



Growing for good

Intensive farming, sustainability
and New Zealand's environment



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Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

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Preface

In a global context New Zealand can be described as being in the business of pampering the palates and passions of the world's more prosperous citizens. We do this through exporting our foods, fibres, wines, films and delivering great visitor experiences in our Gondwanan landscapes. New Zealanders are highly dependent on our natural capital – our waters, soils and biodiversity – for sustaining these wealth-generating capabilities.

In this report we examine the environmental sustainability of more intensive farming in New Zealand. That is, we look at how well the natural resource base of farming is being maintained. We do this by teasing out some of the complex economic, social, political, environmental and global forces that are shaping New Zealand's food and fibre businesses. Our starting position is an optimistic one. My team and I believe that New Zealand's farming sector will continue to play a vital role in our economy far into a distant future. We also believe in the ability of New Zealanders to innovate, to recognise when new directions are needed, and to redesign systems to meet new challenges and opportunities.

From these points of reference we have delved into many strands of farming from a paddock to plate context. We have looked at trends and challenges in the intensive farming systems in the United Kingdom, Netherlands and Australia. We have explored the market demands and the evolution of the Common Agricultural Policy in Europe to get a feel for what the shift from production subsidies to environmental protection might mean for New Zealand's farming and food futures. Closer to home, we have drawn on the wisdom of a great number of studies and people; farmers, local government staff and councillors, bankers, real estate agents, researchers, agribusiness folks, NGOs and members of central government agencies. This was done through visits to four regions and via discussions held in main centres. It was a deliberate process of embedding ourselves into the heart and soul of the farming sector to get a deeper understanding of what was going on. In particular, it involved questioning what is shaping the direction of farming in New Zealand and beyond, both now and in the foreseeable future.

This report synthesises many of the strands we explored. It focuses on the crucial part that two key inputs play in farming productivity – synthetic nitrogen fertiliser and irrigation water. We have zeroed in on these two because they are among the most important 'fuels' of the big increases in productivity over the last decade. They also have a major potential for adverse environmental impacts, as communities worldwide have found to their cost. In examining these two inputs we stress that we are not questioning the use of added nutrients and irrigation in agriculture, as they are both fundamental to farming productivity. However, we do examine the way in which they are being used, as there is mounting evidence that current models may be putting many farm systems at risk. For example the high, and still rising, use of synthetic nitrogen fertiliser appears to be leading to farming systems that are financially and environmentally 'brittle'. Financially brittle because synthetic nitrogen fertiliser relies on petroleum-based products for its manufacture and these products are likely to become increasingly expensive in real terms. Environmentally brittle because a high proportion of the nitrogen that is applied, directly or indirectly via livestock, reaches ground and surface waters and leads to the problems seen in Lake Rotoiti and other lowland water bodies in too many parts of New Zealand.

We have focused on the big shapers of New Zealand's farming and food systems. These are not largely physical, despite the fact that their expression is. Rather they are economic, institutional and political, and frequently originate far from our shores. An example is the enormous production subsidies paid in the European Union, USA and Japan that New Zealand is working hard to have reduced.

Over a decade ago, CSIRO researcher Barney Foran drew together some of the bigger issues that had emerged at an International Grasslands Congress in Palmerston North. He wrote:

The biggest challenge at the moment is to produce a vision of why we produce products from grasslands. If we are worried by the energy consumption of our developed economies, then we must develop low energy integrated pasture systems that give high quality products with no down stream pollution effects – a “cradle to grave” design concept. Our experimental methods must now be redesigned to reflect product quality rather than product quantity. We must re-examine why production per hectare is seen as a Holy Grail. In many areas, land prices have been distorted by government policy, and land is overvalued in terms of its productive worth, rather than limiting in amount. We could do better by helping to crash the land prices, rather than developing technologies to run the land harder to make it pay. This XVII Congress taught us that grasslands give much more than production. Using our grasslands are people who are real, and have life goals. Many of our landscapes are beautiful and biodiverse, and our technologies must accommodate these other uses.⁷

Eleven years later this synopsis is even more pertinent. Unfortunately, in the intervening years New Zealand has made glacial progress in addressing (or even fully acknowledging) the issues, opportunities and needs identified by the large cast of local and international participants. In particular the need for a new vision and to redesign farming systems seems to have gained little traction.

We cannot continue to respond so slowly and in such a piecemeal fashion. A much more strategic, long-term approach is needed. Such an approach should be developed from a wide stakeholder base, be sharply focused, and have clear goals to advance the sustainability of New Zealand's farming and food industries. We highlight the need for a forum for dialogue between all of New Zealand's farming, food and fibre stakeholders. This is not an original idea, as it was raised by a number of leaders during the course of our interviews. The nature of the forum needs to be discussed widely, but to be effective we believe it needs to be enduring, to sit outside government (but with local and central government partnered to it) and to have the capacity to enable all sectors to share strategic thinking. At present it is not easy for the various farming sectors to share ideas and experiences with other sectors. To remain competitive and to become more environmentally sustainable all sectors will need to develop collective understandings of

the major opportunities and threats to our biotic businesses and the natural capital underpinning them all.

We conclude our report by considering the opportunities for redesign, some initiatives already underway, and the resources needed to realise opportunities. We believe it is possible to transform many systems for the better if all players in our biotic futures are prepared to accept the challenges and to enter into dialogue about what is needed to address them. In this context, dialogue is an important word. It is about listening, building on the ideas of others, and working collectively towards agreed goals. My team and I trust that this report will make a contribution to that dialogue. As always, we welcome feedback on our efforts.

New Zealand can do it – let's get on with it!

A handwritten signature in black ink, reading "J. Morgan Williams". The signature is written in a cursive, flowing style.

Dr J. Morgan Williams
Parliamentary Commissioner for the Environment

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Guide to this report

This report examines the environmental impacts and sustainability of more intensive farming in New Zealand. It has been written for a broad range of people and organisations. Although it explores many complex issues, readers are not expected to be experts in any particular area.

Key messages

A separate 12-page pamphlet summarises the main messages from this report. Key points and summaries are also included at the end of each chapter, except for Chapters 1 and 7 as these are relatively short.

1 Introduction

The first chapter identifies the purpose of this report, what it does (and does not) cover and the methods that we used to research and write it.

2 Farming systems and sustainability

The second chapter sets the scene by explaining important concepts. It defines terms such as 'natural capital' and discusses why more intensive farming can be a cause for concern. It also identifies some key principles that have guided the thinking in this report.

3 Current trends

This chapter looks at some recent farming trends within New Zealand. Although the trends vary across each farming sector, it highlights that farming is generally becoming more intensive and that the environment is being damaged in many intensive farming areas.

4 Drivers and incentives

What is driving the development of more intensive farming in New Zealand? This chapter examines what is shaping farming in this country, focusing on the economic factors that tend to have the most influence.

5 Risks and challenges

This chapter examines some of the major risks that the environment and the farming sector face if current trends persist. In particular, it looks at the consequences of using more and more synthetic fertilisers and irrigation on fresh water in New Zealand.

6 Emerging trends

There is currently a lot of activity taking place to address the environmental impacts of farming in New Zealand. This chapter examines some existing approaches to 'redesign' farming and considers the scale of the challenges ahead.

7 Moving forward

Although many initiatives are already underway, more fundamental changes are needed to maintain and improve the quality of the environment and to avoid many risks to farming. The final chapter suggests some first steps towards change and provides recommendations for action.

Glossary

A glossary of terms, abbreviations and Maori words can be found at the end of the report.

Background reports

To support this investigation, more reports have been produced to provide additional analysis in key areas. These background reports are:

1. *Food market and trade risks*: assesses the effects of trade policies, supply trends, market access provisions and commodity prices on profits in the farming sector.
2. *Incentives for intensification*: uses in-depth farmer case studies to examine what is driving them to farm more intensively in New Zealand.
3. *The food production revolution — the search for a consumption efficiency policy*: examines the major economic factors that influence commodity producers and the potential to redesign these incentives to promote sustainability.
4. *International trends in farming and sustainability*: a literature review of farming trends, and policy responses to environmental issues, in the United Kingdom, Netherlands and Australia.

These reports were commissioned by the PCE to assist in this investigation. Any views expressed by the authors of these reports do not necessarily reflect the views of the Commissioner and his staff.

The background reports are available from www.pce.govt.nz or by contacting us directly.

CHAPTER

1

Introduction



The farming sector is very important for New Zealand and to maintain its viability the physical environment in which farming is based needs to be sustained in a healthy condition.¹ This report examines the trends toward more intensive farming systems in New Zealand and the impacts of these trends on 'natural capital', with a major focus on fresh water. It explores the driving forces behind these trends and identifies some major risks and challenges. It highlights a need to redesign many farming systems to promote better environmental, social and economic outcomes. Emphasis is placed on creating more resilient farming systems that are both economically viable *and* environmentally sustainable.

1.1 The importance of farming in New Zealand

Farming is a deeply ingrained part of contemporary New Zealand society. For most of the twentieth century, farming was considered the 'backbone' of the economy. New Zealand's temperate climate and fertile soils have supported almost every kind of farming—from sheep and cattle to cropping, horticulture and forestry. Farming has changed dramatically over time, and with it the shape of many rural communities. Although more than 85 percent of the population now lives in urban areas, the farming sector continues to play a fundamental role in New Zealand's economy. Farming products, excluding forestry, earn more than 40 percent of New Zealand's export income.²

Physically, farming dominates New Zealand's geography. There are about 70,000 farms in the country and over half New Zealand's land area is classified as farmland.³ Farming has also played an influential role in the development of New Zealand's national identity. Farming has long been associated with the innovative 'No. 8 wire' mentality that many people pride themselves on and the rural lowlands and rugged hills of New Zealand are still considered by many people, both urban and rural dwellers alike, to be the 'heartland' of this country.⁴

1.2 Background to this report

The Parliamentary Commissioner for the Environment (PCE) has had a long-standing interest in the farming sector of New Zealand. Several recent PCE investigations have examined elements of this sector, including:

- biosecurity
- the place of native plants on private land
- wetlands management
- progress with sustainable development in New Zealand since the 1992 Earth Summit.⁵

These investigations have highlighted many challenges for the environment and the sustainability of farming, such as the loss of lowland wetlands and biodiversity, the difficulties in managing non-point source pollution in waterways, potential pest and disease risks to monocultures, increased nutrient and energy inputs, and growing water demands for irrigation.

Many farming systems in New Zealand are currently becoming more intensive (as explained

in the following chapter, with the trends identified in Chapter 3). Intensification is born out of a drive to produce more from the same amount of land. The most visible manifestation of intensification in New Zealand over recent years has been in the dairy sector, with significant increases in dairy cows per hectare and milk production per cow. Intensive farming has contributed to declining water quality in many regions and challenges for water allocation. A variety of organisations and individuals have raised concerns about these trends with the Commissioner.

Internationally, there are also growing concerns about the environmental impacts and strategic risks of intensive farming systems (see Chapter 4). Farming in many parts of the globe has become much more intensive since around the 1940s. In Europe and North America in particular, the intensification of farming systems through the use of more materials and energy has led to increasing impacts on the environment. Against this backdrop, it was considered timely to review New Zealand's farming sector and to examine trends towards intensification.

1.3 Purpose of this report

This investigation was carried out pursuant to Sections 16(1)(a), (b) and (c) of the Environment Act 1986. Our terms of reference were to review:

- the characteristics of farming systems in New Zealand — particularly the more intensive forms of *food production* such as dairying, horticulture, and viticulture
- the impacts of farming on the environment — with a focus on *fresh water*.

More specifically, we have examined:

- *systems and trends* — characterising current farming systems and identifying trends, trajectories and driving forces in the farming sector
- *research and information* — reviewing available research, data and indicators to assess the state of New Zealand's natural capital in rural areas
- *impacts and effects* — identifying the links between farming and environmental sustainability
- *dialogue* — stimulating debate and reflecting the diversity of voices in the rural community around opportunities and ideas for the future of farming in New Zealand.

1.3.1 Our focus

This investigation looks at the development of more intensive farming in New Zealand, with a major focus on water. Although there are many elements of farming and sustainability that could have been explored, we decided to focus on water because of major concerns in many parts of New Zealand about the impacts of farming on waterways. Water quality is also a key indicator of ecosystem





health and therefore environmental sustainability. Consistent with this focus, we have looked at trends in nutrient inputs and water demand to explore the implications of these trends for fresh water quality and quantity. We have also examined the driving forces that are helping to shape farming trends in New Zealand, the risks and challenges associated with these trends, and areas where change is needed.

As Chapter 2 highlights, there are many different dimensions to sustainable agriculture. The central focus of this report is on *environmental* sustainability, as a core component of sustainable development — an unending quest to meet environmental, social, cultural and economic goals in ways that can be continued into a distant future.⁶ This environmental focus is consistent with the role and functions of the PCE.⁷ Nonetheless, environmental sustainability cannot be achieved without addressing the social

and economic factors behind unsustainable practices. Economically viable farms play an essential role in supporting rural communities in New Zealand. We have therefore examined some of the broader social and economic dimensions of sustainable agriculture as well. We have focused on opportunities to create more resilient farming systems that are both economically viable for farmers *and* environmentally sustainable.

1.3.2 What this report does NOT cover

This report does not intend to provide a comprehensive review of the entire farming sector. It focuses on intensive forms of farming for *food production*. It encompasses the dairy, intensive beef and sheep, deer, arable, horticulture and viticulture sectors, but *not* forestry and factory/shed farming.⁸ It does not cover urban, peri-urban and lifestyle-block areas, the conservation estate, or marginal lands.

There are some significant issues relevant for farming in New Zealand that have not been covered in this investigation. This investigation does *not*:

- include a review of agency performance or capacity to implement the *Resource Management Act 1991* (RMA) with respect to managing the environmental impacts of farming. This focus is outside the terms of reference and may merit an investigation in its own right. The PCE is planning a separate review of the RMA and these issues will be considered within the context of that investigation.⁹
- comment on *biosecurity*. This is a matter of considerable significance and poses some major risks for farming. However, the PCE has already completed a major investigation into biosecurity and is committed to on-going audits of New Zealand's biosecurity management.¹⁰
- explore the social and cultural dimensions of farming and rural communities in depth. Although it is essential to consider these dimensions in any discussion on sustainability, especially at a local level, our primary focus has been on environmental trends at a macro-level in New Zealand.

- explore the potential role of genetic sciences and one application of it – genetic modification (GM) in depth. This is because it is just one field of knowledge creation amongst many that could advance the sustainability of food production systems.

1.4 Methodology

Scoping (preliminary research) for this investigation began in September 2002. This consisted of desk-based literature reviews and information gathering. A small external reference group was then convened to assist with identifying issues and key questions for the investigation. This team consisted of:

- Don Ross — New Zealand Landcare Trust, Christchurch
- Gavin Sheath — AgResearch, Hamilton
- Anton Meister — Massey University, Palmerston North
- Stuart Morriss — Massey University, Palmerston North
- Jacqueline Rowarth — Unitec, Auckland.

Given the enormous size of the farming sector, we decided to use four regions as 'windows' into the world of farming in New Zealand. The four regions chosen were:

- *Canterbury* — for the trends in conversions to large-scale dairy farming, the size and diversity of the farming sector, the range of issues related to water allocation, irrigation proposals and the impacts of water extraction on the famous Canterbury rivers
- *Hawke's Bay* — for the range of intensive horticulture and viticulture in the region and the pressures on water in a region with low rainfall
- *Waikato* — for its long-established dairying sector and the current initiatives being undertaken to manage water quality issues in the Taupo basin and along the Waikato River
- *Southland* — for the trends in dairying conversions in this region.

The second major phase of the investigation consisted of interviews with a wide range of people with an interest in the farming sector (see Appendix 1). Most interviews were carried out in the four regions identified above. Additional visits were made to Auckland and we continued to hold discussions with a range of individuals and organisations throughout the research and writing phases of this project. To further inform our thinking and analysis, we commissioned research papers on financial and economic drivers relevant to farming in New Zealand. These documents are available as background reports to this investigation.

There is currently a lack of consistent and robust data on the environmental impacts and sustainability of farming in New Zealand. Although we assessed the available quantitative data, we took a more qualitative approach in our research.

