=mgmt; H=story (family, lifestyle); I=0; P=+.
<b>179</b> 77(6): 52 Jan '02	Gap between scientific and public understanding of GM food safety	Statement by "one of NZ's leading plant molecular biologists, Prof. Brian Jordan, director of Lincoln University's soil, plant and ecological sciences division that "it is time findings of the Royal Commission on Genetic Modification are overtly supported and NZ develops gene technology in a safe and sustainable manner". A lengthy and detailed report in support of GE.	E=0; F=0; GM; H=0; News; P=0; Science.
<b>180</b> 77(6): 59 Jan '02	Lessons for NZ from UK foot and mouth	"NZ needs better disease surveillance systems to detect outbreaks such as foot and mouth quickly, and then move promptly with a response, says Massey University's Professor, Roger Morris. "We need effective surveillance to detect and outbreak promptly, constant preparedness . . ."	E=struggl (against disease); F=0; H=0; News (biosecurity); Science.
<b>181</b> 77(7): 24 Feb '02	Survival strategies in black and white	Report on the prospects and concerns of the NZ Holstein-Friesian Association raised at an annual conference	E=0; F=0; H=0; News; P=0; Stock (breed),
<b>182</b> 77(7): 28 Feb '02	Service commemorated in naming LIC facility	Report of the opening of a new conference venue at the Livestock Improvement Centre at Newstead, named after a retired employee of LIC.	E=0; F=0; H=0; I=Info; P=0.
<b>183</b> 77(7): 64 Feb '02	Adaptability along 75-year journey	Report of 75 <sup>th</sup> birthday celebration of NZ Dairy Research Institute; reflections on the strengths of NZDRI (adaptability, innovation in the face of changing world markets).	E=0; F=0; H=0; I=info (organisation); P=0; Science.

Article ID	Title of article	Description, key words and phrases	Code
184 77(7): 70 Feb '02	Exchange rate factored into forecast	A report on agricultural exports for the year ending March 2002, and the contribution of the dairy industry; reports important events that affected exports and the implications of these for NZ (BSE crisis in Europe, FMD in UK, discovery of BSE in Japan and events of Sept 11 <sup>th</sup> ; weak NZ \$	E=0; F=0; H=0; I=Info P=0.
185 77(7): 72 Feb '02	More product to place in markets	A report summarising some key points from <i>Situation and Outlook for NZ Agriculture and Forestry</i> report. "Milksolids for processing into dairy products for the year ending May 2002 are estimated at 1072 million kilograms, up from 1046m kg last season. Volume is expected to reach 1190m kg in 2004-05 season".	E=0; F=0; H=0; I=Info (industry outlook) P=0.
186 77(8): 14 Mar '02	Milking all-year requires planning for quality feed	Article about a couple who milk year round, with an autumn calving herd. Describes management of feed budget to ensure enough feed for winter milkers. "Adrian and Pauline Ball are on course for 1500kg MS/ha and better than 440kg MS/cow over 12 months on their 6 <sup>th</sup> -year dairy conversion at Tirau". Article discusses herd management and breeding and pasture management for quality feed. Monitoring of pasture growth and quality is important.	E=mgmt; F=mgmt; H=story; I=0; P=+; P=mgmt; P=success.
187 77(8): 81 Mar '02	'Foolish' to rush-ratify protocol	Report on the response of Federated Farmers to NZ Climate change Programme. FF is advocating caution in ratifying the protocol, and caution about introducing "high-cost, low-impact action". Argues that NZ government does not understand the cost implications of reducing greenhouse gases, especially on the farming sector.	E=0; F=0; H=0; News; P=0.

Article ID	Title of article	Description, key words and phrases	Code
<b>188</b> 77(8): 124 Mar '02	Consultant clarifies thinking with three heads on the job	Story of a farm consultant and farm family working together on farm management and directions. Describes Mike King and wife, farm consultant, and Bob Berger and wife and son, Simon and wife. The team approach has been successful "This was a high altitude farm at 400m above sea level on light pumice soils. Aggressive farming was needed to crack the 1000kg MS/ha barrier". Farm consultant helps to clarify thinking, and "puts figures on paper to show how things will work".	E=struggl; F=mgmt; H=story; I=0; P=+; P=mgmt.
<b>189</b> 77(9): 8 Apr '02	Keeping 26ha viable whatever happens	Story about a small-size dairy farm owned by "dairyfarmer, environmentalist, fisherman, sports coach and ceroc dancer"; Describes the management of the farm, tree planting; finances; stock management and breeding. The farm needs to go for high stock density (3.9 cows/ha); annual soil tests.	E=care; F=mgmt; H=story; I=0 P=+.
<b>190</b> 77(9): 23 Apr '02	Willows and poplars as effluent sponge	Report of a poster presentation to dairyfarm soil management workshop run by Massey University, to the effect that demonstration plots planted with poplars and willows on a dairy farm in southern Wairarapa to "renovate farm dairy effluent". If dairy effluent is irrigated onto poplars and willows they can remove nitrogen and the foliage then fed to livestock.	E=mgmt; F=xprt adv; H=0; I=0; P=0.
<b>191</b> 77(9): 47 Apr '02	Choice is narrow after overdose of rain on plains	A report of how a wet summer in Canterbury has resulted in "the worst seed crop season ever". "What it all means is that farmers are unlikely to get their preferred varieties".	E=prblm; F=0; H=0; News; P=0.
<b>192</b> 77(9): 78 Apr '02	Users of products and services assume co-operative ownership	Report on the new ownership structuring of Livestock Improvement Corporation following the <i>Dairy Industry Restructuring Act 2001</i> , and amalgamation of NZDB and NZDG and Kiwi Co-op dairy companies into Fonterra. LIC was formerly a subdivision of NZDB, and has become a separate co-operatively owned entity.	E=0; F=0; H=0; I=info (organisation); P=0.

Article ID	Title of article	Description, key words and phrases	Code
193 77(9): 79 Apr '02	Co-operative circle swirls new logo	A report about the new logo of the restructured LIC. The co-operative's focus remained "business as usual" (i.e. herd testing, herd database, artificial breeding). "Its shape represents swirls of milk along with the three planks of LIC's business: genetics, information and advice. The circle they describe represents the strengths of the co-operative."	E=0; F=0; H=0; I=Info; (organisation); P=0.
194 77(10): 40 May '02	Hokitika couple win title	Story of the couple who have won West coast/Top of the South/ Canterbury Sharemilkers of the Year. Describes the number of cows milked (375), on 220ha, their aims, their background (wife is a school teacher, husband is ex-banker). The run-off "has a serious giant buttercup problem which means it has only been used for wintering, rather than growing out young stock. Plans are in place to spray out the aggressive weed but for the past 2 seasons they have been thwarted by the weather. Once that is overcome Pete believes the whole property will run more efficiently and productively"	E=prblm; E=struggl; F=B; F=mgmt; H=story; I=0; P=+ P=success.
195 77(10): 44 May '02	Sold on the South	Report on the Southland sharemilker of the Year; originally from Matamata, "He would never have been able to make the progress he has, if he had stayed in the north". When he moved south he had 230 cows, now has 520 and plans to go to 600. He has 3 f-time staff and, "His staff are the essential element to his success". Description of stock and pasture management.	E=+; F=mgmt; H=story; I=0; P=+; P=Success.
196 77(10): 52 May '02	Aim to save 2 hours a day	Article by Excel consulting officer in Southland to say that the interval between milkings can be increased without loss of production "there is research to show the interval between milking can be pushed out to 16 hours, with little or no loss in production" (8 hours during the day, 16 at night). Advantages are more sociable hours, better value for time, better time organisation; disadvantages: tanker delivery times; pasture management.	E=0; F=xprt adv; H=welf; I=0; P=+; P=mgmt; Stock.

Article ID	Title of article	Description, key words and phrases	Code
197 77(10): 56 May '02	Is once (milking) enough?	Report by Dexcel researcher at Westpac Trust Dairy Conference of research to suggest that once-a-day milking may be enough for production. OAD milking involved less production per cow, but if stock density was increased, production could be the same for OAD as for TAD. Advantages of OAD: less stress; lifestyle opportunity for alternative employment; better use of capital; reduced operating costs; improved labour productivity. Disadvantages included shorter lactation, and lower milk yields and higher SCC levels in late lactation.	E=0; F=0; H=welf; I=0; P=prdcvty; Stock.
198 77(10): 96 May '02	Nestle, Fonterra formalise Dairy Partners Americas	Report on the 50:50 Alliance between Fonterra and Nestle <i>Dairy Partners Americas</i> . "Nestle is the world's largest food company, and global leader in branded dairy products. Fonterra is the world's largest exporter of dairy products." Describes the immediate DPA priorities as Argentina, Brazil, Paraguay, Uruguay and Venezuela.	E=0; F=0; H=0; I=info; P=0.
199 77(10):102 May '02	Protocol prematurity tax cost on farmers	Reported comments by National Party agriculture spokesman on the folly of government's "rush" to ratify the Kyoto protocol. Claims that govt's rush to ratify will hand competitive advantage to non-ratified competing countries, especially Aust. and USA	E=0; F=0; H=0; News (govt. policy); P=0.
200 77(10):120 May '02	Target next year's production now	Dexcel consulting officer talks about target milk solids production per cow, and the need to plan ahead to achieve targets, by feeding lighter cows ahead of calving; by proper care of young stock.	E=0; F=xprt adv; H=0; I=0; P=+; P=mgmt; Stock.

Article ID	Title of article	Description, key words and phrases	Code
77(10):130 May '02	Family: New kitchen could save your assets	Importance of family communication and family relationships. "should partners decide to leave, that may take up to 70% of a diary farmer's assets with them", and "it is important for farming families to negate discontent at the 'front-end' rather than when it becomes a family bust-up problem". "Major causes of family friction on a dairy farm are: money; housing; and working hours".	E=0; F=0; H=welf; I=0; P=0.
77(10):134 May '02	Cultivation: to till or not to till?	No-tillage pasture and crop planting is gaining some traction with seminars at Taupo and Ashburton organised by Monsanto attracting 260 and 300; predominantly farmers, consultants, contractors, and representatives from farm service companies. Success hinges on strategic control of weeds with Roundup herbicide, attention to fertilizer, especially extra nitrogen in the early post-spraying phase when bacteria in decaying plant matter lock up naturally available nitrogen, and careful control of insect pests in the new grass or crop."	E=0; F=0; H=0; I=0; P=+; P=mgmt.

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**Personal communications**

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Chairman, Waikato Farm Environment Award, Waoutu, RD Putaruru

The members of five farm families who did not wish to be identified

10 conservation farmers who did not wish to be identified

2 other farmers who did not wish to be identified.