

CONSERVATION, MARKET PRESSURES AND THE NEW ZEALAND DAIRY SECTOR

Munir Morad

School of Geography, Kingston University, Surrey

and

Mairi Jay

School of Geography, University of Waikato

Abstract

The New Zealand dairy industry is a highly organised, globally marketed food production system. In order to remain internationally competitive, the industry has had to adjust to flexible price regimes and the need to achieve greater production efficiencies. At the same time, the dairy industry is based on an agricultural system grounded in ecological and social specifics that can be in conflict with business aspirations. This paper outlines some of the environmental implications of modernising New Zealand's dairy industry, focusing on the Waikato Region, which has traditionally been a major player in the country's dairy industry. The authors question whether the dairy industry's growth projections, which are linked to realising greater production efficiencies, are sustainable in the long run.

Keywords

New Zealand farming, Dairy farming, Globalisation, Marketing, Waikato

New Zealand farming has experienced fundamental changes over the past three decades. Britain's entry into the European 'Common Market' (EU) in the 1970s, and the elimination of New Zealand farm subsidies in the mid 1980s, created a set of experiences unmatched by the farming sectors in other developed countries (Robinson *et al*, 2000: 114-133). In 1960, over half New Zealand's agricultural exports went to Britain, with the US receiving a further 13 per cent; but by the end of the 1970s, Britain accounted for less than 20 per cent of New Zealand exports, and trade with

the US and other non-UK partners began to increase. By the mid 1980s, nearly one half of New Zealand's agricultural exports (mainly dairy products) involved new markets, including many Third World countries which were able to afford New Zealand's competitively-priced agricultural produce (Smith and Saunders, 1996).

In addition to diversifying trade partnership patterns, current production trends suggest that the agricultural processing sector is pursuing low-cost production products, and new products based on special-order food technologies (Baldwin, 1999). As an example of this novel approach, 120 farmers in the Waikato region of New Zealand have been contracted by the NZ Dairy Board to supply "hyperimmune" milk. The latter is produced from cows especially reared to produce particular antibodies. This is an example of so-called specialty milk, which provides a price premium to the region's dairy farmers.

New Zealand's rural economy is still predominantly pastoral, with cropping, farm forestry and horticulture as secondary forms of agricultural production. The country's pastoral economy has a sophisticated organ-isational structure, where production, finance and trade have existed together as part of a network from the outset (Ville and Fleming, 2000). Livestock farming in New Zealand is a low-input, low-cost form of production. It relies on year-round grazing of animals in open pasture, using clover as the primary nitrogen source. Feed supplements for animals are minimal and there are relatively low inputs of nitrogen fertilisers.

The two main components of the livestock sector in New Zealand, dairy and meat farms, are strongly tied to their respective food marketing and processing chains (Blunden and Cocklin, 1996). However, compared to the meat sector, the dairy industry is a more tightly organised and vertically integrated industry in which farmers are closely involved (as stake-holders) with the organisations that process and market their dairy products (Bradshaw and Cocklin, 1998).

However, despite their relatively high profile in New Zealand agriculture, dairy farmers have not been immune to the declining terms of production which have affected New Zealand farming in the past three decades. Looking at the industry's economic trends, Parker and Holmes (1997) showed that the price received by farmers per kilogram of milk solids decreased by 53 per cent in the period 1950-1985 (from NZ\$7.46 per

kilogram in 1950 to NZ\$3.50 in 1985), where they have remained more or less since. At the same time, as Table 1 illustrates, this decline in economic returns to dairy farmers has coincided with a 30 per cent increase in dairy farm acreage, coupled with a 50 per cent rise in herd population (Livestock Improvement Corporation, 1998).

Despite recent delays in planned mergers, the shift from the current industry structure dominated by the New Zealand Dairy Board to an industry-owned commercial structure (dominated by one or two major firms) seem increasingly likely. The US and EU's continued focus on the NZDB's role as a state trading enterprise will enhance this development. The emergence of a NZ mega-cooperative has some important longer term implications for the dairy sector. The planned removal of the NZDB export monopoly powers could create new opportunity for overseas investment in New Zealand, and will require foreign firms to ensure that they remain competitive at all production and marketing levels. This issue will have particular relevance for firms seeking to move up the value chain away from bulk commodity trade to more specialist product niches and direct consumer sales.

Table 1 **New Zealand herd statistics**

Period	Total number of cows	Average acrea (ha)	Average cow/ha
1974/75	2,079,886	60	2.0
1997/98	3,222,591	87	2.6

(Source: Livestock Improvement Corporation 1998)

The Waikato's Dairy Industry

Like most New Zealand dairy enterprises, the Waikato dairy sector is dominated by the Hamilton-based New Zealand Dairy Group of companies (NZDG), which is tied to a global pattern of consumer demand and economic price flows. The New Zealand Dairy Board, of which NZDG is a member, is the largest international milk marketing organisation. In 1997/98, Waikato's share of the national dairy herd was 33 per cent (with over one

million cows). This herd population produced a total of 4.3 billion litres of milk, amounting to 368 million kilograms of milk solids. The gross farm revenue for the average Waikato dairy farm in 1995/96 was NZ\$204,834 (approximately US\$ 90,000), with a cash farm surplus of NZ\$100,677 (Livestock Improvement Corporation, 1998).

Dairy farms generate business opportunities for a series of small towns in the Waikato region, including Hamilton (population 100,000), Te Awamutu (population 10,000), Matamata (population 6,500), and Morrinsville (population 6,000). These towns are largely farming towns that provide a range of commercial and support services, such as machinery supplies, veterinary, and contract services. There are also agricultural research and advisory services which include AgResearch, the Dairying Research Corporation, Livestock Improvement Corporation, the Agriculture Industry Training organisation, and Agriculture New Zealand, which are mostly concentrated around the region's capital, Hamilton. New Zealand is a major global participant in agricultural research, and AgResearch is a world leader in agricultural research.

In 1997, New Zealand's foremost dairy producer, Anchor Products Ltd, proposed an extension to its Te Rapa dairy factory (on the outskirts of Hamilton) that would double the production of milk powder from 3 million kilograms to 6 million per day. The potential ecological and social impact of the proposal were assessed in terms of the mandatory provisions of New Zealand's primary environmental legislation, the Resource Management Act (1991). However, after protracted reviews of public submissions and objections, the proposed extension has been recently approved (Environment Waikato, 1999). This development marks a new and important phase in the history of New Zealand's dairy industry. It signals a clear progression from local and regional operations, into a global context where production efficiency (including human-resource productivity) serves as the primary yardstick by which success is measured in the face of international competition. Notwithstanding the economic justification for this development, the new expansion ushers in significant human and ecological dilemmas for the region.

Like other agricultural sectors in New Zealand, the dairy industry is dependent on delicate interdependencies between human, animal and landscape components. There are already signs of strain and incipient collapse in this emerging pattern: soil damage, loss of ecological diversity,

surface and groundwater pollution, and social strains resulting from loss of rural services and the fast pace of social change. According to a *State of the Environment Report* by the region's environmental agency, Environment Waikato, three quarters of the indigenous vegetation (preceding 1840, when New Zealand was officially born) has been lost to pasture, horticulture, pine plantations or urban areas. Furthermore, most of the wetlands and lakes of the Waikato region are threatened by the eutrophication and lowering of water tables, which are brought about by the growing demand to irrigate new pastures (Environment Waikato, 1999: 74).

At a public hearing organised by Environment Waikato, representatives from New Zealand's Dairy Research Institute conceded that "good environmental performance was essential in today's markets. There are few who would argue against the sentiment that if New Zealand is to ensure economic success for its agricultural products then we must be environmental leaders internationally". This assessment came in the wake of Health Ministry research which had showed that dairy farmers were mainly to blame for the poor quality of water in the lower Waikato River, which is riddled with high levels of harmful microbes such as giardia and cryptosporidium (NZPA 13 August 1999).

Seen from an ecological perspective, the figures in Table 1 indicate increasing environmental pressure on the land, in terms of grazing capacity and effluent production. A study by Parker and Holmes (1997: 25) showed that farmers have countered the cost-price squeeze by adopting economies of scale in milk production, mainly through adopting intensive grazing and feeding regimes. At the same time, greater processing efficiency has been achieved through greater investment in research and development, product diversification, retaining fewer factories, and the adoption of high-tech production methods. At an organisational level, the NZ Dairy Group's intensification policy is now based on what is termed "megafarm strategy" which, in the case of the Waikato region, has involved consolidating processing operations into 4 key sites.

Intensive dairying areas such as the Waikato have been registering high levels of nitrate in groundwater, including bores for water supplies, and have occasionally reached levels twice the World Health Organisation recommended maximum limit. Furthermore, in a frank assessment of the damage to the environment caused by the dairy industry, the New Zealand Press Association once conceded that the potential for nitrate contamination

of groundwater had to be tackled very seriously. The 50 million sheep, 8 million dairy and beef cattle, 750,000 goats, and 500,000 pigs in New Zealand were churning out effluent equivalent to a population of 150 million people (NZPA, 17 August 1995).

An Uncertain Outlook?

In an economic study of the dairy industry in New Zealand, Parker and Holmes (1997: 32) suggest that "the cost-price squeeze will continue into the foreseeable future... will require farmers, irrespective of their present age, to learn new knowledge and skills, particularly in business management, if they are to succeed in making their farms as least as profitable in 2010_1'. However, it is quite worrying that these suggestions do not appear to consider the environmental resource impact of the projected increases in production levels.

In an adaptive resource management context, New Zealand dairy farming needs to consider indigenous knowledge, as well as the practical experience of dairy farmers and local resource users. According to this perspective, dairy farmers should be part of a composite pattern of ecological interactions, embedded within a wider human community; and that solutions to farming-induced environmental problems must have a community focus. These solutions must, therefore, acknowledge the importance of community insight as well as scientific knowledge (Morad and Jay, 1997).

The high levels of soil and groundwater nitrate levels in the Waikato basin, for example, are a symptom of environmental stress. As herd numbers increase, dairy shed effluent problems will increase, especially during spring, when soils are wet. The effects of (herd-induced) compaction of soil, and soil erosion on hill slopes, may also worsen during winter and spring if current practices continue. These new environmental conditions will require farmers to pay greater attention to stock management practices.

The difficulties are also compounded by the environmental agencies' preoccupation with the cost-effectiveness of remedial measures. For example, trials of artificial wetlands for dairy shed effluent by the Bay of Plenty Regional Council in 1997 were shelved for economic reasons. The Regional Council, also known as Environment BOP, which completed New Zealand's first trial of this disposal method, concluded that this effective remedial measure "was not worth the cost... Establishment costs for a 200-

head herd would be about NZ\$27,000, which would not be money well spent" (NZPA, 31 July 1997).

However, another remedial measure for treating dairy effluent pollution appears to be gaining ground slowly. For the past few years, New Zealand landcare researchers have argued that dairy farmers ought to adopt some successful Europe practices based on using nitrification inhibitors. According to the Landcare Research Institute, in Hamilton, dairy farmers could use the nitrification inhibitor when spreading effluent onto land, which would enable the nitrogen in manure to be released slowly, rather than being washed straight through the soil and into groundwater. A natural process transforms organic nitrogen in manure to ammonium and then to nitrate. Nitrification inhibitors slow the second step, resulting in the nitrogen being retained in the soil as ammonium (NZPA, 17 August 1995).

Most arguments in favour of alternative (organically-based) dairy production systems in New Zealand have ranged from strategies that focus on efficiency (for example, more accurate and controlled uses of inputs and minimisation of waste) to substitution (for example, from more to less disruptive interventions, such as from biocides to more specific biological controls and other more benign alternatives) to fundamental changes in the design and management of the operation. This progression generally involves a shift in the nature of one's dependence, from relying primarily on universal, purchased, imported, technology-based interventions to more specific locally available knowledge and skill-based ones (such as rotational paddock-based grazing). However, as Hill (1999) observed, although efficiency and substitution initiatives can make significant contributions to sustainability over the short term, much greater longer-term improvements can only be achieved by redesign strategies and substantial surveys.

A wide range of factors defines the profitability of dairy farming: region, soil characteristics, farm management and financial circumstances; and some of these are not influenced by the production system, organic or conventional. A model has been developed by Bauer-Eden (2000) to calculate the gross margin including the factors defined by organic production standards, and excluding factors that are influenced by personal management decisions or overall financial circumstances of individual farms. As shown in Table 2, although milk production per hectare tends to be lower on organic dairy farms, the gross margin per hectare is generally higher. The reasons are consistently lower production costs. The expenditure

for fertiliser and animal health are the most prominent factors, and these tend to decrease dramatically in organically managed dairy farms.

Table 2 Gross margins per hectare for conventional and organic farms

	Conventional	Organic
Milk and stock income \$/ha	2,347 - 4,108	2,346 - 3, 692
Variable costs \$/ha	934 —1,211	433 - 728
Gross margin /ha	1,414 — 2,954	1,913 — 2,964

One apparent reason for a decreased milk production per hectare on organic farms is the absence of official commitment to organic farming, and the lack of certified organic feed and grazing in New Zealand. However, as Liepens and Bradshaw (1999) observed, the New Zealand farming community also denigrates the state for its environmental rhetoric and bureaucratic interventions and would be hostile to any perceived threats to its of embrace market freedom and efficiency.

Conclusion

Human-environment interactions and ecological processes create uncertainties, impose limits, and often generate unpredictable consequences, such as pasture and livestock failures. Farmers are not just production agents, but people who have to manage their land and livestock on a sustainable long-term basis. They often have to balance considerations that are hard to reconcile: market movements, technological advances, environmental well-being, and the future prosperity of their dependants.

In the light of the mounting economic and ecological pressures, it seems likely that New Zealand dairy farmers will experience a growing tension between production pressures (to increase milk production and reduce costs) and environmental imperatives. So far, milk production costs have been reduced, mostly by extending the area under dairy pastures and increasing the production of milk solids per cow (and per hectare). However the

physical and biological infrastructure of the country's ecosystems cannot be expected to sustain production increases indefinitely.

Remedial strategies are possible, but the level of environmental mitigation needed to redress current difficulties will depend on the extent to which the dairy processing sector and local environmental agencies can encourage farmers to follow new directions towards a more sustainable system of dairy farming and production.

References

Baldwin, C.I. 1999, 'Food Safety and The New Zealand Dairy Industry: The Politics of Stolle Hyperimmune Milk', pp. In: D. Burch, J. Goss and G. Lawrence (eds.) *Restructuring Global and Regional Agricultures* (Ashgate, Aldershot).

Blunden, G. and Cocklin, C. 1996, 'Sustainability: A view from the Paddock', *New Zealand Geographer*, 52(2): 24-34.

Bradshaw, B. and Cocklin, C. 1998, 'Subsidy Removal and Farm-level Stewardship in Northland', *New Zealand Geographer*, 54(2): 12-20.

Bauer-Eden, H. 2000, *Feasibility Study of Organic Dairy Farming* (Proceedings of Organics 2020, The Soil & Health Association of New Zealand Incorporated, Auckland).

Environment Waikato 1999, *Waikato State of the Environment Report* (Waikato Regional Council, Hamilton, New Zealand).

Hill, S.B. 1999, 'A social ecology framework for achieving an organic New Zealand', *Soil & Health*, 58(6): 24-26.

Liepins R. and Bradshaw, B. 1999, 'Neo-liberal agricultural discourse in New Zealand: Economy, culture and politics linked', *Sociologia Ruralis*, 39 (4): 563- 584.

Livestock Improvement Corporation 1998, *Dairy Statistics 1997-1998* (Livestock Improvement Corporation, Hamilton, New Zealand).

Morad, M. and Jay, M. 1997, 'The Reform of Maori Land Tenure and the Quest for Sustainability in New Zealand', *Development Bulletin*, 41: 44-46.

NZPA (New Zealand Press Association) News Reports (various dates)

New Zealand Dairy Group 1998, *Annual Report* (New Zealand Dairy Group of Companies, Hamilton, New Zealand).

Parker, W.J. and Holmes, C. 1997, 'How Much Will the Average Farm Have to Produce in 2010 in Order to Maintain its Present Level of Income?' *Dairy-farming Annual*, 1997: 25-33.

Robinson, G.M., Loughran, R.I. and Tranter, (eds.) 2000, *Australia and New Zealand: Economy, Society and Environment* (Arnold, London).

Smith, W. and Saunders, L. 1996, 'Agricultural Sustainability, the Cost of the 1984 Agricultural Policy Reforms' *New Zealand Geographer*, 52(1): 2128.

Ville S. and Fleming G. 2000, 'The nature and structure of trade-financial networks: Evidence from the New Zealand pastoral sector', *Business History*, 42(1): 41-61.