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CONFERENCE PAPER

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# Development of a dairy industry in a new area – land use change in Canterbury, New Zealand

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**ABSTRACT**

Canterbury dairying increased from 20,000 ha in 1980-81 to 255,000 ha in 2013-14. During this time, Canterbury production increased from 2% of New Zealand's milk to 19%. This paper examines factors that influenced this increase. The analysis draws on case studies of industry participants, a survey, and secondary data.

There were three waves of development. Wave 1 (1980s) farmers were entrepreneurs who saw Canterbury as a desirable place to live with new economic opportunities related to dairying. Wave 2 (1990s) convertors were a mix of corporate entities and traditional sheep/crop farmers who aimed to increase farm profitability. Wave 3 (since 2000) convertors have included cropping farmers and expanding dairy farming businesses developing large, intensive farms. This wave included substantial investment from non-farmers, particularly through equity partnerships.

The research identified growth factors that could be classified as enablers, drivers, and facilitators – with some factors fitting into more than one classification. Enablers were necessary for growth but by themselves did not create the growth. In contrast, drivers were the fundamental determinants of growth. Facilitators were factors that did not either enable or drive growth, but did influence growth.

Enablers included aspects of the political and economic environments. These included new institutional sources of finance. The prior existence of a local processing cooperative and an established vertically integrated supply chain were also of critical importance.

Drivers of land change included changing levels of profitability between farming systems, the development of a new resource (irrigation) and the perceived potential to grow wealth through business growth and thereby fulfil personal objectives. Increased industry profitability then fuelled further development.

New irrigation technologies were both enablers and facilitators. Extension, consulting and the development of input supply companies were all important facilitators.

**KEYWORDS:** Canterbury dairy industry; agricultural industry development

## 1. Introduction

In the 1960s and 1970s, dairying in Canterbury was a minor industry. There was a town supply industry (fluid milk), plus some small butter and cheese factories. Dairy cows were farmed predominantly on heavy soils such as clay and silt loams. The light lands of the Canterbury Plains were used for sheep production. On the medium soils, the predominant land-use was a mix of sheep, wheat, barley, white clover seed and grass seed. It was in the 1980s that dairy production began to increase.

By 2014 the area in dairying had increased to 255,000 ha from 20,000 ha in 1980. (LIC[3] 2014). In the 1980s, Canterbury production averages per cow and per hectare were lower than for the more established North Island industry. However, by 2014, Canterbury produced the highest level of milksolids (ms) per hectare of any region in New Zealand, at 1,375 kg ms/ha compared to 1,063 kg ms/ha for New Zealand overall. Per cow production of 395 kg ms compared to 371 k ms for New Zealand overall. On a national basis, Canterbury production has increased from 2% of New Zealand's milk in 1982-83 to 19% in 2013-14, even though national production has itself increased. An earlier empirical description of some of these changes was presented at IFMA18 (Pangborn and Woodford, 2011).

Ministry of Agriculture and Fisheries (MAF) models for 2010-11 show income and expenses per kg milksolids, and hence operating surplus per kilogram of milksolids, as being similar for Canterbury and the rest of New Zealand (MAF 2010-11). However, because of higher production per hectare, Canterbury operating surpluses per hectare were greater than elsewhere in New Zealand.

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[3] LIC is the trade name of the Livestock Improvement Corporation. The LIC is a cooperative providing herd testing and genetics to the dairy industry..


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In contrast, historical DairyNZ data indicated that per hectare operating surpluses had been greater in some years only, and either similar or less in other years (DNZ 2010).

Pangborn (2012) calculated from MAF data that in the first decade of this century returns on capital (debt plus equity) were greater in Canterbury than the rest of the country (9% compared to 4%). DairyNZ (DNZ 2012-13) has reported that Canterbury farms in 2012-13 achieved an EBIT (earnings before interest and tax) return on assets of 12.1% compared to a New Zealand average of 9.2%.

## 2. Research methods

An initial model of industry development was constructed from prior literature (Figure 1). Influential authors were Porter (1990, 1998), Schumpeter (1961, 1982), Van de Ven and Garud (1989), and Van de Ven et al. (1989). None of these studies was specific to agriculture. Prior literature which was specific to agriculture included Woods et al (1994).

The key data sources were semi-structured interviews with 35 farmer and non-farmer industry participants from throughout the industry value chain. The main focus was on getting participants to tell their own story as to what they had done and why they had done it, together with broader observations of the industry. Interview prompts were developed from the proposed factors (Figure 1) but in the main the interviewees simply told their 'what and why' story in a discussion framework with the interviewer and in a chronological order. This information and the interpretation thereof was supplemented by insights from an unpublished farmer survey that helped inform the role of extension in promoting growth and the adoption of innovations. Also, the authors have themselves, as local university academics, all been observers of the Canterbury industry. Further, the first author has direct experience over more than 28 years as a practicing Canterbury dairy farmer. The authors therefore acknowledge their own background as shaping the direction of the investigations, while taking care to ensure that all interpretations are evidence-based. More details on methods are reported in Pangborn (2012).

## 3. Results

### Waves

The notion of development waves was an emergent theme from the interviews. In Wave 1 (1980s), farmers tended to be driven by entrepreneurial motives and were often moving from another dairy region that was not considered as favourable. They were able to purchase larger blocks of irrigated land at a lower cost than in other dairying areas. Considerable entrepreneurial profits were achieved.

In Wave 2, (1990s) many conversions were completed by corporate entities. Due to the low operating profits of that period, these corporate farmers had largely left the industry by the late 1990s. In doing so, they sold many of their farms to their sharemilkers, thus creating a new generation of farm owners. However, there were also traditional sheep and crop farms in this wave who were converting to obtain higher levels of profitability than were available in their industry.

In Wave 3, since 2000, new dairy farmers have tended to be established farmers from other sectors such as cropping, or expanding dairy farming businesses, who purchased and converted to dairy farming for economic reasons. The rate of growth was influenced by enthusiastic lending to dairy farmers by the primary and secondary financial institutions. Wave 3 farmers tended to develop large and more intensive farms. This wave also saw investment from non-farming investors, particularly in equity partnerships.

### Factor conditions

A comparison of the findings to Figure 1 confirmed the role of entrepreneurs, particularly in Wave 1. Most informants suggested that the early converters captured significantly more entrepreneurial profits than the later waves. Several Wave 1 participants stated that the pre-purchase analysis of the cost of purchase and conversion was not always rigorous.

Although it would seem logical that Canterbury productivity could be higher than elsewhere in New Zealand due to irrigation, production and profit were similar until the new century. A number of informants suggested that the major research and extension providers were not interested in the industry until the Lincoln University Dairy Farm (LUDF) was initiated in 2001 (Wave 3). Although a number of factors would influence productivity, informants suggested that there was a positive effect on production and profitability from the establishment of the LUDF.

Informants did not consider that there was a large involvement of government in the development of the Canterbury industry. However, there was recognition that the major growth occurred after the removal of most government support for agriculture in the 1980s. The removal of price supports, particularly to the sheep and cropping industries in 1984 (Rayner, 1990), meant that these farming systems became less economic and, so were more likely to be sold or converted to other farming systems such as dairying. The loss in profitability of the historic sheep and cropping systems was a major driver of development. In general, farmer informants focused on 'close to farm' factors and did not identify, without prompting, the efforts of government in international trade negotiations or changes in international markets.

**Figure 1:** Proposed factors in the development of the Canterbury dairy industry


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The economic conditions of the times led to change. The restructuring of the New Zealand economy caused land prices to fall in the late 1980s, which increased opportunities for established and new land owners. Since the restructuring, farmers have not been able to 'farm subsidies' and, in the opinion of informants and the survey participants, farmers have focused on production and profitability. As well as removing farm price supports, the financial industry was deregulated late in Wave 1. A number of informants discussed the difficulty in obtaining finance in Wave 1, but were able to source capital more easily in Wave 2 and some suggested that the financial institutions were too liberal in Wave 3.

A number of informants expressed the advantages of being involved in large vertically integrated processing/marketing cooperatives. In particular, the success of the processing cooperative (Alpine Dairy Products) allowed growth in Wave 2. The company coped with ever increasing volumes of milk, financing new processing capacity and dealing with pesticide and quality issues. However, a number of informants questioned whether Alpine would have been successful without the support of the state sanctioned New Zealand Dairy Board. Several sources suggested that a cooperative was necessary for development of the industry in Waves 1 and 2, as proprietary companies would not have been prepared to spend the time and money necessary to solve the problems that arose.

Innovation and new technologies were considered important. In Waves 1 and 2, innovations in irrigation technology allowed deeper wells, with more labour and water efficient delivery systems. Other factors that contributed to growth in Wave 2 were improved methods for organizing the farm layout and cowsheds, and management techniques for large herds. The most widely adopted technology introduced by the LUDF (low grazing residuals) was suggested to have improved profitability in Wave 3 by some informants and survey participants.

## Additional factors discovered by research

The more intensive use of the irrigation resource was considered an important factor in development. Although irrigation had been part of Canterbury farming since the 1940s, it was often seen as a means of coping with drought rather than as a means of increasing farm output. Stewart's (1963) findings that irrigation in itself did not improve farm returns under the farming systems of the time (sheep/cropping) were prophetic when the subsidies supporting these farming systems were removed at the start of Wave 1. Thus, if a farmer had irrigation he was often driven to either convert or sell his property due to the superior relative economics of the dairy industry - either way there was a financial gain and dairy industry growth.

Human reasons were important, particularly in Waves 1 and 2. The developing dairy industry in Canterbury presented individuals with the opportunity to purchase farms with the hope of more stable production through irrigation. Informants suggested that Wave 1 converters often moved to Canterbury to improve social and educational opportunities and for the challenge of being part of something new. The lower price of land was an attraction; particularly for North Island farmers who could purchase twice as much land in Canterbury with the funds from the sale of their North Island farm. In reality, farmers in all waves moved for the human reasons of improving their lives and financial position.

The motive of capital gains and profit encouraged corporate farmers to invest in what they considered to be 'cheap land'. Informants commented that corporate farmers developed improved methods for converting farms to dairying, were more financially disciplined and instilled in farmers a positive attitude to multiple farm ownership. Although the initial entities departed the industry within ten years due to low operating profits, they left a legacy of alternative business structures to traditional family farms. These included what is described as 'family corporates' and 'equity partnerships'.

The availability of land for supporting the dairy industry was important for industry growth from Wave 2. These blocks allowed a higher stocking rate by removing the replacement heifers from the 'milking platform'. In addition, support blocks became important for grazing cows in the winter and for the production of supplementary feed. Winter grazing and higher levels of supplementation were an integral aspect of the development of a Canterbury dairying system versus traditional self-contained systems.

One of the defining features of the Canterbury dairy industry is that the development has contained elements of resource development, elements of changing land use, and elements of system configuration, together with knowledge transfer from other locations. There was no new product development; rather it as a situation of adapting dairy production systems for a new contextual environment. This is in contrast to much of the industry development literature which focuses on new products.

## A new model

The review of literature on industry development led to Figure 1. In contrast, the case studies and survey of industry participants have led to a new model (Figure 2). This model proposes that within the waves, the relevant factors act in different ways and are best considered within a framework of enablers, drivers, and facilitators of growth. In some cases, the factors fit into two categories. Enablers were defined as factors that were necessary for growth but did not themselves create the growth. In general they relate to the broader political, economic and regulatory environment. Drivers are defined as fundamental factors, typically related to prices and resource availability that caused the growth to occur. Facilitators are defined as factors that had a positive influence on growth, and typically made the growth process more efficient.

Low land prices in Wave 1, encouraged entrepreneurial dairy farmers to purchase land in Canterbury to convert to dairy farming. The lack of profitability in other farming systems drove sheep and cropping farmers to sell their land at low prices. A further driver was the human reasons of establishing an often larger farm in an area seen to have social advantages. Although the development of the irrigation resource was an enabler, it can also be seen as a driver. Informants suggested that once water was added to a property, the highest economic use was as a dairy farm. Wave 2 saw the entry of corporate farmers as industry drivers. With more secure sources of capital and improved farming systems, the corporates converted many farms in pursuit of capital gains. In Wave 3, increased profitability in the dairy industry drove further conversions.

Enablers were the factors that were necessary for the growth to occur. In Wave 1, these included government

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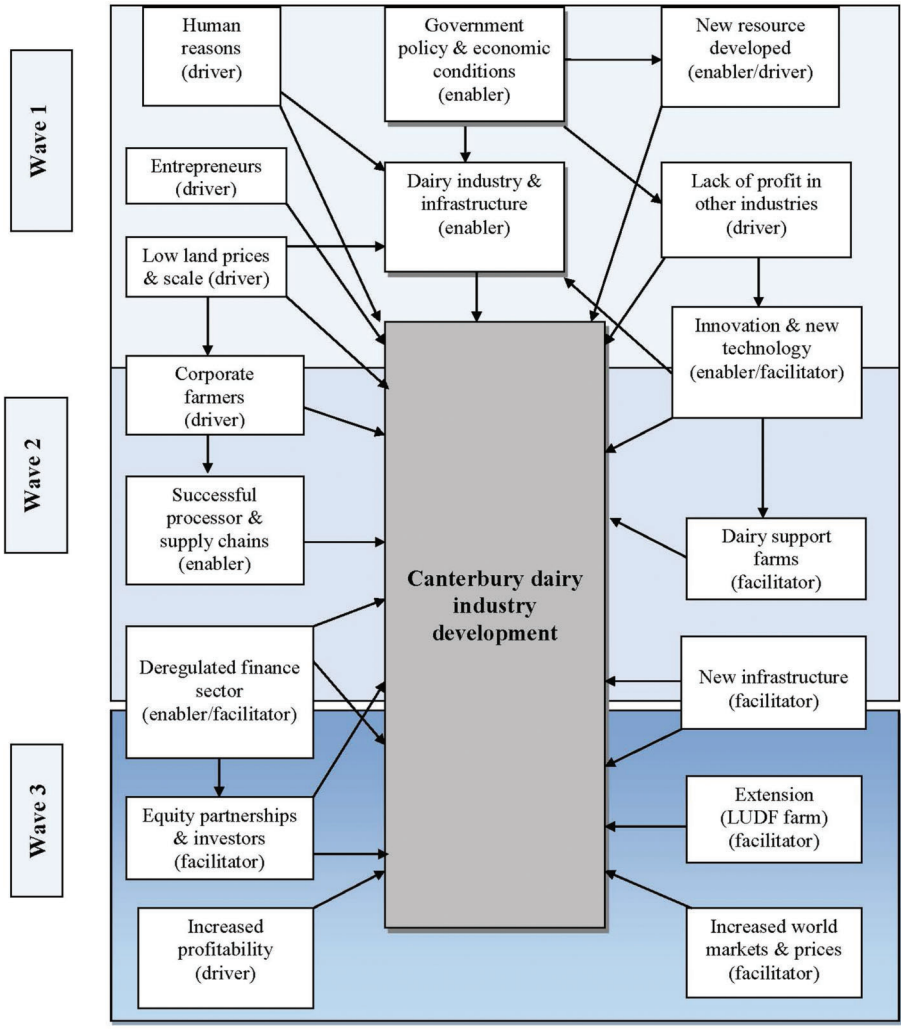


**Figure 2:** Interrelationships of drivers, enablers and facilitators in the development of the Canterbury dairy industry

policies and economic conditions which, in this case, followed the economic restructuring of the New Zealand economy. A further enabler was the industry infrastructure already in place which allowed faster growth, by removing many of the steps necessary for the development of a new industry. The development of the processing cooperative in Wave 2 was an important enabler, as without the ability to process all the milk produced, growth would have slowed. The finance industry became an enabler of growth in Wave 2 and a facilitator of industry growth in Wave 3 through liberal lending policies.

In Waves 1 and 2 the development and adoption of new technology was an important enabler and facilitator. Informants suggested that improved irrigation technology, cowsheds, farm layouts and machinery were important. Other than irrigation, these technologies were available to the rest of the industry, but were more readily adopted by an area 'starting from scratch' with larger land areas.

Facilitators, although not driving or enabling growth, had positive influences. Most of the facilitators were found in Waves 2 and 3 and included new input suppliers, farms that dedicated their system to supporting dairy farms and new business structures that assisted the sourcing of capital for a 'capital hungry' industry. The LUDF was a facilitator in Wave 3 that provided a forum for information and discussion that was one of a number of factors in the productivity and profitability increases. A further facilitator was the trend to increasing milk prices, particularly in Wave 3, a result of increased global demand.

## 4. Conclusions

The development of the Canterbury dairy industry is a consequence of the coalescence of a multiplicity of factors. The profitability of dairying, both in absolute terms and also relative to product prices for competing land uses, was a driver of fundamental importance. Also, the ongoing development of irrigation, which had commenced in much earlier times, helped to create a bio-physical environment that was well suited to pastoral dairying. However, by themselves these would not have been sufficient to create a new industry. First, there had to be a group of entrepreneurial innovators who were prepared to take the first steps and the associated risks in the search for personal fulfilment. Institutional factors, relating in particular to finance and the regulatory environment were then necessary for these innovators and their early followers to be able to operate. Farm input firms had to develop alongside the development of the farms themselves. Also, in the absence of a farmer co-operative the necessary processing facilities may never have developed. Similarly, the presence of the New Zealand Dairy Board, which in those times took responsibility for


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marketing of products, was of major importance in the early stages. Given this multiplicity of factors, any industry policy person who wishes to encourage industry development needs to have a 'whole of system' enabling perspective. Industry development can be constrained by the absence of any one of the many necessary factors.

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