

**FUTURE DAIRY FARM EMPLOYMENT IN NEW ZEALAND – AN APPLICATION OF
THE HUMAN CAPABILITY FRAMEWORK**

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ABSTRACT

The dairy industry is New Zealand's top export earner (\$7.06 billion for year ended 30 June 2002). It generated 23 percent of merchandise exports, and contributed some 7 percent of New Zealand's GDP. However, employment in the farm part of this major sector of the economy has been and is problematic. This paper presents the outcomes of a *Dairy InSight* research project, no. 10015/2003. It provides a view of the future employment situation of the New Zealand dairy farming industry. The project sought to establish the future employment needs of the industry from a study of the future dairy farm labour market; to estimate future labour required and available; and to provide a full discussion of factors affecting those estimates. The report on which this paper is based was intended to provide a foundation document for any future studies of work and employment in dairy farming. The research strategy adopted was to use the Human Capability Framework (HCF) (Tipples, 2004) to analyse the future dairy farm labour market.

The use of the HCF to analyse the future dairy farm employment situation was implemented by a systematic consideration of each of the elements contributing to the supply side (Capacity), to the demand side (Opportunity), and the bringing of those both together (Matching), the three main components of the HCF.

Statistical resources were reviewed and found distinctly wanting. Other documentary sources were considered, expert opinions canvassed, and key sites and parties visited, to facilitate the industry wide analysis. All components of the analysis, together with practical recommendations, were put together in a single report, which was submitted to *Dairy InSight*, the public good funder of the industry. To keep this paper to the prescribed length, the primary focus is on factors influencing the future capacity of the dairy farming workforce. This is the most original part of our report and is based on primary sources, unlike the remainder which is largely derived from secondary sources. The future opportunities becoming available and the matching of capacity with opportunities are treated relatively briefly.

INTRODUCTION

The dairy industry is New Zealand's top export earner (\$7.06 billion for year ended 30 June 2002). It generated 23 percent of merchandise exports, and contributed some 7 percent of New Zealand's GDP (MAF, 2004). However, employment in the farm part of this major sector of the economy has been and is problematic (Edkins and Tipples, 2002). Their most recent embodiment was the farm labour shortage apparent from the late 1990s (Tipples and Morriss, 2002). On-going concerns about the shortage of dairy farm staff and the changing structure of the industry were significant factors giving rise to this project. It also grew out of a continued frustration with the partial analyses which had taken place previously and the belief that an important source of data had been ignored, which could shed valuable light on this changing sector of employment and the economy. The report on which this paper is based (Tipples, Wilson and Edkins, 2004) presents the future employment needs of the industry from a study of the future dairy farm labour market. It attempts to estimate future labour required and available, and it provides a full discussion of factors affecting those estimates. The report, funded by *Dairy InSight*, was intended to provide a foundation document for any future studies of work and employment in dairy farming.

RESEARCH STRATEGY

The research strategy adopted was to use the Human Capability Framework (Tipples, 2004) to analyse the dairy farm labour market. Through this a systematic analysis of the supply (capacity) and demand (opportunity) sides of the industry's labour market could be conducted, with all influencing factors being considered in turn (DoL, 2001). Also, the Human Capability Framework presents a complex mix of factors pictorially, which has been found to be grasped easily by industry members and politicians (Tipples, 2004). The use of the Human Capability Framework (HCF) has been considered to provide a better picture of labour markets than a simple classical economic model. It achieves this by not just focusing on the demand (opportunity) and supply (capacity) sides of the market, but by also considering factors influencing them and how the matching of demand and supply are actually effected. Previous uses of the HCF were considered (Tipples and Morriss (2002); Edkins (2003); Lucock (2003). It seemed to be the most relevant model for this particular study, fitted well along side espoused Government policy for the labour market, and provided the chance to consider such diverse factors as the changing

influence of demography on the future supply of dairy farm staff and the effect of new innovations such as 'Once-a-day' milking (OAD) on the demand for staff, while permitting exploring the relatively new territory of the 'matching' of supply and demand for staff. It also provides a focus for proposed interventions. In Figure 1 the HCF has been modified for the dairy farm labour market.

Data sources for this strategy were partial and had to be exploited in an innovative way. No farm labour data had been collected systematically after the demise of the Agricultural Production Census in 1996 (Fairweather, 1997). Dairy production statistics are cow and farm focused. Dairy farm staff have been ignored. Consequently we know more about individual cows than dairy farm staff. However, no systematic analysis of the data collected in the *Censuses of Population* for dairy farm staff had been made and this seemed to have possibilities. So our research strategy was to analyse the capacity side of the HCF, as far as we could, from the *Census of Population* data available. In this paper we concentrate on this research from primary sources, the *Census of Population* data for 1991, 1996 and 2001. The remainder of the paper, based largely on secondary sources, is treated quite briefly. Those wanting further information are referred to the full report (Tipples, Wilson and Edkins, 2004).

CAPACITY –THE FUTURE SUPPLY OF DAIRY FARM STAFF

The supply side of the dairy farm labour market was considered first. Dairy farm staff were able to be identified at the 'Occupation' level (*Occupation Classification 61211*) which covered all dairy farmers and dairy farm workers. This included cadets, farm hands, managers, supervisors, workers, farmers, stud farmers, milking equipment operators and sharemilkers. While the classification did not differentiate between employers and employees, it did include all those engaged in dairying on-farm. It is this population that is discussed throughout as 'dairy farmers/dairy farm workers'. *StatisticsNZ* advised that 1991, 1996 and 2001 were the only recent and comparable Censuses of Population and Dwellings. They were analysed by occupational status, ethnicity, age, sex, qualifications, hours worked and region.

OCCUPATION VERSUS INDUSTRY

The census records labour force statistics in several quite different forms. At the 2001 census there were 26,331 people employed by 'occupation' as dairy farmers/dairy farm workers in New Zealand (1991: 28,134; 1996: 29,964). This is a lower count than is often reported for the dairy industry workforce as it records only 'on farm' dairy workers who recorded dairy farming as their occupation *in their main job*. By way of contrast there were 35,037 people employed in the dairy 'industry' at the same census. For the resident population on census night 'occupation' in main job is recorded, as is who employs them. From these sets of figures a calculation is made of the numbers employed in any given industry. Thus it is possible to be employed in occupations other than 'dairy farmers/dairy farm worker' and yet be counted in the dairy farming industry figures. Unless otherwise stated all figures referred to in this paper refer to the occupation count.

Insert Figure 1: **The Dairy Farm Labour Market as an HCF Diagram**

Status in Employment

Status in Employment classified people according to whether they were working for themselves or for other people. By this classification the working population was separated into 'paid employees', 'employers', 'self employed without employees' and 'unpaid family workers'. The main operating structures found on New Zealand dairy farms are owner operator, sharemilker and contract milker (*Dairy Statistics, 2002-2003*). This accounted for the high percentages of the dairy farmers/dairy farm workers population in the 'self-employed and without employees' category, as many farms only employed additional labour on a casual or seasonal basis. Traditionally the dairy industry has had a high proportion of unpaid family workers.

Insert Figure 2: **Status in Employment over Time**

Figure 2 suggests that this operating structure may be changing. The proportion of 'employees' and 'employers' have increased over time while the number of 'self employed without employees' has fallen. The gender balance has remained similar, although traditionally a higher proportion of those recorded as 'unpaid family workers' are female.

Individual attributes: Gender/Age

In 2001 the dairy farmers/dairy farm workers population had a slightly higher percentage of females (34.4 percent), which was slowly increasing, than the agricultural population (32 percent) and a small percentage than the total working population (46.6 percent). The age structure of the dairy farmers/dairy farm workers population in 2001 was similar to that of the working population as a whole. While the industry appears to attract young entry level workers, this was not maintained in the same proportions as in the working population as a whole, especially the age groups immediately following the 15-19 year age group. There is potential for this shortfall to increase as a problem for industries such as dairying because the New Zealand population is predicted to alter significantly in age structure over the coming decades. The numbers available in the youth segment of the labour force are declining and will continue to do so. The 18-24 year segment of the labour force is expected to make up only 12 percent of the labour force in 2051, compared with 16 percent in 1996. Those aged 45-64 are expected to increase their share of the labour force from 28 percent in 1996 to 40 percent in 2051 (*New Zealand Labour Force Projections*). Some evidence of population ageing can be seen in the changing age structure of the dairy farmers/dairy farm workers population over the last three censuses (see Figure 3).

Ethnicity

At the 2001 census of the total 26,331 persons employed as dairy farmers/dairy farm workers 1,300 (5 percent) were Maori. One in seven (14.3 percent) of the New Zealand population as a whole identified as Maori. The Maori ethnic group has a younger age structure and higher birth-rate than the non-Maori population and thus has potential to increase its portion of the New Zealand population. This may also increase the percentage of Maori involved in dairying, although, as Table 1 shows, a considerably larger number (14,850) of Maori were employed in agricultural occupations other than dairying at the 2001 Census.

Insert Figure 3: Age Distribution across Census Years

Table 1 shows the numbers employed, by ethnicity, for all agricultural occupations at the 2001 census. Agricultural employment is predominantly undertaken by those of European ethnicity. In the total population there has been a fall in the number of people recording European ethnicity from 83 percent in 1991 to 80 percent in 2001. Counts of people of Asian ethnicity have more than doubled between 1991 and 2001. The column to the right in Table 1 shows the percentage increase for each of the main ethnic groups between 1991 and 2001. Those with the smallest representation in the agricultural workforce are the fastest growing segments of the New Zealand population. Immigration has the potential to further change the ethnic balance in New Zealand.

Insert Table 1: Agriculture occupation and Population increase by Ethnicity

Hours worked

The largest difference between the dairy farm population and the general working population was the much greater proportion (64 percent) working more than 50 hours per week: (agricultural population 40 percent, general working population 25 percent). The hours worked have also changed over time within the dairy farmers/dairy farm workers population as Figure 4 shows. This shows a percentage decrease in the numbers of part time workers and increases in those working 70+ hours per week. Otherwise there had been little change since 1996.

Qualifications

The highest qualifications held by the 2001 dairy farmers/dairy farm workers population is shown in Table 2. Some comparison can be made with the highest qualifications attained by the New Zealand working population. This shows that overall in the working population:

- 1 in 4 had no qualifications (dairy farmers/dairy farm workers 1 in 3.5)
- 1 in 3 had post school qualifications (dairy farmers/dairy farm workers 1 in 4)
- 1 in 5 had vocational qualifications (dairy farmers/dairy farm workers 1 in 4.7)
- 1 in 8 had a degree (dairy farmers/dairy farm workers 1 in 25)

Insert Figure 4: **Hours Worked by Census Year by Dairy farmers/dairy farm workers Population**

Insert Table 2: **Highest Qualification 2001 Dairy Population**

The dairy farmers/dairy farm workers population is poorly educated in comparison to the total population, especially the number who have degree qualifications. As might be expected, however, the dairy farmers/dairy farm workers population is slightly better represented with vocational qualifications.

Those aged 50+ accounted for 40 percent of those with no qualifications at all. Of the dairy farmers/dairy farm workers with no post-school qualifications the age spread was more even, although 27 percent of this group were also over the age of 50. The problems of low levels of education are particularly bad in the older parts of the industry and in the areas with concentrations of older dairy farm staff such as Northland (Tipples et al., 2004).

Dairy Farm Migrations

The pattern of employment in the dairy farming industry is unique. The analysis of census data was extended when it was discovered that the data could reveal the whereabouts of the individual dairy person five years previously. This enabled analysis of the overall patterns of migration undergone by dairy farm staff. Historically dairy farmers, sharemilkers and their employees have often changed farms on 'Gypsy day', 1 June

(Tipples and and Lucock, 2004). Typically cows cease to be milked during May and June and then there is a six-week gap when cows are not milked. By custom 1 June is the day when the majority of farm employees and employers shifted to another farm. Recently Gypsy day has involved many farm families moving from the North Island to the South Island. The successive censuses (1991, 1996 and 2001) showed the overall patterns of inter-censal migration. Thus we were able to derive the first empirical account of the migrations which the dairy farm labour force has experienced between 1986 and 2001.

For North Island districts some 15 percent of total dairy farmers/dairy farm workers per region had moved regions between censuses. For South Island districts the proportion, which had moved, was nearer 25 percent, but that related to much smaller numbers involved. Overall, there had been a marked move to the South Island between 1991 and 1996, which had slowed between 1996 and 2001. At the same time the amount of movement within the South Island had continued to grow. The reasons for the southward movement of the industry are complex. Land is cheaper in the South, which permits larger farms and herds. With irrigation possibilities some of the much drier and healthier districts for cows are now suitable for dairy farming for the first time.

Insert Figure 5: **Migration Synopsis**

In summary, the future supply/capacity of the dairy farm labour force is thus likely to be compromised by a combination of factors: a small and declining number of entrants from a more urban and ethnically diverse pool of potential staff, poor retention of those who do enter, and low numbers training and becoming technically competent. This is now contrasted with the factors influencing the future demands/opportunities for dairy farm staff.

OPPORTUNITY – THE FUTURE DEMAND FOR DAIRY FARM STAFF

The demand side of the dairy farm labour market, the opportunities available for employment of the dairy farm workforce, was considered under the headings highlighted in the Human Capability diagram (Figure 1).

Globalisation

Globalisation is the increasing flow of ideas, goods and services, labour and capital across national boundaries (DoL, 2001). It affects both capacity and opportunities. In Canterbury the growth in dairy farm employment has drawn heavily on qualified migrants to fill dairy farm positions (Lucock, 2003). With almost no unemployment that trend looks likely to continue as a way of enhancing capacity. Furthermore, the opening of world trade barriers, such as the recent New Zealand agreement with China, must affect dairy farm employment opportunities.

Structural Factors

From a structural point of view, the decreasing number of dairy farms may be contrasted with the considerable increase in the number of cows over the twenty years to 2002/2003. Thus the numbers of small herds has declined and large herds increased, while the area of farms has increased at a slower rate because of more intensive stocking (Tipples et al., 2004, 71-76). Consequently, there are larger and more complex farms and herds, which require greater management skill by employers and increasing numbers of employees, who also have to be 'managed'. Regional differences were significant.

Finance, Capital and Exchange Rates

Favourable world dairy prices, after a recent short term decline, have been countered to some degree by the recent and prospective strength of the New Zealand dollar in the exchange rate markets. More serious for the individual dairy farmer is the level of indebtedness, which is more of a problem with rising interest rates. In the event of a fall in commodity prices, a continued strong dollar, and continued rising interest rates many dairy farmers may find themselves caught in a vicious cost/price squeeze. Historically the reaction to that has been to reduce the cost of staff, which may no longer be such a simple option with larger farms, herd sizes and bigger units of employment. (Ibid., 76-78).

Entrepreneurial Attitudes

Entrepreneurial attitudes, particularly of small business enterprise owners, which would include most dairy farmers, were considered and found to have similar effects – difficulties of delegation, working very long hours (a major problem for many prospective dairy farm staff), stressful lifestyles, and dependence on employees. Statutory compliance was always an issue, particularly with what was seen as the increasing tide of regulation of employment and safety conditions. The prospect of future farm ownership seems more remote and less of an incentive to work up from the lower rungs of the traditional dairy farming career ladder than it had done. Many share farming positions are being changed to new forms of equity partnerships with professional farm managers (Ibid., 78-82).

Environmental Factors

Other drivers of demand were also reviewed, including the international and New Zealand business and regulatory environments, which often have additional compliance costs (Ibid.).

Consumer Preferences

Changes in international consumer preferences, highlighted by the growing demand for quality assurance programmes, will have an influence on workforce demand, as will the desire to maintain New Zealand's 'clean, green image'. The need for product traceability for food safety and health reasons, from producer to consumer, and for publicly accepted animal welfare and employee welfare standards, increasingly required by supermarkets (e.g. Eurepgap protocols), will require the ability to document and trace back production. A need for greater literacy and computing skills will be the consequence. (Ibid., 85-89)

Innovation and Technological Change

Changing production systems also have quality assurance implications. The widespread adoption of 'Once-a-day' milking could have a major impact on QA programmes because it is relatively 'cow friendly', which would suit a QA programme with animal welfare concerns such as Eurepgap, while at the same time it has a major implication of a reduced demand for labour. Since we completed our study there has been a huge growth in industry interest in this system. With intensive breeding to harness the benefits of the OAD

system, this could be one of the biggest changes the industry has seen since the abandoning of stripping cows before milking, with substantial effects on those working with such systems (Holmes, 2004). The major technological change nearing mechanical maturity and commercial adoption is the Automated Milking System. This fully robotic milking system, such as on *Dexcel's* fully automated *Greenfield* site at Ruakura, can be operated by the farm worker from off site by means of just a cell phone alarm, which alerts him if there is a system malfunction. If these two changes can be successfully integrated together the staffing implications might include a smaller but more technically competent and qualified work force. (Tipples et al., 2004, 82-85) It could also provide further improvements in the industry's labour productivity, helping towards the achievement of the target 4 percent improvement par annum.

Non-standard Work

The tightness of the dairy farm labour market has forced the adoption of a number of employment practices which have been more employee-friendly to ensure a continued supply of staff. These changes have often involved some element of working outside normal hours or shifts, and a degree of casualization. They reflect trends in society at large of employers and employees seeking a more flexible week (Spoonley et al., 2004).

MATCHING

Matching processes bring together supply with demand. The consideration of matching processes in themselves is a relatively new field and one in which the industry can make further radical improvements. They were found not to be working very well in our study.

An example of poor matching comes from a Taranaki study (Kuriger, 2001), part of dairy heartland, where you would not expect a poor knowledge of dairy farming to be a problem. There was misinformation there and school students often had poor perceptions of dairy farming and believed their chances of employment in the dairy sector were poor. Also they did not want to work weekends and believed social life in the dairy sector was poor. Further they believed higher levels of education were not necessary for dairy farming. Careers counsellors' knowledge of and attitudes to agriculture and dairying were also of concern (Martin, 2002). Poor matching of job applicants with job expectations was an ongoing problem, with poor stereotypical images of the industry. The evidence for the

existence of long hours, one of the contentious issues of most concern to both industry recruits and those already employed, was incontrovertible.

New forms of matching (e.g. internet job advertising) might appear to be helping, but they depend on ready access to and the ability to use a computer. Further, they rarely provide full information for a job applicant, an important part of founding good employment relationships. Regulation of employment conditions can be regarded as both oil to help the relationships run more smoothly and the sand which creates an element of friction (DoL, 2001, 39-40). Failure of statutory compliance can cause difficulties in achieving good matches. Work to improve matching at overall industry level has been the focus of the pan-industry group, *Human Capability in Agriculture and Horticulture* since 2002. This includes a promotional strategy, and careers and schools programmes, together with meeting careers' advisors (Tipples, 2004). *Dexcel*, with its *People4dairying* programme and 'toolkit', and *Dairy InSight*, are already engaged in various programmes to help matching e.g. 'Let's Talk Dairying'. Farmer initiatives have also had some spectacular successes such as the Amuri Dairy Employers Group around Culverden in Canterbury (Edkins, 2003). The growth in matching 'initiatives' since 2000 may be seen very positively, but the industry is warned against losing its current positive momentum. Short term cost cutting in the event of adverse terms of trade and poor dairy farming economics, as has happened in the past, could rapidly undo the good work of the last few years. That might then undermine positive promotion of opportunities in the sector. With an increasing dependence on employed staff potential recruits could be driven away.

ESTIMATING FUTURE DAIRY FARM STAFF

The problems of forecasting or estimating the scale of future staffing needs were found to be considerable. The hazards in such a process were illuminated by a case study of Canterbury, when in 1993 estimates were required of numbers of horticultural staff in the 21st Century (Donnelly, 1993). At that time data sources of both staff and production areas were much better than now. Even so three out of four estimates were wildly wrong compared to the number of persons recorded in the 2001 Census of Population, the worst by a factor of 5.5. Since 1996 the basic data to support such estimations is no longer collected. *Census of Population* data for 1991, 1996 and 2001 were insufficiently compatible to permit better estimations. In this situation, where precise estimation was

very difficult, it is important to understand how and why the critical variables are changing. Consequently, Holmes and Cameron's estimation of the future staffing level for dairy farming in 2030 seems reasonable. All the factors affecting the component parts were discussed, so that if any one cause of change was not what was expected a reasonable re-evaluation of the estimate might be made. For 2030, Holmes and Cameron have suggested:

“4 million cows; 9,000 herds; average 440 cows per herd. Average 3 staff per farm, on the 8,000 largest farms, with at least one person with tertiary (or equivalent) training, and the other two staff either having already completed, or currently working through, the industry's apprenticeship programme.” (Holmes and Cameron, 2001, 54)

If the 1,000 smallest farms do not employ significant numbers of staff except the immediate farm family, which will be counted as 1.5 staff equivalents, the workforce would be some $24,000 + 1,500 = 25,500$ staff equivalents. That total includes both farmer/operators plus employees, whether full or part-time, whether male or female. That is only slightly less than the number identifying themselves as full-time dairy farmers/farm workers at the 2001 census. If the industry continues to expand and businesses continue to get bigger in size, then a further growth in employment is anticipated as family involvement diminishes. Where a greater proportion of employees are to come from, with New Zealand's fast aging and ethnically diverse population, is a moot point. OAD milking, on the other hand, could also substantially reduce demand for staff.

CONCLUSIONS AND RECOMMENDATIONS

1. The supply of labour within and available to the dairy industry, which has been marginal and is likely to diminish, is unlikely to meet the prospective growth in future demand for staff.
2. Future capacity is compromised by a small and probably declining number of entrants from a more urban and ethnically diverse pool of potential staff; inadequate numbers training and achieving technical competence; and by poor retention shown by the declining numbers in the 20-34 age groups.
3. Growth in opportunities is expected to continue with increasing total cow numbers and increasing farm scale, especially in areas which are remote or sparsely populated, often with little dairying history.

4. Literacy and technical requirements of employers and employees will continue to increase.
5. The increase in the amount and level of debate about the industry's employment troubles is a very encouraging development. Greater awareness of and willingness to do something about the industry's employment troubles indicates a groundswell necessary for improvement. The change needs to be encouraged in every way possible.
6. If Once-a-Day milking (OAD) is widely adopted, and cows selected for best OAD characteristics, the implications for the demand for labour could be considerable. Workshops held during 2004, since our report was submitted, have had unprecedented interest from dairy farmers. OAD might have vast advantages for recruiting and retaining staff because it is much more 'worker friendly' and offers real lifestyle advantages. Dairy farmers and workers might indeed 'get-a-life'!
7. To keep improving labour productivity in the sector the need for further mechanization of labour intensive processes is ongoing. The Automatic Dairy Farm offers most opportunity.
8. In terms of the future to 2030, Holmes and Cameron's 2001 estimations of prospective supply and demand for staff seem reasonable in the light of the matters discussed.

Further research on the changing barriers to entry into a dairy career or job is going to continue to be worth study. Continued retention difficulties similarly merit further consideration, especially tactics for employers to adopt to reduce the problem. The implications of Once-a-day milking and Automatic Milking Systems are most exciting and their employment implications need careful evaluation.

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Figure 1:

The Dairy Farm Labour Market as an HCF Diagram

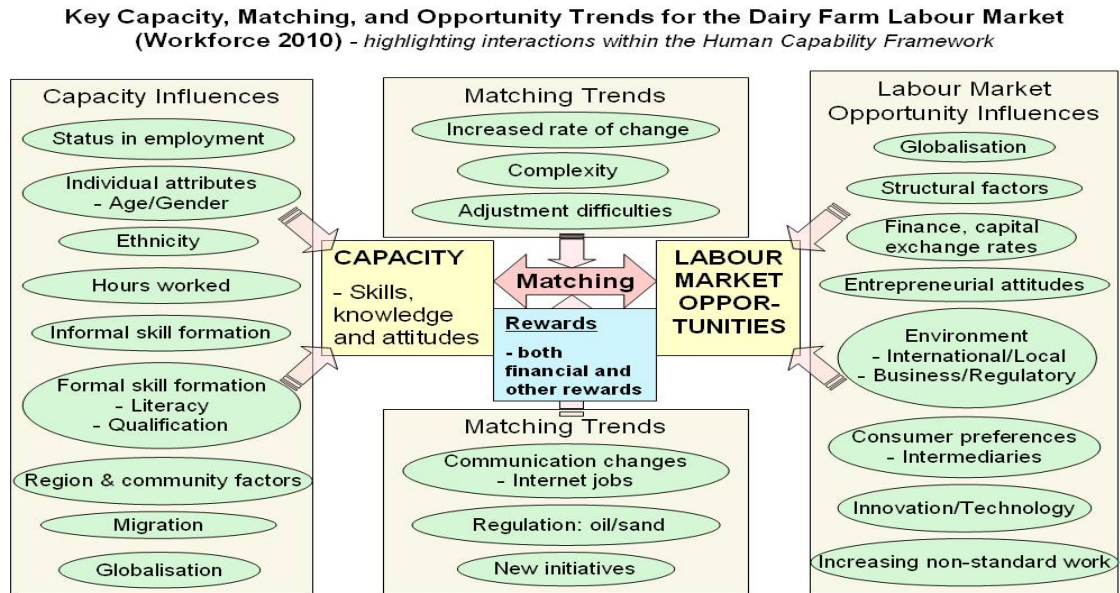


Figure 2:

Status in Employment over Time

(Source: Statistics NZ 1991, 1996 & 2001 Census)

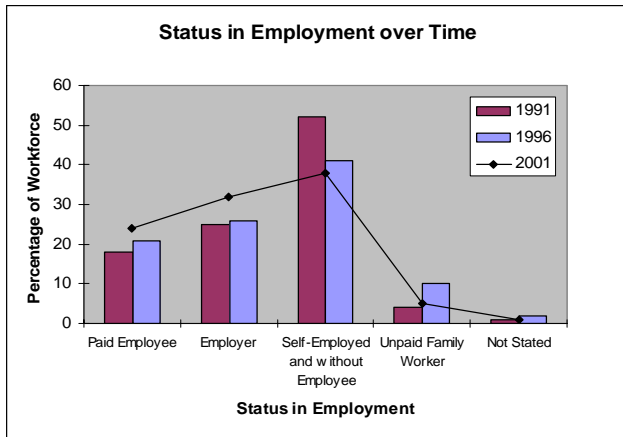


Figure 3:

Age Distribution across Census Years

(Source: Statistics NZ 1991, 1996, 2001 Censuses)

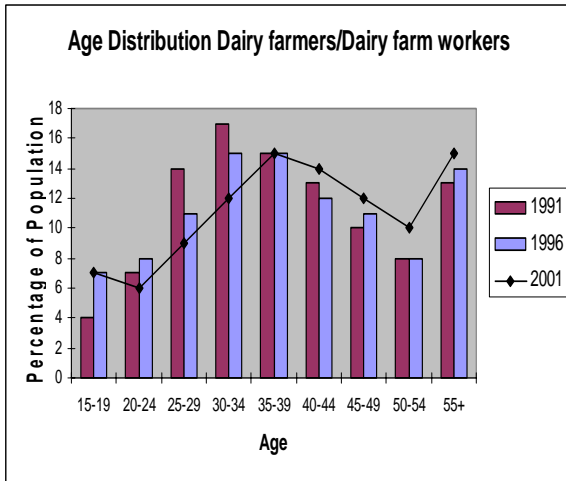


Figure 4:

Hours Worked by Census Year by Dairy farmers/dairy farm workers Population
(Source Statistics NZ 1991, 1996 & 2001 Census)

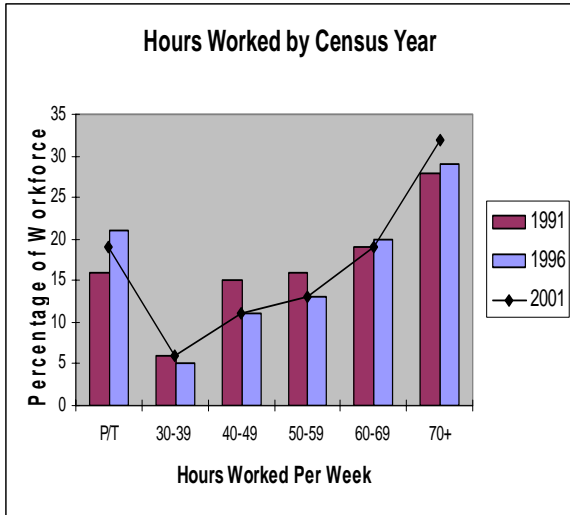


Figure 5:

Migration Synopsis

(Source: Statistics NZ 1991, 1996 and 2001 Census)

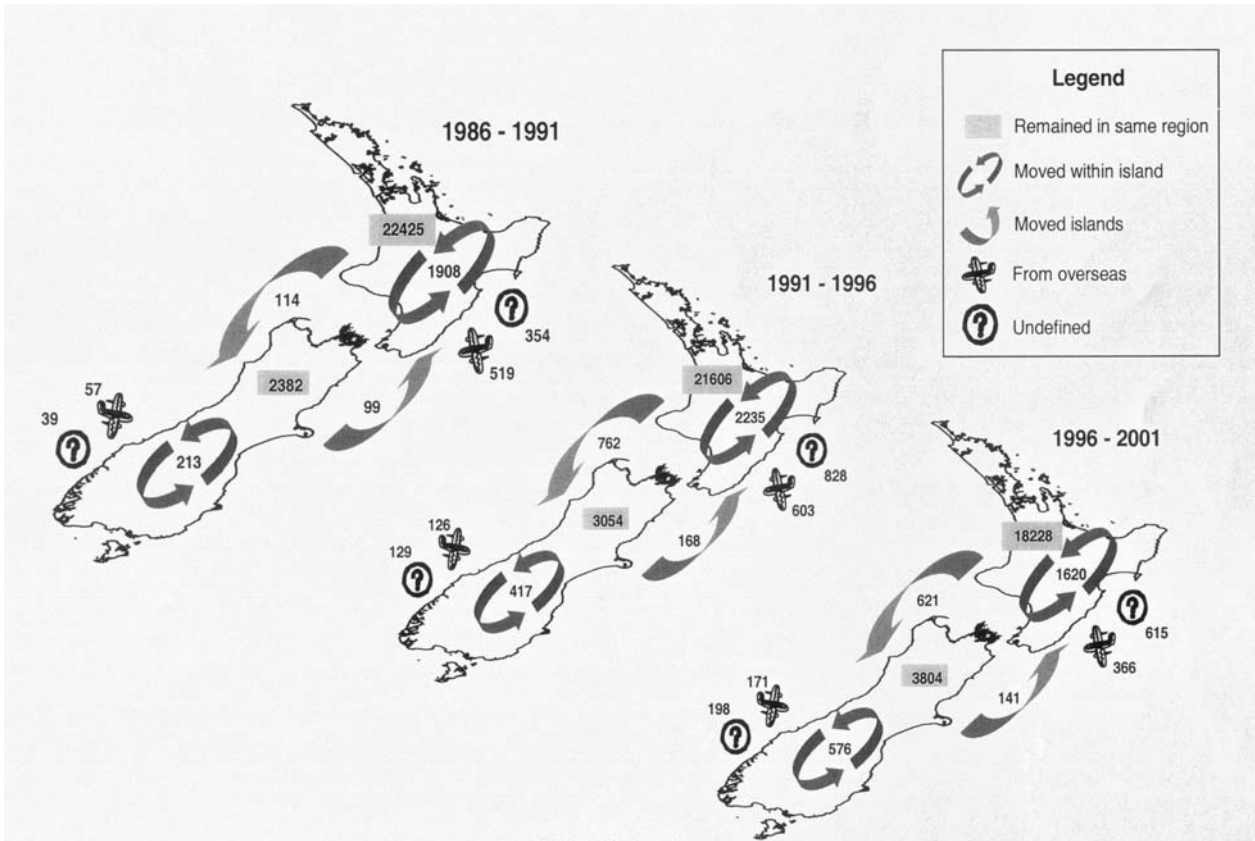


Table 1:

Agriculture occupation and Population increase by Ethnicity

(Source: Statistics NZ 2001 Census)

Ethnicity	Occupation Agriculture	% Population Increase 1991-2001
Total European	122610	- 3.0
Total Maori	14850	+ 21.0
Total Pacific	2208	+ 38.7
Total Asian	2736	+ 138.0
Total Other	168	n/a

Table 2:

Highest Qualification 2001 Dairy Population

(Source: Statistics NZ 2001 Census)

Highest Qualification	Number	%
No Qualification	7602	29
School Qualification	10497	40
Vocational Qualification	5448	21
Degree	1035	4
Unidentified	1749	6
Total	26331	100