Future capability needs for the primary industries in New Zealand

for the Ministry for Primary Industries

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Infometrics

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Ministry for Primary Industries
Manatū Ahu Matua

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1. INTRODUCTION AND KEY FINDINGS

Introduction

Understanding future capability needs and determining how we build this capability is critically important for lifting the productivity and profitability of the New Zealand primary industries.

New Zealand is internationally regarded as a high-quality producer of food and fibre products. To maintain New Zealand's competitive advantage in the marketplace, New Zealand's primary industries must be highly innovative throughout the value chain.

Primary industries are defined in this report as including horticulture, red meat and wool, arable, dairy, seafood, forestry, and other primary sectors. Primary industries are defined as including the whole value chain, including production, processing and marketing, along with support industries such as fertiliser industries, veterinarians, rural consultants and accountants.

In practice we have not been able to make a direct correlation between support industries and specific primary industries. For example, fertiliser and pesticides are used in all the land-based industries. For the purposes of this report, we have modelled the support services for the primary industries as a separate industry. The exceptions are when the service is clearly associated with a primary activity (for example, dairy wholesaling is included as a support service within dairy).

The amount of change that has occurred in the primary industries over the last 10 years has been significant. Farming systems continue to become more sophisticated, and the level of scrutiny over the management of our natural resources intensifies. The skills and knowledge required across the primary industries will need to keep pace with the changing demands of society and discerning consumers.

The primary industries and the Ministry for Primary Industries share a common goal to double export returns by 2025. Growth must be achieved in a sustainable way. To accomplish this, each industry is operating to a strategy that specifies the required investment, technological innovation and market development relevant to their international competitiveness.

Human capability is a core asset underpinning the achievement of each industry's strategy. The nation must grow its people who are working across the food and fibre value chains if it is to have any chance of doubling exports. Volatility characterises our international markets which will continue to represent a management challenge to those who operate value chains in the primary sector. The capability challenge will increasingly be one of skills and talent to manage this volatility. Forecasting capability requirements will facilitate planning and resource allocation decisions pertaining to education, training and employment practices. These decisions also need to account for regional differences.

This report provides an analysis of sector trends and employment information to develop a wider understanding of the skills and capability required by the primary industries over the period to 2025, it uses analysis of industry strategies as a base for labour market modelling. The results reported here have drawn on input and feedback from relevant industry bodies, government agencies, professional bodies, and education training providers.

This report has taken a whole-of-primary industries approach. It is hoped that this work will contribute to better planning for education, training, research, and industry requirements with respect to skills and capability across the value chain. It is acknowledged that expanding primary industries' capabilities will extend to increasing demand for capability offshore. The success of New Zealand primary industries will necessitate increasing employment of foreign nationals in other countries, as well as the posting of New Zealand nationals offshore. Employment projections presented here, however, do not make any explicit allowance for the overseas location of workers for New Zealand primary industries as this will depend to a large extent on the specific business strategies adopted by individual enterprises.

The report is structured as follows: following the introduction and key findings the outlook for primary industries employment is laid out starting with key messages and then moving to employment by industry, occupation and qualification level, field of study, region, ethnicity and gender. Sections 4 to 11 set out the forecasts of skill requirements for horticulture, red meat and wool, arable, dairy, seafood, forest products, support services and other primary products. The method is described in Section 11.

Assumptions and limitations

All numbers presented in this report should be regarded as indicative in nature. Quantitative analysis imposes constraints and rigour to what is otherwise speculative conjecture about the future. Projections presented in this report may be considered questionable. As with all modelling exercises, this reflects the assumptions and judgements underpinning the projections, structural limitations with the models used, or it might highlight a real prospect that challenges our current understanding. The projections presented here are a stimulus to debate and an aid to the ongoing exercise of planning to ensure that access to skills does not become a constraint for future developments in the primary industries.

Context and rationale

Understanding future capability needs (skills and capacity) and ensuring New Zealand is able to meet those needs is critically important for lifting productivity and profitability of the primary industries.

New Zealand's increasingly sophisticated food and fibre industries remain the driving force for economic growth and exports. The primary industries are major users and innovators of technology and knowledge.

Increasing productivity in the primary industries is critical to improve New Zealand's prosperity and well-being. Changes will be needed across the value chain including in production, processing, marketing, and customer relationships if we are to meet the growth targets. This includes adding value and embodying service features into food and fibre exports. To do this, primary industries need to attract, train and retain skilled and capable people.

In the future, the industry will require more specialist skills to take full advantage of increasingly sophisticated farming and processing systems, and increased market opportunities in Asia. Specialist skills will also be required to manage critical issues around food safety, biosecurity, sustainability and animal welfare.

Lifting the overall capability of people involved in the primary industries will require ensuring people have the right skills and knowledge to meet the needs of increasingly diversified markets and discerning consumers. This means attracting young people with both basic and high-level qualifications across a wide range of

core subjects and ensuring existing people have access to retraining and professional development. Greater emphasis and transparency will be needed across each part of the value chain. The dynamics of the market place mean that the primary industries are also going to need greater access to non-traditional skills such as language and cultural understanding. There is also a need to work across the sectors and ensure skills are transferable.

Analysis of skills and capability

Analysis of past sector trends and future industry strategies are used to populate labour market models to develop a wider understanding of the skills and capability that will be required by primary industries over the period to 2025. This work was undertaken in collaboration with industry bodies, government agencies, professional bodies, and training providers.

Initial analysis was tested with a steering group from the arable, dairy, forest products, horticulture, red meat and wool, and seafood sectors, along with rural professionals and government experts. Feedback from the steering group was incorporated into the analysis and industry labour modelling and then tested with a wider grouping of industry stakeholders in a workshop. The workshop participants also identified potential actions to fill gaps in capability between current business-as-usual scenarios and industry growth strategies.

It is important to understand that the forecasts of changes to labour capabilities are underpinned by each industry's own economic growth strategy. The consultancy team has not tried to critique the economic growth forecasts of these strategies rather the focus has been on standardising the growth projections on the year 2025. They represent one view of an uncertain world and vary in the degree they represent stretch targets. As such, it is the direction of travel that is important rather than the absolute numbers in the forecasts. Estimates of where on the value-chain production will occur were also informed by land-use modelling conducted by Motu Economic and Public Policy Research (Motu). For further elaboration see *Land-use modelling* on page 137.

High-level themes have emerged as well as unique features identified for each of the six primary industries. The analysis has also looked at specific regional needs and implications.

Summary of key findings

- Employment in primary industries in 2012 is estimated to have been around 350,000 or 16% of total employment in New Zealand. For some regions, including Gisborne, Tasman, Marlborough and Southland, the primary industries account for over 30% of total employment.
- In 2012, 39% of people employed in the primary industries were involved directly in primary production, for example, on farm, on-orchard, in-forest, and at-sea; 33% was related to processing activities; and 29% of employment was related to support services, for example, producing inputs, research, and other ancillary services.
- Employment in primary industries is projected in the business-as-usual forecasts to increase to 370,000 by 2025. This would actually imply a drop in percentage employed in the primary industries to 15% of total national employment, lower than the 16% in 2012. While employment in the primary industries is growing, employment in other areas of the economy are growing slightly faster. This, in part, reflects increasing labour productivity in the primary industries and the greater use of automation.

- The successful implementation of the primary industry strategies is projected to expand employment within the primary industries by a further 33,000 to 403,000 by 2025.
- The successful implementation of primary industry strategies is expected to have little impact on the numbers of people employed in production – on farm, on-orchard, in-forest, and at-sea – but they are expected to generate growth in processing and to a much greater extent in support services jobs, especially as primary production and processing becomes more sophisticated and greater value is added beyond the farm gate all the way to the consumer.
- Successful implementation of the primary industries strategies is likely to increase demand for highly skilled (degree or higher) workers especially in support services. The primary industries will also continue to generate job opportunities for those without formal qualifications, along with ongoing need for on the job training.
- The modelling suggests there is an increasing demand for more people in occupations with higher qualifications, especially for professional degrees in fields of specialisation aligned with the value chain, including areas such as integrated farms systems. It is also very clear that we need to increase the skill level across the board. This means that even roles that have traditionally not required formal qualifications will increasingly need greater skills and an increased demand for on-the-job and professional training.

High-level themes from industry strategies

Consumer demands are evolving and changing. The primary industries already export to multiple markets, however, the Asian markets are becoming more important and the demographics and demands from our "traditional markets" are also changing. Consumers are becoming more discerning and are looking for food and fibre that suits their tastes and lifestyles, along with greater assurances around social licence, environmental sustainability, animal welfare and food safety.

These changing demands will have impacts for skills across the board (some of which are expanded in more detail below). In particular, there will be a greater need for marketing skills coupled with excellent language and cultural skills. These skills, combined with technical expertise and in-depth knowledge of the product attributes, will be necessary to develop and maintain strong customer relationships.

The need to maintain and add value, especially in the areas of processing, packaging and logistics. Meeting consumer demands will require continued innovation throughout the value chain. For some products, especially products whose highest value is in a fresh form, such as seafood, and many horticultural and meat products, a strong focus on the supply chain, especially where this requires refrigeration, and packaging will be critical. For other products where further processing can add value, such as wool and timber, there will be an increased demand for people with scientific and engineering skills.

Increased automation and robotics. The processing sectors (and others) will require more technical people (engineers, technicians and information technology specialists) as automation and robotics becomes the norm.

Production units are becoming more specialised, sophisticated and larger. Farms and horticultural units are becoming larger and employing more people in specialised roles, such as herd managers. This means there will be an increased demand for management skills, especially people management skills. There is a greater diversity of employees within farms, forests and horticultural units and the ability to manage and develop people with different backgrounds (cultural, urban, rural etc), as well

as being able to manage permanent, seasonal and contract labour will be important. It is also likely that the gender imbalance within the primary industries will diminish over time. While the level of specialised expertise is increasing, there will also be an increased demand for integrated farm systems knowledge. This systems knowledge will be critical for implementing innovation and productivity improvements on farm, and also for meeting the requirements around environmental sustainability, animal welfare, managing risk and food safety.

Greater demand for support services. As the primary industries become more sophisticated there will be an increased demand for professional services from researchers, rural consultants, veterinarians, agronomists and irrigation specialists. There will also be an increase in demand for non-traditional skilled areas such as IT, engineering, robotics, sophisticated automatic processing equipment, precision agriculture and in-market services.

Transferability of skills across the primary industries. Employees will be more skilled and flexible. Not only will employees need good technical skills they will also need the right aptitude and attitude and the flexibility to work across industries during their career.

Industry-specific capability requirements

Horticulture

Horticulture human capability requirements involve:

- More market/product-oriented skills including value-chain skills to maximise market potential of new cultivars.
- Supplying product to diverse markets with consumer oriented services.
- Better business/management-oriented skills particularly in logistics, information and assurance systems.
- New production-oriented skills such as technology adoption in production of proprietary new cultivars.
- Additional science/technical support for the development of proprietary new cultivars.

Our modelling indicates that to achieve their industry plans, employment in horticulture will need to increase by 7,800 from 36,300 in 2012 to 44,100 in 2025. Most of this increase (5,800) is expected to occur on farm, with sales and marketing and management also increasing. The industry will need to train an additional 26,300 workers over the next 13 years to replace the natural attrition of workers.

Red meat and wool

The area of land devoted to the red meat and wool industry has declined with consequent implications for processing due to the prospect of lower throughput. To date export volumes have changed little as productivity increases from higher lambing percentages and heavier lambs have offset declining ewe numbers. This places additional challenges in retaining top-class skills and capability. Key human capability requirements involve:

- More market/product-oriented skills, in-market skills, market-led product innovation, and cultural and language capability.
- Better business/management-oriented skills in supply chain management, including information infrastructure, food safety, and processing innovation.

- Improved production/business-oriented skills, innovative farm managers and owners who are skilled in staff leadership/management and have willingness to adopt new technology.
- Staff with improved literacy and numeracy competency; and targeted science/technical support for production, environment, and social sciences, along with improved capability of accredited rural professionals.

On-farm employment has been in decline, with on-farm numbers of sheep and beef farms declining by 11,000 (or 23%) to 36,300 in 2012. Further declines in on-farm employment are expected, with on-farm employment declining by a further 6,500 to 29,800 by 2025. Meat production is expected to fare relatively better than wool production. Advances in meat processing automation and ultimately industry rationalisation are expected to reduce employment numbers in processing but expand wholesaling employment prospects.

Arable

For the arable industry, specific human capability requirements include:

- More market-oriented skills (in-market skills including marketing, logistics, supply-chain management and cultural and language capability).
- Better business-oriented skills (new business models to transform commodities into branded products with strong supply chain partners).
- A higher level of leadership and entrepreneurial flair with an understanding of the interconnectedness with other sectors and along all components of the value chain.
- Improved production skills (farm and financial management for sophisticated farm systems integrating technology into cropping with livestock, using the same number of people but with higher skill base on farm).
- More science/technical support skills (scientists and technicians with a greater focus on plants, such as botany and agronomy).

The 4,600 forecast increase in jobs associated with the arable industry represents a 24% increase between 2012 and 2025. The forecast increase in employment opportunities is generally proportional with current employment patterns.

Dairy

Future dairy industry human capability requirements involve:

- More market/product-oriented skills in consumer branding, food/nutrition science, process engineering, food service marketing and product innovation and cultural/language to address barriers to doing business in emerging markets.
- A business/management-orientation through risk management, food safety and quality assurance systems.
- Higher levels of production-oriented skills including whole farm systems, information management, resource use, financial efficiency, soft skills and managing local/migrant staff and contractors.
- Increased science/technical support skills particularly researchers on resource use efficiency, reducing environment effects and agriculture resource economics.
- More accredited rural professionals/providers to transfer new techniques and knowledge to farmers.

Land-use projections indicate that after a 37% (500,000 ha) expansion in dairy farm land between 2002 and 2012 land devoted to dairy farming is expected to remain largely static at around 1.9m ha during the period to 2025. This view which is embodied in the forecasts is different to that of the dairy industry which is working off a 2% compound average growth rate and a 10% increase in land area over the period to 2025, with a large variation between regions. Such growth in dairy land takes into account possible new irrigation schemes and significantly improved environmental performance reducing nitrogen leaching to groundwater, which the Motu projections downplay. There is considerable uncertainty about which scenario is likely to play out and this highlights the need for informed debate to plan ahead. On-farm work numbers are projected to remain close to current levels around 38,000. Processing numbers increased strongly over the past decade, with the 2,000 increase in numbers representing a 33% increase. A further 1,300 increase in processing employment numbers is predicted in the 13 years from 2012 to 2025.

Seafood

The two distinct components of the seafood industry, wild capture (traditional fishing) and aquaculture (fish farming) have somewhat different requirements for human capability requirements because of the nature of the activity (fishing versus farming), but in general they involve:

- More market/product-oriented skills for export marketing, improved business/management oriented skills particularly in supply chain and channel management and commercialisation of health claims, and higher-value products.
- Better production-oriented skills for sustainable fishing to retain their social license.
- More emphasis on specification and assurance systems for precision harvesting.
- Specialists in developing offshore aquaculture sites.

Employment in seafood-related activities have been in decline over the past decade. The implementation of the industries' strategies is expected to leave employment numbers more or less at 2012 levels.

Forestry

For the forestry industry, human capability requirements exist for:

- More market/product-oriented skills particularly in-market, showcasing and engagement with the wood/construction sector.
- Better business/management-oriented skills in investment and new business models.
- Better production-oriented skills with greater skilled design engineers and assembly skills.
- A greater emphasis on maintenance and diagnostic skills, chemical engineering, harvesting technology and equipment manufacturing.
- Science/technical support skills in genetics/pathogens, carbon forestry research, extension and sustainability/verification.

Employment in forest product industries is concentrated in processing activities. There was a large decline in processing employment from 36,000 in 2002 to 27,000 in 2012. These declines in processing employment were broad based but the largest declines were in log sawmilling, paper manufacturing and furniture manufacturing activities. Forest sector strategies, however, are expected to see a

considerable expansion in export earnings from processed wood products. The resulting expansion in wood processing will require a considerable expansion in employment in processing: a 4,300 increase from 27,200 in 2012 to 31,500 in 2025.

Meeting future capability needs

Actions will be required to meet the future capability needs of the primary industries. These actions fall into three major areas: attract, train and retain. These actions require an increased focus by everyone on capability improvement.

Attracting new people to the primary industries

The primary industries can provide a rewarding career no matter what someone's interest or skill set is. People have traditionally thought of the primary industries as the production side of farming, forestry or fishing. In addition, it is often assumed that people from rural backgrounds are most likely to be attracted to careers within the primary industries.

With the transformation that the primary industries are undergoing there is a need to attract a greater diversity of people to the primary industries, including from urban areas especially with the increasing urbanisation of New Zealand. The transformation will require young people with basic tertiary qualifications across a broad range of subjects including science, economics, marketing, human relations and others to seek careers in the primary industries.

To attract people to the primary industries will require addressing the following questions.

- How do we help people understand the diversity and breadth of careers in the primary industries and that these careers can be rewarding?
- How do we ensure that those who advise and support people making career decisions (teachers, parents, career consultants) have access to up-to-date knowledge on primary industries careers?
- How do we attract the best and brightest with transferrable skills to the primary industries, for example, in areas such as integrated farm systems, science, IT, engineering, international relations, commercialisation and marketing?

Training our workforce

Training involves both formal education and on-the-job experience. It needs to focus on both technical and generic skills and is a life-long process. The training spectrum is wide. It covers schooling, tertiary education, in-work training, and continuous professional development. As such, it involves students, schools, universities and training providers, employers and employees, professional organisations (for example, the New Zealand Institute of Primary Industry Management (NZIPIM)) and the government.

Some skills, such as literacy and numeracy are foundation skills that apply wider than the primary industries. Other skills such as STEM (science, technology, engineering and mathematics) are very relevant to the primary industries. Initiatives to enhance foundation skills, as well as more specialised skills are important to the primary industries.

To train the people needed for the primary industries will require addressing the following key questions.

- How do we better contextualise the curriculum to demonstrate to a wide range of students that there are exciting career opportunities in the primary industries and that the skills they are learning are appropriate and relevant?
- How do we identify and support an increase in the critical areas of tertiary education needed for the primary industries (for example, BAgrSc, BHortSc, BForSc) that teach specialised skills and also farm systems knowledge within a New Zealand context?
- How do we become more innovative and flexible in the delivery of training, recognising that people have different ways of learning and different constraints, such as work commitments?
- How do we strengthen linkages between industry, professional organisations, training providers and government so that training remains relevant, innovations are supported, and policy settings and funding are appropriate?
- How do we ensure that employers and industry bodies encourage and support training through specifying qualification requirements in job advertisements, supporting and rewarding both formal and informal training, and creating a culture of continuous professional development?

Retaining our people

Retention is critical because people currently in the workforce already have many of the skills needed for the continued success of the primary industries. There is a high cost associated with staff turnover which can reduce the benefits of training, discouraging both employers and employees from investing in further training.

The capability gaps and needs outlined in this report cannot be met purely from new entrants. We need to keep our high-performing individuals by providing great workplaces and opportunities for growth. There is also a need to provide ongoing training/professional development for everyone working in primary industries to keep them motivated and current with a rapidly changing working environment.

To retain our people in the primary industries we will need to answer the following questions.

- How do we support better human resource practices within the primary industries as businesses become larger, and employ more staff?
- How do we provide clear career paths for people in the primary industries, providing greater opportunities to excel and use skills, either within one firm, within a sector or across sectors?
- How do we provide and encourage opportunities to move between primary industries sectors to gain greater experience and ultimately add value across sectors?

Planning for the future

This report provides a baseline study of the current and future human capability requirements of the primary industries. It reveals a future that is highly dependent on an effective education and training system if these industries are to realise their strategic targets and ultimately contribute to doubling exports by 2025.

Subsequent work to track progress against this baseline will need to answer the following questions:

- What are the economic impacts from various levels of investment in education and training for the primary sector?

- What data is most critical for informing action and tracking progress?
- What strategies are necessary to address capability gaps at a sector level to achieve targeted export growth?

2. OUTLOOK FOR PRIMARY INDUSTRIES EMPLOYMENT

Capability Needs: Primary Industries

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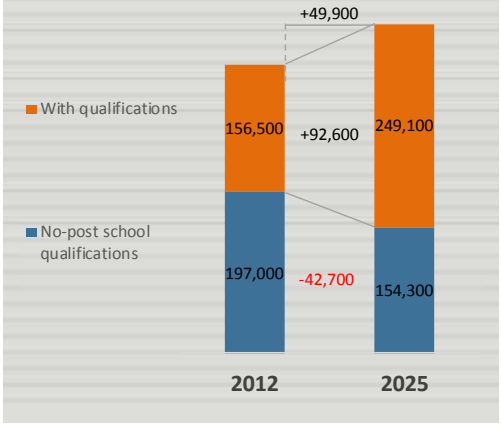
Capability needs 2012-2025:



Primary industries will need:

* a net increase of 49,900 workers
* 92,600 more workers with qualifications
* 42,700 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 235,000 to replace the natural attrition of workers within the industry

New primary sector workers will primarily:

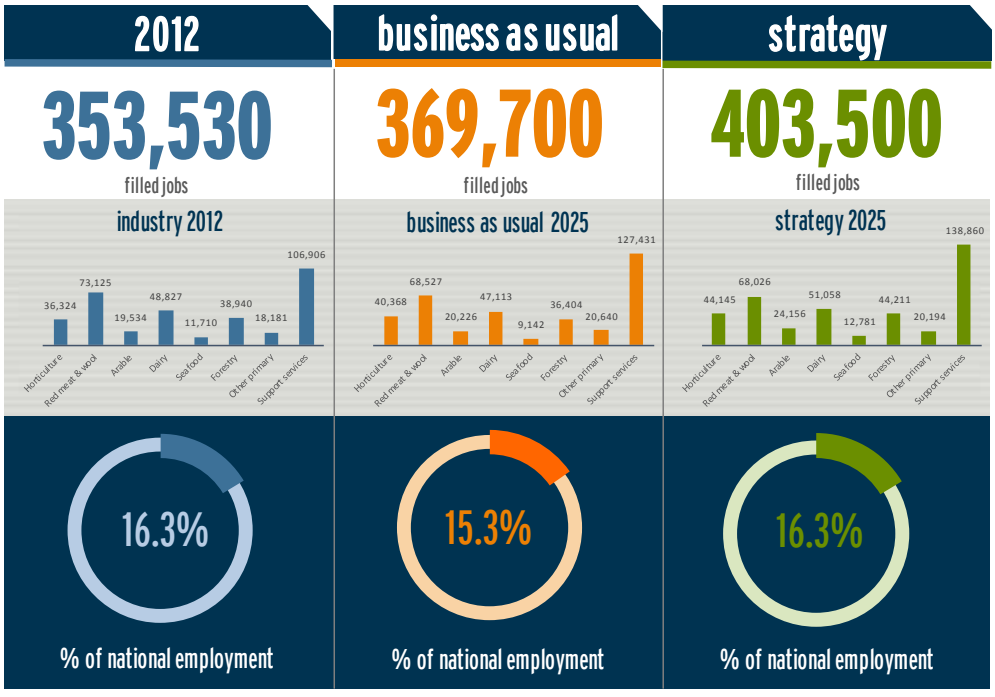
* be in sales and marketing, management, and transport occupations
* have trained in engineering, business, and agriculture fields of study
* seek jobs in Auckland, Northland, Canterbury, Hawke's Bay, and Marlborough

But be less likely to be employed in:

* as a farmer
* in Waikato and Southland

Success will require more skills in:

* Production skills (whole farm systems, resource management, staff management)
* Science skills to develop new products and processes
* Marketing skills into new markets
* Engineering skills to develop new processes
* Technical and management support



This section provides an overview of the current status of capabilities in the primary industries in New Zealand and provides an assessment of the industries' future skill requirements. This analysis incorporates a wide definition of primary industries, including not just agricultural, fisheries, and forestry primary production, but also further processing (for example, meat processing, dairy processing, textiles, wood and paper production), wholesaling and marketing activities, and support services (for example, manufacture of farm inputs and equipment, transport services, and professional services such as IT, scientific research, veterinary services, rural consultants, logistics and marketing). The analysis encompasses a wide range of pertinent skills and activities that are important for the success of primary industries.

The report focuses on three years, 2002, 2012, and 2025. The 2002 and 2012 data are based on employment data extracted from Statistics New Zealand's linked employer-employee database, which in turn is based on IRD tax return data. This means that the employment counts generated are based on population wide data. This also means that we can drill down to quite detailed industry classifications.

Two sets of numbers are presented for 2025: projections based on business-as-usual estimates and projections based on an assessment of the employment implications of primary industries successfully implementing their current industry strategies. The business as usual forecasts present employment by detailed industry classification (level 4 of ANZSIC06) that are consistent with a set of macroeconomic assumptions about factors such as population growth, the terms of trade, interest rates, etc. The business-as-usual forecasts provide a view of what the primary industries will look like given typical market responses to a plausible view of the likely economic environment.

The strategy-based forecasts estimate the employment requirements necessary to meet the export targets consistent with each industry's strategy. The industry strategies incorporate ambitious export earning targets, but as indicated in Table 1 these targets are not necessarily out of line with past achievements in the sector. The employment projections presented in the "strategy" scenarios in this report are based on the assumption that the various strategies will deliver the planned increases in export earnings. Biological constraints mean that production increases will not be sufficient to deliver the proposed expansions in export earnings. Achievement of the strategies requires a higher-value mix of primary product exports. This will require a mix of developing new products, further processing, and successful marketing.

Thus although the achievement of the strategies is likely to require more people, it will not be just more of the same. All sectors will require more emphasis on upstream (product development) and downstream (processing and product delivery) activities. Indeed the expected changes to some sectors (for example, forestry, dairy, and red meat and wool) will potentially be very radical. The employment projections presented here incorporate our assessment of the change in mix of workers that is likely to result from the various approaches of each industry group. Details on the methods underpinning the projections are presented in the *Method* chapter (see page 120).

Table 1: Export earnings growth, achieved and planned
Average annualised growth rates

Sector	Achieved 2002-2012	Planned 2012-2025
Horticulture	5.3%	5.5%
Sheep & Beef	0.5%	4.8%
Arable	7.6%	5.0%
Dairy	7.5%	5.5%
Seafood	-0.1%	3.3%
Forestry	1.6%	10.3%

The presentation of business-as-usual forecasts means that we have two counterfactuals for assessing the future capability requirements of primary industries: a comparison with current capabilities (2012) and a comparison with how things are expected to develop by 2025 without the strategies. The column heading "Growth" used in many tables in this report present estimates of the change in employment resulting from the achievement of the strategies compared with levels recorded in 2012. Columns headed "Gap" present estimates of the difference between the strategy projections and the business as usual forecasts.

Key information

- In 2012, it is estimated that 350,000 or 16% of total employment in New Zealand was in primary industries. For some regions, including Gisborne, Tasman, Marlborough and Southland, the primary industries account for over 30% of total employment. Outside of Auckland and Wellington, primary industries represent around 22% of total employment.
- Of this national primary industry employment 39% was involved directly in primary production, for example, on farm, on-orchard, in-forest and at-sea activities; 33% was related to processing activities; and 29% was related to support services (eg producing inputs, research, and other ancillary services).
- Employment in primary industries is projected to increase to 370,000 by 2025, but this would actually imply a drop in percentage employed in the primary industries to 15% of total national employment, lower than the 16% in 2012. While employment in the primary industries is growing, employment in other areas of the economy are growing slightly faster. This, in part, reflects the growing labour productivity and the greater mechanisation and automation within the primary industries.
- The successful implementation of the primary sector strategies would expand primary industries employment by a further 33,000 by 2025.
- The strategies are expected to have little impact on primary production employment – on farm, on-orchard, in-forest and at-sea employment will have minimal change – but they are expected to generate growth in processing and support services jobs.
- Primary industries strategies are likely to increase demand for highly skilled (degree or higher) workers mainly in support services, but will also continue to generate job opportunities for many without formal qualifications.
- There is an increasing demand for higher qualifications, especially for professional degrees in fields of specialisation aligned with the value chain, including areas such as integrated farms systems.

- There will also be a growing demand for a higher skill base within occupations. Even roles that have traditionally not required formal qualifications will increasingly need greater skills and an increased demand for training.

Employment by industry

Our estimate is that, including further processing and support services, just over 350,000 people were employed in primary industries in 2012. This represented 16% of total employment in New Zealand. However, there has been a decline in the proportion of primary industries employment both in a relative and absolute sense over the last decade. In 2002, employment in primary industries was 11,000 higher (implying a 3% decline in the decade to 2012). In relative terms, this meant that employment in the primary industries declined from 19.6% of total employment in 2002 to 16.3% in 2012.

In the tables below we present analysis of current capabilities, business-as-usual and strategy-consistent forecasts for primary industries. In each table data is provided for 2002 and 2012, along with business-as-usual and strategy projections for 2025. Unless otherwise noted, employment forecasts for 2025 will refer to forecasts consistent with the delivery of primary sector strategies.

For this analysis, the primary industries are divided into eight sub-industries:

- horticulture
- red meat and wool
- arable
- dairy
- seafood
- forestry
- support services
- other primary

A detailed explanation of the definition of these industries based on ANZSIC 2006 level 4 industries is presented in *Industry selection* on page 123. The key point to note is that where possible we have included processing and value-chain services within the appropriate primary production industry (for example, dairy includes dairy farming, dairy product processing, and dairy produce wholesaling). However, there are many support services that cannot be readily attributed to specific primary industry activities (for example, veterinary services will be provided to all livestock farmers, fertilisers and pesticides can be applied to all land-based activities, and scientific research will have varying degrees of importance to all primary sector activities). Rather than making judgements on the allocation of these support service activities, we have included these activities into their own category.

In addition, in many tables, two extra columns are presented, labelled growth and gap. The "growth" numbers present the change between the strategy forecasts for 2025 and the estimates for 2012. The "gap" numbers present the difference between the strategy and business as usual forecasts for 2025. To illustrate, Table 2, the strategy forecast, is for the employment count for forestry in 2025 to be 44,200, which is 5,300 more than the 38,938 estimate for 2012 (growth) and 7,800 more than the 36,400 expected according to the business as usual projections (gap). Thus the successful implementation of the forestry strategy is expected to increase employment opportunities in the forestry industry by 7,800.

These numbers do not include the need to train an additional 25,900 to replace the natural attrition of workers in forestry.

Table 2: Employment count in primary industries
Includes further processing and support services

			2025			
Industry	**2002**	**2012**	Business as Usual	Strategy	Growth	Gap
Horticulture	40,240	36,321	40,400	44,100	7,800	3,800
Red meat and wool	94,850	73,122	68,500	68,000	-5,100	-500
Arable	18,732	19,533	20,200	24,200	4,600	3,900
Dairy	48,728	48,827	47,100	51,100	2,200	3,900
Seafood	15,522	11,708	9,100	12,800	1,100	3,600
Forestry	49,729	38,938	36,400	44,200	5,300	7,800
Other primary	14,270	18,179	20,600	20,200	2,000	-400
Support services	82,343	106,902	127,400	138,900	32,000	11,400
Total	364,414	353,530	369,700	403,500	49,900	33,500

Note: Projected figures may not sum precisely due to rounding

The support services are an important and expanding component of primary sector employment. In 2002, 22.6% of primary sector employment was involved in support services. By 2012, this had expanded to 30.2%, and is expected to be over 34% by 2025. The success of primary industries will depend on activities beyond the farm gate and processing operations.

With the exception of red meat and wool, the implementation of the industry strategies is expected to result in an increased demand for labour. For arable and other primary sectors, the employment growth (plus 4,600 and 2,000 respectively) represents a continuation of the expansion experienced from 2002 to 2012. For dairy, moderate 2,200 employment growth is expected after more or less static employment numbers between 2002 and 2012. The expected 7,800 expansion in horticulture employment more than offsets the 3,919 decline in employment experienced in the decade to 2012. The expected employment growth in forestry and seafood is not sufficient to offset earlier employment declines. Indeed the forecast expansion in employment in seafood is largely the consequence of regulatory changes that will require fishing operations in the New Zealand economic zone to be on New Zealand flagged boats. Depending on how the industry responds to this change, it will either increase fishing employment opportunities for New Zealanders and/or bring foreign fishery staff under New Zealand jurisdiction. In the absence of this change, little change in seafood employment numbers would have been expected.

Table 3: Employment in primary industries

% of total primary sector employment

Industry	2002	2012	2025 Business as Usual	2025 Strategy
Horticulture	11.0%	10.3%	10.9%	10.9%
Red meat and wool	26.0%	20.7%	18.5%	16.9%
Arable	5.1%	5.5%	5.5%	6.0%
Dairy	13.4%	13.8%	12.7%	12.7%
Seafood	4.3%	3.3%	2.5%	3.2%
Forestry	13.6%	11.0%	9.8%	11.0%
Other primary	3.9%	5.1%	5.6%	5.0%
Support services	22.6%	30.2%	34.5%	34.4%
Total	100.0%	100.0%	100.0%	100.0%

Figure 1

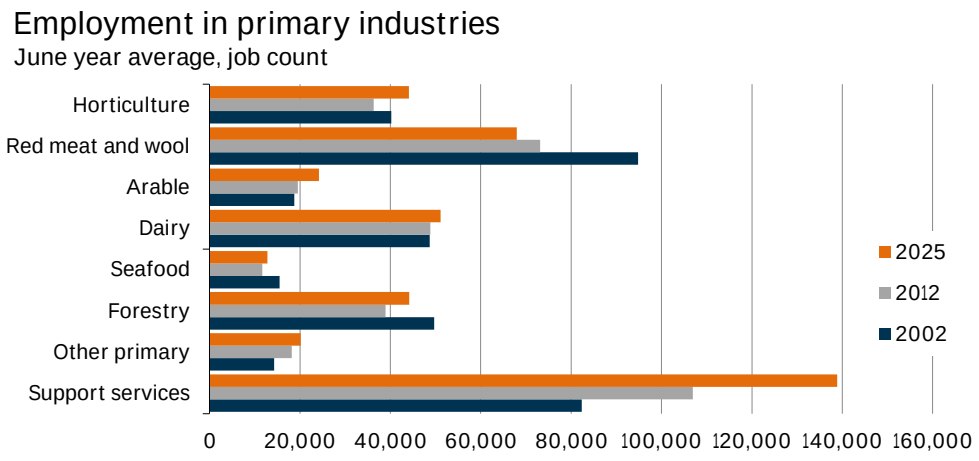


Figure 2

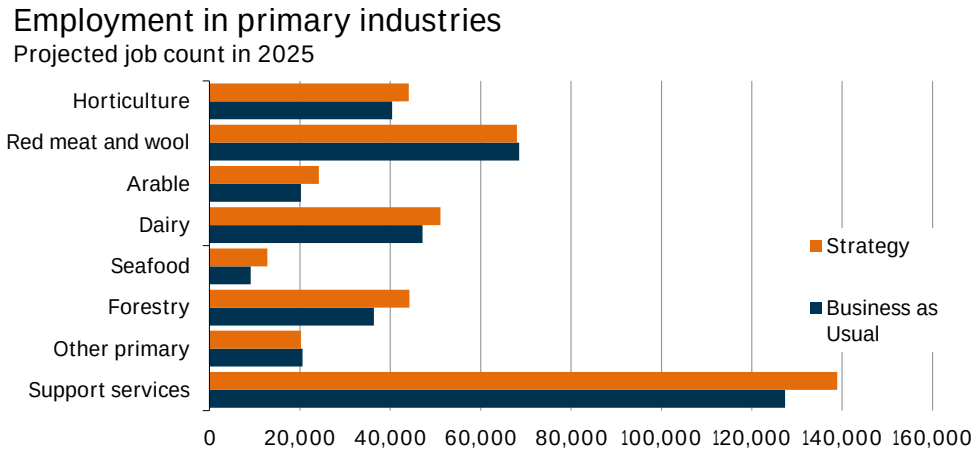


Table 4: Employment growth in primary industries

Average annual % change

Industry	2002-2012	Business as Usual	Strategy
Horticulture	-1.0%	0.8%	1.5%
Red meat and wool	-2.6%	-0.5%	-0.6%
Arable	0.4%	0.3%	1.7%
Dairy	0.0%	-0.3%	0.4%
Seafood	-2.8%	-1.9%	0.7%
Forestry	-2.4%	-0.5%	1.0%
Other primary	2.5%	1.0%	0.8%
Support services	2.6%	1.4%	2.0%
Total	-0.3%	0.3%	1.0%

The business-as-usual outlook is for employment in primary industries to expand by 16,000, or by 4.6% (0.3% pa) to around 370,000 in 2025. Despite this forecast growth, employment is expected to expand faster in other sections of the economy, meaning that without the primary sector strategies employment in the primary industries is expected to decline to 15% of total employment in 2025. The business-as-usual forecasts result in absolute declines in employment in seafood (-1.9% pa), sheep and beef (-0.5% pa), forestry (-0.5% pa) and dairy (-0.3% pa).

The successful implementation of the primary sector strategies would expand employment in primary industries by 50,000 (1.0% pa) to 403,500 in 2025. This would increase the proportion of total employed to 16.7% in 2025. Despite this growth, the 16.6% proportion of total employment in primary industries in 2025 would still be lower than the 19.6% of total employment that worked in primary industries in 2002. The successful implementation of each primary industry's strategy will partially, but not completely reverse the primary industries' declining proportion of national employment. Regardless of the strategies more than half of the projected employment growth is expected to come in non-traditional support services. Capabilities in activities such as management advice, computer support, and scientific research are expected to be of increasing importance for the primary industries to achieve their strategies.

Table 5: Employment in primary industries as % of national employment

Includes further processing and support services

			2025	
Industry	2002	2012	Business as Usual	Strategy
Horticulture	2.2%	1.7%	1.7%	1.8%
Red meat and wool	5.1%	3.4%	2.8%	2.8%
Arable	1.0%	0.9%	0.8%	1.0%
Dairy	2.6%	2.3%	1.9%	2.1%
Seafood	0.8%	0.5%	0.4%	0.5%
Forestry	2.7%	1.8%	1.5%	1.8%
Other primary	0.8%	0.8%	0.8%	0.8%
Support services	4.4%	4.9%	5.3%	5.7%
Total	19.6%	16.3%	15.3%	16.6%

In Table 6 and Table 7 we present a summary of the primary industries employment by type of activity. In 2012, 39% of primary industries' employment was involved directly in primary production, that is, on-farm, on-orchard, in-forest or at-sea activities. A further 32% of workers were involved in primary processing activities (for example, food processing, textile manufacturing, and wood and paper manufacturing activities). The primary industries were also supported by a range of other New Zealand-based activities such as the manufacture of inputs (for example, fertiliser and pesticides), repair and maintenance services (for example, boat repair), wholesaling activities, transport services, and professional services (for example, IT, research, and veterinary services). Employment in these support services is estimated to have accounted for 29% of primary industries employment in 2012.

Table 6: Primary industries employment by type of activity

			2025			
			Business			
Activity	2002	2012	as Usual	Strategy	Growth	Gap
Primary production	152,754	136,916	140,982	141,423	4,507	441
Primary processing	129,230	112,659	107,271	122,807	10,148	15,536
Support services	82,449	103,972	121,598	138,273	34,301	16,675
Total	364,433	353,547	369,851	402,503	48,956	32,652

Table 7: Primary industries employment trends by type of activity

(% of primary industries employment)

			2025	
			Business	
Activity	2002	2012	as Usual	Strategy
Primary production	41.9%	38.7%	38.1%	35.1%
Primary processing	35.5%	31.9%	29.0%	30.5%
Support services	22.6%	29.4%	32.9%	34.4%

Some of these support services are directly accredited to specific primary industries. For example, fruit and vegetable wholesaling is included within horticulture. For many other support activities, however, it is difficult to attribute activities to individual primary industries. For example, fertilisers can be applied to a variety of primary activities, as can IT and research services. Rather than applying an artificial attribution, we have grouped such activities in an item that we have labelled as "support services" for primary industries.

Figure 3

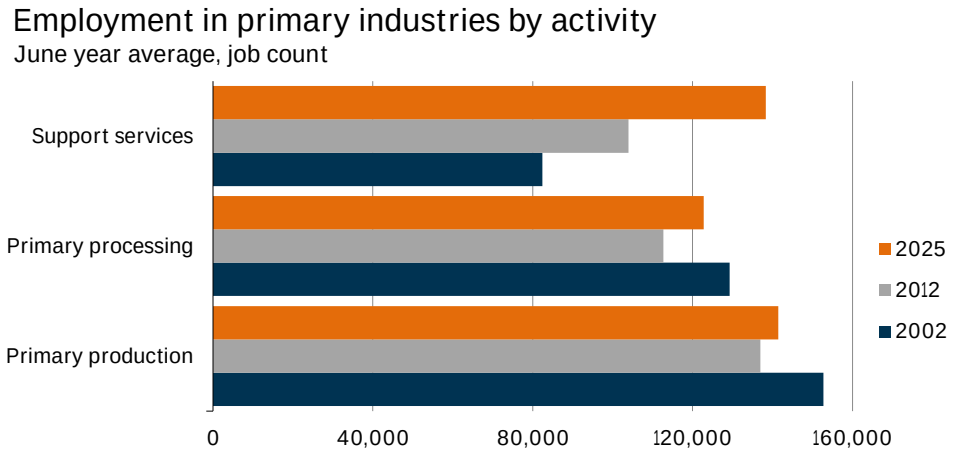
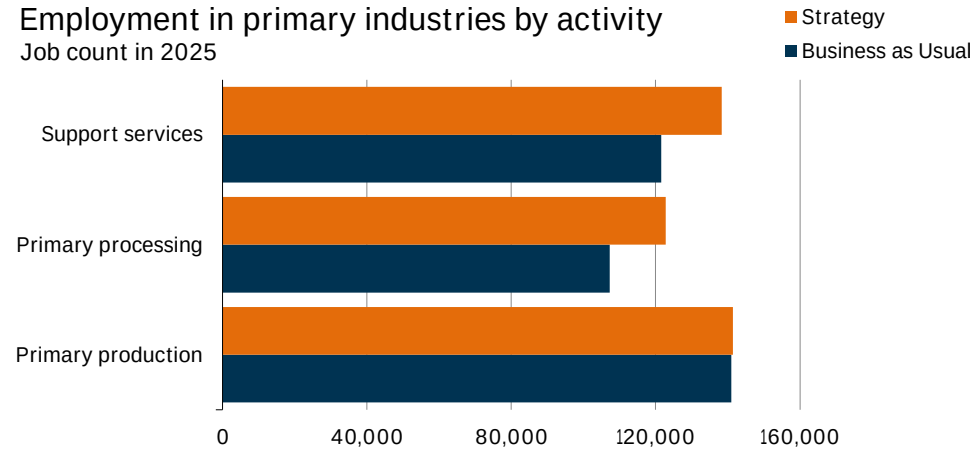


Figure 4



Over the last decade there has been a general trend of workers involved in primary industries to be less likely to be involved in direct production and processing and more likely to be involved in support services. Primary production accounted for 41.9% of primary industries employment in 2002, but this had fallen to 38.7% by 2012 (see Table 7). Employment in primary processing reduced from 35.5% of primary industries employment in 2002 to 31.9% in 2012. Over the same period, employment in support services increased from 22.6% to 29.4% of primary industries employment.

This trend is expected to continue into the future and is particularly accentuated by the primary sector strategies. By 2025 employment in primary production (for example, on-farm activities) is expected to comprise 35% of primary sector employment. A further 34% of employment will be in support services, with primary processing activities employing 31% of primary sector workers in 2025. As illustrated in Figure 4, the key impact of the strategies on employment requirements is to expand the demand for processing and support services, with little change in primary production numbers expected. This reflects a common

theme in strategies of improving export earnings by increasing the amount of value added to primary commodity production in New Zealand.

Employment by occupation

We customise the Statistics New Zealand occupation classifications as per Table 8. The aim is to provide comprehensive coverage, keep the presentation of the tables relatively simple, and yet retain a focus on occupations that are of more relevance to primary industries. Occupations are clusters of workers who perform similar tasks. Although there is often a large overlap between qualifications and occupations (for example, medical doctors will require appropriate medical qualifications to practice), the distinguishing aspect of occupations are the tasks that workers perform not their qualifications. Therefore a taxi driver with an engineering degree is considered to be a taxi driver and not an engineer.

Table 8: Occupation definitions

Title	ANZSCO codes	Notes
Farmers and Farm Managers	12	Includes owner operators and farm managers
Other Managers	11, 13, 14	Includes all other managers and chief executives
Engineering and Science	23	Design, engineering, science and transport professionals
ICT	26	Information and communication technology professionals
Professionals	21,22,24,25,27	All other professional workers including arts and media, business, health, education, and legal professionals
Technicians	31	Engineering, ICT and science technicians
Food Trades	35	Food trades workers
Specialised Farm Workers	36	Skilled animal and horticultural workers
Other Trades	32, 33, 34, 39	All other trade workers including engineering, automotive, construction, and telecom trades
Support and Sales	41-63	Includes middle skilled service workers involved in activities such as security, administration, clerical, and sales
Transport and Plant	71-74	Includes operators of stationary and mobile equipment, including road and rail drivers and storepersons
Factory	83	Factory process workers
Farm and Forestry Workers	84	Farm, forestry and garden workers
Labourers	81, 82, 85, 89	Elementary workers including cleaners, food preparation assistants and labourers

Source: Statistics New Zealand

Table 9 and Table 10 translate the employment by industry estimates into their implication for employment by occupations. These numbers are consistent with the industry employment numbers presented above, though there may some modest difference in totals that result from rounding used in the calculations.

Some key messages to take from this are:

- There was a significant decline in the number of people working as farmers and farm managers in New Zealand between 2002 and 2012, from 76,300 to 60,500.
- Farmer and farm manager numbers are expected to remain relatively static at current levels over the next decade.

- There appears to be growing demand for chief executive and specialist management skills in primary industries and this trend is projected to continue over the next decade.
- Demand is also expanding for the services of professionals, both in terms of business skills and technical and scientific skills.
- There was a decline in the demand for technicians and trade workers in primary industries in the decade to 2012, but demand for these skills is expected to be more stable over the next decade.

Table 9 also reports net replacement demand.[1] This measure accounts for permanent exits from the industry expected between 2012 and 2025, which are not replaced by migrants or people returning to the occupation. That is, it provides an estimate of the number of people that the education system, the industry or migration policy must train for there to be the expected growth in employment. To illustrate, according to Table 9, the net number of farmers and farm managers is expected to decline by 42 people between 2012 and 2025. But for farmer numbers to remain at around 60,500, around 26,800 new farmers and farm managers will need to enter the occupation to replace farmers and farm managers retiring, migrating or moving into other occupations during the 13-year period.

The net replacement demand for farmers and farm managers is the most extreme, but the net replacement demand impact is also very strong for:

- non-farm managers (28,500 or 2,200 pa)
- factory process workers (25,100 or 1,900 pa)
- farm workers (19,100 or 1,500 pa)
- engineers (8,600 or 650 pa)
- ICT professionals (4,600 or 350 pa)

Table 9: Employment in primary activities by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm managers	76,305	60,562	60,619	60,520	-42	-99	26,830
Other Managers	31,432	39,719	43,364	48,381	8,662	5,017	28,467
Design, Engineering, Science and Transport Professionals	9,231	10,808	12,162	13,425	2,617	1,263	8,576
ICT Professionals	3,280	5,338	6,821	7,118	1,780	297	4,647
Other Professionals	10,816	15,064	17,245	19,029	3,965	1,785	12,945
Engineering, ICT and Science Technicians	4,913	6,971	7,730	8,429	1,458	700	3,693
Food Trades Workers	5,174	5,255	5,310	6,120	865	811	2,135
Skilled Animal and Horticultural Workers	7,570	6,825	7,784	7,842	1,017	59	2,666
Other Technicians and Trades Workers	22,699	19,441	20,183	22,303	2,862	2,120	13,518
Miscellaneous Support and Sales Workers	47,061	50,561	54,682	62,094	11,533	7,413	41,993
Transport and Plant Operators	44,438	41,294	41,383	47,939	6,644	6,556	30,193
Factory Process Workers	36,299	29,638	28,718	32,710	3,072	3,991	25,134
Farm, Forestry and Garden Workers	45,885	38,171	39,902	40,228	2,057	325	19,140
Labourers	19,329	23,900	23,949	27,293	3,393	3,344	15,089
Total	364,433	353,547	369,851	403,431	49,884	33,580	235,025

Although the net replacement demand figures presented provide an indication of the extent that training requirements will exceed employment growth, this is an area where we consider more analysis is warranted. There are some critical limitations to the measures presented in this report:

[1] Net replacement demand is a method for estimating job openings by occupation arising from individuals leaving an occupation net of jobs taken by individuals re-entering the occupation. Net replacement demand is a relevant measure for providing advice on education and training needs. A more extensive explanation is provided in *Net replacement demand* on page 139.

- Net replacement demand can be interpreted as providing a measure of the number of people required to complete training to enter an occupation to compensate for those leaving the occupation. Given that not everyone completes their training, however, net replacement demand numbers will be lower than the number of enrolments required to ensure a sufficient number of people can enter the occupation.
- An associated issue is that an occupation with a high level of turnover will potentially have a higher training requirement than is indicated by net replacement demand. Skills and ability depend on experience as well as training. It will take some time for a new entrant or a returning worker to reach the level of competency of departing workers.
- The data presented here is based on Department of Labour analysis that was conducted at a reasonably high level of aggregation. This means that our data represents averages across broad occupation categories. All farmers and farm managers are treated the same here, yet true replacement demand pressures might vary between different types of farmers and farm managers if they have, for example, different age structures.
- Net replacement demand figures will not provide any information about training requirements relating to upskilling within an occupation. For example, it provides information about the need for more workers with a trade qualification, but not about potential training of new skills to trade workers.

Table 10 presents the occupations as a proportion of total employment in primary industries. The fifth column presents the annualised growth rates expected from different occupations. Notwithstanding the importance of farmers and farm managers, skilled farm workers, and other farm workers to existing primary production, the expected expansion is going to generate an increasing demand for:

- ICT professionals with demand increasing by 2.2% pa, although they represented just 1.5% of the employment in 2012.
- Other professionals, including engineers and scientists, with employment growth of 1.7 to 1.8% pa projected.
- Miscellaneous support and sales workers (1.6% pa).
- Engineering, ICT and science technicians (1.5% pa).
- Non-farm based managers (1.5% pa).

These results reflect growing demand for scientific and technical skills, the trend towards specialisation in the primary industries, both in terms of on-farm management (for example, the expansion of dairy operations leading to specialised responsibilities such as herd and milking operation management), as well as the seeking of professional support services such as ICT, engineering, and scientific research. They also highlight the importance of sales and transport support, and the ongoing mechanisation of primary production. For example, increasing the amount of value added in New Zealand will require more transportation of products around the country prior to export, which will increase the demand for transport providers, particularly road freight.

Table 10: Employment in primary activities by occupation
% of total primary sector employment

Occupations	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
Farmers and Farm managers	20.9%	17.1%	16.4%	15.0%	0.0%
Other Managers	8.6%	11.2%	11.7%	12.0%	1.5%
Design, Engineering, Science and Transport Professionals	2.5%	3.1%	3.3%	3.3%	1.7%
ICT Professionals	0.9%	1.5%	1.8%	1.8%	2.2%
Other Professionals	3.0%	4.3%	4.7%	4.7%	1.8%
Engineering, ICT and Science Technicians	1.3%	2.0%	2.1%	2.1%	1.5%
Food Trades Workers	1.4%	1.5%	1.4%	1.5%	1.2%
Skilled Animal and Horticultural Workers	2.1%	1.9%	2.1%	1.9%	1.1%
Other Technicians and Trades Workers	6.2%	5.5%	5.5%	5.5%	1.1%
Miscellaneous Support and Sales Workers	12.9%	14.3%	14.8%	15.4%	1.6%
Transport and Plant Operators	12.2%	11.7%	11.2%	11.9%	1.2%
Factory Process Workers	10.0%	8.4%	7.8%	8.1%	0.8%
Farm, Forestry and Garden Workers	12.6%	10.8%	10.8%	10.0%	0.4%
Labourers	5.3%	6.8%	6.5%	6.8%	1.0%
Total	100.0%	100.0%	100.0%	100.0%	1.0%

Employment by qualification level

Employment by qualification level is based on assessment of the qualifications commensurate with occupations. This information does not reflect qualification attainment, but provides an understanding of the skill level required to carry out the types of jobs undertaken in the primary industries. As Table 11 and Table 12 indicate there is a growing demand for higher-skilled workers in the primary industries.

Although traditionally many primary industry jobs have not required formal qualifications and people have learnt on the job and become skilled at what they do, many of these roles now require some level of formal training, whether required prior to entering the role or through formal in-work training through an industry training organisation (ITO). So while almost half of the 50,000 projected new jobs will be in roles that have not traditionally required level 4 qualifications (23,800), based on the developing work environment that is expected to change somewhat.

Of the 50,000 expected increase in jobs, 16,000 will be for degree qualified people, representing a 13% increase compared with 2012. The more fundamental change is the expected increase in demand for workers with mid-level qualifications (diploma and level 4 qualifications). The 10,000 expected increase in primary industries' positions that require a diploma or level 4 qualifications represents a 19% increase, and reflects the need for higher-skill levels will be spread over a broad spectrum of primary industry jobs.

Table 11: Commensurate qualification level of primary sector employment

			2025			
Commensurate qualification	2002	2012	Business as Usual	Strategy	Growth	Gap
Bachelors degree or higher	127,139	126,955	135,270	142,957	16,002	7,687
Diploma	13,083	17,476	19,330	21,351	3,875	2,021
Level 4 qualification	40,848	36,010	38,059	42,192	6,182	4,133
Lower than Level 4 qualification	183,364	173,106	177,192	196,931	23,825	19,738
Total	364,433	353,547	369,851	403,431	49,884	33,580

Table 12: Commensurate qualification, % of primary sector employment

			2025		
Commensurate qualification	2002	2012	Business as Usual	Strategy	Strategy annualised growth rate
Bachelors degree or higher	34.9%	35.9%	36.6%	35.4%	0.9%
Diploma	3.6%	4.9%	5.2%	5.3%	1.6%
Level 4 qualification	11.2%	10.2%	10.3%	10.5%	1.2%
Lower than Level 4 qualification	50.3%	49.0%	47.9%	48.8%	1.0%
Total	100.0%	100.0%	100.0%	100.0%	1.0%

Employment by field of study

The fields of study projections allocate new employment by occupation to Statistics New Zealand Field of Study classifications (see *Employment by qualification level and field of study* on page 131 for a fuller explanation). This report does not analyse the level of study (for example, degree vs diploma), nor which degree, and further analysis is required. For example, a BAgrSc degree can be equally applicable for science and management as it is for agriculture fields of study.

It is becoming increasingly important for primary sector workers to possess some form of post-school qualification. In 2002 we estimate that close to two-thirds of primary sector workers (64.3%) did not possess a post school qualification. By 2012 this proportion had declined to 55.7%. This trend will continue, with the business-as-usual expectation that by 2025 just 44% of primary sector workers will not have a post school qualification. The achievement of the primary industry strategies is expected to further intensify this trend, leading us to predict that the delivery of the successful delivery of the strategies will allow just 38% of the primary sector workforce to have no post school qualifications.

Although the upward trend in qualification attainment is a signal of past and current success in industry efforts to upskill the primary industries' workforce, the gap between the strategy and business-as-usual forecasts in Table 13 indicates that a further acceleration in training effort is required. The business-as-usual forecasts suggest that without further intensification of effort, the primary industries could be shy of 42,000 qualified workers that will be required for the delivery of the primary industries' strategies.[2]

[2] That is, the strategy forecasts indicate a requirement for 249,100 qualified workers (403,400 – 154,300), while the business-as-usual forecasts indicate that current trends will deliver just 207,000 qualified workers (369,900 – 162,900).

Table 13: Employment in primary industries by field of study[3]

			2025			
Field of Study	2002	2012	Business as Usual	Strategy	Growth	Gap
No Qualification	234,301	197,048	162,828	154,325	-42,723	-8,503
1 Natural and Physical Sciences	5,073	7,372	9,704	11,392	4,020	1,688
2 Information Technology	2,557	3,848	5,258	6,361	2,513	1,103
3 Engineering and Related Technologies	25,943	31,584	39,717	51,617	20,032	11,900
4 Architecture and Building	7,191	8,610	11,605	15,210	6,600	3,605
5 Agriculture, Environmental and Related Studies	15,627	15,763	22,496	23,267	7,504	771
6 Health	5,660	7,393	9,830	10,942	3,549	1,112
7 Education	3,485	4,476	6,076	6,966	2,490	890
8 Management and Commerce	19,247	24,522	32,778	39,585	15,063	6,807
9 Society and Culture	6,434	9,343	12,327	15,389	6,046	3,062
10 Creative Arts	2,223	2,937	3,636	5,058	2,121	1,421
11 Food, Hospitality and Personal Services	5,633	6,418	8,526	13,169	6,751	4,643
Not Defined	31,059	34,232	45,069	50,150	15,918	5,081
Total primary industry employment	364,433	353,547	369,851	403,431	49,884	33,580

The fields of study that the strategy induced expansion in the primary industries will demand most of are:

- Engineering, particularly reflecting the increasing sophistication of equipment used in production and processing.
- Management and commerce, particularly core business and management qualifications, but also accounting and marketing.
- Society and culture qualifications reflect increases in both human resource management requirements and in the demand for foreign language skills.

Table 14: Employment in primary industries by field of study

% of total primary sector employment

			2025		
Field of Study	2002	2012	Business as Usual	Strategy	Strategy annualised growth rate
No Qualification	64.3%	55.7%	44.0%	38.3%	-1.9%
1 Natural and Physical Sciences	1.4%	2.1%	2.6%	2.8%	3.4%
2 Information Technology	0.7%	1.1%	1.4%	1.6%	3.9%
3 Engineering and Related Technologies	7.1%	8.9%	10.7%	12.8%	3.9%
4 Architecture and Building	2.0%	2.4%	3.1%	3.8%	4.5%
5 Agriculture, Environmental and Related Studies	4.3%	4.5%	6.1%	5.8%	3.0%
6 Health	1.6%	2.1%	2.7%	2.7%	3.1%
7 Education	1.0%	1.3%	1.6%	1.7%	3.5%
8 Management and Commerce	5.3%	6.9%	8.9%	9.8%	3.8%
9 Society and Culture	1.8%	2.6%	3.3%	3.8%	3.9%
10 Creative Arts	0.6%	0.8%	1.0%	1.3%	4.3%
11 Food, Hospitality and Personal Services	1.5%	1.8%	2.3%	3.3%	5.7%
Not Defined	8.5%	9.7%	12.2%	12.4%	3.0%
Total primary industry employment	100.0%	100.0%	100.0%	100.0%	1.0%

[3] Note that there is a fundamental difference between the no qualification data contained in Table 13 and the low qualification data in Table 11. The no qualification data in Table 13 relates to the actual count of people without any formal post-school qualification. The qualification data in Table 11 relates to an assessment of the qualifications that are commensurate with the occupations and tasks actually undertaken by workers. Someone who has learnt skills on the job, but has no formal post-school qualification will be counted as no qualification in Table 13, but may actually be doing a job that is commensurate with a qualification of level 4 or above.

Employment by ethnicity

Analysis of employment by ethnicity indicates that forecast changes in employment are unlikely to have a major impact on employment opportunities for different ethnic groups. Although a slight expansion in the proportion of Pacific and Asian employment in primary industries is expected, primary sector employment is expected to continue to be dominated by the European ethnic group.

Table 15: Employment in primary industries by ethnicity

			2025			
Ethnicity	2002	2012	Business as Usual	Strategy	Growth	Gap
European	233,678	253,652	266,417	289,343	35,691	22,927
Māori	47,177	44,790	45,298	49,912	5,122	4,615
Pacific	16,159	17,016	17,546	19,588	2,572	2,042
Asian	17,605	27,043	28,900	31,856	4,813	2,956
Other	49,814	11,046	11,691	12,731	1,685	1,041
Total	364,433	353,547	369,851	403,431	49,884	33,580

Table 16: Employment in primary industries by ethnicity

% of total primary sector employment

			2025		
Ethnicity	2002	2012	Business as Usual	Strategy	Strategy annualised growth rate
European	64.1%	71.7%	72.0%	71.7%	1.0%
Māori	12.9%	12.7%	12.2%	12.4%	0.8%
Pacific	4.4%	4.8%	4.7%	4.9%	1.1%
Asian	4.8%	7.6%	7.8%	7.9%	1.3%
Other	13.7%	3.1%	3.2%	3.2%	1.1%
Total	100.0%	100.0%	100.0%	100.0%	1.0%

In Table 17 the share of employment in individual primary industries by ethnicity is presented. In general, the relativities in primary sector employment shares holds in all sub-industries, for example, the force of numbers means that Europeans tend to dominate employment in all primary industries. However, the data in Table 17 indicates that the more important primary industries for each ethnic group are:

European: dairy, support services

Māori: forestry, seafood, red meat and wool

Pacific: other primary, arable, horticulture, seafood, forestry

Asian: arable, other primary, horticulture, support services, seafood

Other: dairy, horticulture, seafood.

Table 17: Share of employment in primary industries by ethnicity

% of individual industry in 2012

Ethnicity	Horticulture	Red meat and wool	Arable	Dairy	Seafood	Forestry	Other primary	Support services	Total primary
European	66.8%	71.8%	61.4%	**80.3%**	65.4%	68.9%	66.4%	**74.0%**	71.7%
Māori	12.3%	**15.8%**	9.9%	9.7%	**17.2%**	**18.2%**	11.2%	10.2%	12.7%
Pacific	**6.5%**	4.8%	**7.6%**	1.6%	**5.8%**	**5.7%**	**7.7%**	4.3%	4.8%
Asian	**11.1%**	4.7%	**18.3%**	4.8%	**8.2%**	4.5%	**11.5%**	**8.3%**	7.6%
Other	**3.4%**	2.8%	2.8%	**3.6%**	**3.4%**	2.7%	3.1%	3.2%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Employment by gender

In general, one-third of primary sector workers are female and two-thirds are male, and there is no indication that these ratios will alter during the period to 2025. This is an area that would benefit from more focused analysis than has been possible in the current project.

Table 18: Employment in primary industries by gender

			2025			
			Business			
Gender	2002	2012	as Usual	Strategy	Growth	Gap
Female	123,683	117,840	123,829	134,752	16,913	10,923
Male	240,750	235,707	246,022	268,678	32,971	22,656
Total	364,433	353,547	369,851	403,431	49,884	33,580

Table 19: Employment in primary industries by gender

% of total primary sector employment

			2025		
			Business		Strategy annualised
Gender	2002	2012	as Usual	Strategy	growth rate
Female	33.9%	33.3%	33.5%	33.4%	1.0%
Male	66.1%	66.7%	66.5%	66.6%	1.0%
Total	100.0%	100.0%	100.0%	100.0%	1.0%

Examining employment data from 2012 indicates that the primary industries where female employment is greater than one-third of employment are:

- arable
- other primary
- horticulture
- red meat and wool.

Table 20: Employment in individual primary industries by gender in 2012

% of industry employment

Gender	Horticulture	Red meat and wool	Arable	Dairy	Seafood	Forestry	Other primary	Support services	Total primary
Female	**41.6%**	**35.4%**	**45.9%**	32.6%	29.7%	17.2%	**42.7%**	31.8%	33.3%
Male	58.4%	64.6%	54.1%	**67.4%**	**70.3%**	**82.8%**	57.3%	**68.2%**	66.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Regional employment

In 2012, there were five regions where employment in primary industries constituted more than a quarter of their total employment: Tasman (37% of employment), Southland (34%), Marlborough (34%), Gisborne (30%), and Hawke's Bay (27%) (see Table 23). Northland, Marlborough, Nelson, Hawke's Bay, and the West Coast are regions where the importance of employment in primary industries is forecast to expand by 2025. Outside of Auckland and Wellington, primary industries represent around 22% of total employment.

Employment in the Auckland region, closely followed by Northland, is expected to the largest beneficiary from an expansion of primary sector activities. The expansion in Auckland reflects the growing demand for support services by the primary sector and the location of much of this support industry in Auckland. The magnitude of the expected expansion of primary industry employment in Northland based on the modelling is more difficult to explain. Although the rural nature of the Northland economy, its proximity to Auckland and prospects for capital injections into the region from forthcoming Treaty settlements would support the view that Northland is likely to be an area that would benefit from the delivery of the primary industry strategies, we remain somewhat sceptical about the strength of the modelled projections for Northland.

The 7,000 forecast increase in employment in Canterbury is the region with the next largest increase, followed by the 4,400 and 4,000 increases forecast for Hawke's Bay and Marlborough respectively. These are all rural industry strongholds which will naturally benefit from improved performance of the primary industries. Waikato, Southland and Taranaki are the only regions where less than 1% growth is forecast, reflecting productivity improvements on dairy farms and declines in sheep and beef farmer numbers.

Table 21: Employment in primary industries by region

			2025			
			Business			
Region	2002	2012	as Usual	Strategy	Growth	Gap
Northland	15,686	13,256	21,891	23,507	10,251	1,616
Auckland	72,768	79,252	82,298	91,701	12,449	9,403
Waikato	45,575	42,681	38,880	42,369	-312	3,489
Bay of Plenty	28,225	26,516	25,264	28,410	1,894	3,146
Gisborne	6,709	6,240	6,162	6,409	169	247
Hawke's Bay	22,067	20,145	23,310	24,547	4,402	1,238
Taranaki	14,839	12,750	11,823	12,835	85	1,012
Manawatu-Wanganui	25,631	22,308	22,930	23,901	1,593	971
Wellington	23,040	22,595	23,242	25,273	2,678	2,031
West Coast	3,593	3,654	3,880	4,288	635	408
Canterbury	49,228	48,932	51,412	56,000	7,067	4,588
Otago	20,156	18,332	19,303	20,491	2,160	1,188
Southland	17,433	17,153	16,020	17,093	-60	1,073
Tasman	7,319	7,247	7,933	8,852	1,605	919
Nelson	5,278	4,467	4,307	5,681	1,214	1,374
Marlborough	6,887	8,019	11,198	12,073	4,054	875
New Zealand	364,433	353,547	369,851	403,431	49,884	33,580

Table 22: Employment in primary industries by region

% of total primary sector employment

Region	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
Northland	4.3%	3.7%	5.9%	5.8%	4.5%
Auckland	20.0%	22.4%	22.3%	22.7%	1.1%
Waikato	12.5%	12.1%	10.5%	10.5%	-0.1%
Bay of Plenty	7.7%	7.5%	6.8%	7.0%	0.5%
Gisborne	1.8%	1.8%	1.7%	1.6%	0.2%
Hawke's Bay	6.1%	5.7%	6.3%	6.1%	1.5%
Taranaki	4.1%	3.6%	3.2%	3.2%	0.1%
Manawatu-Wanganui	7.0%	6.3%	6.2%	5.9%	0.5%
Wellington	6.3%	6.4%	6.3%	6.3%	0.9%
West Coast	1.0%	1.0%	1.0%	1.1%	1.2%
Canterbury	13.5%	13.8%	13.9%	13.9%	1.0%
Otago	5.5%	5.2%	5.2%	5.1%	0.9%
Southland	4.8%	4.9%	4.3%	4.2%	0.0%
Tasman	2.0%	2.0%	2.1%	2.2%	1.6%
Nelson	1.4%	1.3%	1.2%	1.4%	1.9%
Marlborough	1.9%	2.3%	3.0%	3.0%	3.2%
New Zealand	100.0%	100.0%	100.0%	100.0%	1.0%

Table 23: Importance of primary industries to regional employment

% of total regional employment

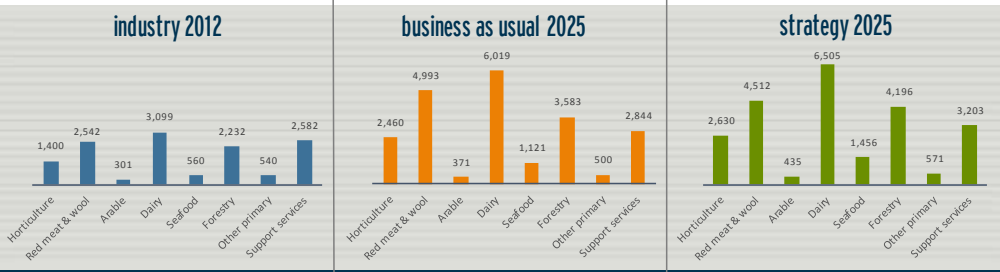
Region	2002	2012	2025 Business as Usual	2025 Strategy
Northland	27.7%	20.9%	30.7%	33.0%
Auckland	12.3%	10.8%	9.9%	11.0%
Waikato	27.5%	22.6%	19.2%	20.9%
Bay of Plenty	25.5%	20.5%	17.9%	20.1%
Gisborne	34.0%	30.4%	28.7%	29.9%
Hawke's Bay	32.5%	26.9%	27.7%	29.1%
Taranaki	30.3%	23.1%	19.2%	20.8%
Manawatu-Wanganui	25.1%	20.9%	20.7%	21.6%
Wellington	10.0%	8.7%	8.0%	8.7%
West Coast	25.7%	21.0%	20.5%	22.7%
Canterbury	20.0%	17.3%	16.0%	17.5%
Otago	21.6%	17.0%	15.1%	16.1%
Southland	36.5%	33.8%	30.6%	32.7%
Tasman	43.6%	37.1%	33.3%	37.1%
Nelson	21.2%	15.3%	13.0%	17.1%
Marlborough	34.7%	33.5%	35.6%	38.3%
New Zealand	19.6%	16.3%	15.3%	16.6%

Northland

Capability Needs Northland

Infometrics

2012	business as usual	strategy
13,256 filled jobs	21,891 filled jobs	23,507 filled jobs



% of region employment

% of region employment

% of region employment

change in job count 2012-2025:

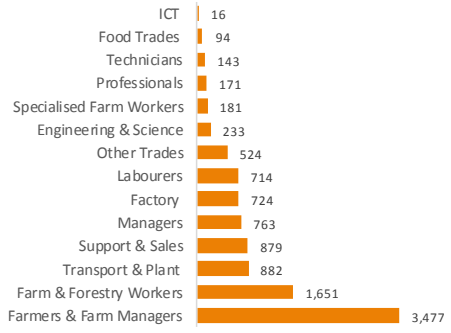
Job growth in Northland is expected most in:

* Dairy
* Red meat and wool
* Forestry

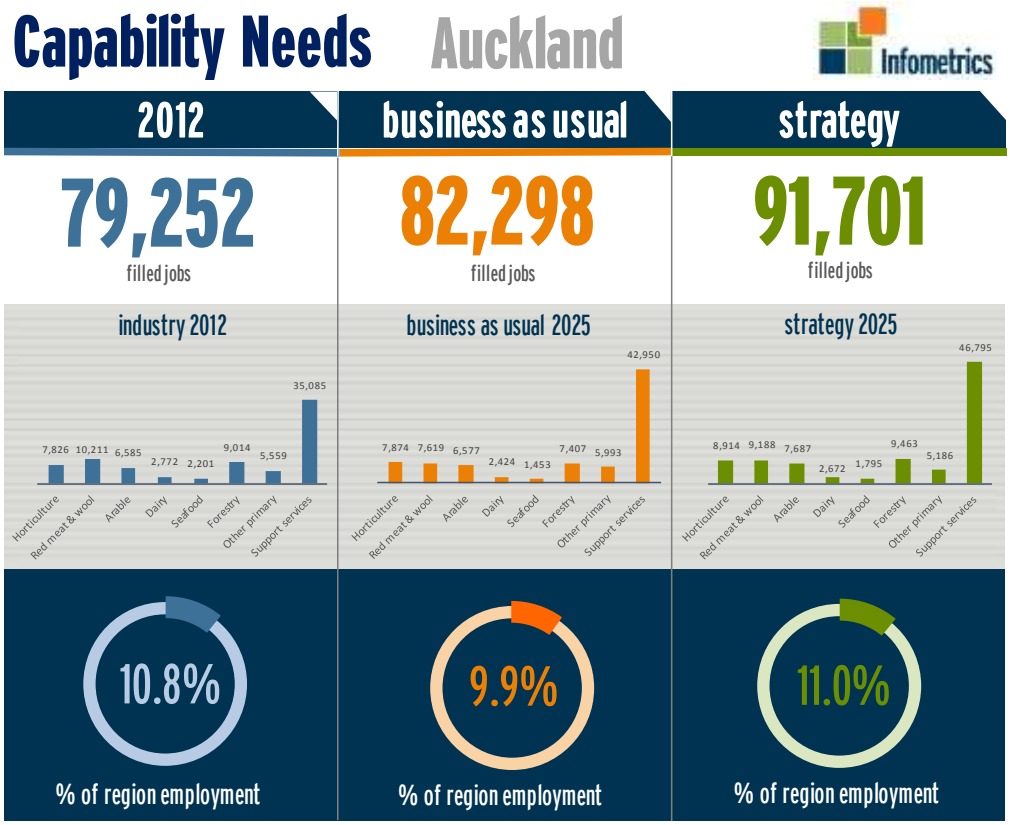
This job growth will require more:

* On-farm workers on horticulture, sheep & beef, and dairy farms
* Forestry and wood processing workers
* Drivers and plant operators
* Managment skills

New jobs by 2025 by occupation



Auckland



change in job count 2012-2025:

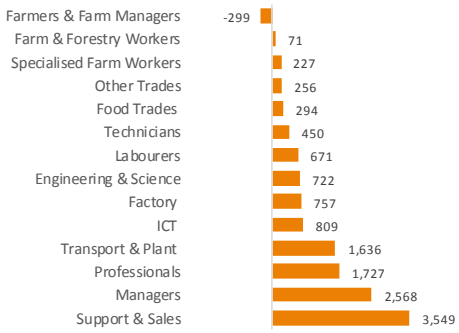
Job growth in Auckland is expected most in:

* Support services

This job growth will require more:

* Support and sales workers
* Management skills
* Business, human resource and marketing professionals
* Freight drivers

New jobs by 2025 by occupation

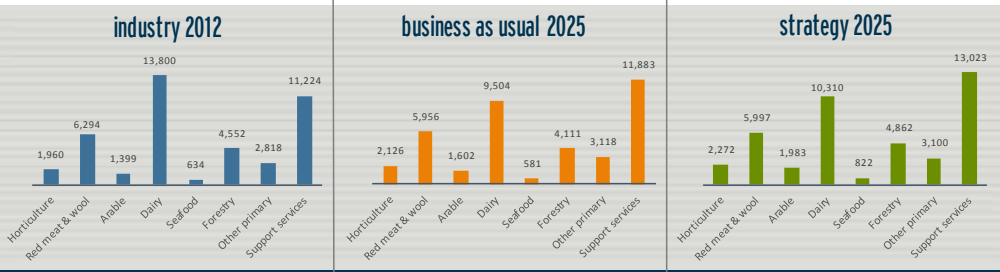


Waikato

Capability Needs Waikato

Infometrics

2012	business as usual	strategy
42,681 filled jobs	38,880 filled jobs	42,369 filled jobs



% of region employment

% of region employment

% of region employment

change in job count 2012-2025:

Job growth in the Waikato is expected most in:

* Support services
* Arable
* Horticulture
* Forestry

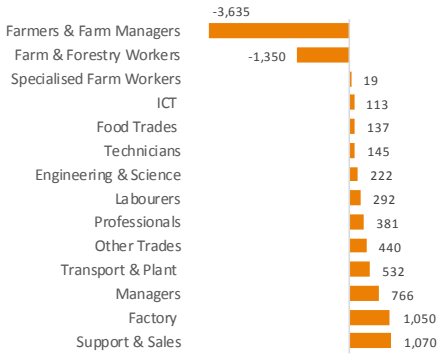
This job growth will require more:

* Support and sales workers
* Factory process workers
* Management skills
* Freight drivers, plant operators and storepersons

but fewer:

* Farmers and farm workers as on-farm productivity advances reduce labour requirements

New jobs by 2025 by occupation

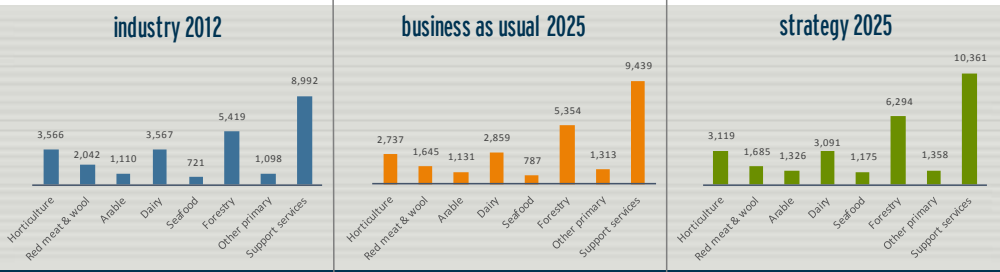


Bay of Plenty

Capability Needs Bay of Plenty

Infometrics

2012	business as usual	strategy
26,516 filled jobs	25,264 filled jobs	28,410 filled jobs



2012	business as usual	strategy
20.5%	17.9%	20.1%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

Job growth in the Bay of Plenty is expected most in:

* Support services
* Forestry
* Seafood
* Management skills

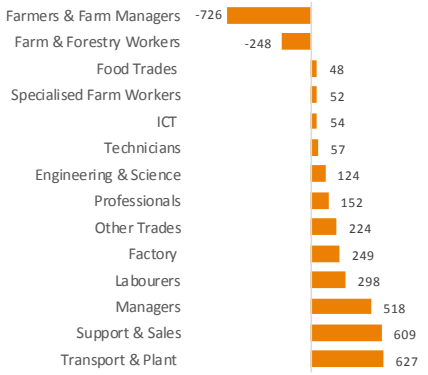
This job growth will require more:

* Freight drivers and plant operators
* Support and sales workers
* Management skills

but fewer:

* Farmers and farm workers as on-farm productivity advances reduce labour requirements

New jobs by 2025 by occupation

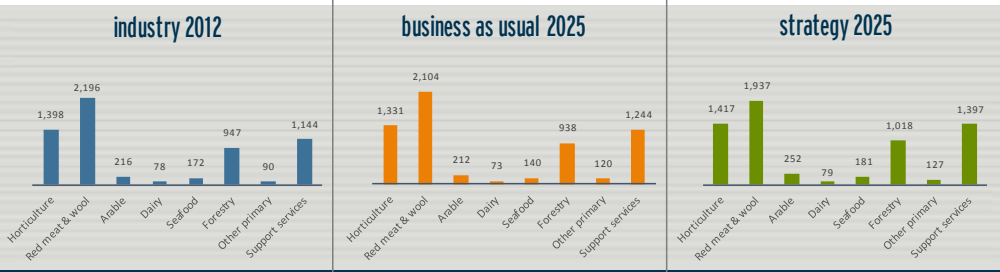


Gisborne

Capability Needs Gisborne

Infometrics

2012	business as usual	strategy
6,240 filled jobs	6,162 filled jobs	6,409 filled jobs



30.4%	28.7%	29.9%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

Job growth in Gisborne is expected most in:

* Support services
* Forestry

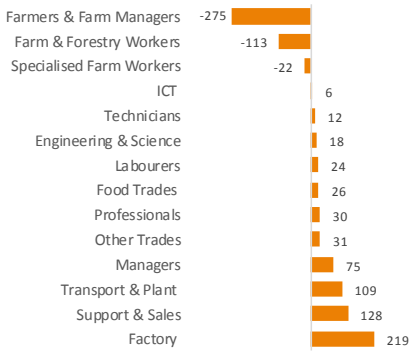
This job growth will require more:

* Factory process workers
* Support and sales workers
* Freight drivers and plant operators
* Management skills

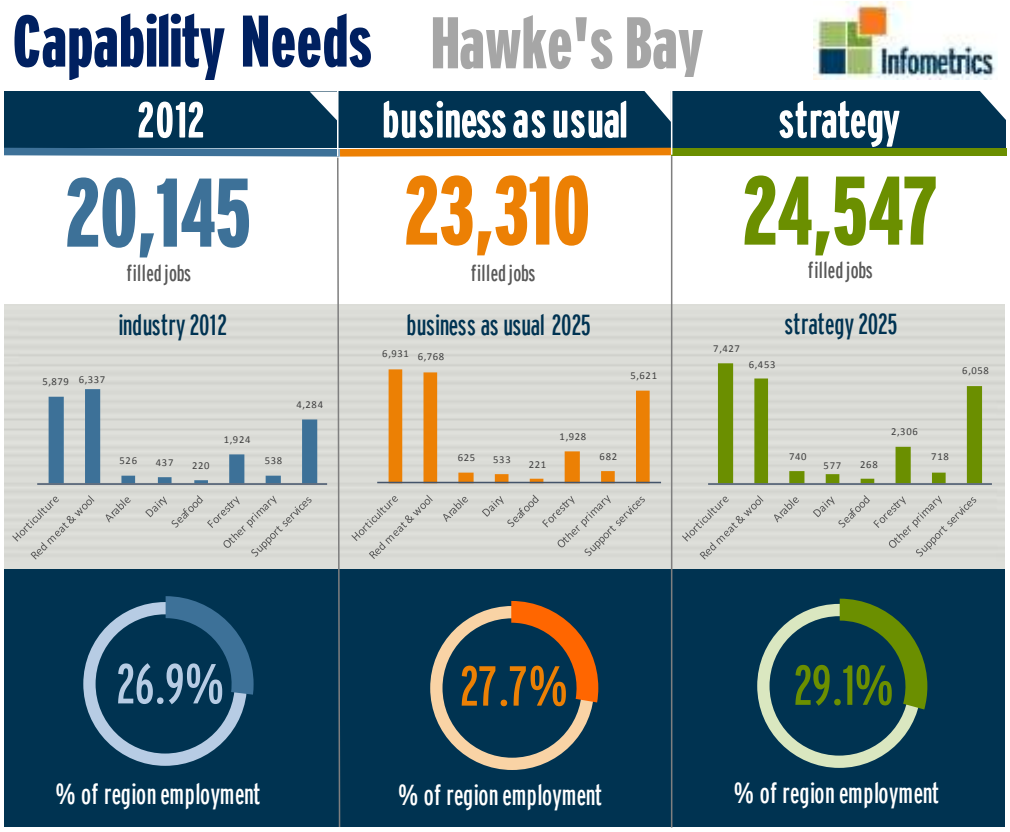
but fewer:

* Farmers and farm workers as land used for sheep and beef farming declines
* Forestry plantation workers as productivity advances reduce labour requirements

New jobs by 2025 by occupation



Hawke's Bay



change in job count 2012-2025:

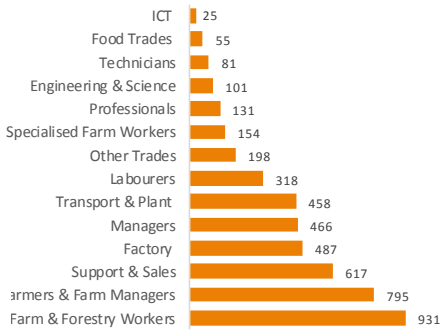
Job growth in the Hawke's Bay is expected most in:

* Support services
* Horticulture
* Red meat and wool

Hawke's Bay will require more:

* Farmers and farm workers, particularly in horticulture
* Support and sales workers
* Factory process workers
* Management skills
* Mobile plant operators
* Forestry and wood processing workers

New jobs by 2025 by occupation

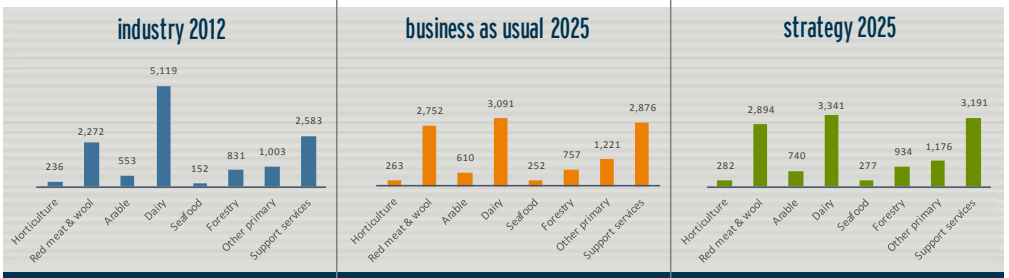


Taranaki

Capability Needs Taranaki

Infometrics

2012	business as usual	strategy
12,750 filled jobs	11,823 filled jobs	12,835 filled jobs



2012	business as usual	strategy
23.1%	19.2%	20.8%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

Job growth in Taranaki is expected most in:

* Red meat and wool
* Support services

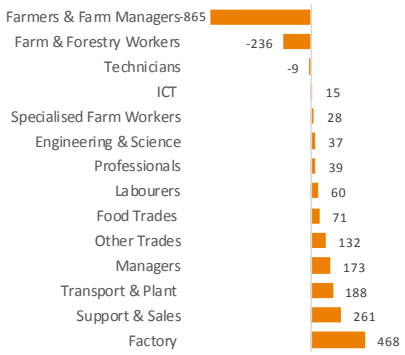
This job growth will require more:

* Factory process workers
* Support and sales workers
* Freight drivers
* Management skills

but fewer:

* Farmers and farm workers as on-farm productivity advances in dairy reduce labour requirements

New jobs by 2025 by occupation

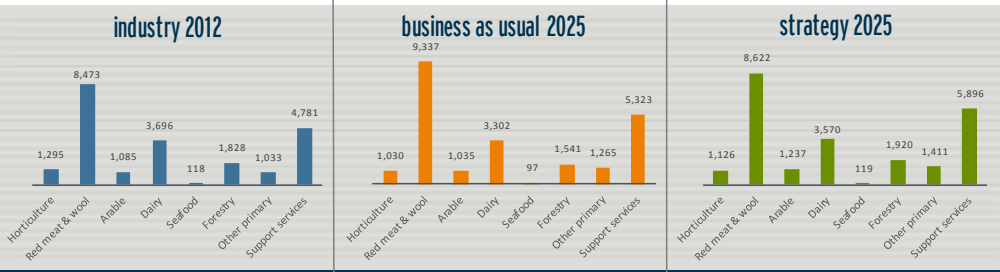


Manawatu-Wanganui

Capability Needs Manawatu-Wanganui

Infometrics

2012	business as usual	strategy
22,308 filled jobs	22,930 filled jobs	23,901 filled jobs



2012	business as usual	strategy
20.9%	20.7%	21.6%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

Job growth in Manawatu-Wanganui is expected most in:

* Support services
* Red meat and wool
* Other primary

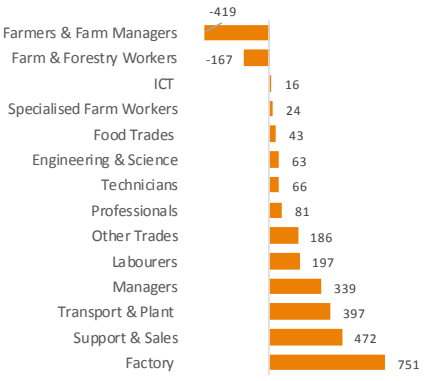
This job growth will require more:

* Factory process workers
* Support and sales workers
* Freight drivers
* Management skills

but fewer:

* Farmers and farm workers as on-farm productivity advances reduce labour requirements

New jobs by 2025 by occupation

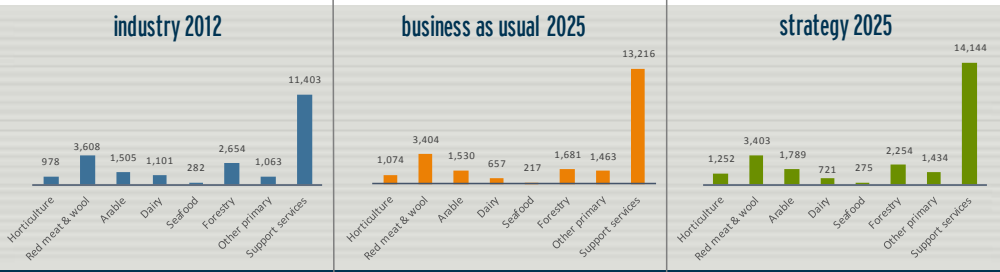


Wellington

Capability Needs Wellington

Infometrics

2012	business as usual	strategy
22,595 filled jobs	23,242 filled jobs	25,723 filled jobs



8.7%	8.0%	8.7%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

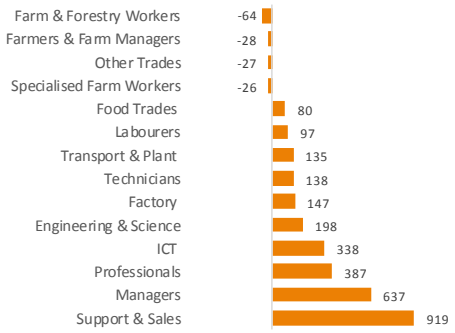
Job growth in Wellington is expected most in:

* Support services

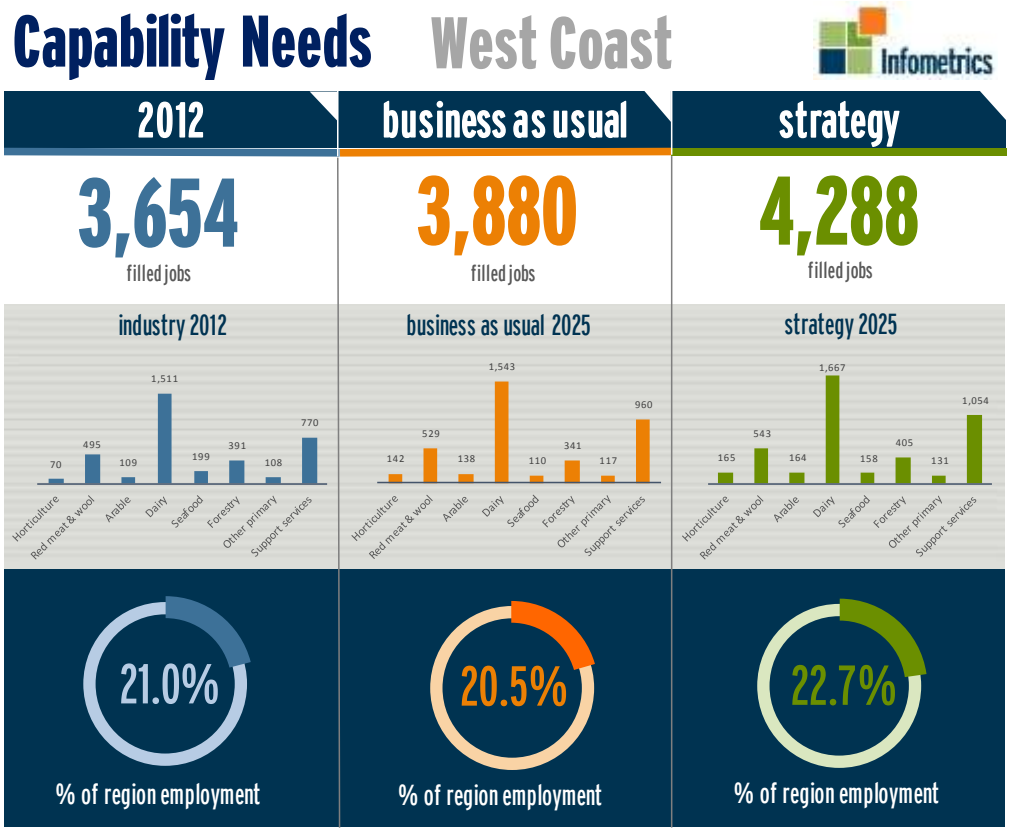
This job growth will require more:

* Support and sales workers
* Management skills
* Business, human resource and marketing professionals
* ICT professionals

New jobs by 2025 by occupation



West Coast



change in job count 2012-2025:

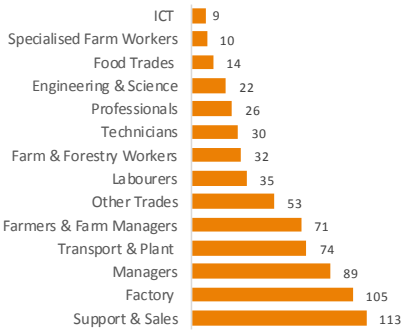
Job growth on the West Coast is expected most in:

* Support services
* Dairy
* Horticulture
* Red meat and wool

This job growth will require more:

* Support and sales workers
* Factory process workers
* Management skills
* Freight drivers, storepersons and plant operators
* Farmers and farm managers

New jobs by 2025 by occupation

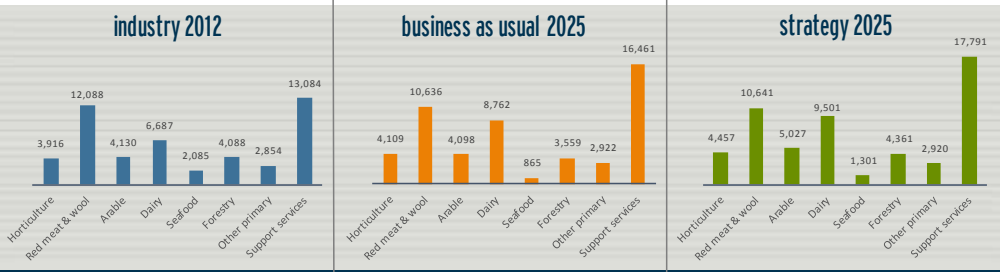


Canterbury

Capability Needs Canterbury

Infometrics

2012	business as usual	strategy
48,932 filled jobs	51,412 filled jobs	56,000 filled jobs



2012	business as usual	strategy
17.3% % of region employment	16.0% % of region employment	17.5% % of region employment

change in job count 2012-2025:

Job growth in Canterbury is expected most in:

* Support services
* Dairy
* Arable

This job growth will require more:

* Support and sales workers
* Management skills
* Freight drivers
* Farmers, farm managers and farm workers
* Business, human resource and marketing professionals

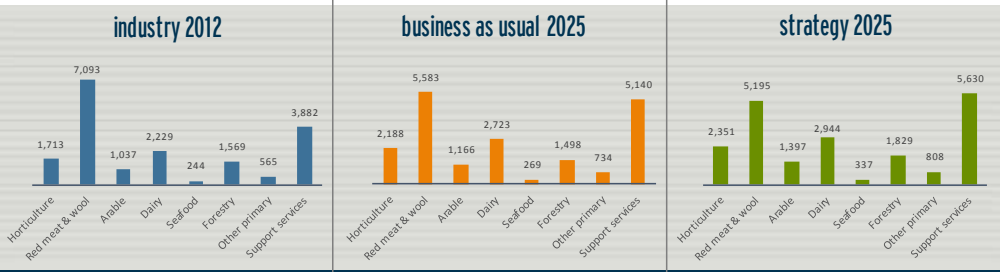
New jobs by 2025 by occupation

Otago

Capability Needs Otago

Infometrics

2012	business as usual	strategy
18,332 filled jobs	19,303 filled jobs	20,491 filled jobs



% of region employment

% of region employment

% of region employment

change in job count 2012-2025:

Job growth in Otago is expected most in:

* Support services
* Dairy
* Horticulture

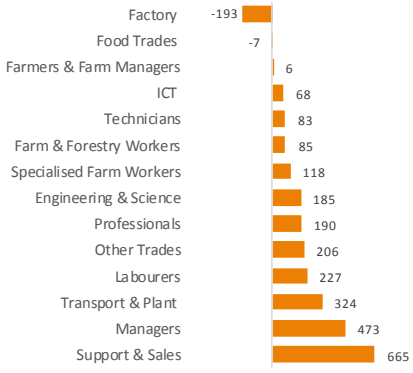
This job growth will require more:

* Support and sales workers
* Management skills
* Freight drivers and plant operators

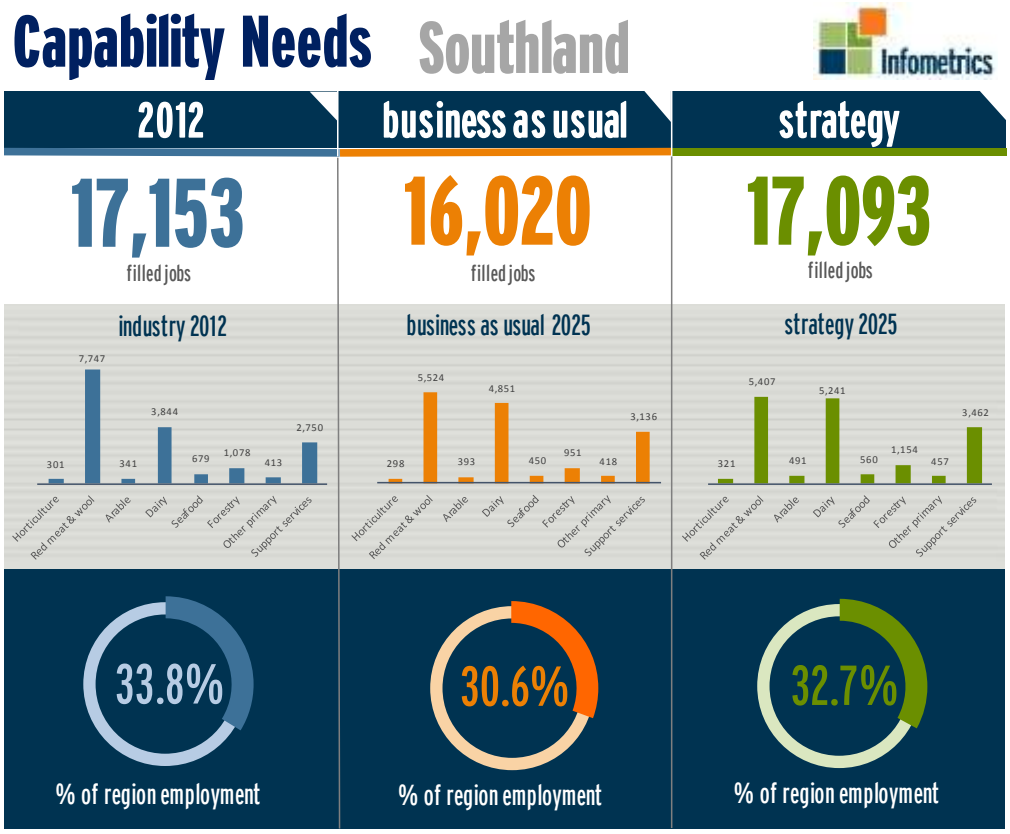
but fewer:

* Textile and meat process workers
* Sheep and beef farmers

New jobs by 2025 by occupation



Southland



change in job count 2012-2025:

Job growth in Southland is expected most in:

* Dairy
* Support services
* Arable

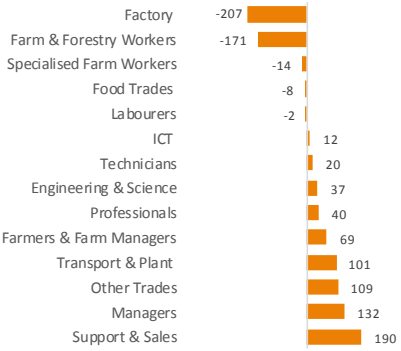
This job growth will require more:

* Support and sales workers
* Management skills
* Engineering trades workers
* Freight drivers and plant operators

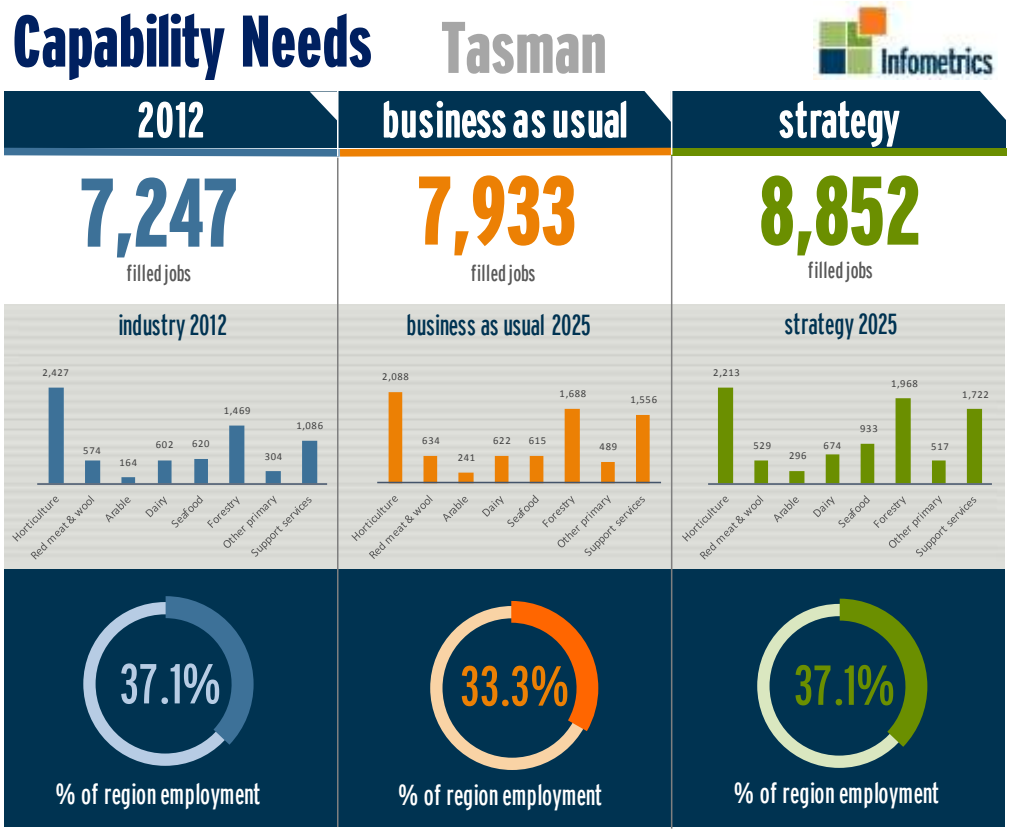
but fewer:

* Textile and meat process workers
* Sheep and beef farmers

New jobs by 2025 by occupation



Tasman



change in job count 2012-2025:

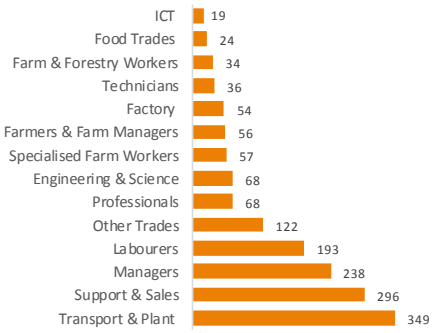
Job growth in Tasman is expected most in:

* Support services
* Forestry
* Seafood

This job growth will require more:

* Freight drivers and plant operators
* Support and sales workers
* Management skills
* Labourers
* Engineering trades workers

New jobs by 2025 by occupation

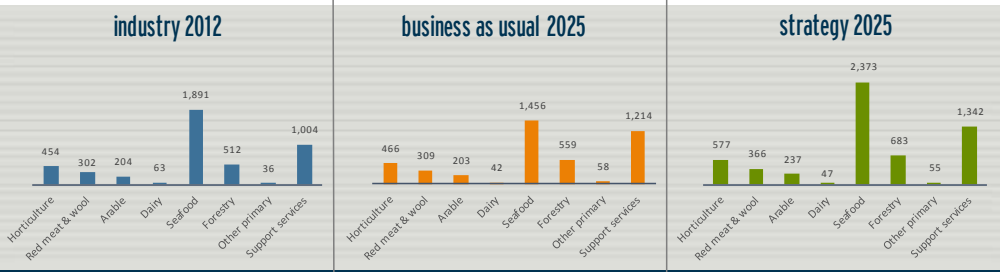


Nelson

Capability Needs Nelson

Infometrics

2012	business as usual	strategy
4,467 filled jobs	4,307 filled jobs	5,681 filled jobs



2012	business as usual	strategy
15.3%	13.0%	17.1%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

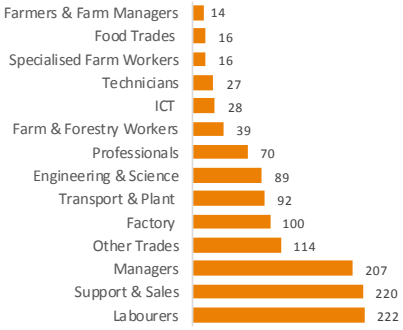
Job growth in Nelson is expected most in:

* Seafood
* Support services
* Forestry

This job growth will require more:

* Labourers
* Support and sales workers
* Management skills
* Trades workers

New jobs by 2025 by occupation

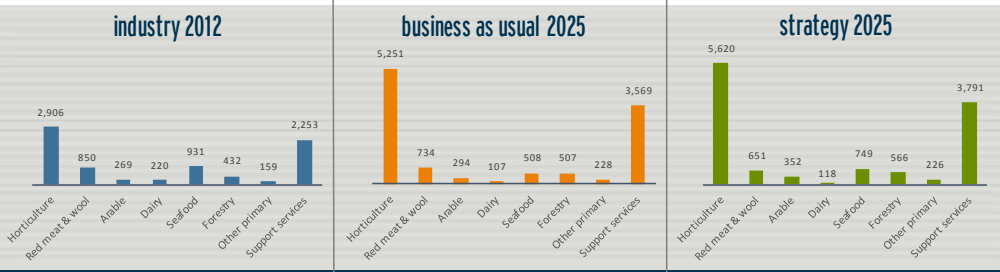


Marlborough

Capability Needs Marlborough

Infometrics

2012	business as usual	strategy
8,019 filled jobs	11,198 filled jobs	12,073 filled jobs



33.5%	35.6%	38.3%
% of region employment	% of region employment	% of region employment

change in job count 2012-2025:

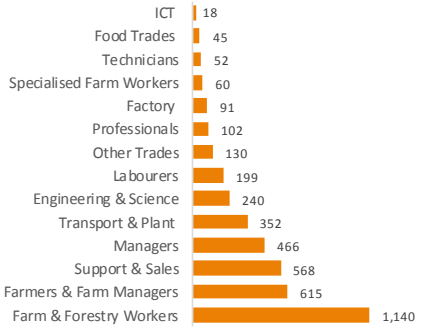
Job growth in Marlborough is expected most in:

* Horticulture
* Support services

This job growth will require more:

* Farmers and farm workers, particularly in horticulture
* Support and sales workers
* Management skills
* Mobile plant operators

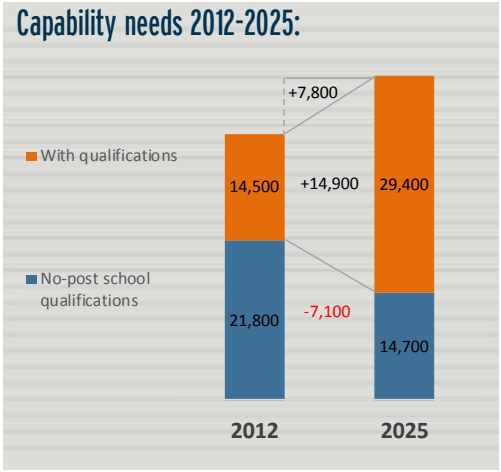
New jobs by 2025 by occupation



3. HORTICULTURE

Capability Needs: Horticulture

Capability needs 2012-2025:



Horticulture will need:

* a net increase of 7,800 workers
* 14,900 more workers with qualifications
* 7,100 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 26,300 to replace the natural attrition of workers within the industry

New horticulture workers will primarily:

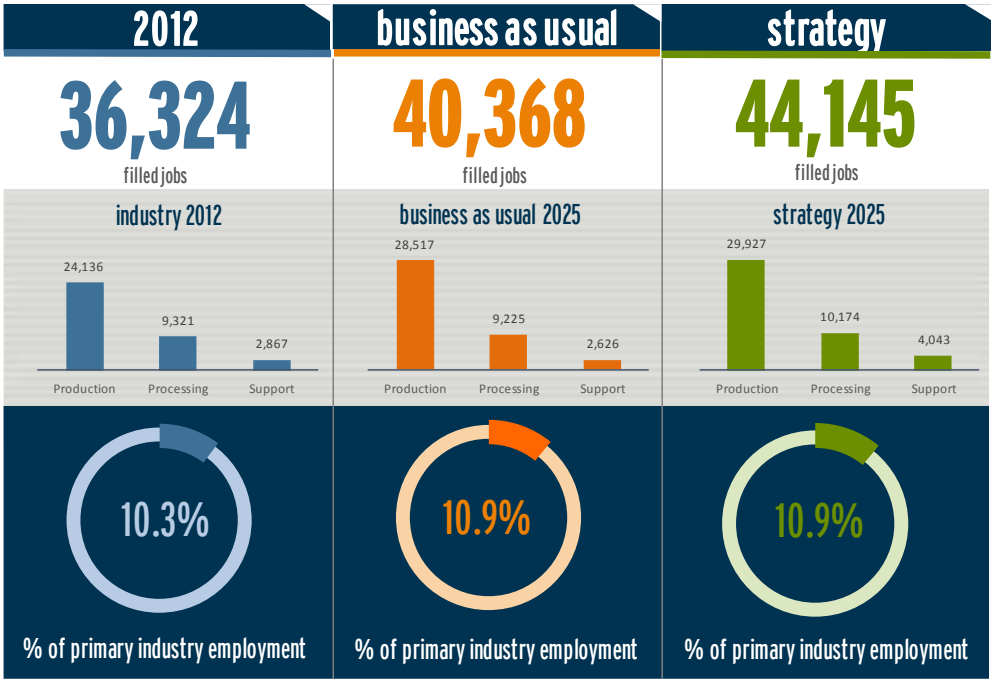
* be in on-farm, sales and marketing, and management occupations
* have trained in agriculture, business, and engineering fields of study
* seek jobs in Marlborough, Hawke's Bay, Northland, Auckland and Otago

But be less likely to be employed in:

* Bay of Plenty, Tasman, or Manawatu-Wanganui

Success will require more skills in:

* Marketing to maximise market potential of new cultivars and supply products to diverse markets
* Business management & leadership (logistics systems, information and assurance systems)
* Production skills (technology adoption in production of proprietary new cultivars)
* Science & technical support (development of proprietary new cultivars)



This fact sheet should be read in conjunction with the service sector fact sheet as some support services cross over a wide range of primary sectors and can't directly be attributed to one sector.

Horticulture is a diverse industry with exports dominated by wine, kiwifruit and apples. These three sectors make up 70% of the total horticultural exports. The value of exports in 2012 was $3.5b[4] with $7.3b projected for 2025.

Extrapolation of trends to 2025 for exports (CAGR % pa) results in overall industry growth of 5.5%, to $7.3b, with wine 5.1% to $2.2b, kiwifruit 8.4% to $2b and apples 7.6% to $0.9b.

By 2020 the industry considers it has the potential to achieve a total revenue of $10b from domestic and export receipts.

The drivers of change towards 2025 are:

- increasing importance of Asian markets,
- market-oriented drivers especially market access and consumer quality requirements, and
- increased use of technology and increased scale.

These have implications for:

- the development and production of proprietary new cultivars,
- reliable supply,
- supporting information and assurance systems, and
- logistics systems that are optimised to service Asian markets.

For human capability, there will be greater demands for:

- more skills across the value chain to maximise the market potential of new cultivars, ensuring productivity and production costs remain competitive;
- an ability to use new technology;
- a reliable supply of product to diverse markets that are supported by consumer-oriented services;
- improved management skills to manage a diverse workforce; and
- governance and leadership skills.

Challenges and risks

The greatest challenge facing horticulture is the availability of labour and skills. Critical to meeting this challenge is developing future leaders across farming, commerce, science and technology/processing. Management structures of small and medium enterprises (SMEs) in the horticultural sector can also create barriers to skill development, retention and career development[6].

Key risks relate to international competitiveness, climate change and extreme events, biosecurity (pests and disease) and market access. The industry's ability to export depends on assuring overseas markets of its phytosanitary status. Incursions of exotic pests and diseases not only affect domestic production, but damage market access by reducing the industry's phytosanitary health status reputation.

[4] Fresh Facts: New Zealand Horticulture 2012 (Horticulture New Zealand and Plant & Food Research, 2012); MPI Production & Trade is $3.54b and $3.53b for year ending June 2012 and June 2013, respectively.
[5] Growing a new future. Horticulture Industry Strategy 2009 – 2020, Horticulture New Zealand.
[6] Foundation Skills in Seasonal Workplaces, Phase 1, Report 1 (2006). Department of Labour.

Market growth

Market growth in China, North Asia and South East Asia will result in changes in the destination profile for New Zealand horticultural exports. This in turn will see changes in the product mix, as well as greater market specialisation of supply chains to service a higher proportion of Asian markets. Further up the supply chain, there will be a greater demand for skilled labour to service a greater diversity of packaging, market access and logistics requirements. It is possible, given the proximity of Asia that there will be growth in high-value, highly perishable air freighted produce or minimally processed food products, as well as more sea freight for specialist processed foods and longer storing produce. Overall, greater complexity of markets, market channels and logistics will require a greater reliance on IT-based track and traceability systems than at present. Sustainability and environmental best practice will be an increasing focus particularly in traditional western markets. Increasing brand value is likely to be a focus of management.

Market preferences

In general, Asian markets prefer sweeter fruits and the conversion of green to gold varieties of kiwifruit recognises this preference. Any new variety of fruit must have exceptional attributes to generate a price premium, for example Zespri® Gold kiwifruit and Jazz™ apples. Developing new varieties requires more skill in relation to intellectual property (IP) management and protection, for example specialist legal expertise, auditing and licensing. There will be a greater requirement for sustainability, quality and food safety reporting. Demand for marketing, research and development, consumer testing and quality monitoring skills tend to increase with new cultivar introduction. For the wine industry, a focus on grape quality rather than quantity is expected to maintain price premiums in the face of global oversupply of wine. As the information content associated with the product increases, there is a greater demand for specialist data capture, processing, auditing and reporting skills, particularly for branded products. Demand for laboratory services and skills will increase to meet food safety and product quality assurance requirements.

Global supply

To meet the expectation of year-round supply of fresh produce, suppliers will partner with overseas producers, for example, in the kiwifruit industry the licensing of Zespri Gold in Italy. Offshore production requires an increase in management skills and services for on-farm, post-harvest and logistics operations that are suited to people with language and cross-cultural (such as adaptable to operating in different cultures) skills. An increase in specialist technical onshore support in New Zealand to service offshore personnel is required. Global supply of labour for New Zealand through the recognised seasonal employment (RSE) scheme will also be important.

New markets

The trend of shifting New Zealand's fruit exports away from Europe and North America to Asia will continue based on higher per kilogram returns compared to traditional European markets. Reduced transport costs coupled with an expected increase in market share in existing Asian markets (for example, Japan and China) will also improve margins. Wine exports are taking market share in Australia (New Zealand's largest export market for wine) from Italian and French wines, while market share in the UK market is expected to continue growing slowly with price premiums. The US market for New Zealand wine is small but fast-growing (10 year CAGR of 27%). Growth rates of processed food exports such as potato french fries to Australia carries the potential of major supply contracts to multinational fast food companies. Specialist skills including language skills and supporting marketing

and logistics services are needed as export growth shifts towards Asia. Product failure can be high in these emerging markets due to fragmented in-market cool chains. This requires specialist post-harvest product handling and segregation in New Zealand, as well as in the management of the product offshore to ensure high-quality in the market. Improved penetration of high tariff markets in Asia (for example, Japan and Korea) are dependent on a breakthrough in trade agreements including the proposed Trans Pacific Partnership (TPP). Key new markets for all fruit and vegetables include China and India.

Adding value

Extracts of high-value components of fruits and vegetables based on scientifically supported health benefits will continue to make progress in affluent Western and Asian markets albeit from a small base. Skill gaps are in market research, marketing, applied research and laboratory services. A key success factor is the development of trusted partners in target markets.

There will be a clear focus on exporting high-quality fresh horticulture produce with ultra-low residues. For wine, this means focusing on high quality grapes rather than on quantity. Processed foods, such as frozen french fry exports, will continue the trend to higher automation.

Packaging and logistics

The demand for bio-degradable and modified atmosphere packaging and labelling will be at the pack house. Current research and development has shown there are opportunities for using waste streams for new packaging materials and inputs into the supply chain. A range of new skills associated with processing wastes, logistics and production of bio-materials are needed as demand for these products increases.

Increased capital investment will be needed along the whole value chain. This includes investment for new transport technology to use whole-of-chain temperature monitoring using radio frequency identification device (RFID), and IT infrastructure to manage inventory, bulk reefer shipping over container lines and direct shipping from port to key market. These advances will place greater demand on IT systems and reporting for real-time decision-making in the logistics chain.

In-market further processing is likely to become more widespread, for example, in Belgium there is a kiwifruit packaging and cooling hub. In-market packaging and processing requires increased specification and management of product in New Zealand prior to dispatch to ensure costly product failure offshore is minimised. This will result in greater specialist skills for product segregation, automation and inventory management in New Zealand and offshore.

Offshore packaging is also likely to continue, for example, bulk wine (currently 27% of wine exports) bottled in Europe often for supermarket own labels. Specialist product quality, traceability and logistics skills are needed to enable high-quality bulk shipping. Bulk transport should result in efficiency gains as long as quality and brand value are protected. Skills in risk management are critical.

Supply response

Responding to these changing patterns of demand will result in competition for additional land at the margin especially for quality soils. Based on existing trends, the total area in horticultural production will increase from 127,100 ha in 2012 to

152,000[7] ha by 2025 – a compound increase of 1.4% pa. The largest increase is possible in grape growing more than doubling from 33,400 ha in 2012 to 77,600 ha in 2025 (6.7% CAGR). Other significant increases in the area for production include potatoes up 1% pa, other vegetables up 0.7% pa and kiwifruit up 0.4% pa. Overall, the productivity of fresh produce per unit area of land will continue to grow alongside quality through the adoption of new cultivars and production methods.

Increased production area will require more permanent and part-time workers across the whole supply chain. This will be balanced by labour efficiency per unit of output through greater mechanisation, more efficient growing systems and plant varieties, as well as improved training and technical IT skills to operate and service equipment/robotics. Contracting out of operations involving high-labour activities, such as pruning and picking, is likely to result in significant efficiencies.

Regional implications

Regional centres of growth for horticulture are expected to be the Bay of Plenty for kiwifruit (+3200 ha)[8], Hawke's Bay and Tasman-Nelson for apples[9], Marlborough for wine[10] (expanding also in the second tier regions of Hawke's Bay, Gisborne and North Canterbury, Auckland), Waikato and Canterbury for potatoes and Hawke's Bay and Canterbury for vegetables[11]. There will be a continuing reliance on seasonal workers (local and RSE) for harvesting, packing and cool storage of horticultural crops particularly in Hawkes Bay and Nelson. RSE policy is critical for seasonal labour, as well as potential to rotate labour between employers and sectors with different seasons. Potato and vegetable production will remain situated near the larger urban areas for easy access to labour supply.

Orchard productivity

Increased production will be a combination of increased area and increases in productivity. New varieties of kiwifruit increasing yields from 20 t per hectare (green) to 27 t per hectare (gold) along with reduced fertiliser/chemical use (use of natural composts/biological controls)[12]. For apples, there will be increased use of biological control (such as pheromone disruption and trapping) rather than spraying. With wine, quality will be more important than yield to manage supply and maintain prices. Moving towards more natural production and reduced artificial inputs (sprays and fertiliser) will continue to account for a bigger proportion of production. Intensification through a greater proportion of new cultivars and more sustainable production systems will increase the demand for more skilled and trained workers, supervisors, managers and horticultural service staff than at present, in short, a higher proportion of more skilled workers within the farm gate. Advances in natural production and new varieties will require specialist agriculture scientists (plant, soil, pests and diseases) and finding the right mix between public research and private IP.

Successful growers will demonstrate improved orchard management, resilience to risks (such as biosecurity, climate change), economies of scale (such as larger, specialised orchards) and/or third party management of orchards (such as management/lease to specialist post-harvest companies). The wine industry may make increased use of mechanisation in harvesting and pruning and increased

[7] Extrapolation to 2025 using growth trends from Fresh Facts: New Zealand Horticulture 2012 (Horticulture New Zealand and Plant & Food Research, 2012).
[8] Zespri 2025 (Zespri 2010).
[9] Overview of the New Zealand apple industry in a global context (Pipfruit New Zealand, 2006).
[10] New Zealand Winegrowers Strategic Review November 2011 (PricewaterhouseCoopers, 2011).
[11] Fresh Facts: New Zealand Horticulture 2012 (Horticulture New Zealand and Plant & Food Research, 2012).
[12] Zespri 2025 (Zespri 2010).

capital investment on crop protection for example frost fans. Crop management will focus on quality by manipulating yield to maintain prices. There will be an increased need for the managers/supervisors at diploma or bachelor's degree level and reduced need for semi-skilled labour for pruning and handpicking grapes.

Forecasts of skill requirements for horticulture industries

Horticulture employment is highly concentrated in on-farm activities with 67% of employment involved in growing activities. The strategies for the horticulture industries is expected to require 7,800 increase in employment numbers from 36,300 in 2012 to 44,100 by 2025. This represents an average annual increase of 1.5% pa., which compares with a 1.0% average annual decline between 2002 and 2012 and a 0.8% average annual growth rate in the business as usual projections. The majority of the employment growth for the sector is expected to be involved in growing activities (up by 5,800). However, this expansion in growers is not that much greater than the 4,400 increase predicted in the business-as-usual projections.

Note service support includes just fruit and vegetable wholesaling activity. The horticulture industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the horticulture industry is the consumer of these services. In general, a strong expansion of support services is expected. The increase due to demand from the horticulture industry may be proportional to the forecast 5.5% pa growth in export earnings expected by the horticulture industry.

Figure 5

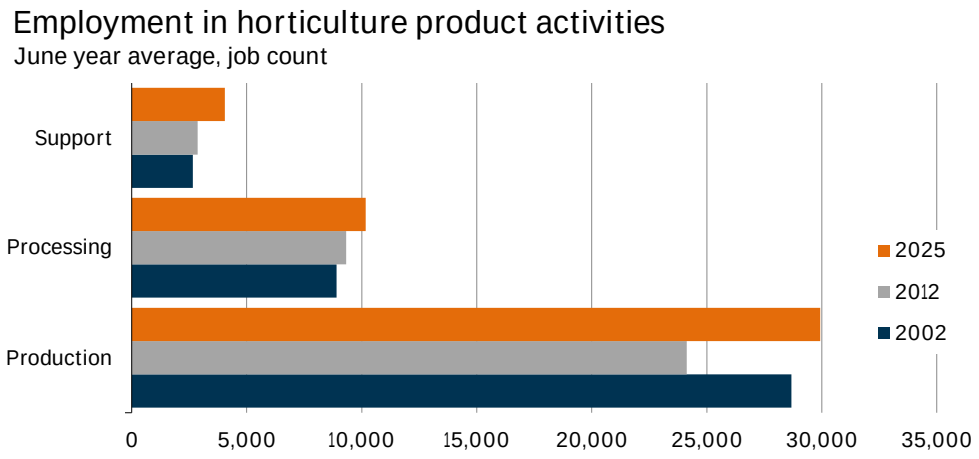


Figure 6

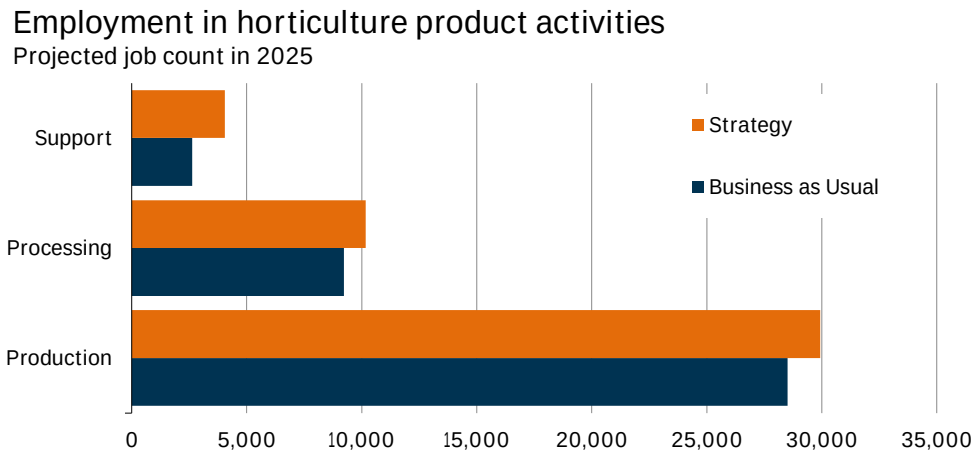


Table 24: Employment in horticulture sub-industries

				2025			
Code	Industry	2002	2012	Business as Usual	Strategy	Growth	Gap
A011100	Nursery Production (Under Cover)	448	1,032	2,031	2,131	1,099	100
A011200	Nursery Production (Outdoors)	3,508	2,281	2,051	2,152	-129	101
A011300	Turf Growing	50	12	13	14	2	1
A011400	Floriculture Production (Under Cover)	187	672	1,152	1,209	537	57
A011500	Floriculture Production (Outdoors)	1,942	352	460	483	131	23
A012100	Mushroom Growing	839	634	754	791	157	37
A012200	Vegetable Growing (Under Cover)	624	1,810	3,317	3,481	1,671	164
A012300	Vegetable Growing (Outdoors)	6,497	3,707	3,058	3,209	-498	151
A013100	Grape Growing	2,424	3,349	5,591	5,867	2,518	276
A013200	Kiwifruit Growing	3,722	2,805	1,743	1,829	-976	86
A013300	Berry Fruit Growing	1,259	1,289	1,710	1,795	506	85
A013400	Apple and Pear Growing	4,709	4,106	4,029	4,228	122	199
A013500	Stone Fruit Growing	637	759	950	997	238	47
A013600	Citrus Fruit Growing	599	356	609	639	283	30
A013700	Olive Growing	77	97	159	167	70	8
A013900	Other Fruit and Tree Nut Growing	1,157	875	890	934	59	44
	Total primary production	28,679	24,136	28,517	29,927	5,791	1,410
C114000	Fruit and Vegetable Processing	4,655	4,160	3,194	3,523	-637	329
C119100	Potato Crisps and Corn Chips Manufacturing	466	609	440	485	-124	45
C121100	Soft Drink, Cordial and Syrup Manufacturing	1,165	1,283	1,409	1,554	271	145
C121400	Wine and Other Alcoholic Beverage Manufacturing	2,620	3,269	4,182	4,612	1,343	430
	Total primary processing	8,906	9,321	9,225	10,174	853	949
F360500	Fruit and Vegetable Wholesaling	2,657	2,867	2,626	4,043	1,176	1,417
	Total service support	2,657	2,867	2,626	4,043	1,176	1,417
Grand Total		40,240	36,321	40,366	44,145	7,824	3,779

The largest employment growth is expected in:

- grape growing (with a 2,500 projected increase in employment numbers),
- under cover vegetable growing (1,700), and
- under cover nursery production (1,100).

Table 25: Percentage of horticulture employment in sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
A011100	Nursery Production (Under Cover)	1.1%	2.8%	5.0%	4.8%	5.7%
A011200	Nursery Production (Outdoors)	8.7%	6.3%	5.1%	4.9%	-0.4%
A011300	Turf Growing	0.1%	0.0%	0.0%	0.0%	1.0%
A011400	Floriculture Production (Under Cover)	0.5%	1.9%	2.9%	2.7%	4.6%
A011500	Floriculture Production (Outdoors)	4.8%	1.0%	1.1%	1.1%	2.5%
A012100	Mushroom Growing	2.1%	1.7%	1.9%	1.8%	1.7%
A012200	Vegetable Growing (Under Cover)	1.6%	5.0%	8.2%	7.9%	5.2%
A012300	Vegetable Growing (Outdoors)	16.1%	10.2%	7.6%	7.3%	-1.1%
A013100	Grape Growing	6.0%	9.2%	13.9%	13.3%	4.4%
A013200	Kiwifruit Growing	9.2%	7.7%	4.3%	4.1%	-3.2%
A013300	Berry Fruit Growing	3.1%	3.5%	4.2%	4.1%	2.6%
A013400	Apple and Pear Growing	11.7%	11.3%	10.0%	9.6%	0.2%
A013500	Stone Fruit Growing	1.6%	2.1%	2.4%	2.3%	2.1%
A013600	Citrus Fruit Growing	1.5%	1.0%	1.5%	1.4%	4.6%
A013700	Olive Growing	0.2%	0.3%	0.4%	0.4%	4.3%
A013900	Other Fruit and Tree Nut Growing	2.9%	2.4%	2.2%	2.1%	0.5%
	Total primary production	71.3%	66.5%	70.6%	67.8%	1.7%
C114000	Fruit and Vegetable Processing	11.6%	11.5%	7.9%	8.0%	-1.3%
C119100	Potato Crisps and Corn Chips Manufacturing	1.2%	1.7%	1.1%	1.1%	-1.7%
C121100	Soft Drink, Cordial and Syrup Manufacturing	2.9%	3.5%	3.5%	3.5%	1.5%
C121400	Wine and Other Alcoholic Beverage Manufacturing	6.5%	9.0%	10.4%	10.4%	2.7%
	Total primary processing	22.1%	25.7%	22.9%	23.0%	0.7%
F360500	Fruit and Vegetable Wholesaling	6.6%	7.9%	6.5%	9.2%	2.7%
	Total service support	6.6%	7.9%	6.5%	9.2%	2.7%

In terms of pace of employment growth, the activity areas where the highest employment growth is expected are:

- under cover nursery production (with employment expected to increase at an rate of 5.7% pa),
- under cover vegetable growing (5.2% pa),
- under cover floriculture (4.6% pa),
- citrus fruit growing (4.6% pa),
- grape growing (4.4% pa), and
- olive growing (4.3% pa).

Occupation

In terms of occupation, the prime growth is expected in on-farm activities. For example, horticulture farmers and farm managers are expected to increase by 1,350 (a 21% increase on 2012) and farm workers are expected to increase by 2,400 (a 28% increase). Other occupations that are likely to become increasingly important for horticulture are skilled horticulture workers, engineers, hospitality workers (probably associated with the wine industry), and sales staff.

The other potential pressure point is with factory process workers. Although the 290 net increase is quite modest, representing just an 8% increase, process workers are an area where there is likely to be considerable net replacement demand. To increase the process worker workforce by 290 it will require the

industry to train 2,800 new process workers[13] – a net replacement demand to job growth ratio of 9.9 to 1.

Other occupations where replacement demand pressures are likely to increase training requirements relative to net employment growth expectations are:

- other technicians and trade workers (with a net replacement demand to job growth ratio of 6.2),
- ICT professionals (5.4), and
- transport and plant operators (4.8).

Table 26: Employment in horticulture by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	9,531	6,479	7,397	7,833	1,354	436	4,229
Other Managers	2,580	3,469	3,804	4,325	856	521	2,600
Design, Engineering, Science and Transport Professionals	806	1,011	1,215	1,335	324	120	881
ICT Professionals	99	115	108	129	14	21	76
Other Professionals	580	804	827	936	132	109	605
Engineering, ICT and Science Technicians	236	433	456	498	65	42	204
Food Trades Workers	218	189	221	239	50	18	96
Skilled Animal and Horticultural Workers	2,592	1,672	2,064	2,192	520	128	924
Other Technicians and Trades Workers	433	552	563	623	71	60	438
Miscellaneous Support and Sales Workers	4,116	4,259	4,665	5,261	1,002	596	3,654
Transport and Plant Operators	2,243	2,683	2,706	3,093	410	387	1,961
Factory Process Workers	2,774	3,427	3,262	3,715	288	453	2,839
Farm, Forestry and Garden Workers	12,240	8,611	10,418	11,043	2,432	625	6,286
Labourers	1,780	2,611	2,657	2,913	302	256	1,502
Total	40,228	36,315	40,363	44,135	7,820	3,772	26,295

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the horticulture industries' strategy targets. In 2012, 40% of the horticulture workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 66%. The horticulture workforce is expected to expand by 7,800 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 14,900. The 14,900 increase in qualified workers projected in the strategy projections is 5,500 more than projected in the business-as-usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

On top of this net training requirement, the industry is likely to need to find an additional 26,300 trained workers to replace the natural attrition of workers (ie net replacement demand).

Primary industry fields of study (such as agriculture studies) will be the most important area for the expansion in the workforce required to achieve horticulture industry strategies, with the 600 increase representing a 32% increase. In terms of numbers, the next most important field is management and commerce (projected to increase by 400). In proportion to current skill areas, the skill areas in growing demand will be sciences (the 200 increase represents a 29% increase) and social sciences (27%).

[13] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

Table 27: Employment in horticulture by field of study

Field of Study	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
No Qualification	27,202	21,837	16,412	14,666	-7,171	-1,746
1 Natural and Physical Sciences	611	808	1,296	1,541	733	246
2 Information Technology	172	205	271	386	181	116
3 Engineering and Related Technologies	1,670	2,067	2,879	3,663	1,597	784
4 Architecture and Building	535	592	959	1,183	591	224
5 Agriculture, Environmental and Related Studies	2,435	2,292	4,606	5,267	2,975	661
6 Health	483	493	913	1,082	589	170
7 Education	461	476	813	990	514	177
8 Management and Commerce	1,664	2,041	3,138	3,988	1,947	850
9 Society and Culture	620	770	1,217	1,546	775	329
10 Creative Arts	169	203	344	443	240	99
11 Food, Hospitality and Personal Services	512	555	959	1,212	657	253
Not Defined	3,708	3,985	6,562	8,177	4,192	1,616
Total primary industry employment	40,242	36,324	40,368	44,145	7,821	3,777

Regional

The largest employment growth in horticulture is expected in Marlborough (2,700), Hawke's Bay (1,500) Northland (1,200) and Auckland (1,100). With 20% of horticulture employment, the Auckland region will have the highest proportion of horticulture employment in 2025. However, with 34% of national employment in Auckland, horticulture is of relatively low importance for the Auckland labour market. The regions where horticulture is of relative importance are:

- Marlborough (which is expected to employ 13% of horticulture workers in 2025, but just 1% of national employment)
- Tasman (5% of horticulture employment, but 1% of national employment)
- Hawke's Bay (17% of horticulture employment, but 4% of national employment)
- Gisborne (3% of horticulture employment, but 1% of national employment)
- Northland (6% of horticulture employment, 3% of national employment)

Table 28: Employment in horticulture by region

Region	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
Northland	1,907	1,400	2,460	2,630	1,229	169
Auckland	8,137	7,826	7,874	8,914	1,088	1,039
Waikato	2,443	1,960	2,126	2,272	313	147
Bay of Plenty	4,517	3,566	2,737	3,119	-447	382
Gisborne	1,859	1,398	1,331	1,417	19	86
Hawke's Bay	6,165	5,879	6,931	7,427	1,548	496
Taranaki	450	236	263	282	46	19
Manawatu-Wanganui	1,915	1,295	1,030	1,126	-168	96
Wellington	1,164	978	1,074	1,252	274	179
West Coast	62	70	142	165	95	24
Canterbury	4,295	3,916	4,109	4,457	541	348
Otago	1,839	1,713	2,188	2,351	638	163
Southland	367	301	298	321	20	23
Tasman	2,646	2,427	2,088	2,213	-214	125
Nelson	315	454	466	577	124	112
Marlborough	2,161	2,906	5,251	5,620	2,714	368
New Zealand	40,242	36,324	40,368	44,145	7,821	3,777

Table 29: Expected regional allocation of horticulture employment in 2025

Region	Horticulture	All primary	All industry
Northland	6.0%	5.8%	2.9%
Auckland	20.2%	22.7%	34.3%
Waikato	5.1%	10.5%	8.4%
Bay of Plenty	7.1%	7.0%	5.8%
Gisborne	3.2%	1.6%	0.9%
Hawke's Bay	16.8%	6.1%	3.5%
Taranaki	0.6%	3.2%	2.5%
Manawatu-Wanganui	2.6%	5.9%	4.6%
Wellington	2.8%	6.3%	12.0%
West Coast	0.4%	1.1%	0.8%
Canterbury	10.1%	13.9%	13.2%
Otago	5.3%	5.1%	5.3%
Southland	0.7%	4.2%	2.2%
Tasman	5.0%	2.2%	1.0%
Nelson	1.3%	1.4%	1.4%
Marlborough	12.7%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

Seasonal employment

The horticulture industry is characterised with large seasonal swings in employment requirements. In the 2012 June year, employment numbers in the March quarter were 5,700 or 17% higher than in the September quarter. Our modelling suggests that seasonal swings in employment in horticulture will decline in the future. A smaller fall in employment numbers in September quarters imply

that the September to March employment swing will reduce to 4,200 or 10%. However, this analysis has been undertaken at an aggregate industry-wide level and may mask the continuation and expansion of seasonal employment swings for sub-components of the horticulture industry.

Table 30: Seasonal employment pattern in horticulture

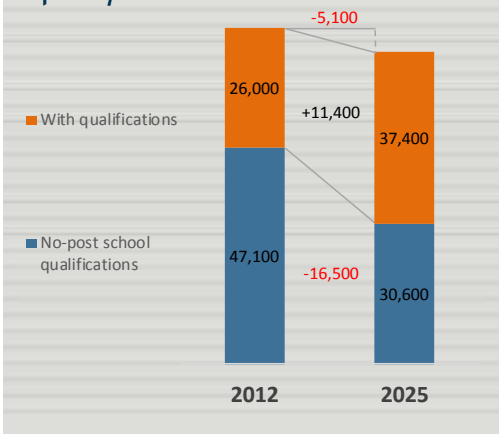
			2025		Difference from average		
			Business			Business	
Quarter	2002	2012	as Usual	Strategy	2012	as Usual	Strategy
September	35,810	33,174	38,684	42,303	-3,150	-1,684	-1,842
December	40,630	35,954	40,805	44,622	-370	437	478
March	44,240	38,893	42,513	46,491	2,569	2,145	2,346
June	40,287	37,275	39,470	43,163	951	-898	-982
Average	40,242	36,324	40,368	44,145			

4. RED MEAT AND WOOL

Capability Needs: Red Meat & Wool

Infometrics

Capability needs 2012-2025:



Red meat & wool will need:

* 5,100 fewer workers
* 11,400 more workers with qualifications
* 16,500 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 32,700 to replace the

New red meat & wool workers will primarily:

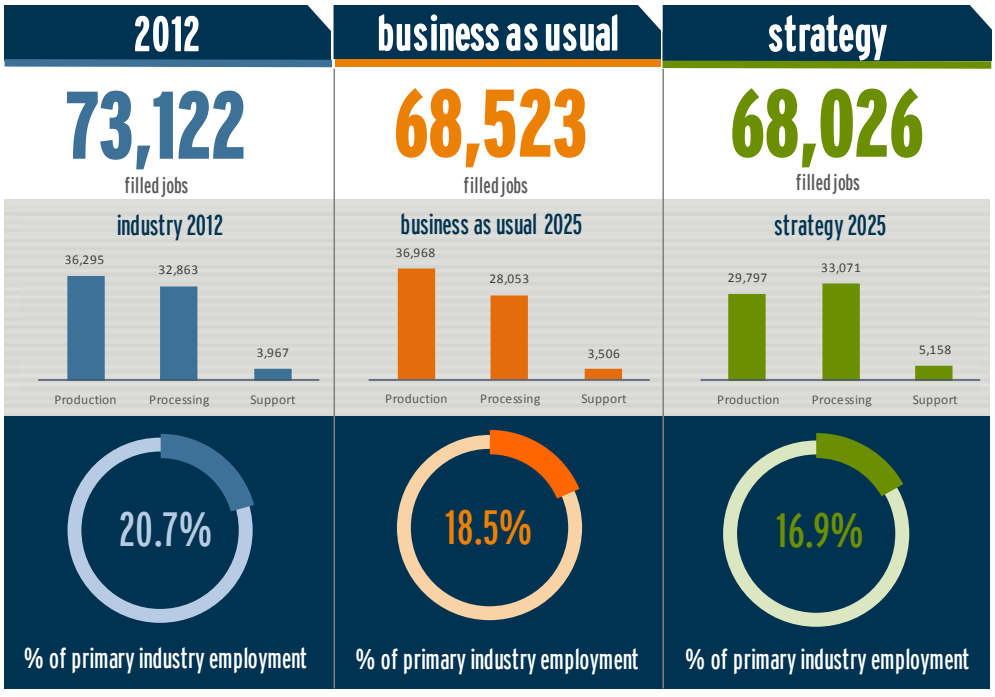
* be in factory, and food trade occupations
* have trained in engineering, hospitality, and business fields of study
* seek jobs in Northland, Taranaki and Manawatu-Wanganui

But be less likely to be employed in:

* on-farm occupations
* Southland, Otago, Canterbury, and Auckland

Success will require more skills in:

* Market development (market-led product innovation, cultural and language capability)
* Supply-chain management (information infrastructure, food safety, and processing innovation)
* Production skills (whole-farm systems, resource management, staff management)
* Science & technical support (production, environment, and rural professionals)



This fact sheet should be read in conjunction with the service sector fact sheet as some support services cross over a wide range of primary sectors and can't directly be attributed to one sector.

The red meat and wool industry comprises meat (beef, sheep, venison, and other red meat), co-products and wool sectors. The value of exports in 2012 was $7.46b[14] (0.7% CAGR from $6.99b in 2002). By 2025, industry expects exports to increase to $13.8b[15] , an increase of 4.8% compound pa (CAGR).

The drivers of change towards 2025 are:

- a new generation of consumers in traditional markets and a rising middle class in new and emerging markets demanding different cuts and products;
- market mix changing over time, with an increasing proportion of red meat and related products being exported to emerging markets;
- the need to lift profitability pre and post farm gate; and
- implementation of more effective environmental regulation.

This has implications for:

- exporting skills and logistics management for changing markets;
- export coordination and aligned procurement to achieve scale; and
- improved productivity on farm to sustain the production base while ensuring improved environmental outcomes.

For human capability, there will be greater demands for:

- in-market skills – for example, marketing, market-led product innovation, cultural and language capability;
- supply chain skills – for example, information infrastructure, food safety, water recycling and processing innovation; and
- on-farm skills and support – for example, improved capability of accredited rural professionals, production, environment, social science and research skills (aligned business models and change management practices), innovative farm managers and owners who are skilled in staff leadership and business management and have willingness to adopt new technology, and staff with improved literacy and numeracy competency.

Challenges and risks

As the meat industry tackles transformation behind and beyond the farm gate to extract more value from production, challenges include;

- access to capital on-farm
- determining appropriate industry structure ,
- risks in execution to achieve scale
- capturing value-chain margins in-market,
- lifting farm performance and success of transformational PGP investments.

[14] Sector metrics industry dashboard (B+LNZ Economic Service 2013). B+LNZ export data coverage is wider than MPI Production & Trade. B+LNZ data is adopted as it aligns with 2025 export target. Apart from sheepmeat, beef, venison, hides/leather and wool products, B+LNZ data includes co-products (tallow, oils/fats) and processed agriculture (meat meal/feeds) while MPI data includes other meat. MPI Production & Trade is $6.83b and $6.82b for year ending June 2012 and June 2013, respectively.
[15] Derived from B+LNZ Economic Service and Red Meat Sector Strategy $11.5b total (export & domestic) 2025 target (2010 dollars), translated to 2025 dollars using 2.2% average inflation and assuming 14.5% share for domestic market.

Market growth

The meat industry will likely focus on a strong brand position in premium markets for a new generation of consumers and achieve scale through export coordination and category approach. There is a need to extract further value by better meeting market needs. The Trans-Pacific Partnership (TPP) has the potential to improve access in the US, Japan and other markets. New markets in Asia with huge growth potential from rising middle classes and geographically proximate to New Zealand compared with traditional markets include China, Vietnam, Philippines, Thailand and Indonesia. As each country has unique market characteristics, further value is to be extracted by adapting consumer-friendly cuts and value-added products to market cultures. The focus for wool will be on new market directions, products, consumers and routes to markets.

Market changes will require exporting skills (including market-led product innovation, cultural and language capability) for changing markets and penetrating new markets, as well as selling New Zealand story and attributes. Innovation in processing (for example engineering and design, high-tech manufacturing) is also required to maximise value from cuts.

Market preferences

Premium positioning of meat products must be supported by consumer (both retail and food service) research (to determine preferences and premium pricing) and new premium product development in the US and key Asian markets. To achieve premium positioning requires a system-wide approach as envisioned by FarmIQ[16] including science-backed eating quality assurance, new genetics with consumer-desired traits, smart processing (such as energy and cost efficiency), product innovation, integrated market/processing/farm information systems.

Non-premium products particularly whole frozen mutton carcass exports to China are on the rise making China the top sheep meat market. There is an opportunity for New Zealand firms to participate in value-adding in China to secure value chain margins, however this will involve considerable investment and taking on new risks. Conversely, there is reduced need for boning and value-adding skills in New Zealand processing plants for exports to China.

There is an opportunity to develop higher-value marbled beef from dairy calves[17] (using Wagyu sires for dairy mating) and food (such as functional ingredients, new global food service products, intermediate meat products for manufacturers), ingredients (such as protein supplements, meaty bones flavouring) and healthcare (such as medical biotissues, animal blood bioculture, nutrition supplement) products from lower-value parts of the red meat carcass[18].

Extracting greater value from premium and lower-value products requires skills in market development, data analytics/software development, genetics, medical/health/food/nutrition science, novel processing and engineering.

The industry considers one way to improve the value of wool is to increase research into consumer preferences to inform the research and innovation on new products, processes, markets and customers. Fine merino targets a niche market to achieve intimacy and loyalty with 30 million global consumers[19].

[16] Demand driven integrated red meat value chain, Outcome logic model November 2013 (MPI PGP, 2013); FarmIQ annual insights: The year 3 report on FarmIQ to June 2013 (FarmIQ, 2013).
[17] Marbled grass-fed beef (MPI PGP, 2013).
[18] FoodPlus: Generating more value from the beef carcass (MPI PGP, 2013).
[19] NZ sheep industry transformation project: Quarterly report for June 2013 (MPI PGP, 2013).

Packaging and logistics

There is need for development of longer-life product through the whole cool chain. This requires expertise in food technology innovation. There is also need for logistics management skills for achieving scale through export coordination.

Supply response

Areas in production and animal numbers have been in decline as sheep and beef farms are converted to dairy. Area in production has dipped by 10.3% to 9.62m hectares in 2012 (vs 2002). The decline is expected to continue to 2025 due to urbanisation and competition from other land uses. Animal numbers have also declined in 2012 compared with 2002. While animal numbers are expected to be stable to declining towards 2025, productivity improvements will lead to a 26% increase in meat production to 2025[20].

To cater to a new generation of consumers and new markets, there is need for aligned procurement for transparency of market signals and product development to alter taste and vitamin/mineral content of red meat, especially sheep meat. This requires information infrastructure, rebalancing and optimisation of processing capacity and research and development. These in turn require skills for data capture, analysis, benchmarking, food safety, water recycling, meat plant robotics and research expertise on feed inputs to alter taste.

The implementation of more effective environmental regulation, including nutrient management will also require innovative management responses.

Regional implications

Competition for land will remain an issue for sheep and beef production areas. Areas under greatest pressure will be newly irrigated areas in Canterbury, Hawke's Bay and also Southland. Environmental regulatory frameworks in regions are a factor in land-use change dynamics.

Farm productivity

Lifting average performance to sector best practices will enhance the production base and meat quality to support investments in processing and marketing. This requires research on employer and predominantly family labour capabilities and drivers of high performance, development of ownership and succession planning models, research and deployment of business change management practices, effective extension of research and development and benchmarking to inform future research and development, nutrient management for efficient conversion of feed to protein, and optimal animal welfare practices. These will require improved capability in number of accredited advisors, science and research skills, as well as innovative farm managers and owners who are skilled in staff management/leadership and have willingness to adopt new technology, and staff with improved literacy and numeracy competency.

Forecasts of skill requirements for red meat and wool industry

There has been a large fall in employment in red meat and wool farming and processing activities in the 10 years to 2012. The trend appears to have been a move out of specialised farming, particularly sheep farming. There have actually been increases in the number of farmers and farm managers involved in both sheep and beef cattle farming, but the net impact has been an overall fall in on-

[20] From 2010 base year modelled in Red meat sector strategy report: B+LNZ and MIA (Deloitte, 2011)

farm employment numbers from 47,000 to 36,000. The business-as-usual projections suggest that although there will be further declines in specialised sheep farming numbers, this will typically be offset by increases in mixed sheep-beef cattle farming numbers, so that overall little net change in farming numbers are expected.

The strategy forecasts, suggest that the business-as-usual projections are overly optimistic about the future for sheep and beef farming numbers. The strategy forecasts incorporate land-use projections prepared by Motu, which suggests that land devoted to sheep and beef farming activities will decline by 7.3% from 6.9m ha in 2012 to 6.4m ha in 2025 (this compares with a 9.6% decline during the period from 2002 to 2012). The net impact is an expectation that on-farm employment numbers will decline by a further 6,500 to 29,800 by 2025.

Continued advances in on-farm productivity and increases in post-farm value added are expected to allow the industry to meet its ambitions for export earnings growth. This increased activity is expected to require some expansion in employment opportunities in meat wholesaling. In processing, a combination of productivity improvements and a realignment from textile to meat processing will mean little change in overall processing employment numbers.

Service support includes just wholesaling activities. The red meat and wool industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the red meat and wool industry is the consumer of these services. In general, a strong expansion of support services is expected and a starting perspective would be that the increase due to demand from the red meat and wool industry would be proportional to the 4.8% pa export earnings growth planned by the red meat and wool industry.

Figure 7

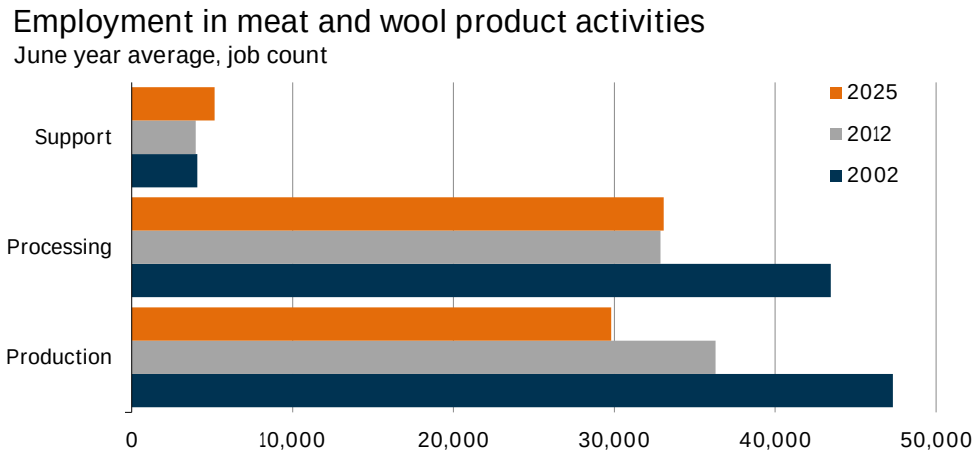


Figure 8

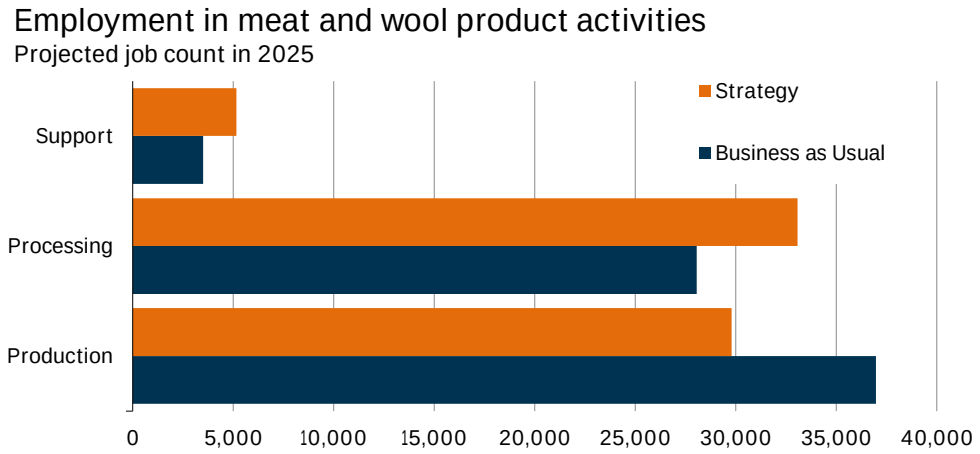


Table 31: Employment in red meat and wool product sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A014100	Sheep Farming (Specialised)	21,018	9,406	5,938	4,786	-4,620	-1,152
A014200	Beef Cattle Farming (Specialised)	10,649	8,075	7,687	6,196	-1,879	-1,491
A014300	Beef Cattle Feedlots (Specialised)	0	0	0	0	0	0
A014400	Sheep-Beef Cattle Farming	8,718	12,943	17,868	14,402	1,459	-3,466
A014500	Grain-Sheep and Grain-Beef Cattle Farming	1,071	915	722	582	-333	-140
A018000	Deer Farming	2,056	1,390	811	654	-736	-157
A052200	Shearing Services	3,814	3,566	3,942	3,177	-389	-765
	Total primary production	47,326	36,295	36,968	29,797	-6,498	-7,171
C111100	Meat Processing	19,844	18,452	16,713	19,703	1,251	2,990
C111300	Cured Meat and Smallgoods Manufacturing	2,005	1,955	1,790	2,110	155	320
C131100	Wool Scouring	569	200	117	138	-62	21
C131200	Natural Fibre Textile Manufacturing	1,793	1,410	1,511	1,781	371	270
C131300	Synthetic Fibre Textile Manufacturing	202	120	92	108	-12	16
C132000	Leather Tanning, Fur Dressing and Leather Product Manufacturing	2,845	1,343	1,038	1,224	-119	186
C133100	Textile Floor Covering Manufacturing	871	586	677	798	212	121
C133300	Cut and Sewn Textile Product Manufacturing	2,966	2,204	1,704	2,009	-195	305
C133400	Textile Finishing and Other Textile Product Manufacturing	1,237	932	464	547	-385	83
C134000	Knitted Product Manufacturing	1,660	859	641	756	-103	115
C135100	Clothing Manufacturing	8,666	4,581	3,114	3,671	-910	557
C135200	Footwear Manufacturing	801	221	192	226	5	34
	Total primary processing	43,459	32,863	28,053	33,071	208	5,018
F331100	Wool Wholesaling	736	538	296	435	-103	139
F360200	Meat, Poultry and Smallgoods Wholesaling	1,299	1,867	2,214	3,257	1,390	1,043
F371100	Textile Product Wholesaling	2,032	1,562	996	1,465	-97	469
	Total service support	4,067	3,967	3,506	5,158	1,191	1,652
Grand Total		94,850	73,122	68,523	68,026	-5,096	-497

Table 32: Percentage of red meat and wool employment in sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy
A014100	Sheep Farming (Specialised)	22.2%	12.9%	8.7%	7.0%
A014200	Beef Cattle Farming (Specialised)	11.2%	11.0%	11.2%	9.1%
A014300	Beef Cattle Feedlots (Specialised)	0.0%	0.0%	0.0%	0.0%
A014400	Sheep-Beef Cattle Farming	9.2%	17.7%	26.1%	21.2%
A014500	Grain-Sheep and Grain-Beef Cattle Farming	1.1%	1.3%	1.1%	0.9%
A018000	Deer Farming	2.2%	1.9%	1.2%	1.0%
A052200	Shearing Services	4.0%	4.9%	5.8%	4.7%
	Total primary production	49.9%	49.6%	53.9%	43.8%
C111100	Meat Processing	20.9%	25.2%	24.4%	29.0%
C111300	Cured Meat and Smallgoods Manufacturing	2.1%	2.7%	2.6%	3.1%
C131100	Wool Scouring	0.6%	0.3%	0.2%	0.2%
C131200	Natural Fibre Textile Manufacturing	1.9%	1.9%	2.2%	2.6%
C131300	Synthetic Fibre Textile Manufacturing	0.2%	0.2%	0.1%	0.2%
C132000	Leather Tanning, Fur Dressing and Leather Product Manufacturing	3.0%	1.8%	1.5%	1.8%
C133100	Textile Floor Covering Manufacturing	0.9%	0.8%	1.0%	1.2%
C133300	Cut and Sewn Textile Product Manufacturing	3.1%	3.0%	2.5%	3.0%
C133400	Textile Finishing and Other Textile Product Manufacturing	1.3%	1.3%	0.7%	0.8%
C134000	Knitted Product Manufacturing	1.8%	1.2%	0.9%	1.1%
C135100	Clothing Manufacturing	9.1%	6.3%	4.5%	5.4%
C135200	Footwear Manufacturing	0.8%	0.3%	0.3%	0.3%
	Total primary processing	45.8%	44.9%	40.9%	48.6%
F331100	Wool Wholesaling	0.8%	0.7%	0.4%	0.6%
F360200	Meat, Poultry and Smallgoods Wholesaling	1.4%	2.6%	3.2%	4.8%
F371100	Textile Product Wholesaling	2.1%	2.1%	1.5%	2.2%
	Total service support	4.3%	5.4%	5.1%	7.6%

The activity areas where the highest employment growth is expected are:

- sheep-beef cattle farming, reflecting a decline in specialised farming, particularly sheep farming;
- meat processing; and
- meat wholesaling.

Occupation

In terms of occupation, process workers (plus 876) and food-trade workers (195) are the only occupations where any significant net increases are expected for the red meat and wool industry. However, once one accounts for net replacement demand[21], there are a number of other areas where training will be required to maintain occupation employment numbers:

- factory process workers (10,300 net replacement demand),
- farmers and farm managers (5,200),
- farm workers (2,900), and
- machine operators (2,300).

[21] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

Table 33: Employment in red meat and wool industries by occupation

Occupations	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	29,336	19,428	19,751	16,050	-3,377	-3,701	5,243
Other Managers	4,839	4,779	4,078	4,712	-67	634	2,340
Design, Engineering, Science and Transport Professionals	849	958	783	877	-81	95	447
ICT Professionals	98	153	137	157	3	20	86
Other Professionals	896	1,273	1,143	1,237	-35	95	759
Engineering, ICT and Science Technicians	606	834	773	830	-4	57	264
Food Trades Workers	1,608	1,656	1,566	1,850	195	285	595
Skilled Animal and Horticultural Workers	2,394	2,082	2,232	1,826	-256	-407	247
Other Technicians and Trades Workers	3,930	2,623	2,145	2,422	-201	277	994
Miscellaneous Support and Sales Workers	6,643	5,803	5,032	5,779	-24	747	3,459
Transport and Plant Operators	12,641	6,960	5,703	6,592	-368	889	3,402
Factory Process Workers	15,903	12,632	11,489	13,508	876	2,018	10,279
Farm, Forestry and Garden Workers	11,669	10,173	10,234	8,487	-1,686	-1,747	2,867
Labourers	3,440	3,773	3,461	3,698	-75	237	1,746
Total	94,852	73,125	68,527	68,026	-5,099	-501	32,728

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the red meat and wool industries' strategy targets. In 2012, 36% of the red meat and wool workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 55%. The red meat and wool workforce is actually expected to contract by 5,100 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 11,400. On top of this net training requirement, the industry is likely to need to find an additional 32,700 trained workers to replace the natural attrition of workers (ie net replacement demand).

The demand for occupations implies that the qualifications most in demand will be in the engineering and construction field of study.

Table 34: Employment in red meat and wool industries by field of study

Field of Study	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
No Qualification	66,490	47,078	30,054	30,598	-16,480	544
1 Natural and Physical Sciences	518	661	1,108	1,185	524	77
2 Information Technology	256	271	336	701	430	365
3 Engineering and Related Technologies	4,299	4,040	5,272	7,880	3,841	2,608
4 Architecture and Building	1,240	1,195	1,730	2,289	1,094	559
5 Agriculture, Environmental and Related Studies	4,424	3,638	6,829	3,731	92	-3,098
6 Health	1,220	1,116	1,917	1,435	320	-482
7 Education	893	833	1,365	1,114	281	-250
8 Management and Commerce	3,836	3,617	5,548	6,274	2,657	726
9 Society and Culture	974	1,033	1,475	1,982	949	507
10 Creative Arts	645	618	526	1,173	554	647
11 Food, Hospitality and Personal Services	1,956	1,945	2,681	5,414	3,470	2,733
Not Defined	8,101	7,079	9,687	4,250	-2,829	-5,437
Total primary industry employment	94,852	73,125	68,527	68,026	-5,099	-501

Regional

With 16% of red meat and wool employment, the Canterbury region will have the highest proportion of red meat and wool employment in 2025. With overall employment in red meat and wool expected to decline by 5,100 by 2025, the general trend is for the importance of the red meat and wool industry to regional

employment to decline. In general, the expected declines reflect current importance with the largest declines expected in Southland (-2,300), Otago (-1,900), Canterbury (-1,500), and Auckland (-1,000). The regions most likely to buck the national downward trend in red meat and wool employment numbers are Northland, Taranaki, and Manawatu-Wanganui.[22]

Table 35: Employment in red meat and wool industries by region

			2025			
Region	2002	2012	Business as Usual	Strategy	Growth	Gap
Northland	3,428	2,542	4,993	4,512	1,970	-481
Auckland	12,857	10,211	7,619	9,188	-1,023	1,569
Waikato	8,272	6,294	5,956	5,997	-297	41
Bay of Plenty	2,775	2,042	1,645	1,685	-356	40
Gisborne	2,274	2,196	2,104	1,937	-258	-167
Hawke's Bay	8,451	6,337	6,768	6,453	117	-314
Taranaki	2,505	2,272	2,752	2,894	622	142
Manawatu-Wanganui	11,183	8,473	9,337	8,622	149	-715
Wellington	4,490	3,608	3,404	3,403	-205	0
West Coast	472	495	529	543	48	14
Canterbury	16,939	12,088	10,636	10,641	-1,447	5
Otago	9,379	7,093	5,583	5,195	-1,898	-389
Southland	9,641	7,747	5,524	5,407	-2,340	-117
Tasman	614	574	634	529	-45	-105
Nelson	299	302	309	366	64	58
Marlborough	1,272	850	734	651	-199	-82
New Zealand	94,852	73,125	68,527	68,026	-5,099	-501

Table 36: Expected regional allocation of red meat and wool employment in 2025

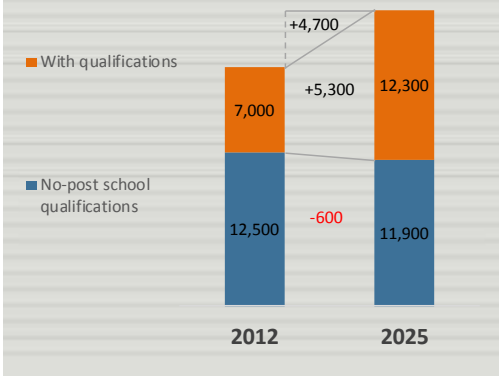
Region	Red meat and wool	All primary	All industry
Northland	6.6%	5.8%	2.9%
Auckland	13.5%	22.7%	34.3%
Waikato	8.8%	10.5%	8.4%
Bay of Plenty	2.5%	7.0%	5.8%
Gisborne	2.8%	1.6%	0.9%
Hawke's Bay	9.5%	6.1%	3.5%
Taranaki	4.3%	3.2%	2.5%
Manawatu-Wanganui	12.7%	5.9%	4.6%
Wellington	5.0%	6.3%	12.0%
West Coast	0.8%	1.1%	0.8%
Canterbury	15.6%	13.9%	13.2%
Otago	7.6%	5.1%	5.3%
Southland	7.9%	4.2%	2.2%
Tasman	0.8%	2.2%	1.0%
Nelson	0.5%	1.4%	1.4%
Marlborough	1.0%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

[22] Note we advise caution in use of regional forecasts. The model used appears to generate some large movements (for example, Northland) that cannot be easily explained.

5. ARABLE

Capability Needs: Arable

Capability needs 2012-2025:



Arable will need:

* a net increase of 4,700 workers
* 5,300 more workers with qualifications
* 600 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 15,200 to replace the natural attrition of workers within the industry

New arable workers will primarily:

* be in sales and marketing, factory processing, and management occupations
* have trained in engineering, hospitality, and businessfields of study
* seek jobs in Auckland Canterbury, Waikato, and Otago

Success will require more skills in:

* Market development (marketing, logistics, supply chain, cultural, and language capability)
* New product development (transform commodities into branded products)
* Production skills (farm management for integrating technology into cropping with livestock)
* Science & technical support (scientists and technicians with greater focus on botany and agronomy)

2012	business as usual	strategy
19,534 filled jobs	20,226 filled jobs	24,156 filled jobs
industry 2012	business as usual 2025	strategy 2025
5.5% % of primary industry employment	5.5% % of primary industry employment	6.0% % of primary industry employment

This fact sheet should be read in conjunction with the service sector fact sheet as some support services cross over a wide range of primary sectors and can't directly be attributed to one sector.

The arable industry provides input to livestock industries, high-value seeds development and production and the food industry. In 2011, direct sales of grains and seeds amounted to $868m contributing $959m to GDP. Direct sales of seeds amounted to $228m, contributing $271m to GDP. Downstream contribution to GDP through pasture improvement was $3.2b. Vegetable and herbage seed export amounted to $150m in 2011[23]. Direct exports of cereals are minor, but the arable industry contributes to other industries as an input into processed foodstuffs.

The drivers of change towards 2025 are:

- Continued strong growth in overseas demand for vegetable and herbage seeds, and specialist flour based products.
- Growth in demand for new plant-based protein products, such as blends or alternatives to animal proteins in spreads and drinks based on sustainability, environmental and human-health grounds.
- Increased integration of forage cropping into intensive dairy production systems with more sophisticated and increased use of information technology to sustain profitability.
- Increased use of contracted services rather than multi-skilled on-farm labour.

These have implications for:

- Maintaining and enhancing in-market relationships with end users to maximise margins along the whole value chain.
- Developing new relationships with new customers in new market segments in the face of strong international competition.
- Breeding and selecting cultivars and species that better fit specialist roles in high intensity farming systems and consumer demand.
- Higher skill levels in specialist areas.

For human capability, there will be greater demands for:

- In-market skills including marketing, logistics, supply chain management and cultural and language capability.
- Growth in demand for support services.
- Scientists and technicians with specialties in plants (for example, botany and agronomy).
- New business models to take products beyond commodities into branded products with strong supply-chain partners.
- Farm and financial management skills training to plan and implement sophisticated precision farming systems, along with integrating cropping into livestock systems.
- Leadership and entrepreneurial flair with an understanding of the interconnectedness with other sectors and along all components of the value chain.

Market growth

Exports of vegetable (40%) and herbage seeds (60%) are growing rapidly. In the late 1990s exports of vegetable seeds amounted to only $5m. In 2012 the total was

[23] Economic Impact Assessment of Arable Production, The Arable Food Industry Council, (BERL August 2012). MPI Production & Trade has no equivalent data.

$90m and by 2025 exports are expected to grow by a further 50% to $135m (BERL 2012).

There will also be growth in specialist flour products such as protein snacks and muesli bars.

New markets in Asia are expected by 2025 with exports of high-quality wheat or wheat products resulting in the need to produce around 200,000 tonnes of specific quality wheat. The increase is expected to come from a roughly equal combination of both increase in yield and land in production.

Market preference

Demands for new crop-based products are expected to increase significantly, particularly in Asia. There is a sustainability and environmental story here that will appeal to certain niche markets, such as oat milk.

Global supply

Increased global demand for food may make it increasingly expensive for New Zealand to obtain imports of specialist grain based products. For example, milling wheat from Australia will be subject to an increased demand from high population growth along the Australian east coast reducing the supply available for New Zealand. New Zealand may need to become more self-sufficient in these specialty products and milling wheat in particular.

New markets

Food production is becoming a high-technology business and there will be opportunities for New Zealand to take a leadership role. For example, New Zealand is the world leader in endophyte technologies, which currently focus on pest resistance in grasses for animal-friendly production. In the future, focus will move on to new areas such as disease resistance and plant stress reduction. An example of a future opportunity would be putting endophytes into cereal seeds for nematode resistance for the Australian market.

There is the potential for the production and marketing of new crops, such as poppies, that could help the industry reach its targets. Such crops may require policy changes and the need to breed new varieties, requiring scientific input and protection of IP.

Adding value

Crop production may become increasingly specialised to fill higher-value niches whether for animal or human consumption. For example, feed wheat is bred internationally for monogastric animals such as poultry and pigs but fed to multi-stomach ruminant animals such as dairy cattle which have different physiological requirements.

New Zealand needs to maintain world-class competency in plant selection and continue to ensure we can produce high-quality seeds and grains free from contamination. Most arable processors are already highly efficient and have invested significantly in state of the art machinery. Little change is expected in employment for processing and growth is expected to be in service support. Innovation in processing equipment is derived from overseas and local operators then refine to suit New Zealand conditions.

Packaging and logistics

A progressive move to fully processed crop-based products with value added across the whole value chain; and a perception fresh is best for healthy lifestyles. This may increase demand for more highly skilled people.

Supply response

Crop areas will grow in conjunction with the growth in the area of dairy farming with the possibility of 10% of the area of dairy farms in crop for forage and pasture renewal by 2025. The arable industry also expects there to be a 30% increase in crop area. Crop areas will be integrated with livestock systems to make best use of effluent/nutrient flows. These changes will depend on real price increases for plant relative to animal protein.

Regional implications

Crops are now grown across the country. New areas such as Fairlie in South Canterbury, which now grows 10% of New Zealand's wheat from near zero 10 years ago, have taken advantage of cheaper land.

Shifts in production will occur to where high-value crops can be grown. Growth into new areas, such as Hawke's Bay and the Wairarapa will depend on water availability and storage.

There are flow-on effects from the change in land use from sheep and beef to dairy that mean an increased demand for forage and feed grain crops. Canterbury and Southland are prime examples of this. Both regions have a tradition of crop growing that can be built on using new varieties bred specifically for feeding to dairy (ruminant) animals.

On-farm productivity

There have been large increases in crop productivity over the last 15 years with 4% pa growth for wheat and 5% pa growth for ryegrass. This level of increase is unlikely to be sustained indefinitely.

New Zealand is seen as a reliable world leader in temperate seed production, such as vegetable seeds, based on world-leading farming systems. Nearly all cropping farmers' use precision agricultural techniques and this is expected to increase particularly for the application of water where underground trickle systems will increase water use efficiency. Specialist contractors are being increasingly used and in some cases replacing on-farm labour.

Increased specialisation and use of technology will increase the demand for skilled labour, specialised contractors and for more professional support in research and development, manufacture, marketing and servicing of high-tech equipment.

Challenges and risks

The main driver for growth in the industry will be growth in demand, particularly of value-added products.

New Zealand is one of the few countries competitive in herbage seed production.

New business models are needed to take products beyond commodities into branded products with strong supply-chain partners. This will require investment capital and strong leadership that positions the industry closer to the "food story".

There is scope to rebrand cropping as a fundamental component of the food value chain. It may be invisible, but it is the basis for many transformed foods identified to point of origin (for example, New Zealand grown, made in Southland).

To make the most of these opportunities, leadership and entrepreneurial flair will be needed with an understanding of the interconnectedness with other sectors and along all components of the value chain.

The industry faces an ageing workforce so attracting and training of young people is critical. Retention of older highly skilled people who can pass on knowledge is also critical. With little growth in numbers of people available, there will be a need for multi-skilling and skill changes within the workforce particularly in high-tech areas. There are also opportunities for highly specialised technical people who work across regions.

Farm management skills training to plan and implement sophisticated farm systems integrating technology into cropping with livestock and the financial management of this is a basic requirement for a successful farm business.

A key challenge for human capability is that the industry considers that tertiary institutions are not currently placing enough emphasis on arable crops in curriculum as indicated by the recent inability of the industry to find a PhD student to award a post-doc scholarship. This has dangers as there are major shifts occurring in world food demand that will require plant specialists at all levels in New Zealand by 2025.

Forecasts of skill requirements for arable industries

Official employment figures for arable product activities indicate that employment is concentrated in processing activities. Smaller numbers in production partly reflects the relatively low labour requirements for arable farming, but it is also likely numbers are being underestimated as a consequence of Statistics New Zealand's industry classification methods. Considerable amounts of crop growing take place on mixed-use farms. But industry classifications are based on a farm's dominant activity. This means that if sheep, beef or dairy farmers grow crops this activity and associated employment will not be classified as arable production.

Primary industry strategies suggest that prospects for activities associated with arable production are considerably stronger than the business-as-usual forecasts. The 4,600 forecast increase in jobs associated with the arable industry represents a 24% increase between 2012 and 2025. The forecast increase in employment opportunities is generally proportional with current employment patterns. Although this may hold at the high level (for example, between farm, processing, and support activities) the development of new products means there is scope for a different mix of employment within processing.

Service support to the arable sector includes just grain wholesaling and storage activities. The arable industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the arable industry is the consumer of these services. In general, a strong expansion of support services is expected. The increase due to demand from the arable industry may be proportional to the 5.0% pa export earnings growth planned by the arable industry.

Figure 9

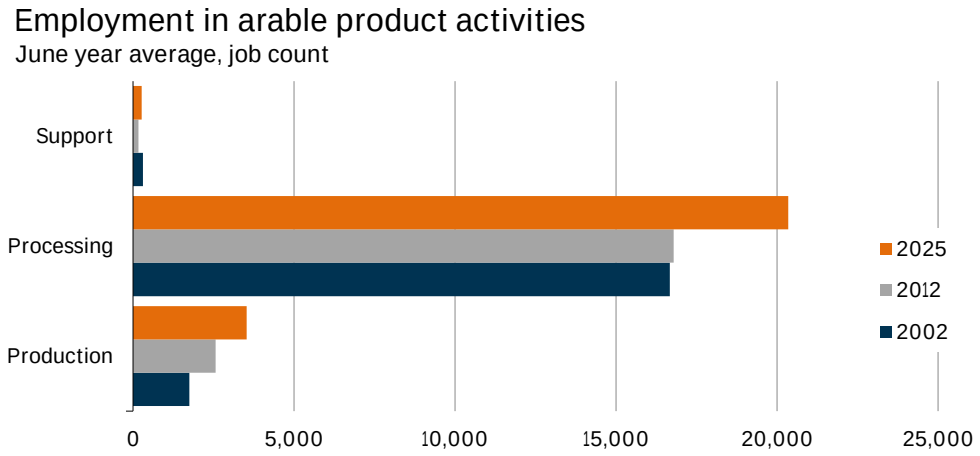


Figure 10

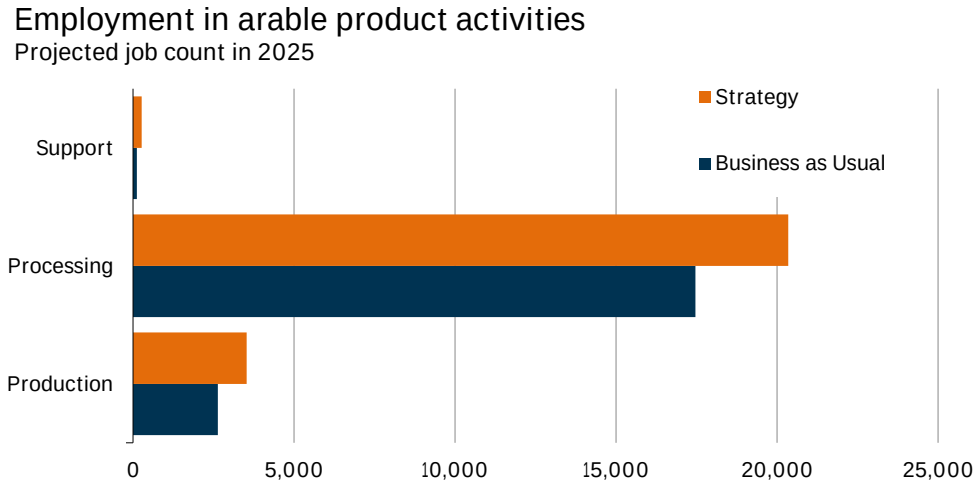


Table 37: Employment in arable sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A014900	Other Grain Growing	1,092	1,186	986	1,322	136	336
A015900	Other Crop Growing n.e.c.	656	1,380	1,648	2,210	830	562
	Total primary production	1,748	2,566	2,634	3,532	966	898
C115000	Oil and Fat Manufacturing	307	345	365	425	80	60
C116100	Grain Mill Product Manufacturing	275	254	165	192	-62	27
C116200	Cereal, Pasta and Baking Mix Manufacturing	571	695	684	797	102	113
C117100	Bread Manufacturing (Factory-based)	3,192	2,401	2,386	2,779	378	393
C117200	Cake and Pastry Manufacturing (Factory-based)	2,034	2,110	1,999	2,328	218	329
C117300	Biscuit Manufacturing (Factory-based)	511	844	1,263	1,471	627	208
C117400	Bakery Product Manufacturing (Non-factory-based)	5,332	6,038	6,238	7,266	1,228	1,028
C118100	Sugar Manufacturing	202	216	213	248	32	35
C118200	Confectionery Manufacturing	1,796	968	1,050	1,223	255	173
C119200	Prepared Animal and Bird Feed Manufacturing	945	1,195	1,474	1,717	522	243
C121200	Beer Manufacturing	841	984	704	820	-164	116
C121300	Spirit Manufacturing	139	435	691	805	370	114
C122000	Cigarette and Tobacco Product Manufacturing	285	162	118	137	-25	19
C133200	Rope, Cordage and Twine Manufacturing	243	146	121	141	-5	20
	Total primary processing	16,673	16,793	17,471	20,350	3,557	2,879
F331200	Cereal Grain Wholesaling	311	170	117	265	95	148
I530100	Grain Storage Services	2	5	4	9	4	5
	Total service support	313	175	121	274	99	153
Grand Total		18,732	19,533	20,222	24,156	4,623	3,934

Table 38: Percentage of employment in arable sub-industries

Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
Other Grain Growing	5.8%	6.1%	4.9%	5.5%	0.8%
Other Crop Growing n.e.c.	3.5%	7.1%	8.1%	9.1%	3.7%
Total primary production	9.3%	13.1%	13.0%	14.6%	2.5%
Oil and Fat Manufacturing	1.6%	1.8%	1.8%	1.8%	1.6%
Grain Mill Product Manufacturing	1.5%	1.3%	0.8%	0.8%	-2.1%
Cereal, Pasta and Baking Mix Manufacturing	3.0%	3.6%	3.4%	3.3%	1.1%
Bread Manufacturing (Factory-based)	17.0%	12.3%	11.8%	11.5%	1.1%
Cake and Pastry Manufacturing (Factory-based)	10.9%	10.8%	9.9%	9.6%	0.8%
Biscuit Manufacturing (Factory-based)	2.7%	4.3%	6.2%	6.1%	4.4%
Bakery Product Manufacturing (Non-factory-based)	28.5%	30.9%	30.8%	30.1%	1.4%
Sugar Manufacturing	1.1%	1.1%	1.1%	1.0%	1.1%
Confectionery Manufacturing	9.6%	5.0%	5.2%	5.1%	1.8%
Prepared Animal and Bird Feed Manufacturing	5.0%	6.1%	7.3%	7.1%	2.8%
Beer Manufacturing	4.5%	5.0%	3.5%	3.4%	-1.4%
Spirit Manufacturing	0.7%	2.2%	3.4%	3.3%	4.8%
Cigarette and Tobacco Product Manufacturing	1.5%	0.8%	0.6%	0.6%	-1.3%
Rope, Cordage and Twine Manufacturing	1.3%	0.7%	0.6%	0.6%	-0.3%
Total primary processing	89.0%	86.0%	86.4%	84.2%	1.5%
Cereal Grain Wholesaling	1.7%	0.9%	0.6%	1.1%	3.5%
Grain Storage Services	0.0%	0.0%	0.0%	0.0%	4.7%
Total service support	1.7%	0.9%	0.6%	1.1%	3.5%

Occupation

In terms of occupations, the expansion in arable industry activities is expected to increase demand most for:

- Support and sales workers (1,000 extra jobs)
- Factory process workers (600)
- Non-farm managers (600)
- Food trade workers (600)

Replacing workers leaving the industry will exacerbate training requirements. For example, a 1,000 net increase in support and sales workers is expected, but to achieve this target accounting for expected net of departures will require attracting 4,400 such workers to the industry.[24].

Other occupations where replacement demand pressures are likely to increase training requirements relative to net employment growth expectations are:

- ICT professionals
- Factory process workers
- Trade workers

Table 39: Employment in arable industries by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	944	982	978	1,302	320	324	756
Other Managers	2,273	2,483	2,630	3,110	627	480	1,829
Design, Engineering, Science and Transport Professionals	183	291	300	362	71	62	231
ICT Professionals	40	61	59	71	10	12	43
Other Professionals	374	504	523	623	119	100	407
Engineering, ICT and Science Technicians	104	172	169	204	32	35	87
Food Trades Workers	2,962	2,906	2,976	3,468	562	492	1,264
Skilled Animal and Horticultural Workers	85	153	171	226	73	55	110
Other Technicians and Trades Workers	307	374	383	462	88	79	333
Miscellaneous Support and Sales Workers	4,575	4,859	4,945	5,845	986	900	4,338
Transport and Plant Operators	1,221	1,512	1,596	1,928	416	332	1,279
Factory Process Workers	3,242	2,802	2,941	3,450	648	509	2,734
Farm, Forestry and Garden Workers	534	613	625	827	214	202	488
Labourers	1,885	1,819	1,921	2,262	443	341	1,268
Total	18,729	19,531	20,217	24,140	4,609	3,923	15,168

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the arable industries' strategy targets. In 2012, 36% of the arable workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 51%. The arable workforce is expected to expand by 4,600 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 5,300. The 5,300 increase in qualified workers projected in the strategy projections is 4,300 more than projected in the business-as-usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

[24] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

On top of this net training requirement, the industry is likely to need to find an additional 15,200 trained workers to replace the natural attrition of workers (ie net replacement demand).

The demand for occupations implies that the qualifications most in demand will be in:

- Engineering and construction
- Management and commerce.

Table 40: Employment in arable industries by field of study

			2025			
Field of Study	2002	2012	Business as Usual	Strategy	Growth	Gap
No Qualification	12,674	12,465	12,197	11,865	-599	-332
1 Natural and Physical Sciences	191	258	272	402	144	130
2 Information Technology	106	137	169	254	117	85
3 Engineering and Related Technologies	879	1,065	1,206	1,802	737	596
4 Architecture and Building	184	239	266	433	194	167
5 Agriculture, Environmental and Related Studies	200	271	311	576	305	265
6 Health	134	169	189	315	146	126
7 Education	143	170	189	308	138	119
8 Management and Commerce	1,035	1,171	1,326	1,973	801	646
9 Society and Culture	307	392	455	692	300	236
10 Creative Arts	129	171	194	296	125	102
11 Food, Hospitality and Personal Services	954	1,026	1,165	1,761	735	596
Not Defined	1,798	2,001	2,286	3,479	1,477	1,193
Total primary industry employment	18,734	19,534	20,226	24,156	4,622	3,930

Regional

The region where the largest increase in arable employment is expected is Auckland where an additional 1,100 arable jobs are expected by 2025. With 32% of the industry's employment Auckland is expected to continue to have the highest proportion of arable employment in 2025. The region where the arable industry will be of most relative importance is Canterbury, which is expected to employ 21% of arable workers in 2025, but just 13% of national employment.

Table 41: Employment in arable industries by region

			2025			
Region	2002	2012	Business as Usual	Strategy	Growth	Gap
Northland	351	301	371	435	135	64
Auckland	5,655	6,585	6,577	7,687	1,102	1,109
Waikato	1,160	1,399	1,602	1,983	584	382
Bay of Plenty	1,091	1,110	1,131	1,326	216	195
Gisborne	241	216	212	252	36	40
Hawke's Bay	581	526	625	740	214	115
Taranaki	448	553	610	740	186	130
Manawatu-Wanganui	1,052	1,085	1,035	1,237	152	202
Wellington	1,797	1,505	1,530	1,789	284	259
West Coast	118	109	138	164	55	27
Canterbury	3,877	4,130	4,098	5,027	897	930
Otago	1,423	1,037	1,166	1,397	360	231
Southland	304	341	393	491	150	98
Tasman	202	164	241	296	132	55
Nelson	225	204	203	237	34	34
Marlborough	210	269	294	352	84	58
New Zealand	18,734	19,534	20,226	24,156	4,622	3,930

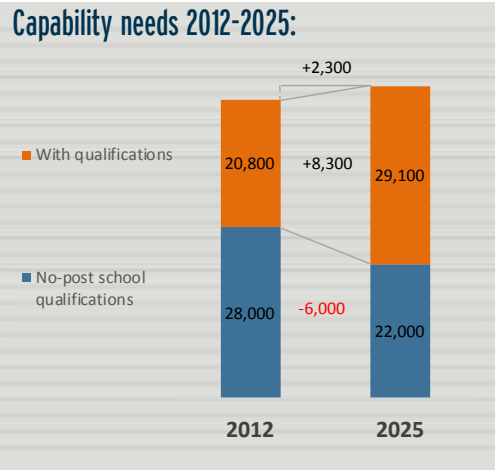
Table 42: Expected regional allocation of arable employment in 2025

Region	Arable	All primary	All industry
Northland	1.8%	5.8%	2.9%
Auckland	31.8%	22.7%	34.3%
Waikato	8.2%	10.5%	8.4%
Bay of Plenty	5.5%	7.0%	5.8%
Gisborne	1.0%	1.6%	0.9%
Hawke's Bay	3.1%	6.1%	3.5%
Taranaki	3.1%	3.2%	2.5%
Manawatu-Wanganui	5.1%	5.9%	4.6%
Wellington	7.4%	6.3%	12.0%
West Coast	0.7%	1.1%	0.8%
Canterbury	20.8%	13.9%	13.2%
Otago	5.8%	5.1%	5.3%
Southland	2.0%	4.2%	2.2%
Tasman	1.2%	2.2%	1.0%
Nelson	1.0%	1.4%	1.4%
Marlborough	1.5%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

6. DAIRY

Capability Needs: Dairy

Capability needs 2012-2025:



Dairy will need:

* a net increase of 2,300 workers
* 8,300 more workers with qualifications
* 6,000 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 25,700 to replace the natural attrition of workers within the industry

New dairy workers will primarily:

* be in on-farm, transport, sales and marketing, factory worker, and management occupations
* have trained in agriculture, business, and engineering fields of study
* seek jobs in Northland, Canterbury, Southland, and Otago

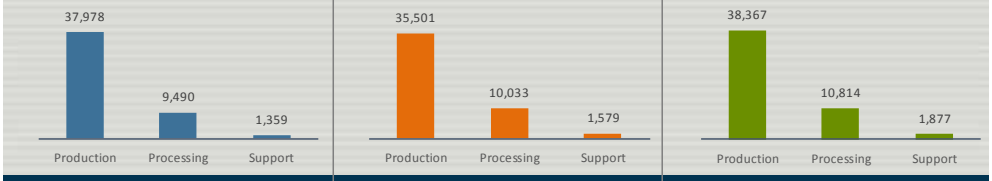
But be less likely to be employed in:

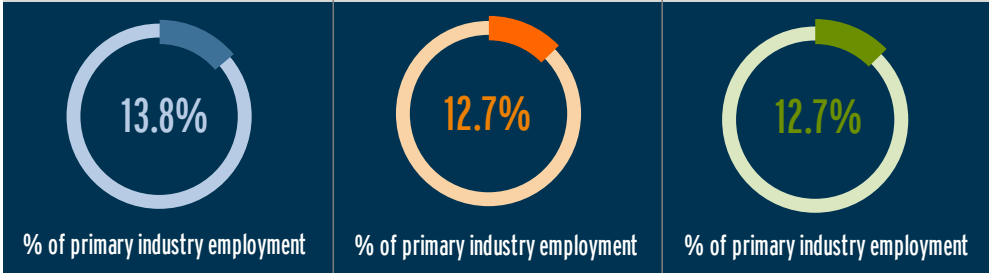
* Waikato, Taranaki, and Bay of Plenty

Success will require more skills in:

* Market development (consumer branding, product innovation and exploiting emerging markets)
* Business skills (risk management, food safety, quality assurance systems, process engineering)
* Production skills (whole farm systems, resource management; staff management)
* Science & technical support (increasing resource use efficiency, reducing environment impact)

2012	business as usual	strategy
48,827 filled jobs	47,113 filled jobs	51,058 filled jobs
industry 2012	business as usual 2025	strategy 2025





This fact sheet should be read in conjunction with the service sector fact sheet as some support servicescross over a wide range of primary sectors and can't directly be attributed to one sector.

The dairy industry has experienced strong growth in value and volume in the past decade. The value of exports in 2012 was $13.66b[25], an increase of 6.2% compound pa (CAGR) from 2002. By 2025, industry expects export value to increase to $27.4b[26], an increase of 5.5% CAGR through volume and value growth. Milk production is expected to grow to 2.4b kg MS, an increase of 2.7% CAGR (vs 3.9% CAGR between 2002 and 2012[27]). Average export value rises to $12 per kg MS, an increase of 2.7% CAGR.

The drivers of change towards 2025 are:

- Growing global demand for dairy from Asia, Middle East and North Africa.
- Constraints to milk production growth in New Zealand, including resource constraints and capital.

This implies the need for:

- Maximising value of New Zealand milk.
- Sustainable solutions for production growth.

For human capability, there will be greater demands for:

- Consumer branding, food/nutrition science, process engineering, risk management, food safety and quality assurance systems.
- Food service marketing and product innovation and cultural/language skills to address barriers to doing business in emerging markets.
- Accredited rural professionals/providers and workforce skills on nutrient/ effluent/ irrigation management, animal nutrition and welfare assessment and off-pasture systems, along with research on resource use efficiency, reducing environment effects and agriculture resource economics.
- Improved management skill to manage a diverse workforce.
- More formalised career roles and formal qualifications and competencies including: whole-farm systems, information management, resource use, financial efficiency, and managing staff.

Challenges and risks

Challenges for the dairy industry include risks to global cost competitiveness, growing competition for water along with higher drought probability on eastern dairy regions, increasing pressure on social licence (such as environmental, soil health, health and safety) including compliance costs, product integrity, loss of growth momentum and underlying investment confidence and ability to access capital, success in emerging markets and importance of higher value per kg MS.

Market growth

Global dairy demand is expected to grow by 100b litres (8.5b kg MS) by 2020 with China and India as significant export market opportunities[28]. The industry will grow consumer-branded nutrition by leveraging the leadership position in Australia and New Zealand into emerging markets (new/underpenetrated Asia, China, Latin

[25] Making dairy farming work for everyone– a strategy for sustainable dairy farming 2013 – 2020, Background supplement (DairyNZ 2013); same figures in Primary industries production and trade June quarter 2012 (MPI, 2012); $13.44b for year ending June 2013.
[26] Making dairy farming work for everyone - a strategy for sustainable dairy farming 2013 – 2020, Background supplement (DairyNZ 2013).
[27] 2012 was a favourable production season.
[28] Fonterra Strategy Refresh 2012.

America, Middle East/North Africa (MENA)). There is opportunity in growing ageing/bone health and paediatric/maternal nutrition markets in Southeast Asia and China. There is potential to grow the food service market (higher-margin products to chefs and solutions for commercial kitchens in quick-service) in China, Southeast Asia and Latin America.

Market growth will require consumer branding and nutrition expertise, food service marketing and product innovation and cultural/language skills to address barriers to doing business in emerging markets.

There is the opportunity to expand production in other countries. This will require people who have the technical knowledge and the adaptability (including language and cultural adaptability) to apply their skills in different countries and environments.

Adding value

Increasing the average value per kg MS by 41% to 2025 requires product development and innovation, including for niche markets, such as for ageing/mobility and paediatric/maternal nutrition markets.

Assurance levels of New Zealand's biosecurity and product integrity need to be enhanced. This will require partnership with government and animal industries for biosecurity issues (for example, foot-and-mouth disease) and industry initiatives on milk quality, environmental management and animal welfare.

Increasing value add will require skills in risk management, food/nutrition science, process engineering and product development while dairy product assurance will require skills in food safety and quality assurance systems and traceability including biosecurity, animal welfare and environmental management.

Supply response

Dairy farming area reached 1.64m hectares in 2012, an increase of 1.6% CAGR since 2002. Land-use modelling indicates that the dairy farming land area is expected to reach 1.85m hectares by 2025 (0.9% CAGR). Cow numbers of 4.63m cows in 2012 (an increase of 2.3% CAGR since 2002) is expected to rise to 5.55m cows by 2025 (1.4% CAGR).

Herd sizes will continue to increase with higher number of cows per herd and more labour per farm but more cows per labour unit. With larger herd size, there will be growing environmental (such as water, soil, GHG, animal health, nutrition and welfare) and social (such as world-class work environment, communities) responsibility for dairy farming leading to higher compliance costs.

There also is expected to be greater reliance on rural service (such as stock feed, fencing, effluent and irrigation) and product (such as rural suppliers) providers and advisors. These will require accredited rural professionals/contractors and farm workforce skills in nutrient/effluent/irrigation management, animal nutrition and welfare assessment and 'off-pasture' systems. Generic work skills, such as the ability to interact and communicate with people, along with the ability to take initiative and responsibility will also be important. Researchers will need to undertake research on farm systems, resource use efficiency and environment effects (including GHG emissions) and economics.

Regional implications

Growth in production area will occur in east coast regions of both islands particularly in the South Island (Canterbury and Southland) and also Hawke's Bay

and Wairarapa supported by greater irrigation infrastructure investments and a range of wintering systems. This growth will often be through larger farms. Differing and sometimes conflicting environmental regulatory frameworks among regions present a challenge to dairy farming.

The wider adoption of nutrient limits by regional councils should result in a greater consistency. This will require specialist training of rural professionals in nutrient planning and management. The migration to cities is expected to continue, which will affect the availability of local labour supply and skills in rural areas.

Farm productivity

As production expands, dairy farming needs to remain globally competitive amidst rising farm and compliance costs. Nutrient limits are likely to see an increased demand for off-pasture arrangements for cows during cold wet times. This requires greater efficiency to increase farm profit, varying ownership structures (single operators vs corporate). There is also a trend towards formal management, more automation, mechanisation and data-rich operation (for example, cup removers, irrigation, real-time monitoring), coordinated research and development investment and extension for innovative technologies and solutions for future dairy farms, and industry systems and structures to serve needs of dairy farmers. This implies need for improved management skill to manage a diverse workforce. There will be more formalised career roles (for example, farm manager, herd manager) with formal qualifications. Increased competencies will be required on whole-farm systems and information management, resource use and financial efficiency. Specialist roles will be needed for evaluating systems, industry-good databases, data exchange and exploiting a data-rich environment.

Forecasts of skill requirements for dairy industries

Farming is the main component of dairy production with farming representing 78% of dairy industry employment in 2012. A further 19% of employment was involved in dairy processing activities, with wholesaling activities making up the remaining 3% of employment. These figures do not account for numerous other support services which cannot be easily attributed to individual product types (for example, research, veterinary services). There have been considerable efficiency gains in dairy farm production techniques in recent years, resulting in a 2,000 decline in dairy farmer numbers in the 10 years to 2012. The business-as-usual projections predict a continuation of this trend.

Land-use projections by Motu indicate that after a 37% (500,000 ha) expansion in dairy farm land between 2002 and 2012, land devoted to dairy farming is expected to remain largely static at around 1.9m ha during the period to 2025. On-farm work numbers are projected to remain close to current levels around 38,000.

Processing numbers increased strongly over the past decade, with the 2,000 increase in numbers representing a 33% increase. A further 1,300 increase in processing employment numbers is predicted in the 13 years from 2012 to 2025. The largest proportion increase in employment numbers are expected in cheese and other dairy product manufacturing, which represent over half of the 2,200 employment increase expected for the entire dairy industry.

Note service support includes just wholesaling activities. The dairy industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the dairy industry is the consumer of these services. In general a strong expansion of support services is expected. The increase due to demand

from the dairy industry may be proportional to the 5.5% pa export earnings growth forecast by the dairy industry.

Figure 11

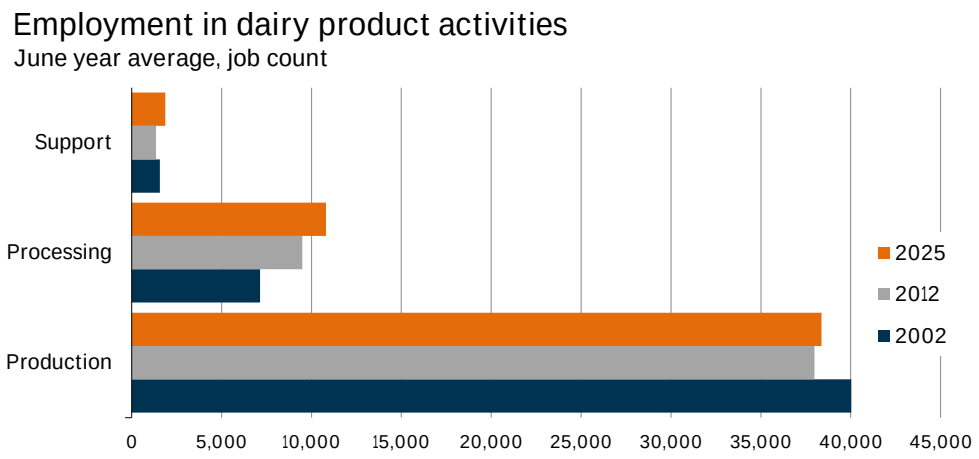


Figure 12

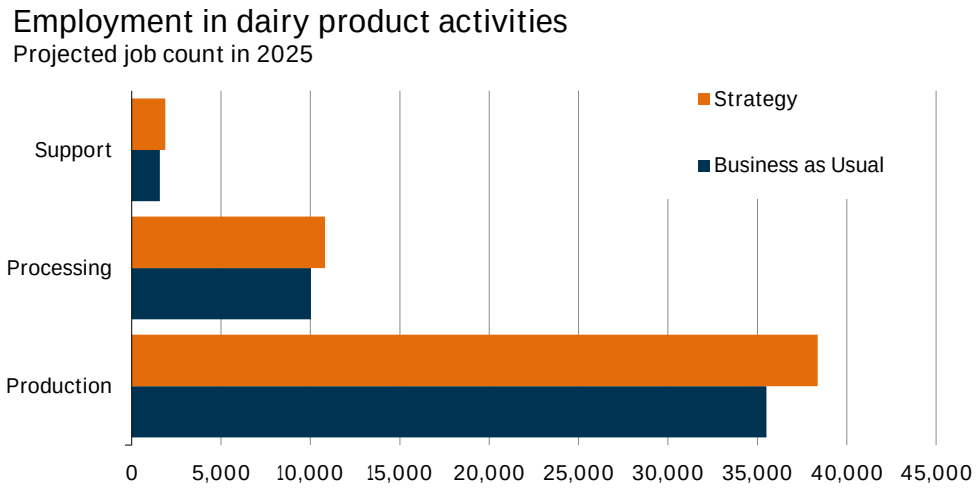


Table 43: Employment in dairy sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A016000	Dairy Cattle Farming	40,025	37,978	35,501	38,367	389	2,866
	Total primary production	40,025	37,978	35,501	38,367	389	2,866
C113100	Milk and Cream Processing	704	820	793	855	35	62
C113200	Ice Cream Manufacturing	470	556	634	683	127	49
C113300	Cheese and Other Dairy Product Manufacturing	5,965	8,114	8,606	9,276	1,162	670
	Total primary processing	7,139	9,490	10,033	10,814	1,324	781
F360300	Dairy Produce Wholesaling	1,566	1,359	1,579	1,877	518	298
	Total service support	1,566	1,359	1,579	1,877	518	298
Grand Total		48,728	48,827	47,113	51,058	2,231	3,945

Table 44: Percentage of employment in dairy sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
A016000	Dairy Cattle Farming	82.1%	77.8%	75.4%	75.1%	0.1%
	Total primary production	82.1%	77.8%	75.4%	75.1%	0.1%
C113100	Milk and Cream Processing	1.4%	1.7%	1.7%	1.7%	0.3%
C113200	Ice Cream Manufacturing	1.0%	1.1%	1.3%	1.3%	1.6%
C113300	Cheese and Other Dairy Product Manufacturing	12.2%	16.6%	18.3%	18.2%	1.0%
	Total primary processing	14.7%	19.4%	21.3%	21.2%	1.0%
F360300	Dairy Produce Wholesaling	3.2%	2.8%	3.4%	3.7%	2.5%
	Total service support	3.2%	2.8%	3.4%	3.7%	2.5%

Occupation

In terms of occupation, some points of interest include:

- While the number of dairy farmers and farm managers are only expected to increase by 1%, the number of non-farm managers is expected to increase by 15%, indicating a continued trend towards corporatisation of dairy farm operations.
- Sales are expected to be the fastest growing occupations for dairy, with sales jobs increasing by more than 20% by 2025.
- Although the net increase in dairy farmers and farm managers is relatively small, the high turnover on dairy farms means that it has a high net-replacement demand so that the industry will need to train an additional 12,000 dairy farmers and farm managers to achieve a net increase of 300 dairy farmers and farm managers by 2025[29].
- The other pressure areas with high net-replacement demand are with farm workers and factory process workers.
- Representatives from the industry report a need to lift the overall skill level, both for those entering the industry and those already in the industry

[29] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

Table 45: Employment in dairy by occupation

Occupations	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	29,060	26,579	24,889	26,902	323	2,013	12,117
Other Managers	1,549	1,811	1,859	2,039	228	180	1,138
Design, Engineering, Science and Transport Professionals	236	492	513	553	61	40	332
ICT Professionals	175	141	151	166	25	15	101
Other Professionals	568	721	738	805	84	67	520
Engineering, ICT and Science Technicians	567	918	959	1,039	121	80	415
Food Trades Workers	29	52	53	59	7	6	20
Skilled Animal and Horticultural Workers	108	115	109	119	4	10	32
Other Technicians and Trades Workers	467	777	815	886	109	71	623
Miscellaneous Support and Sales Workers	2,352	2,326	2,392	2,643	317	251	1,728
Transport and Plant Operators	1,809	2,553	2,656	2,888	335	232	1,808
Factory Process Workers	2,332	2,194	2,319	2,512	318	193	1,951
Farm, Forestry and Garden Workers	8,699	8,490	7,957	8,600	110	643	3,910
Labourers	778	1,649	1,705	1,847	198	142	977
Total	48,729	48,818	47,115	51,058	2,240	3,943	25,671

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the dairy industry's strategy targets. In 2012, 43% of the dairy workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 57%. The dairy workforce is expected to expand by 2,300 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 8,300. The 8,300 increase in qualified workers projected in the strategy projections is 5,900 more than projected in the business-as-usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

On top of this net-training requirement, the industry is likely to need to find an additional 25,700 trained workers to replace the natural attrition of workers (ie net replacement demand).

The demand for occupations implies that the qualifications most in demand will be in:

- Agriculture, environment and related studies
- Engineering and construction
- Management and commerce.

Table 46: Employment in dairy industries by field of study

			2025			
Field of Study	2002	2012	Business as Usual	Strategy	Growth	Gap
No Qualification	31,684	28,023	23,889	21,966	-6,057	-1,924
1 Natural and Physical Sciences	564	873	1,084	1,288	415	204
2 Information Technology	146	164	222	274	109	52
3 Engineering and Related Technologies	2,515	3,421	4,101	5,062	1,641	961
4 Architecture and Building	695	860	973	1,224	365	251
5 Agriculture, Environmental and Related Studies	4,115	4,671	4,772	6,080	1,409	1,308
6 Health	842	1,016	1,064	1,352	336	289
7 Education	646	770	808	1,022	252	214
8 Management and Commerce	2,594	2,960	3,299	4,101	1,141	802
9 Society and Culture	561	732	843	1,065	333	222
10 Creative Arts	89	118	141	193	76	52
11 Food, Hospitality and Personal Services	570	665	748	967	302	219
Not Defined	3,709	4,554	5,168	6,464	1,910	1,296
Total primary industry employment	48,730	48,827	47,113	51,058	2,231	3,945

Regional

As we have noted in other sections, the results of some of the regional employment projections appear quite extreme and the dairy industry is a prime example of this. Although the directions of change projected appear plausible, the magnitudes often seem quite extreme. For example, it seems quite plausible for productivity gains to reduce employment prospects in established dairy regions, such as Taranaki and the Waikato, but the forecast declines look excessive. Similarly, we would expect an expansion of employment opportunities in developing dairy areas such as Canterbury, but some of forecast increases, particularly for Northland, seem very large.

Table 47: Employment in dairy industries by region

			2025			
Region	2002	2012	Business as Usual	Strategy	Growth	Gap
Northland	4,059	3,099	6,019	6,505	3,406	485
Auckland	2,442	2,772	2,424	2,672	-100	248
Waikato	14,729	13,800	9,504	10,310	-3,489	807
Bay of Plenty	3,964	3,567	2,859	3,091	-476	232
Gisborne	132	78	73	79	0	6
Hawke's Bay	352	437	533	577	140	43
Taranaki	7,478	5,119	3,091	3,341	-1,778	250
Manawatu-Wanganui	3,764	3,696	3,302	3,570	-126	269
Wellington	1,733	1,101	657	721	-380	64
West Coast	1,255	1,511	1,543	1,667	156	124
Canterbury	3,783	6,687	8,762	9,501	2,814	740
Otago	1,625	2,229	2,723	2,944	715	221
Southland	2,240	3,844	4,851	5,241	1,397	390
Tasman	738	602	622	674	72	52
Nelson	100	63	42	47	-17	4
Marlborough	335	220	107	118	-102	11
New Zealand	48,730	48,827	47,113	51,058	2,231	3,945

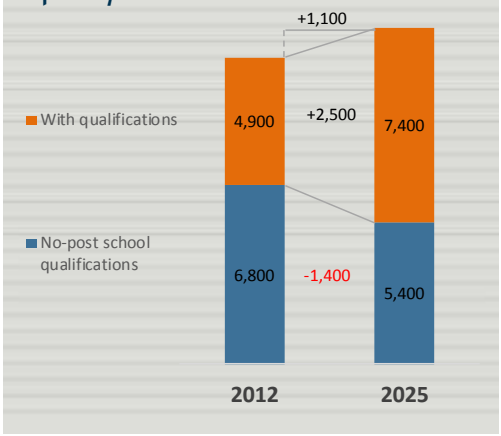
Table 48: Expected regional allocation of dairy employment in 2025

Region	Dairy	All primary	All industry
Northland	12.7%	5.8%	2.9%
Auckland	5.2%	22.7%	34.3%
Waikato	20.2%	10.5%	8.4%
Bay of Plenty	6.1%	7.0%	5.8%
Gisborne	0.2%	1.6%	0.9%
Hawke's Bay	1.1%	6.1%	3.5%
Taranaki	6.5%	3.2%	2.5%
Manawatu-Wanganui	7.0%	5.9%	4.6%
Wellington	1.4%	6.3%	12.0%
West Coast	3.3%	1.1%	0.8%
Canterbury	18.6%	13.9%	13.2%
Otago	5.8%	5.1%	5.3%
Southland	10.3%	4.2%	2.2%
Tasman	1.3%	2.2%	1.0%
Nelson	0.1%	1.4%	1.4%
Marlborough	0.2%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

7. SEAFOOD

Capability Needs: Seafood

Capability needs 2012-2025:



Seafood will need:

* a net increase of 1,100 workers
* 2,500 more workers with qualifications
* 1,400 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 7,200 to replace the natural attrition of workers within the industry

New seafood workers will primarily:

* be in labouring, sales and marketing, and management occupations
* have trained in engineering and business fields of study
* seek jobs in Northland, Nelson, the Bay of Plenty, and Tasman

But be less likely to be employed in:

* Canterbury, Auckland or Marlborough

Success will require more skills in:

* Market development (export marketing)
* Business skills (supply chain management, commercialise higher value products, social licence)
* Production skills (sustainable fishing, specification assurance, precision harvesting)
* Science & technical support (improved farm management, precision harvesting, offshore aquaculture sites)

2012	business as usual	strategy
11,710 filled jobs	9,142 filled jobs	12,781 filled jobs
industry 2012	business as usual 2025	strategy 2025
3,806 / 4,865 / 3,039	3,267 / 2,819 / 3,056	4,800 / 4,666 / 3,315
Production / Processing / Support	Production / Processing / Support	Production / Processing / Support
3.3%	2.5%	3.2%
% of primary industry employment	% of primary industry employment	% of primary industry employment

This fact sheet should be read in conjunction with the service sector fact sheet as some support services cross over a wide range of primary sectors and can't directly be attributed to one sector.

The total value of exports in 2012 was $1.5b[30], an increase of 0.1% compound pa (CAGR) from 2002[31]. The seafood industry is currently dominated by wild caught fisheries with aquaculture a significantly smaller sector. The seafood industry expects total seafood exports to reach $2.3b[32] by 2025, an increase of 3.3% CAGR (wild fisheries $1.6b; 2% CAGR and aquaculture $0.8b; 9.1% CAGR).

The drivers of change towards 2025 include:

- Extracting higher value from limited wild fisheries production.
- A growing share of aquaculture in global seafood supply.

This has implications for:

- Access to traditional markets with sustainable assurance systems.
- Precision harvesting and packaging innovation to cater to live or fresh chilled markets in seafood consuming markets in Asia and emerging economies.
- Higher productivity, new species, and increased area for aquaculture.
- Development of higher-value nutraceutical, pharmaceutical and nanofibre products.

For human capability, there will be greater demands for:

- Export marketing, supply chain and channel management expertise.
- Sustainable fishing (social licence expertise) and specification assurance systems expertise.
- Expertise in research and development and commercialisation for precision harvesting, health claims, and higher-value products.
- Research and extension expertise in improved farm management and specialists in developing offshore sites.

Challenges and risks

The challenges for the seafood sector include regulatory and social licence risks for catch and farming space, commercial success of new species, new spaces and higher-value products and enhanced in-market position. Social licence capability has impact on production (such as access to wild fish and farming space), productivity (such as allowable catch methods) and value (such as market demand influenced by perceived environmental impacts).

Market growth

The United Nations Food and Agriculture Organisation (UN FAO) expects farmed seafood to grow to the point that it contributes over half of global seafood by 2022. New Zealand exports are roughly split between traditional western markets and growing Asian markets. Access to traditional markets (Australia, US, EU) increasingly relies on assurances that product is sourced from sustainable fisheries with third-party certification acceptable to major customers. Rising middle classes in seafood consuming markets in developing Asia and other emerging economies

[30] Primary industries production and trade December quarter 2012 (MPI, 2012); $1.465b for year ending June 2013.
[31] 2002 exports $1.48b (source: Coriolis/MAF/MFish from Food and Beverage Information Project 2011: Depth Sector Stream – Seafood (Coriolis, 2011)); Exports dropped substantially in 2003 to $1.17b, reduction was primarily in wild capture fisheries. CAGR from 2003 to 2012 is 2.8%.
[32] Personal communication Alastair Macfarlane (Seafood NZ) and Gary Hooper (Aquaculture NZ), 3 December 2013; $200m of exports in 2012 were further processed overseas and imported back to NZ; Domestic market $225m in 2012 and $400m in 2025.

provide new (and premium) markets for wild fisheries. The Australian market is a strong strategic focus for aquaculture with US, Korea, Japan and China as secondary markets.

In-market joint ventures are required to achieve efficiencies in coordinated promotion and developing the New Zealand seafood story, and integrating fragmented eco-credentials into a succinct and compelling proposition. This requires export marketing (including language and cultural skills), branding, supply chain, and channel management skills to extract greater market values.

Market preferences

Asian markets have a strong preference for fresh fish, which means fresh chilled from New Zealand along a fully functioning cool chain. Frozen and processed seafood products are well down the value proposition, but can contribute to margins by using low-value species and otherwise waste streams.

Adding value

With sustainability constraints on wild fisheries, access to premium markets requires certification of provenance and sustainability assurance systems. In aquaculture, the sector aims to define market-driven specification demands (for example, size, colour, type of processing). Ecological footprints need to be understood, quantified, managed and verifiable. These will require skills in sustainable fishing (for example, social license expertise) and specification assurance systems.

With higher value for fresh seafood, precision seafood harvesting and wild capture live holding have potential for live harvest and export of deep-sea fish with improved fish quality. Rising labour costs in China would likely erode competitiveness of China-based processing to support on-shore processing.

Waste and low-value fish parts have potential to be developed into higher-value nutraceutical, pharmaceutical and nanofibre products. There is also long-term potential in algal bioactives.

Aquaculture processing is expected to become increasingly automated such as mussel opening machines thereby decreasing need for labour-intensive processing, but increasing the demand for process workers skilled in plant operation. The seafood industry will require workers with science, technology and business expertise in order to expand precision harvesting, develop new products and enhance their commercial value.

Packaging and logistics

New packaging technologies, such as modified atmosphere packaging for shellfish, would enable sea freight transport of fresh seafood for proximate markets, particularly Australia, Singapore and other direct access ports. This requires science skills and innovation in packaging technology.

Supply response

Wild fisheries supply is managed by Total Allowable Commercial Catch (TACC) within the Quota Management System (QMS) for 636 fished species. The TACC is significantly under-caught with total TACC for all species in 2012 of 631,791 tonnes while total catch reached 446,945 tonnes only. A significant proposition of the under catch is due to some species (such as squid) having wide fluctuations in annual abundance. A growing aquaculture sector needs research, development and commercialisation of new finfish (kingfish and hāpuku) and high-value shellfish (flat

oysters and pāua). Updated growth forecasts prepared by Ernst & Young indicate aquaculture area is expected to grow to 6,800 hectares, an increase of 2.4% CAGR on a business-as-usual scenario (from 5,005 ha in 2012). Under a favourable growth scenario of new space being available for mussel farming (by converting spat catching to grow-out space and proactive planning to establish new farming zones) and commercialisation of new finfish species (kingfish and hāpuku), aquaculture area could grow to 8,500 hectares by 2025, an increase of 4.2% CAGR.

Regional implications

Growth in aquaculture in the immediate future is likely to be focused on existing growing areas (Northland, Auckland, Waikato, Marlborough, Tasman and Southland), though more pronounced in Auckland/Waikato and Tasman. The Bay of Plenty, Hawke's Bay and Canterbury present longer-term growth prospects if offshore farming technologies can be proven.

Farm productivity

For oyster farming productivity, gains could come from improved husbandry, managing young mortality and shift from stick to basket. Development of hatchery spat for mussels will drive increased yield from existing space. Productivity between grow-out sites varies significantly from location to location while exposed offshore sites are unproven and therefore involve considerable risk. There is a need for research and extension in improved farm management and specialists in developing offshore sites.

Forecasts of skill requirements for seafood industries

Employment in seafood related activities have been in decline over the past decade. The implementation of the industries' strategies is expected to leave employment numbers more or less at 2012 levels. The projections below are distorted by the impact of new regulations that will require ships fishing New Zealand quota to be flagged in New Zealand. The projections presented here incorporate a regulatory change that effectively transforms overseas jobs into New Zealand jobs, irrespective of whether there are any physical changes to the fleet fishing New Zealand waters.[33] Taking this impact out implies that fishing employment numbers are expected to remain reasonably static, with a slight change in emphasis from wild catch to aquaculture activities.

Note service support includes just boat repair and seafood wholesaling activities. The seafood industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the seafood industry is the consumer of these services. In general, a strong expansion of support services is expected. The increase due to demand from the seafood industry may be proportional to the 3.3% pa export earnings growth forecast by the seafood industry.

[33] Based on advice received from the New Zealand Seafood Industry.

Figure 13

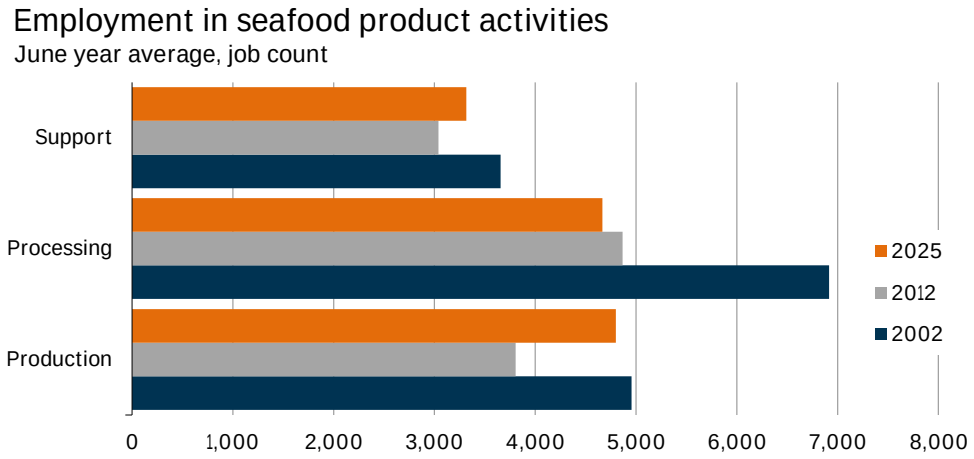


Figure 14

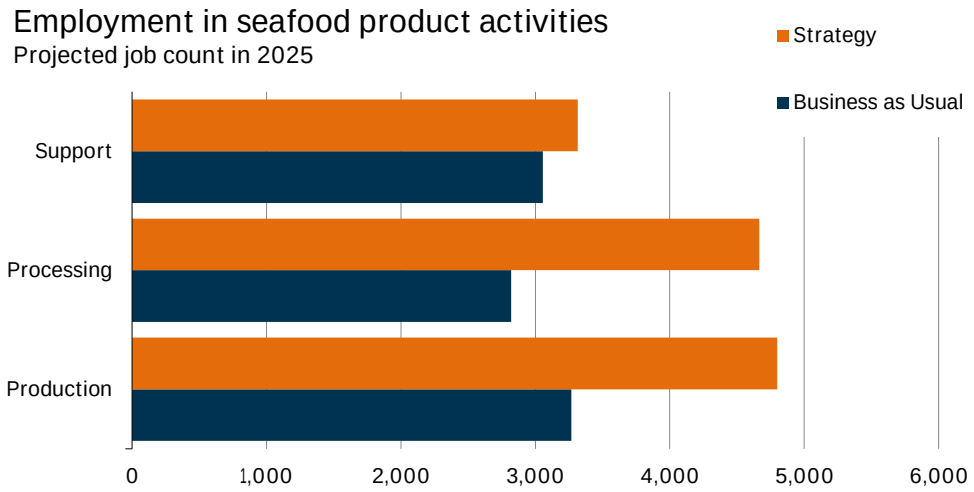


Table 49: Employment in seafood sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A020100	Longline and Rack (Offshore) Aquaculture	631	421	481	537	116	56
A020200	Caged (Offshore) Aquaculture	133	96	60	217	121	157
A020300	Onshore Aquaculture	219	206	275	307	101	32
A041100	Rock Lobster and Crab Potting	529	426	297	332	-94	35
A041200	Prawn Fishing		2			-2	
A041300	Line Fishing	986	686	623	696	10	73
A041400	Fish Trawling, Seining and Netting	2,237	1,524	1,083	2,210	686	1,127
A041900	Other Fishing	220	445	448	501	56	53
	Total primary production	4,955	3,806	3,267	4,800	994	1,533
C112000	Seafood Processing	6,914	4,865	2,819	4,666	-199	1,847
	Total primary processing	6,914	4,865	2,819	4,666	-199	1,847
C239100	Shipbuilding and Repair Services	473	409	389	422	13	33
C239200	Boatbuilding and Repair Services	2,517	1,869	1,798	1,950	81	152
F360400	Fish and Seafood Wholesaling	666	761	869	943	182	74
	Total service support	3,656	3,039	3,056	3,315	276	259
Grand Total		15,522	11,708	9,141	12,781	1,073	3,640

Table 50: Percentage of employment in seafood sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy
A020100	Longline and Rack (Offshore) Aquaculture	4.1%	3.6%	5.3%	4.2%
A020200	Caged (Offshore) Aquaculture	0.9%	0.8%	0.7%	1.7%
A020300	Onshore Aquaculture	1.4%	1.8%	3.0%	2.4%
A041100	Rock Lobster and Crab Potting	3.4%	3.6%	3.2%	2.6%
A041200	Prawn Fishing		0.0%		
A041300	Line Fishing	6.4%	5.9%	6.8%	5.4%
A041400	Fish Trawling, Seining and Netting	14.4%	13.0%	11.8%	17.3%
A041900	Other Fishing	1.4%	3.8%	4.9%	3.9%
	Total primary production	31.9%	32.5%	35.7%	37.6%
C112000	Seafood Processing	44.5%	41.6%	30.8%	36.5%
	Total primary processing	44.5%	41.6%	30.8%	36.5%
C239100	Shipbuilding and Repair Services	3.0%	3.5%	4.3%	3.3%
C239200	Boatbuilding and Repair Services	16.2%	16.0%	19.7%	15.3%
F360400	Fish and Seafood Wholesaling	4.3%	6.5%	9.5%	7.4%
	Total service support	23.6%	26.0%	33.4%	25.9%
Grand Total		100.0%	100.0%	100.0%	100.0%

Occupation

In terms of occupations, the expansion in seafood industry activities is expected to increase demand most for:

- Labourers (300 extra jobs)
- Farmers and farm managers, and other managers (300)
- Support and sales workers (150)

Replacing workers leaving the industry will exacerbate training requirements. For example, a 61 net increase in factory process workers is expected, but to achieve this target accounting for expected net of departures will require attracting 1,100 such workers to the industry[34].

Other occupations where replacement demand pressures are likely to increase training requirements relative to net employment growth expectations are:

- ICT professionals
- Technicians
- Transport and plant operators
- Trade workers

Table 51: Employment in seafood product industries by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	688	504	454	625	121	171	345
Other Managers	1,533	1,400	1,141	1,563	163	422	890
Design, Engineering, Science and Transport Professionals	958	704	584	811	107	227	495
ICT Professionals	39	61	43	60	-1	17	32
Other Professionals	280	343	266	365	22	99	222
Engineering, ICT and Science Technicians	135	127	96	132	5	36	46
Food Trades Workers	95	71	55	78	7	23	24
Skilled Animal and Horticultural Workers	15	44	30	52	8	22	19
Other Technicians and Trades Workers	1,999	1,479	1,385	1,549	70	164	681
Miscellaneous Support and Sales Workers	1,716	1,449	1,162	1,596	147	434	990
Transport and Plant Operators	763	625	460	662	37	202	397
Factory Process Workers	3,337	1,424	935	1,485	61	550	1,121
Farm, Forestry and Garden Workers	224	240	199	267	27	68	134
Labourers	3,732	3,230	2,316	3,539	309	1,223	1,773
Total	15,514	11,701	9,126	12,784	1,083	3,658	7,168

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the seafood industries' strategy targets. In 2012, 42% of the seafood workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 57%. The seafood workforce is expected to expand by 1,100 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 2,500. The 2,500 increase in qualified workers projected in the strategy projections is 2,400 more than projected in the business-as-usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

[34] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

On top of this net training requirement, the industry is likely to need to find an additional 7,200 trained workers to replace the natural attrition of workers (ie net replacement demand).

The demand for occupations implies that the qualifications most in demand will be in the engineering and construction field of study.

Table 52: Employment in seafood product industries by field of study

			2025			
			Business			
Field of Study	2002	2012	as Usual	Strategy	Growth	Gap
No Qualification	9,775	6,768	4,196	5,444	-1,324	1,248
1 Natural and Physical Sciences	102	91	93	145	55	52
2 Information Technology	65	65	74	93	29	19
3 Engineering and Related Technologies	2,068	1,710	1,633	2,476	766	842
4 Architecture and Building	337	275	259	407	132	148
5 Agriculture, Environmental and Related Studies	366	273	235	467	194	232
6 Health	64	61	68	92	31	24
7 Education	70	72	86	114	42	28
8 Management and Commerce	590	611	732	887	276	156
9 Society and Culture	178	170	188	272	102	84
10 Creative Arts	66	61	66	91	29	25
11 Food, Hospitality and Personal Services	175	140	130	217	77	87
Not Defined	1,669	1,412	1,381	2,074	662	693
Total primary industry employment	15,525	11,710	9,142	12,781	1,071	3,639

Regional

The regions where the largest increases in seafood industry employment are expected are Northland, where an additional 900 seafood jobs are expected by 2025, Nelson (500), and Bay of Plenty (500). With 19% of the industry's employment, Nelson is expected to continue to have the highest proportion of seafood employment in 2025. The regions where the seafood industry will be of relative importance are:

- Nelson (which is expected to employ 19% of seafood workers in 2025, but just 1% of national employment)
- Tasman (7% of seafood employment, but 1% of national employment)
- Marlborough (6% of seafood employment, but 1% of national employment)
- Northland (11% of seafood employment, but 3% of national employment)

Table 53: Employment in seafood product industries by region

			2025			
Region	2002	2012	Business as Usual	Strategy	Growth	Gap
Northland	792	560	1,121	1,456	896	336
Auckland	2,980	2,201	1,453	1,795	-405	343
Waikato	799	634	581	822	188	241
Bay of Plenty	877	721	787	1,175	454	388
Gisborne	177	172	140	181	9	41
Hawke's Bay	274	220	221	268	48	47
Taranaki	101	152	252	277	125	25
Manawatu-Wanganui	152	118	97	119	1	22
Wellington	549	282	217	275	-7	58
West Coast	279	199	110	158	-41	48
Canterbury	2,505	2,085	865	1,301	-784	436
Otago	620	244	269	337	93	67
Southland	796	679	450	560	-119	110
Tasman	748	620	615	933	313	317
Nelson	2,835	1,891	1,456	2,373	482	917
Marlborough	1,040	931	508	749	-181	241
New Zealand	15,525	11,710	9,142	12,781	1,071	3,639

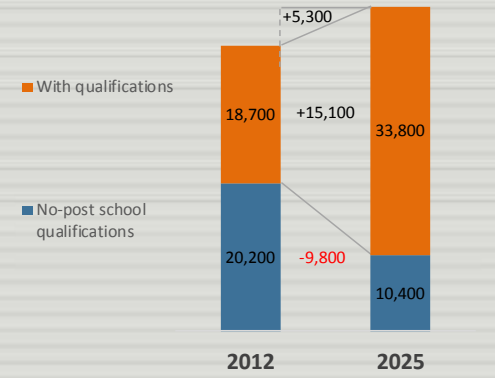
Table 54: Expected regional allocation of seafood employment in 2025

Region	Seafood	All primary	All industry
Northland	11.4%	5.8%	2.9%
Auckland	14.0%	22.7%	34.3%
Waikato	6.4%	10.5%	8.4%
Bay of Plenty	9.2%	7.0%	5.8%
Gisborne	1.4%	1.6%	0.9%
Hawke's Bay	2.1%	6.1%	3.5%
Taranaki	2.2%	3.2%	2.5%
Manawatu-Wanganui	0.9%	5.9%	4.6%
Wellington	2.2%	6.3%	12.0%
West Coast	1.2%	1.1%	0.8%
Canterbury	10.2%	13.9%	13.2%
Otago	2.6%	5.1%	5.3%
Southland	4.4%	4.2%	2.2%
Tasman	7.3%	2.2%	1.0%
Nelson	18.6%	1.4%	1.4%
Marlborough	5.9%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

8. FORESTRY PRODUCTS

Capability Needs: Forestry

Capability needs 2012-2025:



Forestry will need:

* a net increase of 5,300 workers
* 15,100 more workers with qualifications
* 9,800 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 25,900 to replace the natural attrition of workers within the industry

New forestry workers will primarily:

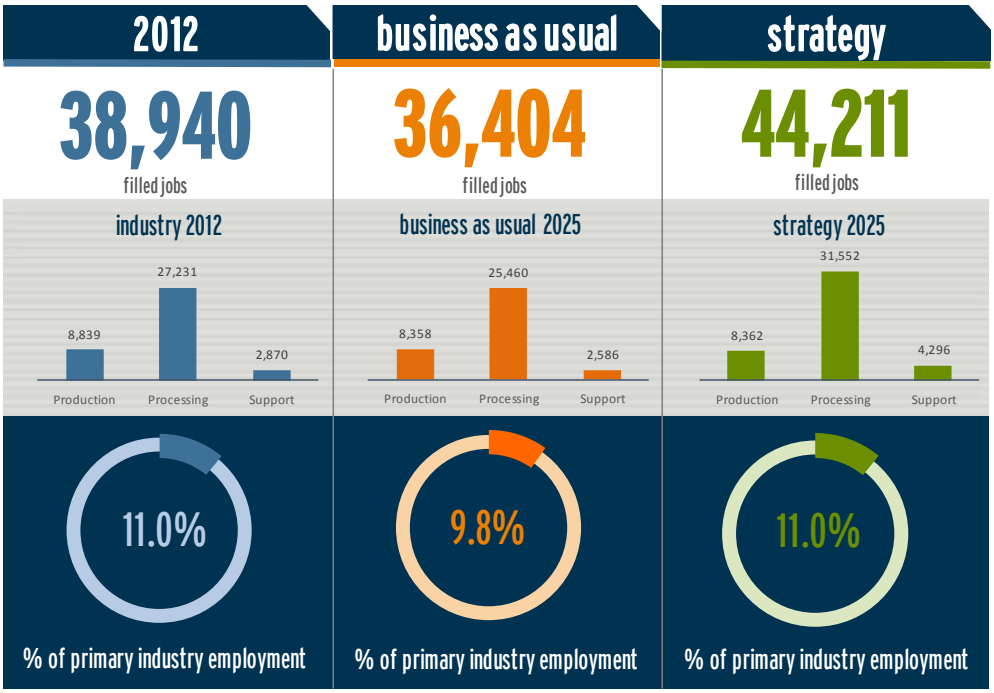
* be in sales and marketing, trades, and management occupations
* have trained in engineering, building, and business fields of study
* seek jobs in Northland, Bay of Plenty, Tasman, and Auckland

But be less likely to be employed in:

* forestry occupations on plantation
* Wellington

Success will require more skills in:

* Market development (international marketing, engagement with domestic construction sector)
* Business skills (investment skills and new business models)
* Production skills (design engineers, production line maintenance, chemical engineering, harvesting technology)
* Science & technical support (genetics, pathogens, carbon forestry, sustainability verification specialists)



This fact sheet should be read in conjunction with the service sector fact sheet as some support servicescross over a wide range of primary sectors and can't directly be attributed to one sector.

Forestry exports are characterised by logs and wood products. Export value reached $4.29b in 2012[35] (38% logs, 62% wood products), an increase of 2.4% CAGR from 2002[36]. It is a capital intensive industry with estimated fixed capital of $20.9b (planted forests $15b, wood processing $5b, logistics $0.9b). The replacement value of wood processing fixed capital estimated at $11.1b emphasises the capital intensity of the industry[37].

By 2025, export value has the potential to increase to $12b[38], an increase of 8.3% compound pa (CAGR) in real terms (10.3% CAGR inclusive of average inflation). If the industry strategy is achieved, the lift in export value is expected to be driven by wood products rising to 23 million m^3 round wood equivalent (RWE) from 7 million m^3 in 2013 (14.1% CAGR) as log exports decline to 6 million m^3 from 16.1 million m^3 in 2013. This is a massive shift in structure for the industry and will require major capital investment and increases in skill sets across the board including investment skills.

The drivers of change towards 2025 are:

- increasing log availability;
- industrial roundwood deficit particularly in Asia;
- a desire to export more processed products and therefore transition of the forestry sector from log exporters to market-led and automated capital-intensive manufacturing industry;
- a desire to diversify revenue through bioenergy and biochemical; and
- opportunities such as carbon farming.

This implies:

- increased investment in wood processing (primary and secondary) and bio-refineries;
- repositioning of New Zealand *Pinus radiata* to a more higher-valued product;
- higher productivity behind the forest gate; and
- potential carbon forestry investments.

For human capability, there will be greater demands for:

- greater skilled workforce (design engineers, skilled assembly), maintenance and diagnostic skills, chemical engineering, harvesting technology and equipment manufacturing;
- in-market showcasing/marketing skills and engagement with wood/construction sector;
- increased skills in managing large investments; and
- extension and sustainability/verification specialists, genetics/pathogens and carbon forestry researchers.

[35] Primary industries production and trade December quarter 2012 (MPI, 2012); $4.48b in year ending June 2013.
[36] Exports of $3.38b in 2002; 2012 and 2002 exclude newsprint.
[37] New Zealand forest and wood products industry strategic action plan (Woodco, March 2012).
[38] Export target for 2022 excluding $300m of newsprint (source: Potential export revenues from forest and wood products by 2022 (Andres Katz, 2012); adopted for 2025 as wood availability is similar level.

Challenges and risks

Challenges in achieving industry transformation include the need to attract capital and meet regulatory requirements for significant investments in wood processing, the ability to reposition our products in international markets, the availability of greater skills, and an uncertain carbon price.

Market growth

The US and Australia are expected to remain important markets, but Asia is expected to become an increasingly important market. This is due to demand growth with projected industrial roundwood deficit of 150 million m^3 by 2020 for China as production falls short of consumption, thus increasing dependence on imports. Key markets in Asia apart from China include Japan and India. Continued growth is expected from emerging markets including Malaysia, Indonesia and Thailand.

To achieve growth, especially with structural timber, will require skills in in-market collaborative marketing and showcasing (for example, innovation centres, campaigns) and in-market engagement with the wood/construction sector (for example, culture, building standards, regulatory systems, timber importers).

Product mix and adding value

The growing importance of Asian markets and shifting product mix from logs to wood and fibre-based products requires improved processing efficiency (for example, more fast wood drying capacity), new capital investments in wood processing to expand capacity/capability and possibly development of bio-refinery capacity. It also may mean new product development (for example, biochemical co-products).

The move to automation for improved efficiency (reduced labour) will require a more skilled workforce, better maintenance and diagnostic skills while fabricated and engineered products require design engineers, and skilled assembly/fabricators. If bio-refinery proceeds it will require chemical engineering and technology-based skills. Greater emphasis on engineered products and prefabrication of buildings require training/extension specialists to educate engineers, designers and architects. To verify the sustainability of our forest products will also require specialists.

Behind the forest gate response

Planted forestry land declined by 5.2% to 1.72 million hectares in 2012 from 1.81 million hectares in 2002. Maturing forest estate will increase wood availability to a total of 35 million m^3 annually into the 2020s[39]. Expanded planting may come from converting marginal pastoral land to forest, with a possible boost from 2018 to offset carbon emissions from harvesting of plantings in mid-1990s and riparian planting on pastoral land.

To encourage wood processing investment, the forestry industry has a target to double productivity per hectare while improving wood quality and resistance from pests and diseases. Increasing volume by 5m^3/ha/year (approximately 28%[40] increase) could add 8 million m^3 to wood availability annually. This increased productivity may be achieved through effective extension, improved forest

[39] New Zealand forest and wood products industry strategic action plan (Woodco, March 2012); increase of 28% from 27.3m m^3 harvest for year ending December 2012; latest harvest is 29.5m m^3 for year ending September 2013.
[40] From 17.66 m^3/ha/year currently (505 m^3/ha clearfell yield and 28.6 years average clearfell age; NZ plantation forestry industry facts & figures 2011/2012).

management (robotic/semi-automatic forest operations) and logistics (steep-land harvesting, log optimisation system), advanced genetics and reduced losses from pathogens. A greater mix of higher-value products requires tighter specifications and may increase the need for appearance grade logs. There is also need for diversification of timber species from the dominance of *Pinus radiata* for risk mitigation and possible other uses such riparian planting.

The forestry sector will continue to require researchers, extension specialists, and a skilled engineering workforce for harvesting technology and equipment manufacturing.

Regional implications

Land that is suitable for conversion to other more profitable uses after harvest will be under threat, for example, in Canterbury, the Central Plateau and Waikato.

If there is confidence around a sustainable price for carbon then there may be afforestation of hill country, especially along the North Island East Coast and areas susceptible to erosion.

Forecasts of skill requirements for forest product industries

Employment in forest product industries is concentrated in processing activities. There was a large decline in processing employment from 36,000 in 2002 to 27,000 in 2012. The decline in processing employment was broad based but the biggest job losses were in log sawmilling, paper manufacturing and furniture manufacturing activities.

The forest product strategy expects an expansion in roundwood removals from 28m m^3 to 36m m^3 by 2025. After allowing for domestic consumption of wood products, this expansion of the roundwood harvest is expected to result in the volume of wood product exports to expand from 22.4m m^3 of roundwood equivalent in 2013 to 28.5m m^3 in 2025. The forest product strategy incorporates a 10.3% average annual growth in export earnings from forest products. Such revenue growth cannot be achieved simply from the expected expansion in the roundwood harvest; it also requires a change in the mix of forest product exported away from logs and wood chips to more highly processed products. We estimate that achieving the target increase in export earnings requires the volume of processed wood products to almost triple to 18.3m m^3 of roundwood equivalent, and as a consequence log and wood chip export volumes would decline from 16.0m to 10.2m m^3. This projected mix of forest product exports represents a marked change from existing export patterns, see Table 55.

Table 55: Forestry export volumes,
(000 m^3, roundwood equivalent)

June years	Logs and wood chips	Other processed wood exports	Total wood product
2000	6,965	6,199	13,164
2001	7,136	8,783	15,919
2002	8,614	7,100	15,714
2003	9,361	4,345	13,706
2004	7,024	6,218	13,242
2005	5,764	7,470	13,234
2006	5,840	7,230	13,071
2007	7,026	6,584	13,610
2008	7,109	5,874	12,984
2009	8,294	6,085	14,379
2010	10,778	6,184	16,963
2011	13,309	6,294	19,603
2012	14,083	6,417	20,500
2013	15,938	6,497	22,435
Forecast for 2025 based on:			
10.3% CAGR, 2% pa wood price growth	10,225	18,317	28,542

Source: http://www.mpi.govt.nz/news-resources/statistics-forecasting/forestry/annual-forestry-export-statistics.aspx

The implication of this expected expansion in wood processing is that there needs to be an expansion in employment in processing: a 4,300 increase from 27,200 in 2012 to 31,500 in 2025.

The strongest employment growth is expected for Wooden Structural Fittings and Components Manufacturing (with 2,400 new jobs) and Timber Resawing and Dressing (with 1,300 new jobs).

Service support includes just fire protection and wholesaling activities. The forest product industry will consume many of the services discussed in *Support services* on page 108, but, as discussed in *Employment by industry* on page 16, it is quite difficult to apportion the extent that the forest product industry is the consumer of these services. In general, a strong expansion of support services is expected. The increase due to demand from the forest product industry is expected to be proportional to the 10.3% pa export earnings growth forecast by the forest product industry.

Figure 15

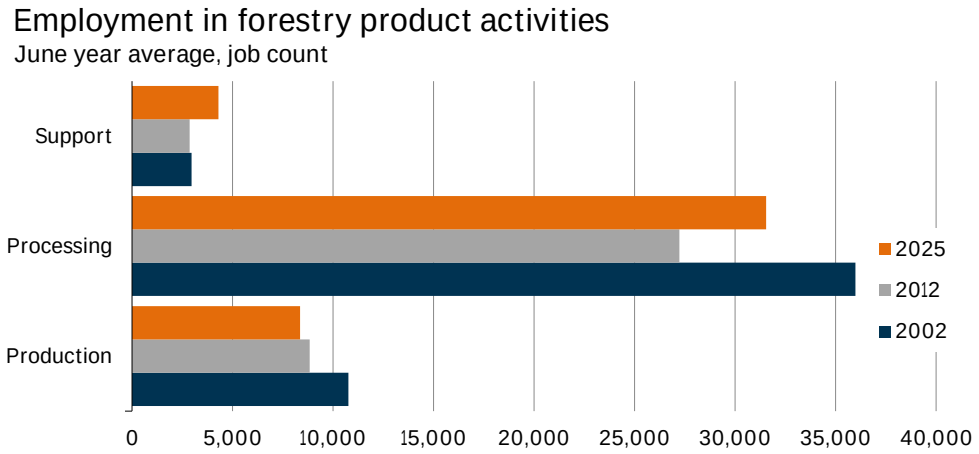


Figure 16

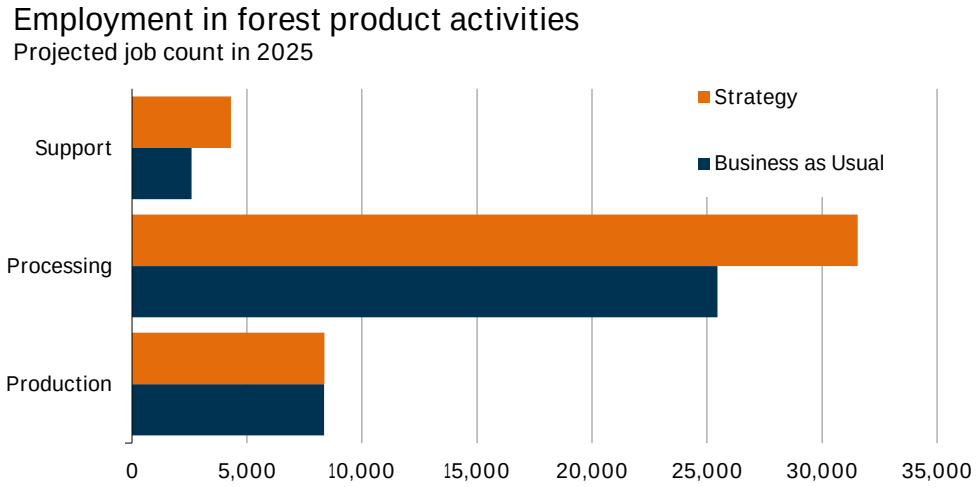


Table 56: Employment in forest product sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A030100	Forestry	1,642	1,515	1,264	1,265	-250	1
A030200	Logging	4,765	4,319	3,819	3,821	-498	2
A051000	Forestry Support Services	4,367	3,005	3,275	3,277	272	2
	Total primary production	10,774	8,839	8,358	8,362	-477	4
C141100	Log Sawmilling	7,646	5,444	4,383	5,432	-12	1,049
C141200	Wood Chipping	31	28	25	31	3	6
C141300	Timber Resawing and Dressing	1,774	1,669	2,399	2,973	1,304	574
C149100	Prefabricated Wooden Building Manufacturing	479	260	449	556	296	107
C149200	Wooden Structural Fittings and Components Manufacturing	5,835	5,653	6,516	8,075	2,422	1,559
C149300	Veneer and Plywood Manufacturing	1,894	1,225	713	884	-341	171
C149400	Reconstituted Wood Product Manufacturing	1,161	824	1,059	1,312	488	253
C149900	Other Wood Product Manufacturing n.e.c.	2,516	2,045	1,774	2,199	154	425
C151000	Pulp, Paper and Paperboard Manufacturing	2,449	1,599	1,381	1,711	112	330
C152100	Corrugated Paperboard and Paperboard Container Manufacturing	2,018	1,481	870	1,078	-403	208
C152200	Paper Bag and Sack Manufacturing	322	74	38	47	-27	9
C152300	Paper Stationery Manufacturing	169	396	792	982	586	190
C152400	Sanitary Paper Product Manufacturing	440	455	399	494	39	95
C152900	Other Converted Paper Product Manufacturing	894	323	227	281	-42	54
C251100	Wooden Furniture and Upholstered Seat Manufacturing	7,698	4,914	3,498	4,335	-579	837
C251900	Other Furniture Manufacturing	665	841	937	1,161	320	224
	Total primary processing	35,991	27,231	25,460	31,552	4,321	6,092
F333100	Timber Wholesaling	1,483	1,133	820	1,362	229	542
O771300	Fire Protection and Other Emergency Services (except Ambulance Services)	1,484	1,737	1,766	2,934	1,197	1,168
	Total service support	2,967	2,870	2,586	4,296	1,426	1,710
Total Forestry		49,729	38,938	36,404	44,211	5,273	7,807

Table 57: Percentage of employment in forest product sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
A030100	Forestry	3.3%	3.9%	3.5%	2.9%	-1.4%
A030200	Logging	9.6%	11.1%	10.5%	8.6%	-0.9%
A051000	Forestry Support Services	8.8%	7.7%	9.0%	7.4%	0.7%
	Total primary production	21.7%	22.7%	23.0%	18.9%	-0.4%
C141100	Log Sawmilling	15.4%	14.0%	12.0%	12.3%	0.0%
C141200	Wood Chipping	0.1%	0.1%	0.1%	0.1%	0.8%
C141300	Timber Resawing and Dressing	3.6%	4.3%	6.6%	6.7%	4.5%
C149100	Prefabricated Wooden Building Manufacturing	1.0%	0.7%	1.2%	1.3%	6.0%
C149200	Wooden Structural Fittings and Components Manufacturing	11.7%	14.5%	17.9%	18.3%	2.8%
C149300	Veneer and Plywood Manufacturing	3.8%	3.1%	2.0%	2.0%	-2.5%
C149400	Reconstituted Wood Product Manufacturing	2.3%	2.1%	2.9%	3.0%	3.6%
C149900	Other Wood Product Manufacturing n.e.c.	5.1%	5.3%	4.9%	5.0%	0.6%
C151000	Pulp, Paper and Paperboard Manufacturing	4.9%	4.1%	3.8%	3.9%	0.5%
C152100	Corrugated Paperboard and Paperboard Container Manufacturing	4.1%	3.8%	2.4%	2.4%	-2.4%
C152200	Paper Bag and Sack Manufacturing	0.6%	0.2%	0.1%	0.1%	-3.4%
C152300	Paper Stationery Manufacturing	0.3%	1.0%	2.2%	2.2%	7.2%
C152400	Sanitary Paper Product Manufacturing	0.9%	1.2%	1.1%	1.1%	0.6%
C152900	Other Converted Paper Product Manufacturing	1.8%	0.8%	0.6%	0.6%	-1.1%
C251100	Wooden Furniture and Upholstered Seat Manufacturing	15.5%	12.6%	9.6%	9.8%	-1.0%
C251900	Other Furniture Manufacturing	1.3%	2.2%	2.6%	2.6%	2.5%
	Total primary processing	72.4%	69.9%	69.9%	71.4%	1.1%
F333100	Timber Wholesaling	3.0%	2.9%	2.3%	3.1%	1.4%
O771300	Fire Protection and Other Emergency Services (except Ambulance Services)	3.0%	4.5%	4.9%	6.6%	4.1%
	Total service support	6.0%	7.4%	7.1%	9.7%	3.2%

Table 58: Employment in forest product industries by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	290	307	295	317	10	22	146
Other Managers	5,557	5,241	4,989	6,142	901	1,153	3,496
Design, Engineering, Science and Transport Professionals	1,475	951	938	1,083	132	145	656
ICT Professionals	175	174	169	215	41	46	134
Other Professionals	982	1,089	1,008	1,254	165	246	807
Engineering, ICT and Science Technicians	585	723	690	821	98	131	330
Food Trades Workers	14	32	30	40	8	10	16
Skilled Animal and Horticultural Workers	447	491	479	493	2	14	121
Other Technicians and Trades Workers	10,302	6,878	6,386	7,899	1,021	1,513	4,270
Miscellaneous Support and Sales Workers	6,807	5,669	5,366	7,200	1,531	1,834	5,117
Transport and Plant Operators	8,136	7,272	6,568	7,890	618	1,322	4,576
Factory Process Workers	5,656	2,590	2,327	2,876	286	549	2,214
Farm, Forestry and Garden Workers	6,400	4,063	3,807	3,855	-208	48	1,610
Labourers	2,885	3,450	3,338	4,106	656	768	2,429
Total	49,711	38,930	36,390	44,191	5,261	7,801	25,922

Occupation

In terms of occupations the largest job growth is expected for:

- support and sales workers (1,500 new jobs)
- Technicians and trade workers (1,000)
- Non-farm managers (900)
- Labourers (650)
- Transport and plant operators (600)

The one occupation where a decline is expected is with forest workers. This decline reflects our modelling assumption of a zero carbon price, so that labour productivity improvements offset any increases of on-plantation activity.

Replacing workers leaving the industry will exacerbate training requirements. For example, a 1,500 net increase in support and sales workers is expected, but to achieve this target accounting for expected net of departures will require attracting 5,100 such workers to the industry.[41]

Other occupations where replacement demand pressures are likely to increase training requirements relative to net employment growth expectations are:

- Transport and plant operators
- Technicians and trade workers
- Factory process workers
- Forestry workers

Field of study

Common to other primary industries, improving the skill level of the workforce will be a critical requirement for achieving the forestry industries' strategy targets. In 2012, 48% of the forestry workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 77%. The forestry workforce is expected to expand by 5,300 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase

[41] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

by 15,100. The 15,100 increase in qualified workers projected in the strategy projections is 12,800 more than projected in the business-as-usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

On top of this net training requirement, the industry is likely to need to find an additional 25,900 trained workers to replace the natural attrition of workers (ie net replacement demand).

In terms of fields of study, the largest employment increases are expected for those with engineering and related technology qualifications (4,400). Architecture and building (2,400) and management and commerce qualifications (1,700) are expected to be the next most important skills required.

Table 59: Employment in forest product industries by field of study

			2025			
			Business			
Field of Study	2002	2012	as Usual	Strategy	Growth	Gap
No Qualification	30,660	20,202	15,404	10,376	-9,826	-5,027
1 Natural and Physical Sciences	403	472	589	814	341	225
2 Information Technology	225	241	273	482	241	209
3 Engineering and Related Technologies	5,691	5,384	5,831	9,811	4,427	3,980
4 Architecture and Building	2,460	2,323	3,045	4,766	2,443	1,721
5 Agriculture, Environmental and Related Studies	2,043	1,781	1,943	2,553	772	610
6 Health	245	275	302	498	223	196
7 Education	229	297	332	562	265	230
8 Management and Commerce	1,859	2,017	2,277	3,694	1,677	1,417
9 Society and Culture	641	747	832	1,455	708	623
10 Creative Arts	338	355	373	658	303	284
11 Food, Hospitality and Personal Services	421	449	490	876	427	386
Not Defined	4,517	4,396	4,713	7,666	3,269	2,952
Total primary industry employment	49,732	38,940	36,404	44,211	5,271	7,807

Regional

The regions where the largest increases in forest industry employment are expected are Northland, where an additional 2,000 forest industry jobs are expected by 2025, Bay of Plenty (900), and Tasman (500). With 21% of the industry's employment, Auckland is expected to continue to have the highest proportion of forest industry employment in 2025. The regions where the forest industry will be of relative importance are:

- Tasman (which is expected to employ 5% of forest industry workers in 2025, but just 1% of national employment)
- Northland (10% of forest industry employment, but 3% of national employment)
- Gisborne (2% of forest industry employment, but 1% of national employment)
- Bay of Plenty (14% of forest industry employment, but 6% of national employment)

Table 60: Employment in forest product industries by region

			2025			
Region	2002	2012	Business as Usual	Strategy	Growth	Gap
Northland	2,602	2,232	3,583	4,196	1,964	613
Auckland	11,118	9,014	7,407	9,463	450	2,056
Waikato	6,614	4,552	4,111	4,862	310	751
Bay of Plenty	7,240	5,419	5,354	6,294	875	940
Gisborne	1,100	947	938	1,018	71	80
Hawke's Bay	1,942	1,924	1,928	2,306	382	377
Taranaki	944	831	757	934	102	177
Manawatu-Wanganui	2,654	1,828	1,541	1,920	92	378
Wellington	3,461	2,654	1,681	2,254	-400	573
West Coast	776	391	341	405	14	64
Canterbury	5,427	4,088	3,559	4,361	273	802
Otago	1,903	1,569	1,498	1,829	260	330
Southland	1,177	1,078	951	1,154	76	203
Tasman	1,606	1,469	1,688	1,968	499	279
Nelson	584	512	559	683	171	124
Marlborough	584	432	507	566	134	59
New Zealand	49,732	38,940	36,404	44,211	5,271	7,807

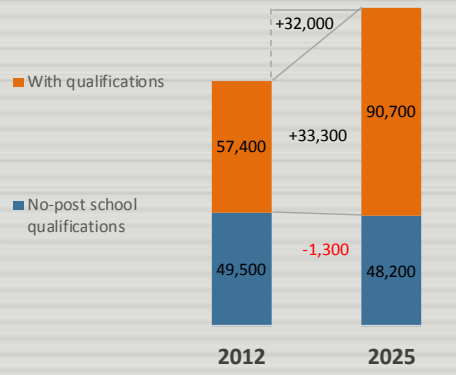
Table 61: Expected regional allocation of forestry employment in 2025

Region	Forestry	All primary	All industry
Northland	9.5%	5.8%	2.9%
Auckland	21.4%	22.7%	34.3%
Waikato	11.0%	10.5%	8.4%
Bay of Plenty	14.2%	7.0%	5.8%
Gisborne	2.3%	1.6%	0.9%
Hawke's Bay	5.2%	6.1%	3.5%
Taranaki	2.1%	3.2%	2.5%
Manawatu-Wanganui	4.3%	5.9%	4.6%
Wellington	5.1%	6.3%	12.0%
West Coast	0.9%	1.1%	0.8%
Canterbury	9.9%	13.9%	13.2%
Otago	4.1%	5.1%	5.3%
Southland	2.6%	4.2%	2.2%
Tasman	4.5%	2.2%	1.0%
Nelson	1.5%	1.4%	1.4%
Marlborough	1.3%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

9. SUPPORT SERVICES

Capability Needs: Support services

Capability needs 2012-2025:



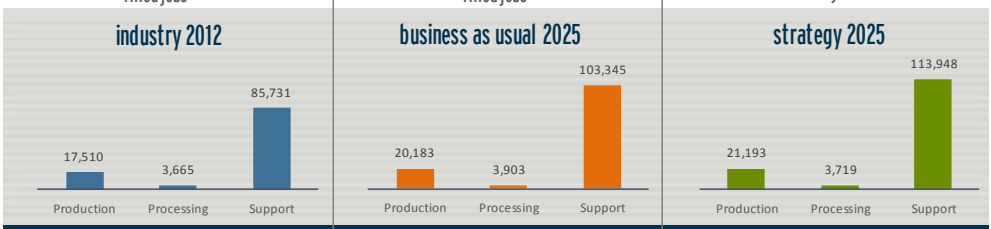
Support services will need:

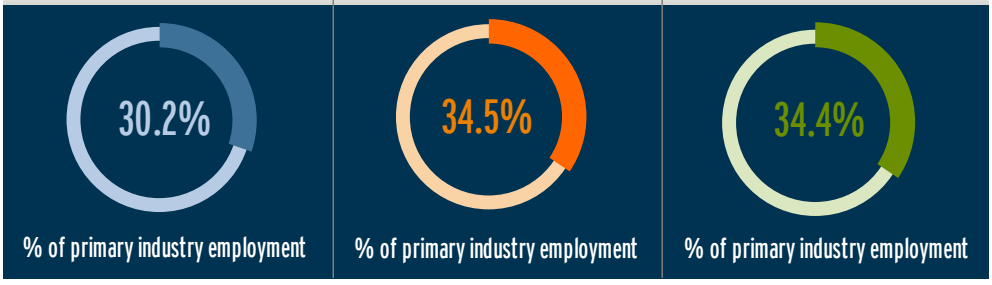
* a net increase of 32,000 workers
* 33,300 more workers with qualifications
* 1,300 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 90,200 to replace the natural attrition of workers within the industry

New support service workers will primarily:

* be in management, transport, sales and marketing, and professional occupations
* have trained in business, engineering, and society and culture fields of study
* seek jobs in Auckland, Canterbury, Wellington, Otago, and Marlborough

2012	business as usual	strategy
106,906 filled jobs	127,431 filled jobs	138,860 filled jobs





Support services activities represent a diverse range of activities that have been grouped together primarily because it is difficult to attribute activities to specific primary products. Activities included here are input manufacturing (for example, fertilisers and pesticides), equipment manufacture and maintenance, transport services, and professional services. There is a possibility that our count of employment in this sector, particularly associated with professional services, could overstate the involvement in primary industries. Many people counted here provide important support for primary industries, but there is a possibility that we have included a number who are only peripherally associated with the industries.

Services are an expanding source of employment in New Zealand generally. Some of this growth simply reflects organisational changes; companies that once had accounts, legal, and design departments are now more likely to outsource many of these services. However, there has been a fundamental change towards a higher proportion of value-added products incorporating service aspects, such as design and customisation. The business-as-usual projections incorporate a continuation of this trend, but the strategies suggest that the demand from primary industries for service support will be even stronger. The areas where employment demand is expected to be strongest as a result of the primary industry strategies are:

- Transport services, particularly road transport
- Management advice and consulting services
- Agriculture support services
- Computer support services
- Scientific research
- Agricultural input wholesaling, and
- Veterinary services.

Figure 17

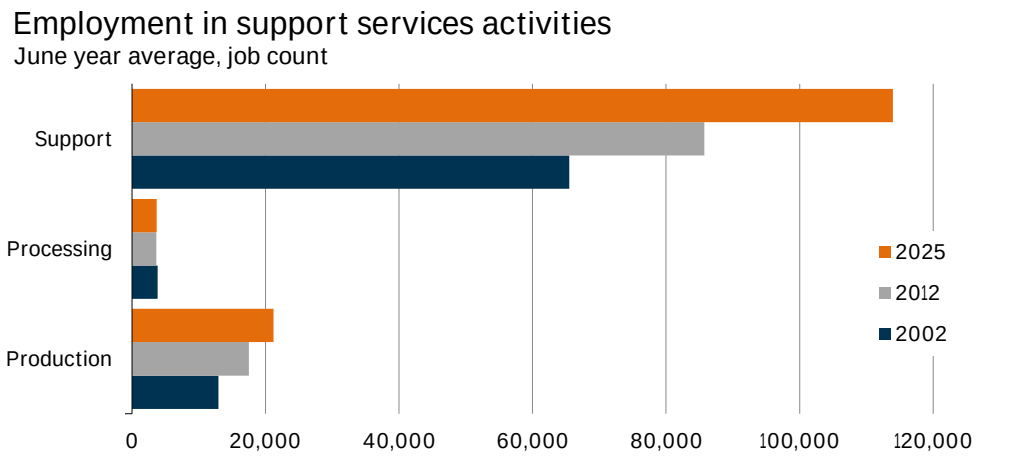


Figure 18

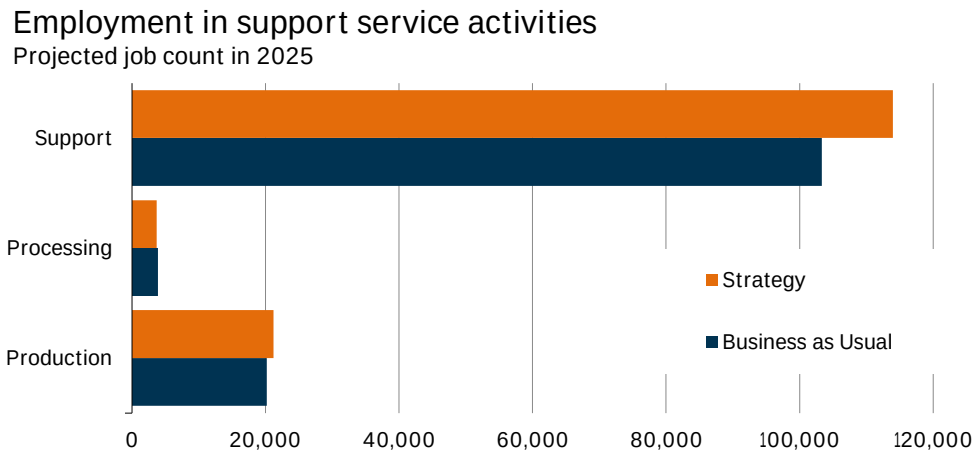


Table 62: Employment in primary industry support service sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A052900	Other Agriculture and Fishing Support Services	12,963	17,510	20,183	21,193	3,683	1,010
	Total primary production	12,963	17,510	20,183	21,193	3,683	1,010
C183100	Fertiliser Manufacturing	641	634	600	670	36	70
C183200	Pesticide Manufacturing	81	125	132	132	7	0
C184200	Veterinary Pharmaceutical and Medicinal Product Manufacturing	420	422	427	442	20	15
C203100	Cement and Lime Manufacturing	210	219	181	225	6	44
C239300	Railway Rolling Stock Manufacturing and Repair Services	192	131	148	0	-131	-148
C246100	Agricultural Machinery and Equipment Manufacturing	2,328	2,134	2,415	2,250	116	-165
	Total primary processing	3,872	3,665	3,903	3,719	54	-184
D291900	Other Waste Collection Services	45	221	348	279	58	-69
E310900	Other Heavy and Civil Engineering Construction	3,378	6,266	9,251	8,116	1,850	-1,135
F332300	Industrial and Agricultural Chemical Product Wholesaling	3,106	3,283	3,587	4,430	1,147	843
F341100	Agricultural and Construction Machinery Wholesaling	3,447	4,621	5,992	6,235	1,614	243
I461000	Road Freight Transport	17,744	19,065	19,627	24,867	5,802	5,240
I471000	Rail Freight Transport	497	701	663	856	155	193
I481000	Water Freight Transport	478	347	440	430	83	-10
I521100	Stevedoring Services	1,360	850	605	1,020	170	415
I521200	Port and Water Transport Terminal Operations	1,159	1,444	1,702	1,733	289	31
I521900	Other Water Transport Support Services	174	501	774	601	100	-173
I529100	Customs Agency Services	229	231	176	284	53	108
I529200	Freight Forwarding Services	1,982	2,751	3,342	3,381	630	39
I530900	Other Warehousing and Storage Services	3,039	3,366	3,889	4,055	689	166
M691000	Scientific Research Services	3,523	4,459	5,152	6,160	1,701	1,008
M692100	Architectural Services	37	140	199	191	51	-8
M692200	Surveying and Mapping Services	9	47	57	64	17	7
M692300	Engineering Design and Engineering Consulting Services	377	796	1,028	1,084	288	56
M692400	Other Specialised Design Services	54	70	72	95	25	23
M692500	Scientific Testing and Analysis Services	1,543	1,894	2,195	2,577	683	382
M693100	Legal Services	43	71	68	98	27	30
M693200	Accounting Services	130	207	238	281	74	43
M694000	Advertising Services	14	43	55	59	16	4
M695000	Market Research and Statistical Services	1,422	1,340	1,028	1,836	496	808
M696100	Corporate Head Office Management Services	5,912	8,581	11,006	11,759	3,178	753
M696200	Management Advice and Other Consulting Services	8,726	12,736	16,564	17,452	4,716	888
M697000	Veterinary Services	2,484	3,411	4,153	4,718	1,307	565
M699900	Other Professional, Scientific and Technical Services n.e.c.	403	571	657	777	206	120
M700000	Computer Systems Design and Related Services	3,374	6,478	9,035	9,015	2,537	-20
S942900	Other Machinery and Equipment Repair and Maintenance	825	1,240	1,442	1,497	257	55
	Total service support	65,514	85,731	103,345	113,948	28,217	10,603
Grand Total		82,343	106,902	127,425	138,860	31,958	11,435

Table 63: Percentage of employment in support service sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
A052900	Other Agriculture and Fishing Support Services	15.7%	16.4%	15.8%	15.3%	1.5%
	Total primary production	15.7%	16.4%	15.8%	15.3%	1.5%
C183100	Fertiliser Manufacturing	0.8%	0.6%	0.5%	0.5%	0.4%
C183200	Pesticide Manufacturing	0.1%	0.1%	0.1%	0.1%	0.4%
C184200	Veterinary Pharmaceutical and Medicinal Product Manufacturing	0.5%	0.4%	0.3%	0.3%	0.4%
C203100	Cement and Lime Manufacturing	0.3%	0.2%	0.1%	0.2%	0.2%
C239300	Railway Rolling Stock Manufacturing and Repair Services	0.2%	0.1%	0.1%	0.0%	-100.0%
C246100	Agricultural Machinery and Equipment Manufacturing	2.8%	2.0%	1.9%	1.6%	0.4%
	Total primary processing	4.7%	3.4%	3.1%	2.7%	0.1%
D291900	Other Waste Collection Services	0.1%	0.2%	0.3%	0.2%	1.8%
E310900	Other Heavy and Civil Engineering Construction	4.1%	5.9%	7.3%	5.8%	2.0%
F332300	Industrial and Agricultural Chemical Product Wholesaling	3.8%	3.1%	2.8%	3.2%	2.3%
F341100	Agricultural and Construction Machinery Wholesaling	4.2%	4.3%	4.7%	4.5%	2.3%
I461000	Road Freight Transport	21.5%	17.8%	15.4%	17.9%	2.1%
I471000	Rail Freight Transport	0.6%	0.7%	0.5%	0.6%	1.5%
I481000	Water Freight Transport	0.6%	0.3%	0.3%	0.3%	1.7%
I521100	Stevedoring Services	1.7%	0.8%	0.5%	0.7%	1.4%
I521200	Port and Water Transport Terminal Operations	1.4%	1.4%	1.3%	1.2%	1.4%
I521900	Other Water Transport Support Services	0.2%	0.5%	0.6%	0.4%	1.4%
I529100	Customs Agency Services	0.3%	0.2%	0.1%	0.2%	1.6%
I529200	Freight Forwarding Services	2.4%	2.6%	2.6%	2.4%	1.6%
I530900	Other Warehousing and Storage Services	3.7%	3.1%	3.1%	2.9%	1.4%
M691000	Scientific Research Services	4.3%	4.2%	4.0%	4.4%	2.5%
M692100	Architectural Services	0.0%	0.1%	0.2%	0.1%	2.4%
M692200	Surveying and Mapping Services	0.0%	0.0%	0.0%	0.0%	2.4%
M692300	Engineering Design and Engineering Consulting Services	0.5%	0.7%	0.8%	0.8%	2.4%
M692400	Other Specialised Design Services	0.1%	0.1%	0.1%	0.1%	2.4%
M692500	Scientific Testing and Analysis Services	1.9%	1.8%	1.7%	1.9%	2.4%
M693100	Legal Services	0.1%	0.1%	0.1%	0.1%	2.5%
M693200	Accounting Services	0.2%	0.2%	0.2%	0.2%	2.4%
M694000	Advertising Services	0.0%	0.0%	0.0%	0.0%	2.5%
M695000	Market Research and Statistical Services	1.7%	1.3%	0.8%	1.3%	2.5%
M696100	Corporate Head Office Management Services	7.2%	8.0%	8.6%	8.5%	2.5%
M696200	Management Advice and Other Consulting Services	10.6%	11.9%	13.0%	12.6%	2.5%
M697000	Veterinary Services	3.0%	3.2%	3.3%	3.4%	2.5%
M699900	Other Professional, Scientific and Technical Services n.e.c.	0.5%	0.5%	0.5%	0.6%	2.4%
M700000	Computer Systems Design and Related Services	4.1%	6.1%	7.1%	6.5%	2.6%
S942900	Other Machinery and Equipment Repair and Maintenance	1.0%	1.2%	1.1%	1.1%	1.5%
	Total service support	79.6%	80.2%	81.1%	82.1%	2.2%

Occupation

In terms of occupations, the expansion in primary industry activities is expected to increase demand most for:

- Support and sales workers (7,000)
- Non-farm managers (5,600 extra jobs)
- Transport and plant operators (5,000)
- Professionals (design, engineering, science and transport: 1,900, ICT: 1,700, and other professionals: 3,400)

Replacing workers leaving the industry will exacerbate training requirements. For example, a 7,000 net increase in support and sales workers is expected, but to achieve this target accounting for expected net of departures will require attracting 20,000 such workers to the industry[42].

[42] See *Net replacement demand* on page 139 for an explanation of this concept and a discussion of its potential shortcomings.

Other occupations where replacement demand pressures are likely to increase training requirements relative to net employment growth expectations are:

- Managers
- Trade workers
- Factory process workers
- Transport and plant operators

Table 64: Employment in support services by occupation

			2025				
Occupations	2002	2012	Business as Usual	Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	2,893	3,631	4,195	4,445	814	250	2,425
Other Managers	11,596	18,047	21,949	23,699	5,652	1,750	14,649
Design, Engineering, Science and Transport Professionals	4,515	6,021	7,390	7,970	1,949	580	5,269
ICT Professionals	2,609	4,560	6,064	6,239	1,679	175	4,128
Other Professionals	6,809	9,650	11,924	13,033	3,383	1,109	9,135
Engineering, ICT and Science Technicians	2,496	3,436	4,200	4,537	1,101	337	2,203
Food Trades Workers	92	140	169	182	42	13	76
Skilled Animal and Horticultural Workers	1,664	2,012	2,441	2,650	638	209	1,124
Other Technicians and Trades Workers	5,031	6,371	8,070	8,074	1,703	4	5,935
Miscellaneous Support and Sales Workers	18,314	22,579	26,875	29,591	7,012	2,716	19,938
Transport and Plant Operators	16,657	18,395	20,153	23,475	5,080	3,322	15,911
Factory Process Workers	1,454	1,838	2,125	2,281	443	156	1,811
Farm, Forestry and Garden Workers	4,104	4,356	5,093	5,360	1,004	267	2,953
Labourers	4,093	5,871	6,765	7,323	1,452	558	4,601
Total	82,327	106,907	127,413	138,859	31,952	11,446	90,159

Field of study

As well as improving direct access to skills, primary industries will also need to obtain access to a wider range of skills from the support services. This in turn is likely to increase the qualification level of support services. In 2012, 54% of the primary industries support service workforce had a formal post-school qualification. Our forecasts suggest that by 2025 this will perhaps need to increase to 65%. The primary industries support service workforce is expected to expand by 32,000 workers between 2012 and 2025, but the number of workers with a formal qualification is expected to increase by 33,300. The 33,300 increase in qualified workers projected in the strategy projections is 12,700 more than projected in the business as usual forecasts. This indicates that a further acceleration in training activity is required to meet the industries' potential demand.

On top of this net training requirement, the industry is likely to need to find an additional 90,200 trained workers to replace the natural attrition of workers (ie net replacement demand).

The demand for occupations implies that the qualifications in demand will be:

- Engineering and construction
- Management and commerce
- Social sciences
- Sciences
- Agriculture, environmental and related studies

Table 65: Employment in support services by field of study

Field of Study	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
No Qualification	46,052	49,542	49,542	48,228	-1,314	-1,314
1 Natural and Physical Sciences	2,514	3,881	4,829	5,619	1,738	791
2 Information Technology	1,516	2,630	3,688	3,996	1,366	308
3 Engineering and Related Technologies	8,176	12,778	17,258	19,551	6,773	2,292
4 Architecture and Building	1,589	2,866	4,014	4,551	1,685	537
5 Agriculture, Environmental and Related Studies	1,558	2,288	3,218	3,809	1,520	591
6 Health	2,528	4,016	5,084	5,856	1,839	772
7 Education	934	1,701	2,275	2,655	954	380
8 Management and Commerce	6,920	10,846	14,800	17,108	6,261	2,308
9 Society and Culture	2,946	5,105	6,753	7,854	2,749	1,100
10 Creative Arts	725	1,276	1,782	2,019	744	237
11 Food, Hospitality and Personal Services	846	1,299	1,837	2,297	998	459
Not Defined	6,045	8,677	12,350	15,317	6,641	2,967
Total primary industry employment	82,349	106,906	127,431	138,860	31,954	11,429

Regional

The regions where the largest increases in support service employment are expected are Auckland, where an additional 12,000 support service jobs are expected by 2025, Canterbury (5,000), and Wellington (3,000). With 34% of the industry's employment, Auckland is expected to continue to have the highest proportion of support service employment in 2025. However, the region where support service will be of relative most importance for employment is Marlborough, which is expected to employ 3% of support service workers in 2025, but just 1% of national employment.

Table 66: Employment in support services by region

Region	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
Northland	2,252	2,582	2,844	3,203	621	359
Auckland	25,260	35,085	42,950	46,795	11,710	3,845
Waikato	9,289	11,224	11,883	13,023	1,799	1,140
Bay of Plenty	6,976	8,992	9,439	10,361	1,369	922
Gisborne	861	1,144	1,244	1,397	253	153
Hawke's Bay	3,885	4,284	5,621	6,058	1,774	437
Taranaki	2,153	2,583	2,876	3,191	608	315
Manawatu-Wanganui	4,088	4,781	5,323	5,896	1,116	573
Wellington	9,143	11,403	13,216	14,144	2,741	928
West Coast	573	770	960	1,054	284	94
Canterbury	9,985	13,084	16,461	17,791	4,707	1,330
Otago	2,850	3,882	5,140	5,630	1,749	490
Southland	2,400	2,750	3,136	3,462	712	326
Tasman	596	1,086	1,556	1,722	635	166
Nelson	884	1,004	1,214	1,342	338	129
Marlborough	1,155	2,253	3,569	3,791	1,538	222
New Zealand	82,349	106,906	127,431	138,860	31,954	11,429

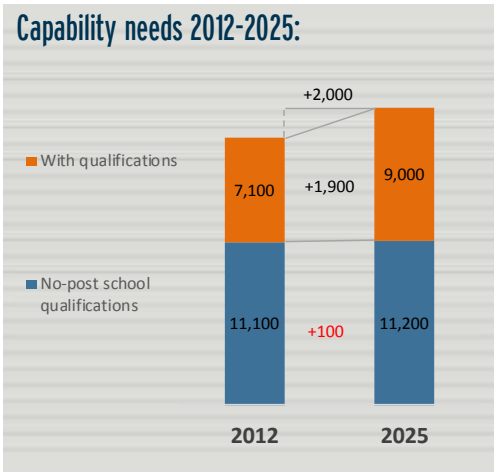
Table 67: Expected regional allocation of support service employment in 2025

Region	Support	All primary	All industry
Northland	2.3%	5.8%	2.9%
Auckland	33.7%	22.7%	34.3%
Waikato	9.4%	10.5%	8.4%
Bay of Plenty	7.5%	7.0%	5.8%
Gisborne	1.0%	1.6%	0.9%
Hawke's Bay	4.4%	6.1%	3.5%
Taranaki	2.3%	3.2%	2.5%
Manawatu-Wanganui	4.2%	5.9%	4.6%
Wellington	10.2%	6.3%	12.0%
West Coast	0.8%	1.1%	0.8%
Canterbury	12.8%	13.9%	13.2%
Otago	4.1%	5.1%	5.3%
Southland	2.5%	4.2%	2.2%
Tasman	1.2%	2.2%	1.0%
Nelson	1.0%	1.4%	1.4%
Marlborough	2.7%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

10. OTHER PRIMARY PRODUCTS

Capability Needs: Other primary

Capability needs 2012-2025:



Other primary will need:

* a net increase of 2,000 workers
* 1,900 more workers with qualifications
* 100 fewer workers without post-school qualifications (through training and natural attrition)
* to train an additional 11,900 to replace the natural attrition of workers within the industry

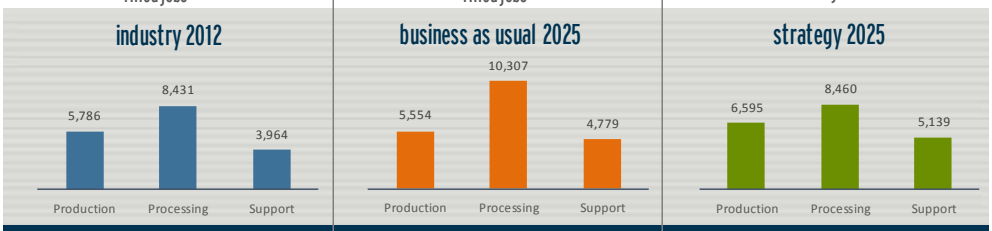
New other primary workers will primarily:

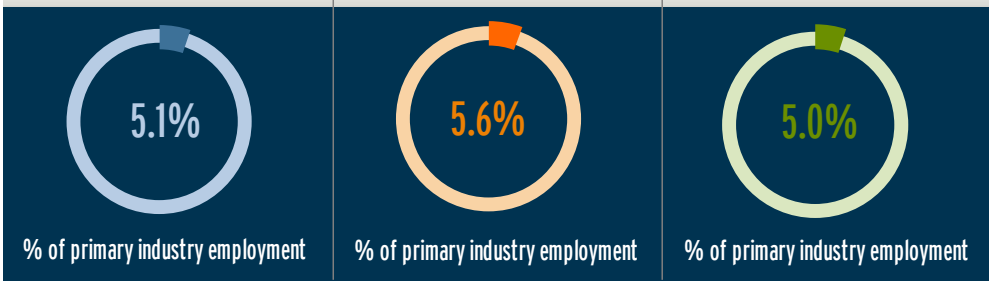
* be in farming, sales and marketing, and factory processing occupations
* have trained in business, engineering, and agriculture fields of study
* seek jobs in Manawatu-Wanganui, Wellington, Waikato, Bay of Plenty, and Otago

But be less likely to be employed in:

* Auckland

2012	business as usual	strategy
18,181 filled jobs	20,640 filled jobs	20,194 filled jobs





This fact sheet should be read in conjunction with the service sector fact sheet as some support servicescross over a wide range of primary sectors and can't directly be attributed to one sector.

Other primary products is defined here as including a number of farming activities that are primarily focused on the domestic market (for example, poultry and pig farming) and not covered earlier. As such, these activities are not the focus of this report. Although no strategies for other primary industries have been explicitly included in the current analysis, for completeness we have included a "strategy" set of forecasts for other primary industries. These forecasts represent the ramifications that the employment consequences of the strategies in other areas (such as horticulture, dairy) have for employment in other primary.

Figure 19

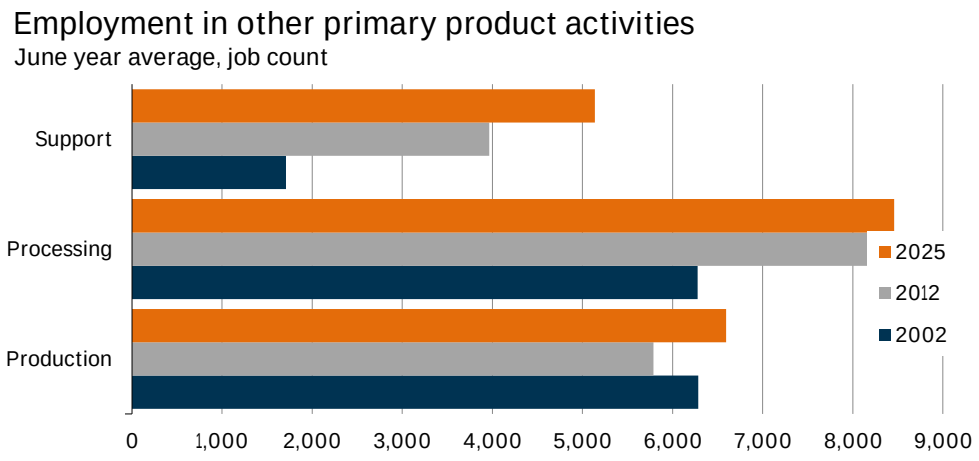


Figure 20

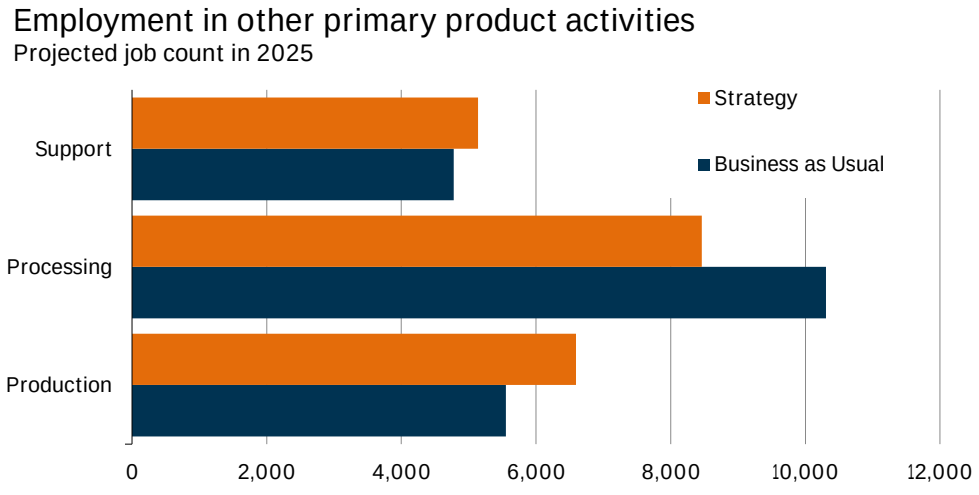


Table 68: Employment in other primary sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
A017100	Poultry Farming (Meat)	982	937	696	826	-111	130
A017200	Poultry Farming (Eggs)	647	1,020	1,196	1,420	400	224
A019100	Horse Farming	1,250	1,070	955	1,134	64	179
A019200	Pig Farming	806	661	488	579	-82	91
A019300	Beekeeping	614	1,090	1,351	1,604	514	253
A019900	Other Livestock Farming n.e.c.	1,727	783	634	753	-30	119
A042000	Hunting and Trapping	258	225	234	278	53	44
	Total primary production	6,284	5,786	5,554	6,595	809	1,041
C111200	Poultry Processing	1,992	2,811	3,719	3,053	242	-666
C119900	Other Food Products Manufacturing n.e.c.	4,284	5,620	6,588	5,407	-213	-1,181
	Total primary processing	6,276	8,431	10,307	8,460	29	-1,847
F331900	Other Agricultural Product Wholesaling	1,709	3,964	4,779	5,139	1,175	360
	Total service support	1,709	3,964	4,779	5,139	1,175	360
Grand Total		14,270	18,179	20,639	20,194	2,015	-445

Table 69: Percentage employment in other primary sub-industries

Code	Industry	2002	2012	2025 Business as Usual	2025 Strategy	Strategy annualised growth rate
A017100	Poultry Farming (Meat)	6.9%	5.2%	3.4%	4.1%	-1.0%
A017200	Poultry Farming (Eggs)	4.5%	5.6%	5.8%	7.0%	2.6%
A019100	Horse Farming	8.8%	5.9%	4.6%	5.6%	0.4%
A019200	Pig Farming	5.6%	3.6%	2.4%	2.9%	-1.0%
A019300	Beekeeping	4.3%	6.0%	6.5%	7.9%	3.0%
A019900	Other Livestock Farming n.e.c.	12.1%	4.3%	3.1%	3.7%	-0.3%
A042000	Hunting and Trapping	1.8%	1.2%	1.1%	1.4%	1.6%
	Total primary production	44.0%	31.8%	26.9%	32.7%	1.0%
C111200	Poultry Processing	14.0%	15.5%	18.0%	15.1%	0.6%
C119900	Other Food Products Manufacturing n.e.c.	30.0%	30.9%	31.9%	26.8%	-0.3%
	Total primary processing	44.0%	46.4%	49.9%	41.9%	0.0%
F331900	Other Agricultural Product Wholesaling	12.0%	21.8%	23.2%	25.4%	2.0%
	Total service support	12.0%	21.8%	23.2%	25.4%	2.0%

Table 70: Employment in other primary industries by occupation

Occupations	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap	Net replacement demand
Farmers and Farm Managers	3,559	2,652	2,655	3,046	394	391	1,571
Other Managers	1,493	2,487	2,918	2,788	301	-130	1,522
Design, Engineering, Science and Transport Professionals	203	373	443	426	53	-17	259
ICT Professionals	45	71	88	81	10	-7	48
Other Professionals	314	676	797	753	77	-44	468
Engineering, ICT and Science Technicians	184	329	389	366	37	-23	142
Food Trades Workers	156	208	241	205	-3	-36	47
Skilled Animal and Horticultural Workers	262	253	259	286	33	27	94
Other Technicians and Trades Workers	219	372	422	392	20	-30	254
Miscellaneous Support and Sales Workers	2,529	3,609	4,220	4,175	566	-45	2,766
Transport and Plant Operators	962	1,303	1,528	1,401	98	-127	845
Factory Process Workers	1,591	2,732	3,318	2,881	149	-437	2,183
Farm, Forestry and Garden Workers	2,004	1,619	1,572	1,784	165	212	890
Labourers	739	1,496	1,779	1,605	109	-174	794
Total	14,260	18,180	20,629	20,189	2,009	-440	11,882

Table 71: Employment in other primary industries by field of study

Field of Study	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
No Qualification	9,764	11,134	11,134	11,182	48	48
1 Natural and Physical Sciences	170	327	433	397	70	-37
2 Information Technology	71	134	225	175	42	-50
3 Engineering and Related Technologies	645	1,121	1,535	1,371	250	-164
4 Architecture and Building	151	260	360	357	97	-3
5 Agriculture, Environmental and Related Studies	486	549	582	785	235	203
6 Health	144	246	293	311	65	19
7 Education	109	157	209	201	44	-9
8 Management and Commerce	749	1,259	1,658	1,560	302	-98
9 Society and Culture	207	394	563	523	129	-40
10 Creative Arts	62	135	211	185	50	-25
11 Food, Hospitality and Personal Services	199	339	515	424	86	-91
Not Defined	1,512	2,127	2,922	2,723	596	-199
Total primary industry employment	14,269	18,181	20,640	20,194	2,013	-446

Table 72: Employment in other primary industries by region

Region	2002	2012	2025 Business as Usual	2025 Strategy	Growth	Gap
Northland	296	540	500	571	31	71
Auckland	4,318	5,559	5,993	5,186	-373	-808
Waikato	2,269	2,818	3,118	3,100	282	-18
Bay of Plenty	784	1,098	1,313	1,358	260	46
Gisborne	66	90	120	127	38	7
Hawke's Bay	417	538	682	718	181	37
Taranaki	761	1,003	1,221	1,176	173	-45
Manawatu-Wanganui	823	1,033	1,265	1,411	377	146
Wellington	702	1,063	1,463	1,434	371	-29
West Coast	58	108	117	131	23	13
Canterbury	2,417	2,854	2,922	2,920	66	-2
Otago	516	565	734	808	244	74
Southland	507	413	418	457	45	39
Tasman	169	304	489	517	212	28
Nelson	35	36	58	55	18	-3
Marlborough	130	159	228	226	67	-2
New Zealand	14,269	18,181	20,640	20,194	2,013	-446

Table 73: Expected regional allocation of other primary employment in 2025

Region	Other primary	All primary	All industry
Northland	2.8%	5.8%	2.9%
Auckland	25.7%	22.7%	34.3%
Waikato	15.3%	10.5%	8.4%
Bay of Plenty	6.7%	7.0%	5.8%
Gisborne	0.6%	1.6%	0.9%
Hawke's Bay	3.6%	6.1%	3.5%
Taranaki	5.8%	3.2%	2.5%
Manawatu-Wanganui	7.0%	5.9%	4.6%
Wellington	7.1%	6.3%	12.0%
West Coast	0.6%	1.1%	0.8%
Canterbury	14.5%	13.9%	13.2%
Otago	4.0%	5.1%	5.3%
Southland	2.3%	4.2%	2.2%
Tasman	2.6%	2.2%	1.0%
Nelson	0.3%	1.4%	1.4%
Marlborough	1.1%	3.0%	1.3%
New Zealand	100.0%	100.0%	100.0%

11. METHOD

Process

The process for investigating the future capability requirements of the primary industries involved:

1. Reviewing strategies developed by individual primary industries.
2. Collecting historical information about the industries' recent skill requirements.
3. Preparing detailed employment forecasts out to 2025 based both on the implementation of the strategies and on a business-as-usual basis.
4. Consulting with stakeholders to expand our understanding of industry prospects and allow a critical review of the employment forecasts.
5. Revising industry narratives and employment forecasts.

Strategies

All the primary industries have strategic plans. While the general thrust of these plans is similar there are differences in approach and timeframes between industries and a key task was to develop a standard framework so that the strategies of the industries can be considered consistently over the timeframe to 2025. The industry strategies were reviewed to identify current positioning capability to implement the strategy. The following identifies published information readily available on industry strategies.

Key documents by industry are:

Ministry for Primary Industries

- MPI 2013. *Ministerial Statement of Responsibility: Statement of Intent*.
- MPI 2013. 2013+2018, Strategic direction, *Our strategy 2030*.
- MPI 2013. *Situation and Outlook for Primary Industries (SOPI).*

Dairy

- DairyNZ 2013. *Making dairy farming work for everyone – a strategy for sustainable dairy farming 2013–2020*.
- Coriolis 2010. *Fonterra & the New Zealand dairy industry: options going forward*. A discussion document, v1.01 February 2010.
- Woodford, Keith 2008. Dairy Industry Strategy and Structure as New Zealand takes on the World, *Primary Industry Management*, Vol. 11, No 1, pp5-9 March 2008.

Sheep and beef

- Deloitte 2011. *Red meat strategy report – to 2025*, prepared for Beef + Lamb New Zealand Limited and the L Meat Industry Association of New Zealand.
- Wool Taskforce, 2010. *Restoring profitability to the strong wool sector.*

Arable

- BERL 2012. *Economic Impact Assessment of Arable Production*, prepared for the Arable Food Industry Council.
- Foundation for Arable Research (FAR) 2011. *Research and Extension Strategy and Portfolio*.
- Sustainable Farming Fund 2008. *Developing a climate change strategy for the NZ Arable Industry*, Grant No: C07/001.
- Taylor, M. 2012. *New Technologies in Arable Farming*, A report for the New Zealand Nuffield Farming Scholarship Trust (Michael Tayler, 2012, Nuffield Scholar).

Horticulture

- Horticulture New Zealand 2010. *An Overview: Horticulture Industry Strategy 2020*.
- Horticulture New Zealand 2010. *National Horticulture/Viticulture Labour Governance Group: 2010 Strategy*. A partnership of Industry, Government and the Council of Trade Unions and Horticulture New Zealand.
- PWC 2011. *NZ Winegrowers Strategic Review*.

Forestry

- Wood Council of New Zealand 2012. *New Zealand forest and wood products industry strategic action plan 2022* (Version 1, March 2012).
- Wood Co 2011. *Forest Industry Strategic Study*.
- Forest Owners Association 2012. *New Zealand Forestry Science and Innovation Plan*, research and development to increase the profitability and export earnings of the New Zealand forest growing sector.

Seafood

- Aquaculture New Zealand 2006. *The New Zealand Aquaculture Strategy 2025*, Aquaculture Council with the assistance of the New Zealand Seafood Industry Council and the Ministry of Economic Development.
- Seafood New Zealand 2013. *Seafood Strategy*.

Review process

To map primary industries' capability needs to 2025 a consistent set of industry strategies have been developed to provide context for the forecasting parameters in the doubling of exports from 2012. While most primary industries have strategic plans, differences in approach (for example, exports vs domestic, GDP, real vs nominal) and timeframes (for example, 2020, 2022, 2025) between industries required a standard framework to be developed for a consistent analysis of the strategies over the timeframe to 2025.

The framework is a bottom-up approach involving an analysis of the existing strategies of each primary industry and developing a picture of each in 2025. Forecast export earnings in 2025 serve as the pivot from which growth drivers are disaggregated into production and market-related factors.

The Steering Group, comprising six primary industry and rural professional representatives plus MPI senior staff, provided critical information and

perspectives for the 2025 strategic analysis. The Steering Group also served as a conduit to key stakeholders in their respective industries for broader input.

The Steering Group provided input and critiqued iterations of the summaries of the industry strategies. The Steering Group also expanded on the areas that would impact both the numbers of people in the industry and the skill requirements.

The Steering Group and thought leaders across the primary industries participated in a day-long workshop held on 30 January 2014. The workshop, especially the industry-focused break-out sessions, reflected and contributed critical perspectives to the 2025 industry strategy and human capability narratives in the areas of:

- drivers, implications, requirements for human capability
- challenges and risks
- market growth
- market preferences
- adding value
- packaging and logistics
- supply response
- regional implications
- farm productivity.

Observations and insights from the workshop were reflected into the industry strategy and capability summaries.

The workshop had a session on focusing on potential actions under the following headings.

Historical employment data

Infometrics have developed a regional industry employment model (RIEM) which provides more robust and up-to-date information than Business Demography statistics, the source used by most economic analysts for estimates of regional employment. The RIEM is built on quarterly and annual linked employer-employee data (LEED) extracted by special request from Statistics New Zealand at the territorial authority level. Quarterly LEED provides the number of employees in each industry for each quarter. Annual LEED provides the number of self-employed in each industry which are quarterised and added to the number of employees to arrive at total employment.

The model estimates employment in recent quarters for which LEED is not available by using time series analysis. The model draws on the relationships between industry performance at the territorial authority level and national level and recent trends in industry performance.

The RIEM provides estimates of the number of people employed in 480 industries in each region and territorial authority for each quarter since June 1999.

Data from the RIEM has the following advantages over data from Business Demography.

- The RIEM includes self-employment whereas it is excluded from Business Demography. The exclusion of self-employment leads to a significant undercount of employment in certain industries such as agriculture and

construction. Infometrics uses LEED and census to provide estimates of self-employment by industry.

- The RIEM is benchmarked on industry employment totals from LEED, which is statistically more robust than Business Demography. LEED is designed to measure employment whereas Business Demography is designed to measure the number of establishments and only measures employment as a spin off.
- The RIEM measures employment in each quarter of the year whereas Business Demography provides only a single snapshot (February) each year. Providing only a single snapshot is inadequate for industries such as horticulture and hospitality which are highly seasonal.
- The RIEM is significantly more up-to-date than Business Demography. The latest data available from the Business Demography is from February 2009 whereas the RIEM has data up to the December 2009 quarter.

Industry selection

The selection of industries relevant to the future capabilities project was made in consultation with the working group. Statistical analysis is necessarily based on the 2006 ANZ System of Industry Classification (ANZSIC06). Although we use the finest definition of the data available (level 4), it is not possible to get a perfect match between user requirements and the industry classifications used by statistical agencies. Some issues arise because of the difficulty of classifying the multiple activities conducted by different organisations. For example, many farms will grow crops as well as grazing stock. There are also issues relating to the grouping of value adding activities by the nature of the activity rather than a focus on the products that have value added. For example, no division is available of veterinary services between sheep, beef, dairy, horse, or pet care for that matter. Given the imperfections that attend the data used, employment by industry has been clustered into the following groups:

- Horticulture
- Red meat and wool
- Arable
- Dairy
- Seafood
- Forestry
- Other primary
- Support services

The sub-components of these industry clusters are defined in the following tables.

Table 74

Horticulture

ANZSIC 2006 Primary Industries

A011100	Nursery Production (Under Cover)
A011200	Nursery Production (Outdoors)
A011300	Turf Growing
A011400	Floriculture Production (Under Cover)
A011500	Floriculture Production (Outdoors)
A012100	Mushroom Growing
A012200	Vegetable Growing (Under Cover)
A012300	Vegetable Growing (Outdoors)
A013100	Grape Growing
A013200	Kiwifruit Growing
A013300	Berry Fruit Growing
A013400	Apple and Pear Growing
A013500	Stone Fruit Growing
A013600	Citrus Fruit Growing
A013700	Olive Growing
A013900	Other Fruit and Tree Nut Growing

ANZSIC 2006 Primary Processing Industries

C114000	Fruit and Vegetable Processing
C119100	Potato Crisps and Corn Chips Manufacturing
C121100	Soft Drink, Cordial and Syrup Manufacturing
C121400	Wine and Other Alcoholic Beverage Manufacturing

ANZSIC 2006 Other potential value chain industries

F360500	Fruit and Vegetable Wholesaling

Table 75

Red meat and wool

ANZSIC 2006 Primary Industries

A014100	Sheep Farming (Specialised)
A014200	Beef Cattle Farming (Specialised)
A014300	Beef Cattle Feedlots (Specialised)
A014400	Sheep-Beef Cattle Farming
A014500	Grain-Sheep and Grain-Beef Cattle Farming
A018000	Deer Farming
A052200	Shearing Services

ANZSIC 2006 Primary Processing Industries

C111100	Meat Processing
C111300	Cured Meat and Smallgoods Manufacturing
C131100	Wool Scouring
C131200	Natural Fibre Textile Manufacturing
C131300	Synthetic Fibre Textile Manufacturing
C132000	Leather Tanning, Fur Dressing and Leather Product Manufacturing
C133100	Textile Floor Covering Manufacturing
C133300	Cut and Sewn Textile Product Manufacturing
C133400	Textile Finishing and Other Textile Product Manufacturing
C134000	Knitted Product Manufacturing
C135100	Clothing Manufacturing
C135200	Footwear Manufacturing

ANZSIC 2006 Other potential value chain industries

F331100	Wool Wholesaling
F360200	Meat, Poultry and Smallgoods Wholesaling
F371100	Textile Product Wholesaling

Table 76

Arable

ANZSIC 2006 Primary Industries

A014600	Rice Growing
A014900	Other Grain Growing
A015100	Sugar Cane Growing
A015200	Cotton Growing
A015900	Other Crop Growing n.e.c.

ANZSIC 2006 Primary Processing Industries

C115000	Oil and Fat Manufacturing
C116100	Grain Mill Product Manufacturing
C116200	Cereal, Pasta and Baking Mix Manufacturing
C117100	Bread Manufacturing (Factory-based)
C117200	Cake and Pastry Manufacturing (Factory-based)
C117300	Biscuit Manufacturing (Factory-based)
C117400	Bakery Product Manufacturing (Non-factory-based)
C118100	Sugar Manufacturing
C118200	Confectionery Manufacturing
C119200	Prepared Animal and Bird Feed Manufacturing
C121200	Beer Manufacturing
C121300	Spirit Manufacturing
C122000	Cigarette and Tobacco Product Manufacturing
C133200	Rope, Cordage and Twine Manufacturing

ANZSIC 2006 Other potential value chain industries

F331200	Cereal Grain Wholesaling
I530100	Grain Storage Services

Table 77

Dairy

ANZSIC 2006 Primary Industries

A016000	Dairy Cattle Farming

ANZSIC 2006 Primary Processing Industries

C113100	Milk and Cream Processing
C113200	Ice Cream Manufacturing
C113300	Cheese and Other Dairy Product Manufacturing

ANZSIC 2006 Other potential value chain industries

F360300	Dairy Produce Wholesaling

Table 78

Seafood

ANZSIC 2006 Primary Industries

A020100	Longline and Rack (Offshore) Aquaculture
A020200	Caged (Offshore) Aquaculture
A020300	Onshore Aquaculture
A041100	Rock Lobster and Crab Potting
A041200	Prawn Fishing
A041300	Line Fishing
A041400	Fish Trawling, Seining and Netting
A041900	Other Fishing

ANZSIC 2006 Primary Processing Industries

C112000	Seafood Processing

ANZSIC 2006 Other potential value chain industries

C239100	Shipbuilding and Repair Services
C239200	Boatbuilding and Repair Services
F360400	Fish and Seafood Wholesaling

Table 79

Forestry

ANZSIC 2006 Primary Industries

A030100	Forestry
A030200	Logging
A051000	Forestry Support Services

ANZSIC 2006 Primary Processing Industries

C141100	Log Sawmilling
C141200	Wood Chipping
C141300	Timber Resawing and Dressing
C149100	Prefabricated Wooden Building Manufacturing
C149200	Wooden Structural Fittings and Components Manufacturing
C149300	Veneer and Plywood Manufacturing
C149400	Reconstituted Wood Product Manufacturing
C149900	Other Wood Product Manufacturing n.e.c.
C151000	Pulp, Paper and Paperboard Manufacturing
C152100	Corrugated Paperboard and Paperboard Container Manufacturing
C152200	Paper Bag and Sack Manufacturing
C152300	Paper Stationery Manufacturing
C152400	Sanitary Paper Product Manufacturing
C152900	Other Converted Paper Product Manufacturing
C251100	Wooden Furniture and Upholstered Seat Manufacturing
C251900	Other Furniture Manufacturing

ANZSIC 2006 Other potential value chain industries

F333100	Timber Wholesaling
O771300	Fire Protection and Other Emergency Services (except Ambulance Services)

Table 80

Other primary

ANZSIC 2006 Primary Industries

A017100	Poultry Farming (Meat)
A017200	Poultry Farming (Eggs)
A019100	Horse Farming
A019200	Pig Farming
A019300	Beekeeping
A019900	Other Livestock Farming n.e.c.
A042000	Hunting and Trapping
A052100	Cotton Ginning

ANZSIC 2006 Primary Processing Industries

C111200	Poultry Processing
C119900	Other Food Products Manufacturing n.e.c.

ANZSIC 2006 Other potential value chain industries

F331900	Other Agricultural Product Wholesaling

Table 81

Support services

ANZSIC 2006 Primary Industries	
A052900	Other Agriculture and Fishing Support Services
ANZSIC 2006 Other potential value chain industries	
C183100	Fertiliser Manufacturing
C183200	Pesticide Manufacturing
C184200	Veterinary Pharmaceutical and Medicinal Product Manufacturing
C203100	Cement and Lime Manufacturing
C239300	Railway Rolling Stock Manufacturing and Repair Services
C246100	Agricultural Machinery and Equipment Manufacturing
D291900	Other Waste Collection Services
E310900	Other Heavy and Civil Engineering Construction
F332300	Industrial and Agricultural Chemical Product Wholesaling
F341100	Agricultural and Construction Machinery Wholesaling
I461000	Road Freight Transport
I471000	Rail Freight Transport
I481000	Water Freight Transport
I521100	Stevedoring Services
I521200	Port and Water Transport Terminal Operations
I521900	Other Water Transport Support Services
I529100	Customs Agency Services
I529200	Freight Forwarding Services
I530900	Other Warehousing and Storage Services
M691000	Scientific Research Services
M692100	Architectural Services
M692200	Surveying and Mapping Services
M692300	Engineering Design and Engineering Consulting Services
M692400	Other Specialised Design Services
M692500	Scientific Testing and Analysis Services
M693100	Legal Services
M693200	Accounting Services
M694000	Advertising Services
M695000	Market Research and Statistical Services
M696100	Corporate Head Office Management Services
M696200	Management Advice and Other Consulting Services
M697000	Veterinary Services
M699900	Other Professional, Scientific and Technical Services n.e.c.
M700000	Computer Systems Design and Related Services
S942900	Other Machinery and Equipment Repair and Maintenance

Support services

Only a subset of the employment in support services will actually be involved in primary industry activities. For example, although most fertiliser and pesticide production will be associated with primary activities, a smaller proportion of freight transport and other service activities listed in Table 81 will be involved in purely primary sector activities. To minimise the potential degree of over-count, the employment count used involved just a subset of what we deemed to be the most relevant occupations were used in the "other" potential value-chain industries. For

example, although we include agricultural engineers in our count we exclude aeronautical engineers; we include marine biologists, but exclude geologists and metallurgists; we include accountants if they are employed by a sawmill, but exclude them if they work for an accounting firm.

We have thus tended to err on the side of caution and, outside primary production and processing, have tended towards favouring an under-count ahead of an over-count. However, the nature of the industrial classification means that we are in a process of trying to fit square pegs into round holes. There will naturally be places where our estimates overstate the true number of people working in primary industry activities. Likewise there will be other areas where our estimates are an understatement.

There is also an issue of attribution with specific primary industries. We provide estimates of employment in rail freight, but cannot realistically divide the extent that this employment depends on transporting forest products rather than dairy products. The implication is more important from the perspective of the primary industry. For example, our estimates of the skill requirement of the seafood industry will understate their skill requirements by the extent that important services such as IT, scientific research, and legal services are outsourced. Hopefully we have captured many of these people within miscellaneous support of primary industries, but it is beyond the scope of the methods used in the current project to attribute this skill requirement between the different primary industry sectors (for example, between dairy and seafood).

Employment by occupation

Employment by occupation is estimated through a process of translating employment by industry to employment by occupation. Employment in each industry is converted to occupational employment using the relationship between industry and occupational employment observed in various Population Censuses. The Population Census measures the occupational composition of employment in each industry and how this changes over time. In our method, there are two effects influencing the growth or decline in employment in each occupation. The first is the *industry effect* which is the effect of growth in employment in which an occupation is concentrated. For instance, most carpenters work in the residential construction industry so growth in this industry results in growth in demand for carpenters. The second effect is the *occupational effect* which is the effect of the changing composition of employment in each industry. For instance, the number of carpenters used relative to other occupations in the residential construction industry may be declining because of the increasing use of kit-set houses which require fewer skilled carpenters and more less-skilled hammer-hands than conventional construction methods.

Estimates of employment by occupation are based on the following steps:

1. Estimate employment by industry for each year to the current year.
2. Estimate the occupational shares of employment in each industry in the base year. This is estimated from the Population Census.
3. Estimate the occupational shares of employment in each industry for each year up to the current year. This is estimated using the change in occupational shares observed between the 1996, 2001 and 2006 Population Censuses and adjusted on an ad-hoc basis to reflect industry specific feedback that we have received while conducting analysis for various institutions.
4. The occupational shares in each industry in each year are multiplied by estimated employment in each industry to arrive at occupational employment in each industry. Occupational employment is summed across industries to arrive at total employment by occupation in each year.

Employment by qualification level and field of study

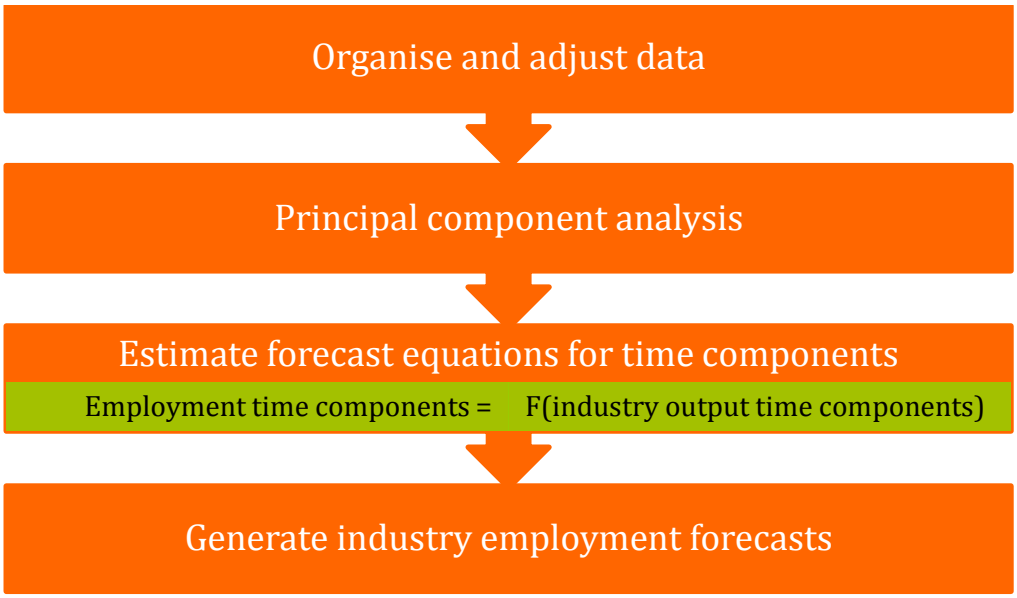
1. We derive estimates of employment by qualification using the link between occupation and qualification used in the Australian New Zealand Standard Classification of Occupations (ANZSCO). We assume that each occupation requires the qualification level indicated by ANZSCO. We do not measure the qualification levels of the workforce as it is likely that many individuals will have qualifications higher or lower (or no qualifications at all) than that suggested by ANZSCO. Instead, we measure the ideal mix of qualifications required by the economy.
2. Each occupation in the ANZSCO classification at the 6 Digit level is uniquely matched to one of five qualifications (or skill) categories. These five categories are:
    - Skill level 1 which is commensurate with a degree or higher qualifications ie NZQA level 7 and above. This skill level is referred to as "Highly Skilled" in the report.
    - Skill level 2 which is commensurate with NZ Register Diploma ie NZQA level 5 and 6. This skill level is referred to as "Medium-high Skilled" in the report.
    - Skill level 3 which is commensurate with NZ Register Level 4 qualification. This skill level is referred to as "Medium Skilled" in the report.
    - Skill level 4 which is commensurate with a NZ Register Level 2 or 3. This skill level is referred to as "Medium-low Skilled" in the report.
    - Skill level 5 which is commensurate with NZ Register Level 1. This skill level is referred to as "Low Skilled" in the report.
3. We split our estimates of employment for each combination of occupation and qualification into fields of study using data from the 2006 Population Census. From the Census we can estimate in which field of study individuals have qualifications. By aggregating across the various combinations of occupations and qualifications we arrive at the total for each field of study.
4. The resulting demand for labour by qualification and field of study is then driven by forecasted demand for labour by industry and changing shares of occupations in industry employment while the shares of field of study for each occupation/qualification combination remains constant according to what can be observed in the 2006 Population Census.
5. While there is not a unique mapping from occupation to qualification at the 2 digit ANZSCO, the above results on qualification and field of study are obtained by means of weighted averaging.

Employment forecasts

Business-as-usual forecasts

The business-as-usual forecasts are based on a model developed by Infometrics for forecasting employment by detailed industry at the regional level (506 level 4 ANZSIC industries by 16 regions). The forecasts generated by this model are in turn based on a model that forecasts output (contributions to GDP) for 54 individual industries. An overview of the forecast process is presented in Figure 21.

Figure 21: Overview of industry employment forecasting process



Data organisation

The RIEM employment data is expressed as a percentage of total national employment, so we model the shares of employment in each industry i and region j

$$\overline{E} = \sum_{i=1}^{I}\sum_{j=1}^{J} s_{i,j}\overline{E}$$

Expressing employment in this way means that trends in employment numbers are excluded from the analysis underpinning the model development. It also means that it is a straightforward task to ensure that the sum of employment in industries sum to the outlook for total national employment.

Principal component analysis

Principal component analysis is critical to the modelling approach. Principal component analysis allows a structured decomposition of a panel dataset into independent (orthogonal) clusters that have co-moved over time. This is important as macro-economic forces can have simultaneous (though not necessarily equal) impacts on employment in different industries. Using principal components allows inter-dependencies between employment in different industries and regions to be isolated and a reduction in the dimensionality of the analysis (thus removing noise from the model and focusing on the underlying drivers of industry employment). The orthogonal properties of the principal components mean that one can estimate forecasting equations for each of the associated time components independently using standard single equation OLS regression techniques and then apply matrix multiplication to obtain forecasts for employment in individual industries.

Figure 22: Conceptual illustration of model structure

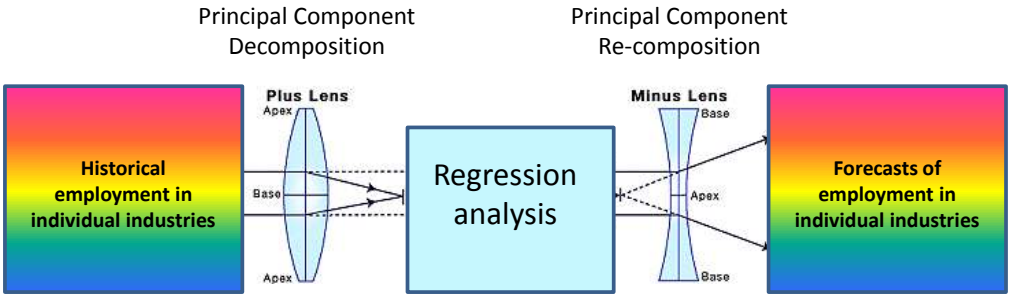


Figure 22 presents a schematic illustration of the model structure. Historical panel data of employment by region are analysed using principal component analysis to cluster historical co-movements. The derived principal components have two dimensions, a cross-section correlation element and an inter-temporal time component that records common movements in the cluster over time. A key property of principal component analysis is an ability to order the components in order of their ability to explain historical variation in the panel of interest. This property can be used to reduce the dimensionality and scale of the forecast problem. In the current situation, this allows us to reduce the forecasting problem from having to forecast 506 inter-dependent time series of industry employment in each region into one of forecasting much fewer (just 12) independent time components for each region.

The model structure uses principal component analysis to identify the critical time components. Regression techniques are then used to develop forecast models for each of the time components. Once forecasts have been derived for the time components, we then generate forecasts of the full panel by multiplying the forecast time components with their associated cross-sectional elements.

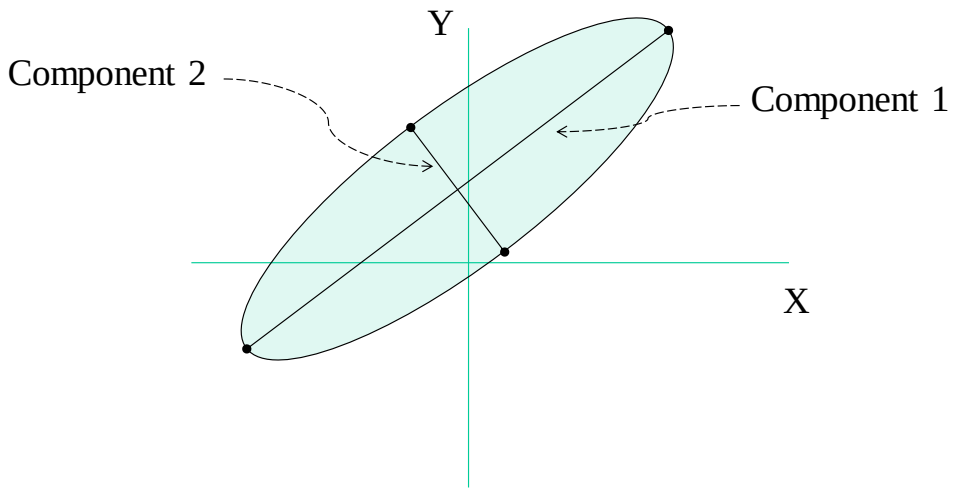
Principal component decomposition

Principal component analysis is a mathematical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of uncorrelated variables called principal components.[43] The number of principal components is less than or equal to the number of original variables. This transformation is defined in such a way that the first principal component has as high a variance as possible (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it be orthogonal to (uncorrelated with) the preceding components (see Figure 23).

[43] This concept is illustrated in 2 dimensions in Figure 23 where a scatter of observations is illustrated as lying within an ellipse. The principal component analysis conducts 3 tasks:

1. it identifies the orthogonal dimensions of the data (illustrated here by the perpendicular lines marked component 1 and component 2);
2. it orders the components in order of magnitude (component 1 "explains" more of the variation in the data than component 2); and
3. it describes the orientation of the components relative to the XY axes, ie the rotation and transformation that explains the angle and placement of each component relative to the XY axes.

Figure 23: Conceptual illustration of principal components



The main applications of principal component techniques are: (1) to *reduce* the number of variables and (2) to *detect structure* in the relationships between variables, that is to *classify variables*. We adopt a principal component approach because we consider there to be a strong chance that employment in different industries and regions will respond in a common way to external stimuli (for example, an increase in world milk prices will increase employment opportunities on dairy farms, in agricultural services, dairy processing). The principal component approach uses eigenvector/eigenvalue matrix algebra techniques to distil correlations between employment in different industries and regions.

The approach has the added advantage of reducing the number of forecast equations. In the case of industry employment in each region, the 506 industries over 49 quarters (March 2000 to March 2012) represents 24,794 separate points of data. If we denote this 506 by 49 matrix as S, then principal component analysis can then decompose the matrix into 506 orthonormal components (ie 506 49x1 vectors) with each component's associated eigenvector. A property of this decomposition is that matrix multiplication of the stacked principal component and eigenvectors yields the original matrix of industrial output shares, ie

$$S = PC * EV$$

where PC is a 49x506 matrix of principal components and EV is a 506x506 matrix of associated eigenvectors. Thus the matrix multiplication product of the decompositions yields the 49x506 matrix S as per the equation above. The principal components and associated eigenvectors are ordered in descending order of the amount of variation in the data set explained by each combination. The implication is that one can generate estimates of S using fewer eigenvectors, for example for any k<50 one can estimate S by:

$$S \approx PC(49 \times k) * EV(k \times 506)$$

This property, plus the linear independence of each principal component (orthonormality), is exploited to generate forecasts. As a high percentage of the variation in S can perhaps be explained by a small number of principal components it is usually possible to greatly simplify the forecasting process. Forecasts can be generated for the entire dataset by forecasting just a handful (k) of the principal components. The orthonormality of the principal components means that each principal component can be forecast independently, and it is the eigenvectors that allow the forecasts to capture co-movements in the series.

In practice, time series forecasting processes are used to forecast values of *PC*. These forecast values are then multiplied against the eigenvectors to generate forecasts of the industry shares, ie the re-composition phase illustrated in Figure 22. By using principal component methods we are able to forecast employment in each region for all 506 industries by using just 12 forecast equations.

Generating forecasts

From a conceptual basis the regional forecast approach is a top-down one. We begin with a national perspective of economic prospects. This not only determines overall growth prospects, but also the key drivers that will influence the nature of this economic growth. This feeds into the regional forecasts in two ways. First, they provide realistic constraints on the regional forecasts, for example, the sum of regional production must equate to national expectations. Second, it presents factors that will influence economic prospects in different regions. For example, an outlook that incorporates a fall in the exchange rate and/or improvements in the terms of trade might be expected to see relatively higher growth in tradable industries (such as primary and manufacturing industries) and in regions which have a high proportion of tradable industries.

In a process sense, regional economic forecasts are developed in the following practical steps:

1. Infometrics undertakes its economy-wide forecasts.
2. National industrial production is forecast at the national level (ie how much of GDP will come from agriculture, fishing, forestry) using a principle components approach. Forecasts of the principal time components of industrial production are forecast by establishing a relationship with macroeconomic indicators, for example, PC1 = f(terms of trade, interest rates, government consumption).
3. Regional industry employment (expressed as a percentage of total national employment) is decomposed into its principal components. This analysis is undertaken at the regional level (ie for Northland, Auckland, ..., Southland).
4. Ordinary least squares regression techniques are used to establish the equilibrium correction relationship between the regional employment principal time components (derived in stage 3) and the national industry output principal time components (derived in stage 2).
5. Forecasts of the national industry output principal time components are then used via the relationships estimated in stage 4 to forecast the regional industry employment principal time components. Employment numbers are then derived by multiplying the time components by their associated cross sectional eigenvectors and then multiplying the resulting estimates of employment shares by forecasts of national employment.

Primary industry employment business as usual forecasts

The forecast process just described generates a set of forecasts of the employment count for 506 industries in 16 regions. We then used the industry definitions for primary industries (described in *Industry selection* on page 123) to generate specific employment forecasts. Cross tabulations by occupation (see page 130) and qualification level and field of study (page 131) are also derived.

Strategy forecasts

The business-as-usual forecasts represent the outlook for employment in primary industries given the current structure of the primary industries, the past

performance of these industries and the outlook for the world economy based on Infometrics forecasts. The business-as-usual forecasts are a benchmark for comparing the outlook based on the industry strategies. Where the strategy forecasts present the skill implications of the industries' aspirations, the business-as-usual forecasts provide an indication of the benchmark prospects for the industries' demand for skills.

The process of forecasting the employment implications of the successful implementation of the strategies is to:

1. Use supply use tables to determine the production implications of achieving the strategy export targets.
2. Adjust the mix of production to account for land use projections and biological production constraints.
3. Apply productivity assumptions to generate a split in labour requirements between primary production, processing activities and support services.
4. Make adjustments based on specific feedback received from industry representatives.
5. Allocate employment into detailed industry and occupations based on results established in the business as usual forecasts.

Export targets

The strategies are typically expressed in terms of an expansion of the export earnings of primary industries. The strategies recognise that lifting export earnings will require increasing the value of exports. Depending on the industry, higher export earnings will require a combination of more processing, product innovation and a changing mix of workers.

A comparison of the planned export performances with that achieved in the 10 years from 2002 to 2012 is presented in Table 82. The planned expansions in export earnings for horticulture, arable and dairy are ambitious but in line with the type of growth achieved between 2002 and 2012. Given past stagnation in export earnings the planned 3.3% pa, expansion in seafood export earnings growth is realistically more modest than other sectors. The planned export growth for sheep and beef and forest products appear the most ambitious given recent performance. Both will require a significant jump up the value chain via product innovation, further processing, and market development. For sheep and beef further reductions in land use (see *Land-use modelling* below) and continued poor prospects for wool-based products mean that the export revenue target will require a higher-valued product range of the sheep and beef exports.

Table 82: Export earnings growth, achieved and planned, average annualised growth rates

Sector	Achieved 2002-2012	Planned 2012-2025
Horticulture	5.3%	5.5%
Sheep and Beef	0.5%	4.8%
Arable	7.6%	5.0%
Dairy	7.5%	5.5%
Seafood	-0.1%	3.3%
Forestry	1.6%	10.3%

The desired 10.3% pa increase in export earnings from forest products requires a significant expansion in New Zealand's capacity to produce higher valued wood products. Although there is likely to be an increases in the sustainable roundwood harvest up from 26m m^3 in 2012 to 36m m^3 in 2025, this expansion of supply is not sufficient to generate the anticipated expansion in export earnings without exports containing a larger proportion of higher valued processed products. In 2013, over 70% of the volume of wood products exported from New Zealand was in the form of logs or wood chips. To achieve the desired expansion in export earnings we estimate that processed wood exports will need to expand from 6.5m m^3 of roundwood equivalent in 2013 to 18.3m m^3 by 2025, while logs and woodchip exports will need to decline from 16.0m m^3 to 10.0m m^3.

Table 83: Forestry export volumes,
(000 M^3, roundwood equivalent)

June years	Logs and wood chips	Other processed wood exports	Total wood product
2000	6,965	6,199	13,164
2001	7,136	8,783	15,919
2002	8,614	7,100	15,714
2003	9,361	4,345	13,706
2004	7,024	6,218	13,242
2005	5,764	7,470	13,234
2006	5,840	7,230	13,071
2007	7,026	6,584	13,610
2008	7,109	5,874	12,984
2009	8,294	6,085	14,379
2010	10,778	6,184	16,963
2011	13,309	6,294	19,603
2012	14,083	6,417	20,500
2013	15,938	6,497	22,435
Forecast for 2025 based on:			
10.3% CAGR, 2% pa wood price growth	10,225	18,317	28,542

Source: http://www.mpi.govt.nz/news-resources/statistics-forecasting/forestry/annual-forestry-export-statistics.aspx

Land-use modelling

Estimates of where on the value-chain production will occur were also informed by land-use modelling conducted by Motu.[44] The critical inputs into this modelling were:

- the interest rates,
- commodity prices, and
- the carbon price.

The interest rate and commodity price profiles were provided by Infometrics, consistent with the Infometrics November 2013 Economic Forecasts. The carbon price was set to zero.

[44] Information about LURNZ, the land use model used is available from the Motu website: http://www.motu.org.nz/research/group/land_use_in_rural_new_zealand_model.

The summary results of the LURNZ based land-use projections are presented in Table 84 and Table 85. The model indicates that between 2002 and 2012 there was a substantial 688,000 ha decline in land devoted to sheep and beef farming. There was also a modest 8,000 ha decline in forest land. Dairy conversions accounted for 404,000 ha of these declines, but 291,000 ha went into other uses (defined in LURNZ as scrub).

Looking forward, LURNZ generally suggests a moderated continuation in these trends. A further 573,000 ha decline in sheep and beef farm land is expected by 2025. Most of this decline, 406,000 ha, is expected to go into other uses (scrub), but the area devoted to dairy production is expected to expand by a further 150,000 ha. Forest land is expected to expand by 16,000 ha, more than offsetting the 2002 to 2012 decline. The modest change in forest land reflects the zero carbon price underpinning the modelling. The expansion of "scrub" land suggests that access to land is unlikely to be a constraint, should a higher carbon price induce an expansion of forest land in the future.

Table 84: LURNZ land-use estimates and forecasts

	2002	2012	2025
Area (m Ha)			
Dairy	1.386	1.790	1.941
Sheep and Beef	7.628	6.940	6.367
Forest	1.333	1.326	1.342
Scrub	1.272	1.564	1.970
Share (%)			
Dairy	11.9%	15.4%	16.7%
Sheep and Beef	65.6%	59.7%	54.8%
Forest	11.5%	11.4%	11.6%
Scrub	11.0%	13.5%	17.0%

Table 85: LURNZ change in land-use estimates and forecasts

	2002-2012	2012-2025
Area (m Ha)		
Dairy	0.404	0.150
Sheep and Beef	-0.688	-0.573
Forest	-0.008	0.016
Scrub	0.291	0.406
Percent change		
Dairy	29.2%	8.4%
Sheep and Beef	-9.0%	-8.3%
Forest	-0.6%	1.2%
Scrub	22.9%	26.0%

Production implications

We made use of 2006/07 supply-use tables to translate export targets into production at different levels of the value chain. Supply-use tables allow a match between export and upstream industrial production. To allow matching with the

2006/07 tables we assume that export prices increase on average by 2% pa. We make one further critical adjustment in our calculations, we deemed that primary production is constrained by land use, as forecast using LURNZ (see above). The production from on farm is allowed to increase with land use adjusted for the same level of productivity growth experienced in the 2002 to 2012 period. Forecasts of off-land production are adjusted up in a pro rata way so that it is consistent with achieving the export targets.

Labour requirements

Labour requirements are influenced by judgements about labour productivity growth expectations for different stages of the value chain. In general we allow for 1.5% pa productivity growth for "on farm" production, 2.5% pa in processing activities, and 0.5% pa in support services.

Finally once the model generated forecasts of employment by industry, we applied the same filters applied to the business as usual forecasts to generate employment forecasts by:

- Occupation
- Field of study
- Level of qualification implications
- Ethnicity
- Gender
- Region
- Net replacement demand implications

Net replacement demand

Net replacement demand is a method for estimating job openings by occupation arising from individuals leaving an occupation net of jobs taken by individuals re-entering the occupation. By netting out individuals re-entering an occupation, net replacement rates measures are a subset of more commonly cited labour turnover rates. Net replacement demand is the relevant measure for providing advice on education and training needs, and potentially also for informing the setting of migration policy. By focusing on jobs defined by *occupation*, net replacement demand expresses job openings in a way that is applicable for education, training, and migration purposes. By *netting* out individuals re-entering the occupation, net replacement demand focuses on the subset of labour turnover that applies for education, training and migration requirements.

The cohort-component method described by Shah and Burke[45] has been used to estimate net replacement rates. The cohort-component method uses estimates of employment by occupation and age category at two different points in time, to establish the inflows and the outflows in each occupation in each age-cohort. Shah and Burke used annual data, however, due to the lack of annual data for New Zealand, data from the 2001 and 2006 Census was used in this study, together with national level forecasts from the Department of Labour.

The net flow from an occupation was estimated as the sum of the change in the size of each age cohorts between 2001 and 2006. If the size of the cohort decreased then there has been an outflow whereas if the cohort increased the net outflow is equal to zero. This is true if the number of people employed in an

[45] Shah C and Burke G. 2001. 'Occupational replacement demand in Australia'. *International Journal of Manpower*, Vol. 22, No. 7, pp. 648-663. Centre for the Economics of Education and Training, Monash University.

occupation is expanding, however, if employment is decreasing then the net outflow is equal to sum of outflows less the size of the employment decline. Total net outflow from an occupation is estimated by summing the net outflow from each age cohort. The five-year net demand replacement rate is estimated by dividing the total net outflow by employment in the occupation in 2001. This rate is converted to an annual rate.

An implication of the Shah and Burke method is that net replacement demand estimates are net of migration flows. This is appropriate as the employment of an appropriately trained immigrant offsets the requirement to train a replacement for an emigrant.

The above method provides historical estimates of net replacement demand rates for each occupation over the period 2001 to 2006. The data used here draws on forecasts developed by the Department of Labour out to 2016. Infometrics has extended these forecasts out to 2025 by relating the net replacement rate estimates to the age structure of the population based on Statistics New Zealand population projections.

Although the net replacement demand figures presented in the report provide an indication of the extent that training requirements will exceed employment growth, this is an area where we consider more analysis is warranted. There are some critical limitations to the measures presented in this report:

- Net replacement demand can be interpreted as providing a measure of the number of people required to complete training to enter an occupation to compensate for those leaving the occupation. Given that not everyone completes their training, however, net replacement demand numbers will be lower than the number of enrolments required to ensure that sufficient people can enter the occupation.
- An associated issue is that an occupation with a high level of turnover will potentially have a higher training requirement than is indicated by net replacement demand. Skills and ability depend on experience as well as training. It will take some time for a new entrant or a returning worker to reach the level of competency of departing workers.
- There will be aggregation errors in the measurement of net replacement demand, meaning that special factors for individual industries or sub-occupations will be missed. All farmers and farm managers are treated the same here, irrespective of the type of farm they work on.
- Net replacement demand figures will not provide any information about training requirements relating to upskilling within an occupation. It provides information about, say, the need for more workers with a trade qualification, but not about the potential need for training new skills to trade workers.