





## Problems Affecting Biotechnology R&D Work

**52** Mark all that apply. Which of the following constraints to biotechnology research and development activities did this organisation face in the 12 months ending 30 June 2004?

i	Access to capital	<input type="checkbox"/>	5201
ii	Access to management experts	<input type="checkbox"/>	5202
iii	Access to qualified biotechnology research and technical experts	<input type="checkbox"/>	5203
iv	Access to suitably experienced biotechnology research and technical experts	<input type="checkbox"/>	5204
v	Access to biotechnology research data and / or information	<input type="checkbox"/>	5205
vi	Access to technology	<input type="checkbox"/>	5206
vii	Lack of information about markets	<input type="checkbox"/>	5207
viii	Regulations	<input type="checkbox"/>	5208
ix	Implications of Treaty of Waitangi claims	<input type="checkbox"/>	5209
x	Other, please specify:	<input type="checkbox"/>	5210
	5211	<input type="checkbox"/>	

## Definitions

**5** **What is biotechnology?**

The OECD defines biotechnology as 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 OECD provides the following list of biotechnologies, which can be used as an indicative guide to biotechnology activity.

**DNA - the coding:** Genomics, pharmaco-genetics, gene probes, DNA sequencing / synthesis / amplification, genetic modification.

**Proteins and molecules - the functional blocks:** Protein / peptide sequencing / synthesis, lipid / protein glycoengineering, 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.

**Sub-cellular organisms:** Gene therapy, viral vectors.

**Other:** Bioinformatics, nanobiotechnologies, etc.

**6** **Development stages**

The process of using biotechnology for commercial purposes can be divided into three main stages. These stages are outlined below:

**Research / product development stage**

Refers to the development of biotechnology products, processes and knowledge through research and development (R&D).

This stage includes the testing of processes and products in clinical or field trials.

**Part of the production stage**

The biotechnology product, process, or knowledge is used as an input into another distinct product or process.

**Part of the product sold stage**

The biotechnology product, process or knowledge becomes part of, or the entire final product sold.

**7** **What is research and development (R&D)?**

Research and experimental development comprises 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.

## Use of Biotechnologies

Mark your answers like this:

**i** This section asks about the use of biotechnologies by this organisation. Please refer to **6** for the definitions of the development stages.

### DNA - The Coding

**8** Mark all that apply. In the last 3 years, in which development stage(s) has this organisation used the following?

		Research & development	Part of the production process	Part of the product sold	Did not use this biotechnology
i	Genomics, pharmaco-genetics	<input type="radio"/> 0811	<input type="radio"/> 0812	<input type="radio"/> 0813	<input type="radio"/> 0814
ii	Gene probes	<input type="radio"/> 0821	<input type="radio"/> 0822	<input type="radio"/> 0823	<input type="radio"/> 0824
iii	DNA sequencing / synthesis / amplification, genetic modification	<input type="radio"/> 0831	<input type="radio"/> 0832	<input type="radio"/> 0833	<input type="radio"/> 0834

### Proteins and Molecules - The Functional Blocks

**9** Mark all that apply. In the last 3 years, in which development stage(s) has this organisation used the following?

		Research & development	Part of the production process	Part of the product sold	Did not use this biotechnology
i	Protein / peptide sequencing, synthesis	<input type="radio"/> 0911	<input type="radio"/> 0912	<input type="radio"/> 0913	<input type="radio"/> 0914
ii	Lipid / protein glycoengineering	<input type="radio"/> 0921	<input type="radio"/> 0922	<input type="radio"/> 0923	<input type="radio"/> 0924
iii	Proteomics	<input type="radio"/> 0931	<input type="radio"/> 0932	<input type="radio"/> 0933	<input type="radio"/> 0934
iv	Hormones and growth factors	<input type="radio"/> 0941	<input type="radio"/> 0942	<input type="radio"/> 0943	<input type="radio"/> 0944
v	Cell receptors / signalling / pheromones	<input type="radio"/> 0951	<input type="radio"/> 0952	<input type="radio"/> 0953	<input type="radio"/> 0954

### Cell and Tissue Culture, and Engineering

**10** Mark all that apply. In the last 3 years, in which development stage(s) has this organisation used the following?

		Research & development	Part of the production process	Part of the product sold	Did not use this biotechnology
i	Cell / tissue culture, tissue engineering	<input type="radio"/> 1011	<input type="radio"/> 1012	<input type="radio"/> 1013	<input type="radio"/> 1014
ii	Embryo manipulation	<input type="radio"/> 1021	<input type="radio"/> 1022	<input type="radio"/> 1023	<input type="radio"/> 1024
iii	Hybridization	<input type="radio"/> 1031	<input type="radio"/> 1032	<input type="radio"/> 1033	<input type="radio"/> 1034
iv	Cellular fusion	<input type="radio"/> 1041	<input type="radio"/> 1042	<input type="radio"/> 1043	<input type="radio"/> 1044
v	Vaccine / immune stimulants	<input type="radio"/> 1051	<input type="radio"/> 1052	<input type="radio"/> 1053	<input type="radio"/> 1054

## Human Resources Supporting Biotechnology

**50** Please give the number of biotechnology employees (headcount) and their full-time equivalents as at 30 June 2004.

Note: Full-time equivalents may be given to a decimal point.

Full-time equivalent (FTE): Biotechnology may be carried out by persons who work solely on biotechnology projects or by persons who devote only part of their time to biotechnology, and the balance to other activities such as testing, quality control and production engineering. To arrive at the total effort devoted to biotechnology in terms of hours worked, it is necessary to estimate the FTEs of these people working part time in biotechnology.

FTE = Number of persons who work solely on biotechnology projects + the estimate of time of persons working part-time on biotechnology.

Example calculation: If out of five scientists engaged in biotechnology work, one works solely on biotechnology projects and the remaining four devote one quarter each of their working time, the calculation would be:  
FTE = 1+1/4+1/4+1/4+1/4 = 2 FTE.

#### Exclude:

- Staff performing indirect support to biotechnology activities
- Central finance or personnel services
- Centralised support services, eg computer departments, security, cleaning, cafeteria etc.

#### Biotechnology employees

i	Headcount as at 30 June 2004	<input type="text"/>	5001
ii	FTEs during the year ended 30 June 2004	<input type="text"/>	5002
iii	Biotechnology positions unfilled as at 30 June 2004	<input type="text"/>	5003

**51** Please show the highest qualification levels of personnel working on biotechnology as at 30 June 2004.

	Qualification	Headcount as at 30 June 2004
i	PhD	<input type="text"/> 5101
ii	Bachelor degree or equivalent and postgraduate qualifications other than PhD For example: Masters degrees and post graduate diploma.	<input type="text"/> 5102
iii	Technical and trade qualifications For example: NZ Certificate of Engineering and NZ Trade Certificate.	<input type="text"/> 5103
iv	Other qualifications	<input type="text"/> 5104







**32** Mark all that apply. Which of the following overseas organisations did this organisation make partnership(s) / alliance(s) with in the last 3 years?

	Australia	USA	Europe	Asia	Other
i University	<input type="radio"/> 3211	<input type="radio"/> 3212	<input type="radio"/> 3213	<input type="radio"/> 3214	<input type="radio"/> 3215
ii Other organisations, please specify:	<input type="radio"/> 3221	<input type="radio"/> 3222	<input type="radio"/> 3223	<input type="radio"/> 3224	<input type="radio"/> 3225
	<input type="radio"/> 3226				

## Financial and Trade Information

**i** Please provide financial information for total business activity and careful estimates for the percentage of biotechnology activities.

Please report data for the accounting year ended 30 June 2004 or your last accounting year that ended within the 12 months up to 30 June 2004. Do NOT include sales and operations of your subsidiaries located outside New Zealand.

- Supply GST EXCLUSIVE values if possible.
- Supply whole dollar values only.

**33** What is the end-date of the accounting year you will report for?

Day      Month      Year

3301

**34** The figures given in this questionnaire:

Exclude GST  1

Include GST  2

3401

**35** What is the total income of this organisation?

\$

3501

**36** What is the percentage of total income attributable to biotechnology for this organisation?

%

3601

**37** What is the total expenditure of this organisation?

\$

3701

**38** What is the percentage of total expenditure attributable to biotechnology for this organisation?

%

3801

**39** What is the total value of goods, services, processes and knowledge exported by this organisation?

\$

3901

**40** What is the percentage of goods, services, processes and knowledge exported that are attributable to biotechnology for this organisation?

%

4001

## Aquaculture

**20** Mark all that apply. What area(s) of application best describe the products and / or services produced by this organisation?

i Fish health (eg diagnostics, therapeutics)  2001

ii Broodstock genetics (eg tracking superior traits, genetic modification)  2002

iii Bioextraction (eg carrageenan from seaweed, antifreeze proteins from fish, flavours)  2003

## Mining / Energy / Petroleum / Chemicals

**21** Mark all that apply. What area(s) of application best describe the products and / or services produced by this organisation?

i Microbiologically enhanced petroleum / mineral recovery  2101

ii (Cleaner) Industrial processing (eg biodesulphurisation, bio-cracking, bio-recovery)  2102

## Forest Products

**22** Mark all that apply. What area(s) of application best describe the products and / or services produced by this organisation?

i Silviculture (eg immunodiagnostics, gene probes, biosensors, medical laboratory)  2201

ii (Cleaner) Industrial processing (eg bio-pulping, bio-bleaching, biological prevention of sapstain)  2202

## Environment

**23** Mark all that apply. What area(s) of application best describe the products and / or services produced by this organisation?

i Biofiltration (eg treatment of organic emissions to air / water)  2301

ii Bioremediation and phytoremediation (eg cleanup of sewage water and toxic waste sites using micro-organisms)  2302

iii Diagnostics (eg detection of toxic substances using bioindicators, biosensors, immunodiagnostics)  2303

## Other

**24** Mark all that apply. What area(s) of application best describe the products and / or services produced by this organisation?

i Custom synthesis (eg peptides, proteins, nucleotides, hormones, growth factors, biochemicals)  2401

ii Other, please specify:  2402

2403

## New / Improved Biotechnology work

**25** In the last 3 years, did this organisation introduce any new or significantly improved biotechnology processes?

Note: Biotechnology processes are a range of techniques employed in biotechnology. Please refer to **5** for an indicative list of biotechnologies.

Yes  1 **2500** → How many processes?   2501

No  2 → Go to **27**

**26** How many of these new or significantly improved processes were:

i New to the world?   2601

ii New to New Zealand?   2602

iii New to this business?   2603

**27** In the last 3 years, has this organisation introduced any new or significantly improved biotechnology products / services?

Note: Biotechnology products are the goods and services produced for research and commercial use through the utilisation of one or more biotechnology processes.

Yes  1 **2700** → How many products / services?   2701

No  2

**28** In the next 3 years, does this organisation plan to introduce any new or significantly improved biotechnology products / services?

Note: Biotechnology products are the goods and services produced for research and commercial use through the utilisation of one or more biotechnology processes.

Yes  1 **2800** → How many products / services?   2801

No  2

## Strategic Partnership(s) / Alliance(s)

**29** In the last 3 years, did this organisation have any partnership(s) / alliance(s) for undertaking biotechnology activity (research and / or production)?

Note: Partnership / alliance is defined as an agreement with another business to undertake business activities without merging.

Yes  1

No  2 → Go to **33**

2901

**30** Mark all that apply. What were the purposes of these partnership(s) / alliance(s)?

i Product / process development  3001

ii Clinical / field trial  3002

iii Manufacturing  3003

iv Marketing / distribution  3004

v Regulatory affairs  3005

vi Finance  3006

vii Other, please specify:  3007

3008

**31** Mark all that apply. Which of the following New Zealand organisations did this organisation make partnership(s) / alliance(s) with in the last 3 years?

i Another business  3101

ii University  3102

iii Crown Research Institute  3103

iv Polytechnic  3104

v Other, please specify:  3105

3106