Growing for good

Summary of key messages

October 2004

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

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The roots of farming run deep in New Zealand society. New Zealand farmers have proven that they are among the most competitive in the world and they generate substantial wealth in the rural lowlands and rugged hills of this country. But is it possible to keep growing more and more food from the same area of land? How can farmers meet consumers' expectations for quality food at competitive prices while sustaining the 'clean and green' environment that New Zealanders expect? Is it possible for farmers to maintain profitability and enjoy a good quality of life in ways that maintain and improve the quality of this environment? These are just some of the questions raised by *Growing for good: Intensive farming, sustainability and New Zealand's environment.*

Extract from the Commissioner's 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.

Purpose of this report

This report began in 2002 after many individuals and organisations raised concerns with the Parliamentary Commissioner for the Environment about the impacts of intensive farming, particularly dairying, on New Zealand's waterways. We (the Commissioner and his staff) have drawn on extensive research and interviews with a wide variety of individuals and organisations to examine:

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

The report raises concerns about many current trends and the serious risks to the

quality of the environment and the sustainability of farming in this country. We therefore highlight a need to redesign existing systems to achieve better environmental, social and economic outcomes.

The development of more intensive farming

'More intensive' farming refers to the increasing use of inputs (such as fertiliser, irrigation, knowledge or capital) to grow more food from the same area of land. Farming has become more intensive in many parts of the globe by adding more 'external' inputs from beyond the farm. These include petroleum-dependent fertilisers, chemical pesticides, irrigation water and animal feedstuffs. These inputs have often taken the place of natural processes or resources (e.g. using synthetic fertilisers instead of legumes to provide nitrogen). Although food production has increased markedly through their use, there are major concerns about the long-term environmental, social and economic consequences of farming systems that have become dependent on these inputs. Prominent issues include the erosion of topsoil, loss of soil fertility, water pollution, loss of biodiversity and dependence on non-renewable fossil fuels. There are also concerns about food safety, human health, the viability of small family farms and the quality of life in rural communities.

... farming throughout New Zealand has generally become more intensive over the last decade.

Nonetheless, there are many ways in which farmers can maintain or increase productivity and avoid adverse effects. For example, it is possible to apply human knowledge to design systems that are more profitable and use less materials and energy. It is the particular way in which farming becomes more intensive, and not just its use of inputs, which needs to be considered in any discussion on its sustainability.

Farming in New Zealand over the last decade

New Zealand farmers have achieved major gains in economic productivity over the last decade. Their exposure to world markets and intense competition from subsidised producers in many other parts of the world has also placed a lot of pressure on them to farm more intensively. These pressures are strongest in agricultural commodity systems, in which food from New Zealand farms is very difficult to differentiate from products grown elsewhere around the globe. Examples of these commodities include milk powder and frozen beef. Commodity producers face ongoing demands to farm more intensively to maintain their position as low cost producers.

It is the particular *way* in which farming becomes more intensive, and not just its use of inputs, which needs to be considered.

Although farming throughout New Zealand has generally become more intensive over the last decade, different trends have emerged within each farming sector. For example:

- Dairy farming has become more intensive via the use of more external inputs (such as nitrogen fertiliser and irrigation) and by increasing the number of stock per hectare of land. There has been a major focus on increasing milk production volumes.

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- Intensive sheep and beef farms have also used more external inputs. However, there has been an emphasis on increasing the weight of animals rather than increasing total stock numbers per hectare. There has been a focus on increasing the value (instead of just the volume) of products such as lamb and prime beef, although many meat commodities are still being produced.
- The horticultural sectors, including viticulture, have also focused on high value production. Relative to the pastoral sectors, there has been more widespread adoption of environmental management systems, quality assurance systems, and technologies such as integrated pest management to carefully manage the use of external inputs.

Despite these differences, a common theme across each farming sector has been the increasing use of synthetic fertilisers to boost production. In particular, nitrogen fertiliser use has soared. Many farmers are also using irrigation to increase production. Page 5 provides some indicators from the main report that illustrate these trends. These inputs generate significant economic benefits. However, their ever-higher use can also come at a cost to natural capital, with risks to farming over the longer term.

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Farming and sustainability – in New Zealand and beyond

For farming to remain viable, the physical environment in which it is based needs to be sustained in a healthy condition. This is because farming is dependent on 'natural capital' – the stocks of natural resources such as water, soil and biodiversity – and the 'services' that this natural capital provides. These services include clean air and water, the creation and maintenance of fertile soils, pollination, liveable climates, raw materials, genetic resources for growing food and fibre, and processes to decompose and assimilate waste. Although these services are often taken for granted, they have immense value. Many are indeed priceless, as they have no known substitutes.

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Farming can impact on natural capital in many ways, for better or worse. If it degrades natural capital, the ongoing viability of farming may be threatened. Degraded natural capital is contributing to decreasing farm productivity in many parts of the world. Furthermore, if the wider community thinks that the environmental damage from farming is unacceptable, farmers risk losing their 'licence to operate' in society. Ultimately, to ensure that food production from farms can be sustained, farming needs to be:

- *Environmentally sustainable:* to maintain and enhance the natural capital on which farming depends as well as other ecosystems influenced by farming.
- *Socially beneficial:* to enhance the quality of life for people in rural communities and beyond, while addressing wider social and cultural concerns.
- *Economically viable:* to ensure farmers have a secure and rewarding livelihood.

Selected trends from the main report

Dairy sector

Cows per hectare

Up 19%
1994 – 2002

Milksolids per hectare

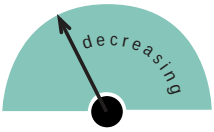
Up 34%
1994 – 2002

Urea fertiliser use per hectare

Up 162%
1996 – 2002

Sheep and beef sector

Stock per hectare on intensive farms



Down between
5% – 20%
1981 – 2002

Lamb export carcass weights

Up 25%
1980 – 2003

Beef export carcass weights

Up 13%
1980 – 2003

Tonnes of fertiliser on intensive farms

Up between
167% – 263%
1991 – 2002

Horticulture and viticulture sectors

Hectares farmed

Up 6%
1994 – 2002

Land under irrigation

Up 199%
1985 – 2002

DAP fertiliser use per hectare

Up 150% in the vegetable sector
1996 – 2002

Use of inputs across farming sectors

Synthetic fertiliser use

Up 21%
1996 – 2002

Nitrogen fertiliser: urea use

Up 160%
1996 – 2002

Area of irrigated land

Increasing 55% each decade

Water abstraction

Increasing for both surface water and ground water

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Most New Zealand farmers produce food or fibre for overseas markets. They therefore need to be responsive to the concerns of people living overseas as well as in New Zealand. There are rising concerns in many parts of the world about the quality of people's food and the integrity of the environment in which it is grown. In Europe, agricultural reforms are being structured around environmentally sound production methods, high standards of animal welfare, and food safety and quality concerns. Many consumers are willing to pay a premium for food that is produced in a responsible way. It is also possible that new trade restrictions will develop on the basis of production methods – including environmental impacts.

Farming and fresh water in New Zealand

Growing for good takes a close look at the consequences of using more and more synthetic fertilisers and irrigation on fresh water. New Zealand's surface waters (streams, rivers and lakes) and groundwater systems are coming under increasing pressure from intensive farming. Water quality is decreasing in many areas and there are increasing demands for irrigation.

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There has been a major increase in the use of synthetic fertilisers (particularly nitrogen) which provide nutrients to the soil to boost production on the farm. Nutrients can also be added to the soil via legumes such as clover, spraying effluent onto pasture, via the activities of soil micro-organisms from animal excreta (particularly urine) and, in geological timescales, from the weathering of rocks and soil particles.

Nutrient inputs need to be very carefully managed. If excessive amounts are applied to pasture or crops it leaks into the wider environment. Nitrogen in particular is highly mobile and can easily enter streams or leach through the soil into groundwater, eventually ending up in rivers, lakes and coastal waters. This leads to the eutrophication of fresh waters and coastal waters and the deterioration of groundwater quality. Once nitrogen enters the environment there is no effective way to remove it.

... New Zealand's waterways and lakes are becoming nutrient enriched and degraded.

There is strong evidence that New Zealand's waterways and lakes are becoming nutrient enriched and degraded. The lag time taken for nutrients to move from soils into these water bodies suggests that any problems will get worse before they eventually improve. For example, the current deterioration in Lake Taupo's water quality is due to increased nitrogen from farming up to 50 years ago. Given that farming has become much more intensive since this time, the medium-term outlook does not look good – hence the major collaborative efforts to reshape land uses in the Taupo basin. The longer it takes to address these problems across New Zealand, the more likely it is that serious degradation will result.

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Faecal matter and eroded sediment from farming sources are other major contaminants of New Zealand's waterways. Many of New Zealand's lowland rivers are now unsuitable for swimming and some drinking water supplies are at risk from faecal contamination. Sediment can adversely affect water bodies in two ways: it can be

suspended in water, affecting light penetration and visual clarity; and it can smother animals, plants and streambeds, affecting animal lifecycles and food supply.

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Water allocation is also a significant issue in New Zealand. The demand for water continues to increase, with the biggest demands coming from the dairy farming sector. The efficiency of water use also appears to be variable and requires major attention. While irrigation provides many benefits, it can also contribute to adverse environmental effects. Both surface waters and groundwater sustain complex ecosystems. Any removal of water from these water bodies impacts on those ecosystems. Irrigation can also act as a transport medium for contaminants (such as sediment, farming chemicals, effluent discharges and nutrients) to move from the land to surface water and groundwater.

Using more inputs such as synthetic fertilisers and irrigation enables farmers to grow more pasture or crops and to increase the number of stock on each hectare of land. This can worsen many of the environmental impacts discussed above. For example, higher stocking rates in the dairy sector have led to more faecal matter and more cow urine (and thus nitrogen) leaching to the environment.

Growing risks for the environment and farming

There are now major risks to the quality and availability of fresh water in New Zealand. Both are in decline in many regions. These risks are likely to become more critical if current trends persist. The farming sector is already facing rising public pressure to properly address these trends. New Zealanders highly value waterways being maintained in a healthy condition for purposes such as swimming, fishing and boating as well as for drinking water supplies. Furthermore, many other economic sectors, particularly tourism, rely on New Zealand's 'clean and green' image. The wealth generation capabilities of New Zealand as a whole could suffer if environmental realities do not meet the expectations of overseas consumers or tourists.

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Other looming risks for farming, which are likely to become more serious if current trends continue, include:

- the potential loss of access to lucrative overseas markets if trade becomes restricted on the basis of production methods, including environmental impacts
- a growing reliance on fossil-fuel dependent fertilisers, even though these inputs are likely to become much more expensive in the future
- ongoing loss of natural capital and the essential services it provides to farming.

Looking overseas, it is easy to see where more intensive farming can sometimes lead. Nitrogen saturation in soils and high nitrates in water are a significant problem in Europe. Farming in the United Kingdom has been devastated by the BSE ('mad cow') disease and foot-and-mouth outbreaks, leading to a major rethink of their food and

farming systems. Access to water for irrigation is also getting more difficult in many countries as water levels in aquifers drop from overuse.

Current trends are not inevitable.

To respond to the growing environmental risks within New Zealand, and to avoid some of the major problems being experienced overseas, New Zealand farmers need to acknowledge and address these trends. Current trends are not inevitable. It is possible to farm in ways that are environmentally, socially and economically sustainable. However, this will require many existing systems to be redesigned.

Redesigning for sustainability

'Redesign' involves purposefully changing or adapting farming practices, and the broader systems that shape those practices, to meet specific goals or values.

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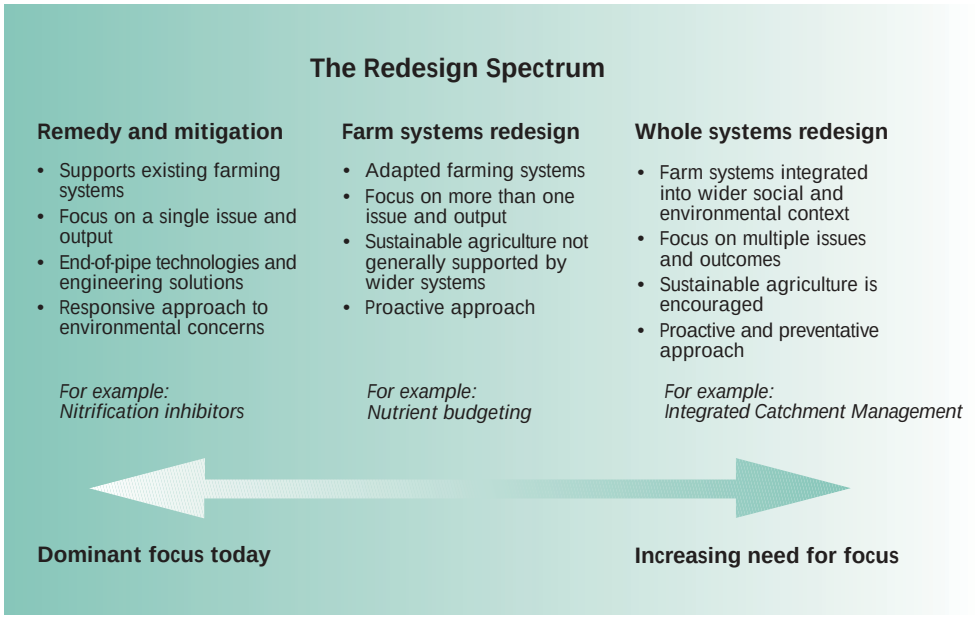

Remedy and mitigation approaches aim to alleviate the undesirable impacts of farming practices. They do not tend to address the underlying factors that often drive farmers, or enable them, to adopt these practices in the first place. More fundamental redesign involves examining how an entire farm is set up and then changing it to deliver better environmental, social and economic outcomes. However, these initiatives are often not supported by broader social and economic institutions (including markets) in society that help to shape farming practices. 'Whole systems redesign' takes place when many people and organisations work together to change these broad shapers in society. For example, many farmers and communities within a catchment can work together to improve water quality in their region. Similarly, farmers can work with processors, marketers and consumers of food to make sure that broader food systems promote sustainability.

The good news is that a lot of activity is already taking place in New Zealand to redesign the production systems on our farms. There are many examples in *Growing for good* of changes taking place across the redesign spectrum. More good news is that there are major opportunities for New Zealand to avoid the problems experienced in many other countries and to develop farming systems that are the best in the world.

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However, the not so good news is that existing initiatives are not sufficiently profound or widespread enough to make a real and lasting difference. More and more external inputs are being used to boost production, while the health of the environment continues to decline. More fundamental change is required. There is a need for much more focus on developing farming systems that deliver environmental sustainability *and* economic wealth – not short-term economic returns at the expense of environmental quality.

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Steps to a sustainable future

There is a long history in New Zealand's farming sector of innovating and overcoming major challenges. The farming community, working with many others, can use this capacity to develop more sustainable systems. Effective redesign will require more support for existing activities and a concerted effort to develop many new approaches. Redesign will also need to occur at many levels:

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- *on-the farm,* through the ongoing development of more sustainable farming systems
- *regionally*, via approaches that integrate the activities of many farms, such as integrated catchment management
- *nationally,* through the development of policies and strategies to support changes (e.g. research) and economic instruments to ensure that the environmental costs and benefits of farming are appropriately valued
- *internationally,* by ensuring that international trade negotiations and rules support environmentally sustainable outcomes.

Priorities for action

A: Improve dialogue

As a useful starting point, we believe that the farming and agri-business community need to explore ways to improve dialogue on the long-term future of farming, food and fibre production in this country. This is because many of the strategic risks to farming, including those identified above, do not appear to be widely understood or accepted in the farming sector and beyond. There is currently no appropriate forum to discuss these risks and to craft strategic directions for the sector. We therefore believe an organisation is needed to:

- stimulate a constructive dialogue around the future of farming in New Zealand and broader food systems
- facilitate widespread engagement in that dialogue
- create a vision and direction for farming that is environmentally, socially and economically sustainable
- identify and fill knowledge gaps to support this ongoing dialogue and to promote strategies to address changing needs.

An appropriate organisational structure may be along the lines of a foundation or trust, collectively owned by those involved in the farming and food sectors. It could be based outside of government (local and central) but partnered with it.

B: Advance existing efforts and take further action

While the strategic focus is being expanded, there are also some issues that require significant and immediate action to stop further damage to natural capital. These include:

- better nutrient management, particularly of nitrogen fertilisers
- reductions in faecal contamination of waterways
- adequately addressing fresh water quality and allocation concerns
- the development of appropriate indicators for sustainable farming
- the development of appropriate indicators to monitor the state of the environment.

There is already some action underway by various organisations in all these critical areas. However, all these efforts need to be vigorously maintained and advanced within a broader strategic framework. They also need to be regularly assessed to ensure they are making positive contributions to improving the environmental sustainability of farming.

The Commissioner has also made some formal recommendations to government to strengthen action on some of these concerns:

- To the *Minister of Agriculture and Forestry:* to take the lead on the development and implementation of indicators for sustainable farming.
- To the *Minister for the Environment:* to ensure that the State of the Environment indicators programme is completed and implemented as soon as possible.
- To the *Minister of Research Science and Technology:* to pay particular attention to farming systems research requirements, and Integrated Catchment Management research requirements, during the development of the Foundation for Research, Science and Technology's investment strategy for 2004/05 to 2010/11.

We will also continue to take part in the dialogue on the sustainability of farming in New Zealand to ensure that the food and fibre from our farms can keep growing for good.

Contents of the main report

This pamphlet is a summary of *Growing for good: Intensive farming, sustainability and New Zealand's environment.*

A free copy of the full report can be obtained from www.pce.govt.nz or by contacting us directly. We also welcome any comments you may have.

Please note: All references to support this summary are available in the full report.