Chapter 10

Technical Documentation

This chapter provides a technical description of the data that was used to compile this report. It focuses on the data quality, and the definitions and processes used for data collection and analysis.

Survey background

The Biotechnology Survey 2005 measured the use of biotechnologies and their uptake. The survey also asked respondents about the characteristics of their organisations, including the use of strategic alliances, information sharing and constraints on biotechnology work.

Data collection

The Biotechnology Survey 2005 was a postal survey of all organisations meeting the population selection criteria. There were two ways in which an organisation could meet the criteria. The first was if certain biotechnology-specific keywords were found to match those in an organisation name on the Statistics New Zealand Business Frame.

Statistics NZ then supplemented this population with lists from New Zealand Government funding agencies and New Zealand biotechnology associations, as well as the indicator in the Research and Development Survey 2004.

The majority of the questionnaire uses a two-year reference period. Financial information was requested from respondents for the 2005 financial year. The survey was posted out in August 2005.

Target population

The population selection methodology was similar to that used by Statistics NZ in the Biotechnology Survey 2004. The only modification was the addition of enterprises to the population that reported biotechnology R&D in the Research and Development Survey 2004, but were not already captured through any of the keyword searches or organisational lists.

Organisations that reported they did not use biotechnology techniques in the 2004 survey were excluded from the population for 2005, unless there was good reason to include them.

The selection unit for inclusion in the population was set at the enterprise level.

Criterion 1

The population included enterprises whose predominant activity was likely to be modern biotechnology.

This category included:

(a) All enterprises on the Statistics NZ Business Frame with any of the following keywords in their legal and/or trading names:

- Bioinformatics
- Bioprocessing
- Bioreagent
- Biotechnology
- Biotransformation(s)
- Chromatography
- Clonal
- Concentrates
- Extract
- Extraction
- Fluid extraction
- Functional foods
- Genetic(s)
- Genomic(s)
- Industrial microbiology
- Monoclonal
- Nutraceutical(s)
- Proteomic(s)
- Supercritical
- Transgenic.

(b) Enterprises on the NZBio membership list.
(c) All institutions on the 2004 Foundation for Research, Science and Technology lists of applicants receiving funding to carry out biotechnology-related research and/or development activities.
(d) Local authority sewerage treatment facilities.
(e) All Crown research institutes.
(f) University departments that have an interest in biotechnology.
(g) Microbiology units in metropolitan hospitals.
(h) The New Zealand Blood Service.

Criterion 2

The second part of population selection attempted to identify enterprises whose predominant activity was not modern biotechnology, but who were considered likely to engage in some modern biotechnology activity. This category includes all enterprises on the Statistics NZ Business Frame with any of the following keywords in their legal and/or trading names:

- Biological
- Bioscience(s)
- Diagnostics
- Health
- Life science(s)
- Pharmaceutical(s)
- Pharmaceuticals
- Science(s)
- Scientific
- Serum.

The third part of the population selection process involved selecting all enterprises that have geographical units on the Statistics NZ Business Frame with one of the following ANZSIC codes:

A0301 Forestry
B1101 Black coal mining
B1200 Oil and gas extraction
C2121 Milk and cream manufacturing
C2129 Dairy product manufacturing
C2161 Bread manufacturing
Measurement errors
Given the nature of the data collected, there are limitations on the level of accuracy that can be expected from the Biotechnology Survey 2005. For many enterprises in New Zealand, biotechnology represents only a small portion of their operations, and for this reason it is hard to separate out biotechnology work from other work. Detailed definitions of what should and should not be included as biotechnology were provided on the questionnaire, and phone-in help was available to respondents.

Comparison between the 2004 and 2005 surveys
A number of changes have taken place between the running of the 2004 and 2005 surveys. The key changes are described below.

For all questions not relating to the last financial year, the reference period changed from the three-year period used in the Biotechnology Survey 2004, to a two-year period in the Biotechnology Survey 2005. This coincided with the survey becoming biennial from 2005.

In 2005, a new framework was used to determine the areas of application of biotechnology techniques being used. This framework is based on the work of the Ministry of Research, Science and Technology, and New Zealand Trade and Enterprise. For this reason, no comparisons can be made with previous years’ data.

The Biotechnology Survey 2005 captured data specifically on biotechnology commercialisation (new products/services introduced to the market).

As well as measuring constraints to R&D, as in 2004, the Biotechnology Survey 2005 also identified constraints to biotechnology commercialisation.

Caution needs to be taken when making comparisons between data from the Biotechnology Survey 2004 and the Biotechnology Survey 2005.

Industry sector breakdown
Throughout this report, industries have been classified to the following industry sectors, based on their ANZSIC96 (Australia New Zealand Standard Industrial Classification 1996) code.

The scientific research sector includes enterprises classified to scientific research (L7810), and technical services (L7829). Crown research institutes are classified to this sector.

In this report, universities are included in the higher education sector.

The manufacturing sector consists of all enterprises with an ANZSIC code of C, and includes both food and non-food manufacturing enterprises.
Response rate

The target overall response rate for the Biotechnology Survey 2005 was 90 percent. The survey achieved an actual response rate of 93 percent. A sector breakdown of response rates is given below in Table 10.1.

The population for the Biotechnology Survey 2005 consisted of 401 enterprises.

Table 10.01

<table>
<thead>
<tr>
<th>Industry</th>
<th>Response rate</th>
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<tbody>
<tr>
<td></td>
<td>Sent</td>
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<tr>
<td>Manufacturing</td>
<td>87</td>
</tr>
<tr>
<td>Scientific research</td>
<td>50</td>
</tr>
<tr>
<td>Higher education</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>254</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>401</strong></td>
</tr>
</tbody>
</table>

Imputation

No imputation was conducted for the Biotechnology Survey 2005.

Definitions

**ANZSIC**: Australia and New Zealand Standard Industrial Classification system – NZ version, 1996.

**Biotechnology**: The application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

The following list of techniques was published by the OECD in 2004 as an interpretative guide as to what biotechnology includes:

- **DNA – the coding**: genomics, pharmaco-genetics, gene probes, DNA sequencing/synthesis/amplification, genetic engineering
- **Proteins and molecules – the functional blocks**: protein/peptide sequencing/synthesis, lipid/protein glyco-engineering, proteomics, hormones, and growth factors, cell receptors/signalling/pheromones
- **Cell and tissue culture, and engineering**: cell/tissue culture, tissue engineering, hybridisation, cellular fusion, vaccine/immune stimulants, embryo manipulation
- **Process biotechnologies**: bioreactors, fermentation, bioprocessing, bioleaching, bio-pulping, bio-bleaching, biodesulphurisation, bioremediation, and biofiltration
- **DNA and RNA vectors**: gene therapy, viral vectors
- **Other**: bioinformatics, nanobiotechnologies, other.

**Enterprise**: A business or service entity operating in New Zealand. It can be a company, partnership, trust, estate, incorporated society, producer board, local or central government organisation, voluntary organisation or self-employed individual.

**Goods and services tax (GST)**: Respondents are asked to exclude GST if possible in the financial figures provided in the questionnaire. If they have not, Statistics NZ takes out GST to make all enterprises comparable.
Research and development (R&D): Research and experimental development comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge. Any activity classified as R&D is characterised by originality. Investigation is a primary objective.

Statistics New Zealand Business Frame: A register of all businesses operating in New Zealand.