Recent Pre- and Post-Farm Gate Developments in the New Zealand Dairy Industry

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Take Home Message

- The current system of dairy production in New Zealand is characterised by seasonal supply from a pasture-based diet.
- Most milk is processed and exported as commodity products to world markets.
- Dairy farm returns are subject to cost-price squeeze, necessitating many actions to maintain or increase profitability.
- Dairy companies and factories have merged to obtain economies of scale. Two companies now process over 95% of the milk.
- The current industry structure has historical roots, supported by legislation that enforces a single marketing organisation. This legislation will be removed in the near future.
- The organisation of dairy-related research and education is under major revision.
- The challenge for the industry is to concurrently improve the efficiency of commodity production while capturing niche market opportunities.

Dairy Production in New Zealand

New Zealand is characterised by a temperate climate that encourages the growth of ryegrass and white clover pasture and enables grazing for twelve months of the year. Indoor housing is not required at any time although supplementary feeding may be beneficial in certain management circumstances. The soil temperatures and sunshine hours limit the yields of cereal and forage crops, which along with high fuel and machinery costs results

in most concentrate feeds being more expensive than pasture. For the whole year, some 10-16 t dry matter (DM) is grown per ha with 60-85% of this being consumed by cows which can produce 70-90 kg milksolids per tonne DM consumed, or 500-1200 kg milksolids per ha.

Pasture is a living feed, with a short shelf-life before it dies, deteriorates then disappears. Efficient farming systems are characterised by production circumstances that result in synchronisation of pasture supply and pasture demand to minimise the need for harvesting the surplus or feeding supplements. This has traditionally been achieved by Spring calving cows at high stocking rates in order to harvest the rapid growth that occurs in Spring (Figure 1). Cows must walk to their pastures after every milking, limiting the size of a farm to a land area within walking distance of the milking platform. Summer pasture growth rates are often limited by moisture deficits, resulting in erosion of daily milk yields and the early drying off of some cows. Accordingly, average lactation lengths are short by international standards. Cows must calve every 365 days and reproductive management is therefore critical. Successful dairy businesses must achieve concentrated calvings and this requires high submission and high conception rates in a typically eight-week season of artificial breeding.

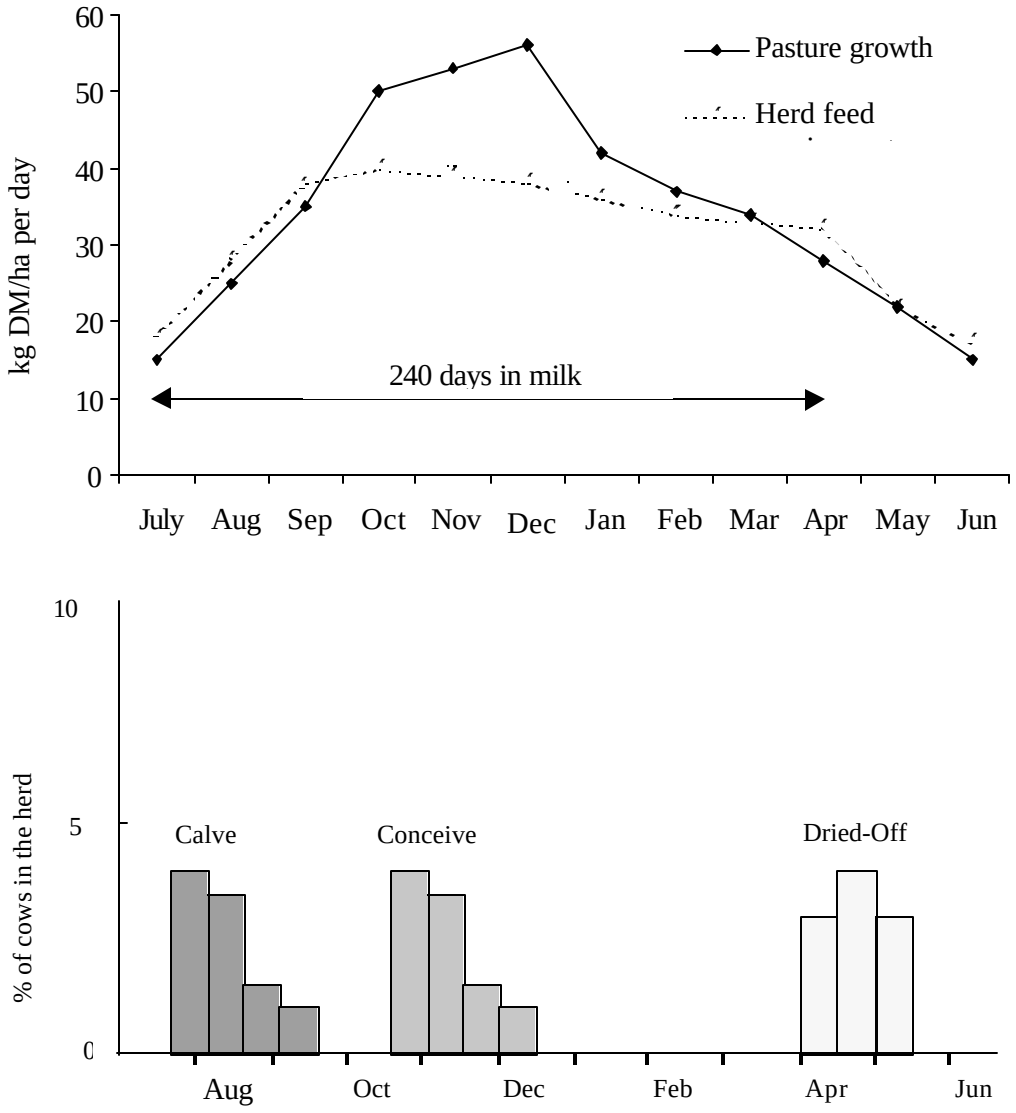

Figure 1. The seasonal pattern of calving and drying-off and their effects on the synchrony between feed requirements and pasture growth.

The New Zealand dairy industry has always produced far more milk than its inhabitants can consume. In the early years of the industry, a typical family farm was characterised by milk harvesting, separation of cream that was transported to small, local processors principally for manufacture into export butter. The skim milk supported pig farm operations in concert with every dairy farm. Today, the local population consumes about 5% of the industry produce with over 800 products and ingredients being manufactured and exported to more than 120 countries. New Zealand currently produces less than 2% of the world's milk, but contributes about 30% of the traded produce.

■ Trends in Milk Returns and Farm Costs

NZ producers were paid solely on the basis of milkfat yield until mid 1985. The payment system then changed to separately reward the milkfat and protein yields with a volume penalty, using a system known as *a*+*b*-*c*. There is no change in price according to the timing of the milk supply, except in a few instances where so-called winter milk (previously town milk) receives a premium over milk destined for factory processing and export. High quality milk must be free of antibiotic and other residues, and below a ceiling somatic cell count of 400,000 somatic cells per ml.

The returns for milk, expressed on a per litre or per unit milksolids equivalent, have generally deteriorated over the last 50 years (Figure 2). This price erosion is typical of commodity products and is very similar to that observed in meat or wool values over a similar time period. In contrast to the rapid erosion in price, total costs per cow have been relatively static, with a tendency to increase slightly from about $700 to about $800 per cow over the last ten years. A consequence of the reduction in milk price and the increase in costs is that farm profit would have been eroded if there were no changes in animal productivity or farm scale.

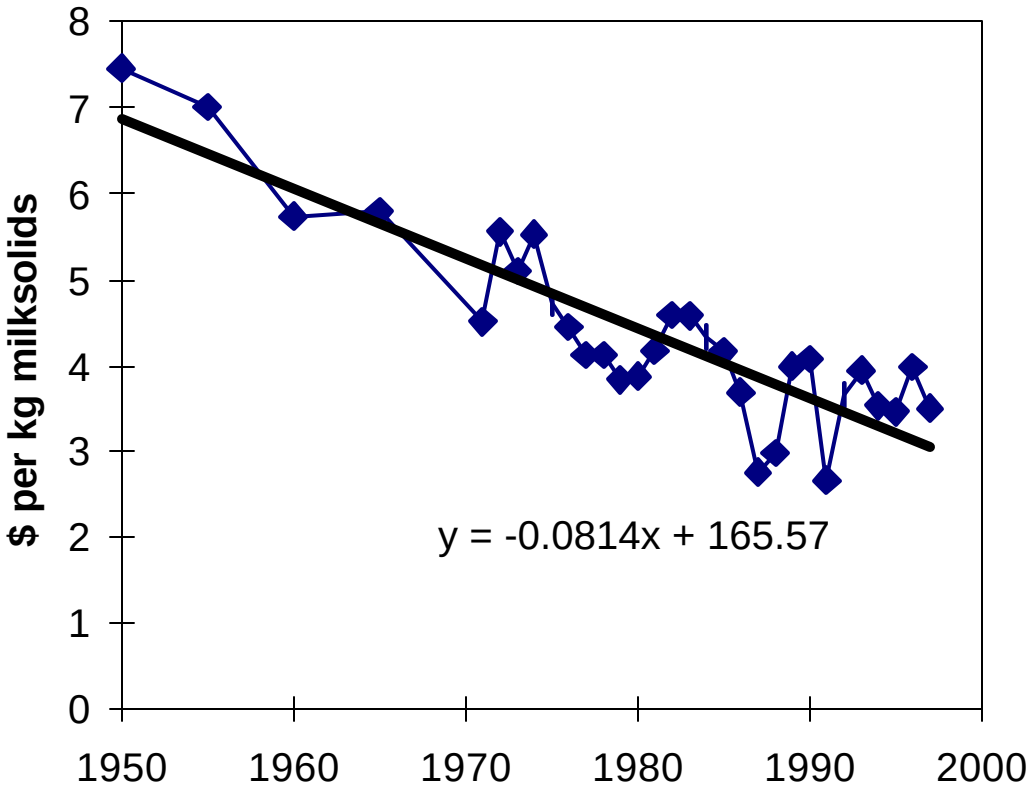

Figure 2. Trends in the real price of milk (NZ$) expressed per kg of milksolids (milkfat plus protein yield)

■ Producer Responses to the Cost-Price Squeeze

Farmers and processors had long recognised that the value of milk varied between cows and between farms. Four sets of Babcock testing equipment arrived in New Zealand in 1892 for use in dairy factories and within a few years similar equipment was being routinely used to test individual cows for the purposes of culling decisions. Sire proving was introduced in the 1940's and co-operative based systems of herdtesting and sire proving have continued since that time. Currently, 85% of herds voluntarily use artificial insemination and herdtesting. The rate of genetic progress achieved in New Zealand herds is very close to theoretical expectations based on the available intensity of selection, accuracy of breeding value estimation and age structure of the national herd.

Producers have responded in various ways to the erosion of milk price, but most notably by increasing productivity per cow, per hectare and farm size (Table 1). A major dilemma facing farmers wishing to increase productivity is the distinction between production per cow and per hectare. It is a straightforward matter to increase production per cow – simply increase the allowance of high quality pasture dry matter. However, increased pasture allowance typically leads to increased post-grazing residual dry matter. A consequence of this is that pasture utilisation is reduced and subsequent pasture quality is typically compromised. Both of these factors contribute to reduced production per hectare. The challenge for pastoral farmers is to concurrently grow high yields of forage, utilise a high proportion of the forage grown, and efficiently convert the consumed forage into milk revenue. These three factors all interact and it requires system skills to adequately monitor and control all three factors and their interactions, both across years and seasons.

Table 1. Changes in number of herds, herd size, stocking rate and production of milk solids per cow and per hectare (Livestock Improvement, 2000).

Year	Herds	Cows per herd	Cows per hectare	Milk solids[1] per cow	Milk solids per hectare
1935	40,000	45	1.1	180	196
1965	29,300	65	1.7	225	380
1981	15,800	133	2.2	250	550
1991	14,660	163	2.4	260	620
2000	13,861	239	2.7	288	768

[1] milk solids = fat yield + protein yield.

Increased productivity per cow has been achieved by genetic advances and by improving feed management. The use of subdivision, strategic supplementation (including the use of nitrogenous fertilisers), assessment of pasture covers in concert with feed budgeting have all assisted this process. More detail on these aspects is in Holmes (1998). Increasing the number of cows has been achieved by all manner of methods for increasing the feed supply. These include the use of drainage, fertiliser, bought-in supplementary feed, land acquisition and grazing heifer replacements off farm. The average herd size has approximately doubled in twenty years and quadrupled in fifty years. Despite the increases in productivity per cow, and an associated increase in feed requirements, stocking rates have actually increased such that per hectare productivity has increased more rapidly than production per cow. Changes in production per cow and per ha are shown in Figure 3.

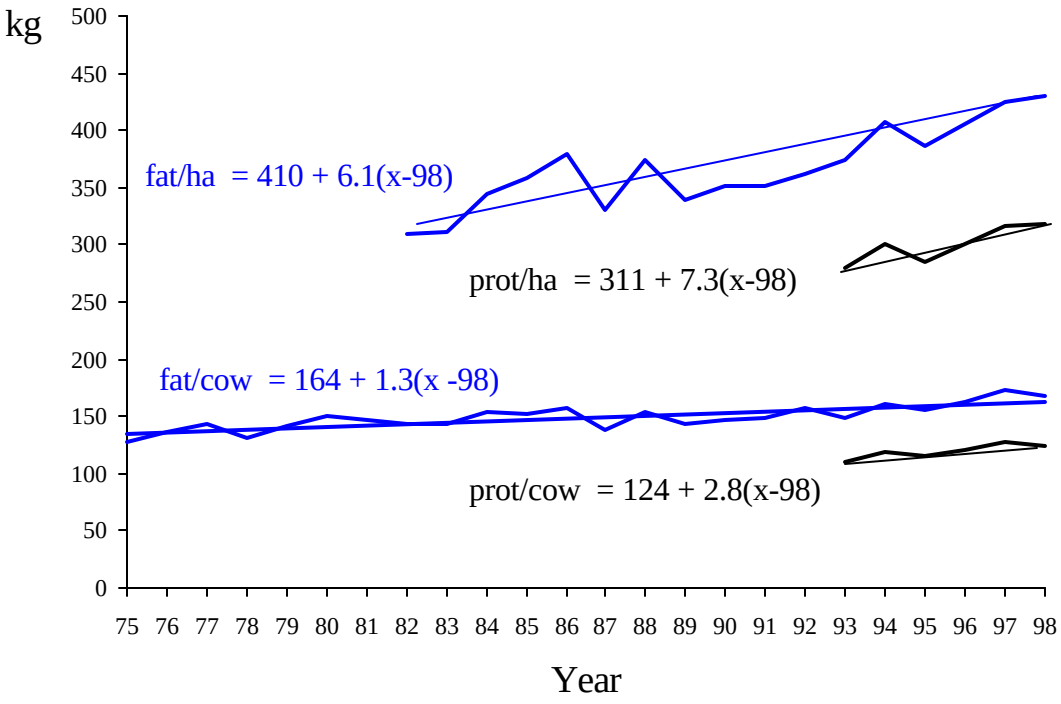

Figure 3. Annual New Zealand productivity of milkfat and protein per cow and per hectare

A limitation to continued increase in farm scale is created by the current system based on a fixed milking platform with cows accessing the pasture by walking along farm races. A 1,000 cow herd typically requires about 400 ha and grazing time is compromised if cows have to walk further than this to access more pasture. Increased farm size will require transportable milking platforms, cut and carried forage, or mechanised systems for transporting cows to forage. None of these technologies are currently practical in New Zealand without substantially increasing costs.

■ Amalgamation of Dairy Processing

The dairy industry began with small co-operative dairy factories that were supplied with whole milk from small farms in the immediate vicinity. These companies produced butter and cheese. In 1895 there were 218 dairy factories in operation and experiments began to produce new products such as condensed milk, casein and lactose. The development of the cream separator allowed farmers to transport smaller volumes of cream rather than whole milk,

facilitating the transport over greater distances and led to dairying in more inaccessible areas. By 1918, about three-quarters of the milk supplied to factories had been separated on farm. By 1920 there were over 500 dairy companies and factories, 85% of which were co-operatively owned. Improved transportation and real or perceived economies of scale then led to amalgamation of factories and companies. In 1981 there were 30 companies with 85 factories. In 2000, the largest company, New Zealand Dairy Group controls 58% of processing and the second largest, Kiwi Co-operative Dairies controls 39%. Trends in the number of companies and the milk collection strategies are in Table 2. These two companies have been discussing a mega merger over the last two years. The New Zealand Dairy Board, has and continues to have the exclusive (legislative) right to sell milk products in foreign markets for over 60 years. The plan had been to remove the legislation that protects the Dairy Board, with their marketing responsibilities being taken over by the processors and their other responsibilities, such as herdtesting, research and education being taken over by other organisations.

Table 2. Changes in milk collection and number of dairy processing companies in New Zealand.

Year	Number of dairy companies	Collection of milk
1900	160	Whole milk in cans
1920	540	On-farm separation
1940	405	Cream in cans (80%); Cream suppliers.
1950	206	Bulk tanker collection from refrigerated vats still 60% cream.
1960	165	
1970	80	
1980	30	100% whole milk suppliers, in bulk.
1990	23	Milk transported by train
2000	6*	

* One site: 14 million litres per day

■ Removal of Legislative Protection

The previous National government believed that the legislative marketing monopoly under which the New Zealand Dairy Board operated was viewed unfavourably by the US administration and might therefore compromise the freeing up of world market access for New Zealand agricultural products. Accordingly, the government was keen to remove the legislation and rely on business arrangements to maintain any competitive advantage that the Board currently enjoyed. The industry has debated various structures at some length, but the mega merger has run into difficulties, many relating to the valuation of assets relevant to the two major processors, Dairy Group and Kiwi. At this stage, the mega merger negotiations seem to have stalled. The Labour

government that is now in power is less anxious to change the legislation, unless the change is wanted by the industry. It appears that the legislation will be removed, and alternative structures for some of the New Zealand Dairy Board roles are now being considered and implemented. It is generally accepted that the marketing activities currently undertaken by the Dairy Board should be more closely aligned with the processing company or companies.

■ Structure and Nature of Research and Support Services

It is proposed that the New Zealand Dairy Board will disappear, with a new "industry good" entity being created to collect levies. These levies will be used for disease surveillance and control issues, some industry databases related to animal improvement, on-farm research and education. Many of these activities will be channelled through a newly created commercial Trust, known as Dexcel or the Dairying Centre of Excellence. This organisation will have a single productivity goal, to achieve 4% increase in dairy farm productivity per year. Its focus will be on the integration of technology, capability, delivery and change, rather than simply a technology focus as has been the case historically. Dexcel owns the research dairy farms previously operated by the Dairying Research Corporation (DRC) and owns and runs the consulting officer service, previously controlled by Livestock Improvement Corporation (LIC). Administration of the national database and animal evaluation is currently undertaken by LIC on behalf of the Dairy Board in conjunction with LIC's other activities of herdtesting and managing the largest artificial breeding company In New Zealand (Whittaker, 1994). The future role of LIC in relation to these activities is still under negotiation. Two other organisations that are important to the industry are a charitable Trust known as the New Zealand Dairy Research Institute (NZDRI), that undertakes milk characteristics and milk processing research, and ViaLactia Biosciences (VLB) a Dairy Board subsidiary responsible for the industry's biotechnology strategy. VLB is undertaking bovine, forage and microbial biotechnology research, much of which is done by contract or joint venture with other organisations. If the mega merger goes ahead, the activities of NZDRI and VLB are likely to be directed through the mega co-op. If Dairy Group and Kiwi fail to negotiate a merger, NZDRI and VLB will be in a more difficult political position as their future will rely on the two companies sharing the same vision.

■ Commodity or Niche Market

The development of the dairy industry has largely occurred through the production, processing and export of commodity manufactured products, such as butter, cheese, whole and skim milk powders. Mergers between companies and ever-increasing scale has been directed at cost reduction. Continued

increases in efficiency will be mandatory if the industry maintains its reliance on these strategies. In contrast, research into milk and product characteristics, human nutrition research and many aspects of the bovine biotechnology strategy require the production of designer milks and the separation and discrete processing of milk from different herds. Achieving this segregation of milk would have been more easily achieved some 60 years ago, when there were many dairy factories, each with their own local catchment of suppliers.

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