

Part 10 Comments and Additional Information**37** How long did it take you to complete this questionnaire?**Include:**

- The time spent reading the instructions, working on the questions and obtaining information
- The time spent by all employees in collecting and providing this information

hrs mins

38 Please make any additional comments below which might be useful to us in analysing the information you have given:
39 Please provide details of the person completing this questionnaire:

Name	Position	
<input type="text"/>	<input type="text"/>	
E-mail	Phone	Fax
<input type="text"/>	()	()
Signature	Date	
<input type="text"/>	<input type="text"/>	

Thank you for your time and effort**www.stats.govt.nz has the main results of all our surveys****Biotechnology Survey 1998/99**

Please correct any errors in this panel

For help and information:

Phone: 0800 809 464

Fax: 09 357 2195

E-mail: surveys@stats.govt.nz

Mail: Statistics New Zealand
 Freepost 10007
 Private Bag 92003
 Auckland

Return date:Please return this completed questionnaire, in the reply paid envelope enclosed, **within 15 days** of receiving it.**Purpose of this survey:**

The purpose of this survey is to collect statistics to develop an understanding of the use of modern biotechnology in New Zealand. The statistics collected by this survey will be used to measure the contribution of modern biotechnology to the New Zealand economy; and in the formulation of policies and procedures in support of modern biotechnology business activity.

Compulsory requirement:

The taking of this survey has been approved by the Minister of Statistics and the return of this questionnaire duly filled in and signed is a compulsory requirement under the Statistics Act 1975.

Confidentiality of information supplied:

Only people authorised by the Statistics Act 1975 are allowed to see your individual information, and they must use it only for statistical purposes. Your information will be combined with similar information to prepare summary statistics.

D. M. Macaskill

Dianne Macaskill
 Acting Government Statistician

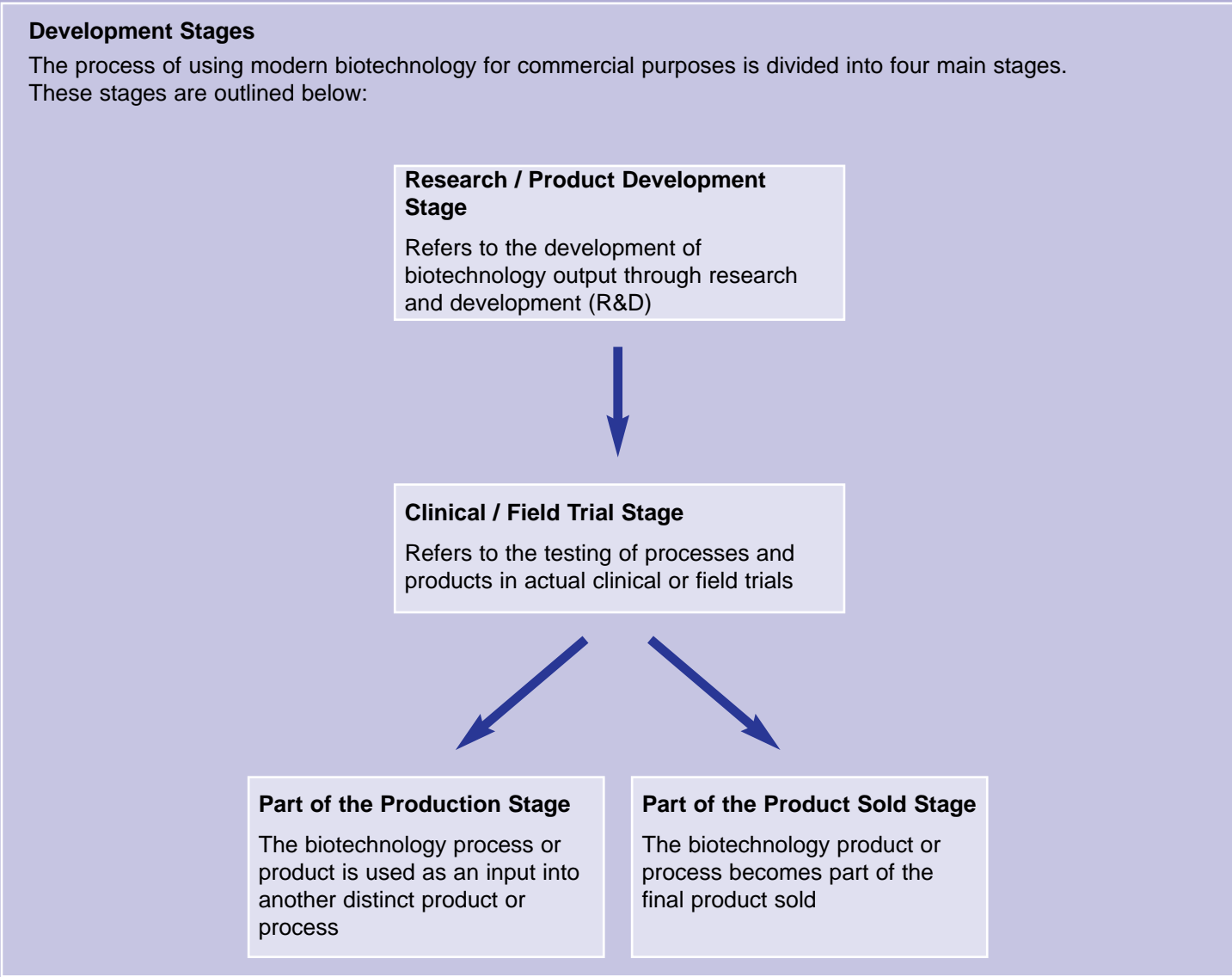
Biotechnology Survey

What is modern biotechnology?
 The New Zealand Biotechnology Association defines modern biotechnology as:
 “The application of scientific and engineering principles to the processing of material by biological agents and the processing of biological materials to improve the quality of life by isolating, modifying and synthesising the genetic instructions responsible for actual biological processes.”

Biotechnology Output
 The output of modern biotechnology includes both **processes** as well as **products**.

What are biotechnology processes?
 Biotechnology processes are a range of techniques dealing with recombinant DNA, cell fusion, plant and animal cell cloning, monoclonal antibodies, tissue culture, and bioprocess engineering.
 A total of 58 biotechnology processes classified into four groups are printed on pages 4 through 19.

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



What is Research & Development (R&D)?
 “Research and development refers to investigative work which is of actual or potential use in the development of new or enhanced materials, products, services or processes. R&D directed towards duplicating work already developed by others should only be included if the knowledge or technology required for development is not available to this business.”

Part 9 Problems Affecting Biotechnology Research and Development Work

34 Tick as many spaces as you need to show the constraints to biotechnology research and development activities faced by this business over the accounting period:

- i. Access to capital
- ii. Access to management experts
- iii. Access to trained biotechnology research and technical experts
- iv. Access to suitably experienced biotechnology research and technical experts
- v. Access to biotechnology research data and/or information
- vi. Access to technology
- vii. Lack of information about markets
- viii. Regulations
- ix. Implications of Treaty of Waitangi claims
- x. Other (Please specify)

35 In the 12 months ending 30 June 1999, did this business try to recruit any staff from outside New Zealand for biotechnology research and development work?

Yes

No → Go to question 37

36 In the 12 months ending 30 June 1999, were any of these overseas recruitment bids successful?

Yes No

Tick as many spaces as you need to show which countries staff were recruited from

- i. Australia
- ii. Asia
- iii. Europe
- iv. USA
- v. Other (Please specify)

Tick as many spaces as you need to show why this business' overseas recruitment bids failed

- i. Inability to match overseas salary levels
- ii. Personal income taxes
- iii. Immigration rules and procedures
- iv. Advancement opportunities
- v. Loss of professional networks
- vi. Other (Please specify)

Please go to next page →

Part 7 Research Publications and Conferences

31 In the 12 months ending 30 June 1999, did any staff member of this business:

	Yes	No
i. Publish an article on biotechnology in a refereed journal?.....	<input type="radio"/>	<input type="radio"/>
ii. Attend a conference (national or international) on a biotechnology subject?.....	<input type="radio"/>	<input type="radio"/>
iii. Present a research paper at such a conference (national or international) on biotechnology?.....	<input type="radio"/>	<input type="radio"/>

Part 8 Human Resources Supporting Biotechnology Activity

32 Please give the number of employees (or Head-count) and their full-time equivalents as at 30 June 1999. Note: Full-time equivalents may be given to a decimal point.

Full-time equivalents (FTEs) are measured in terms of full-time equivalent years. For example, a full-time person spending 40% of his/her working time on biotechnology during half of the survey year would contribute 0.4 persons x 0.5 years = 0.2 full-time equivalent years to the biotechnology effort.

Do NOT include:

- staff performing indirect support to biotechnology activities
- central finance or personnel services
- centralised support services eg computer departments, security, cleaning, cafeteria etc.

(If information is not available, please make careful estimates)

Biotechnology Employees

i. Head-count as at 30 June 1999	<input style="width: 50px; height: 20px;" type="text"/>
ii. FTEs during the year ended 30 June 1999	<input style="width: 50px; height: 20px;" type="text"/>
iii. Biotechnology positions unfilled as at 30 June 1999	<input style="width: 50px; height: 20px;" type="text"/>

33 How many of this business' biotechnology staff members have these qualifications as at 30 June 1999? Include staff doing biotechnology research and development work.

Qualification	Head-count
i. Ph D	<input style="width: 50px; height: 20px;" type="text"/>
ii. M Phil / M Sc	<input style="width: 50px; height: 20px;" type="text"/>
iii. B Sc / B Tech	<input style="width: 50px; height: 20px;" type="text"/>
iv. Diploma / Certificate	<input style="width: 50px; height: 20px;" type="text"/>
v. Other	<input style="width: 50px; height: 20px;" type="text"/>

Part 1 Instructions

1 **Include information only for the business named on the front page - do NOT provide consolidated data.**

Do NOT include:

- Subsidiary or associated businesses
- Accounting divisions that operate entirely outside New Zealand

2 **Please keep a record of the time it takes you to complete this questionnaire. You are asked to record this in question 37, page 28.**

Include:

- The time spent reading the instructions, working on the questions and obtaining information
- The time spent by all employees in collecting and providing this information

3 **Survey Reference Period**

Unless otherwise specified, please provide data for the year ended **30 June 1999** OR your last accounting year that ended within the 12 months up to 30 June 1999.

Please go to next page

Part 2 Use of Biotechnology Processes by This Business

4 For each process listed, work across these pages to answer every question in the column headings.

5 DNA Based: Technology using chemistry of DNA as a major component

Biotechnology Processes	Was this process used in operations by this business during the accounting year?
Please see page 2 for the definition of biotechnology processes.	
1. Genetic Engineering / Recombinant DNA The manipulation of an organism's genetic material by introducing or eliminating specific genetic changes through modern molecular biology techniques	<input type="radio"/> Yes → <input type="radio"/> No →
2. Gene Probes A section of DNA or RNA of known structure or function which is marked with a radioactive isotope, dye or enzyme that can be used to detect the presence of a similar sequence from any biological material	<input type="radio"/> Yes → <input type="radio"/> No →
3. Bio-informatics Computer-based analysis of biological information (bio-info), especially genomics and molecular modelling (eg DNA/RNA/protein sequencing and databases for genes of humans, plants, animals and micro-organisms)	<input type="radio"/> Yes → <input type="radio"/> No →
4. Genomics The use and organisation of information of biological interest, including the construction and analysis of genes that may be used to search for new genes of interest, matching existing genes etc.	<input type="radio"/> Yes → <input type="radio"/> No →
5. Pharmacogenetics The study of the genetics of drug production, action or assimilation	<input type="radio"/> Yes → <input type="radio"/> No →
6. DNA Sequencing A method to determine the order of nucleotides on a gene or DNA fragment	<input type="radio"/> Yes → <input type="radio"/> No →
7. DNA Synthesis Design and synthesis of a DNA molecule from existing information of its constituent bases	<input type="radio"/> Yes → <input type="radio"/> No →
8. DNA Amplification Process of increasing the number of copies of a particular gene of chromosomal sequence	<input type="radio"/> Yes → <input type="radio"/> No →

25 Has this business ever had to abandon or not start a biotechnology development activity because further work had been blocked by lack of access to basic research data or information?

Yes
 No

26 In the last 3 years has this business been involved in litigation relating to patent infringements? Yes → How many different cases? No

27 In the last 3 years has this business been involved in disputes relating to access to research data or information? Yes → How many different cases? No

28 In the last 3 years has this business entered into any informal arrangements to share information with any of these organisations? Tick as many spaces as you need.

	In NZ	Outside NZ
Another business	<input type="radio"/>	<input type="radio"/>
University	<input type="radio"/>	<input type="radio"/>
Crown Research Institute	<input type="radio"/>	
Hospital	<input type="radio"/>	<input type="radio"/>
Other (Please specify)	<input type="radio"/>	<input type="radio"/>

29 In the last accounting year has this business acquired the right to use intellectual property from any of these? Tick as many spaces as you need.

	In NZ	Outside NZ
Another business	<input type="radio"/>	<input type="radio"/>
University	<input type="radio"/>	<input type="radio"/>
Crown Research Institute	<input type="radio"/>	
Hospital	<input type="radio"/>	<input type="radio"/>
Other (Please specify)	<input type="radio"/>	<input type="radio"/>

30 Please write in the number of successful biotechnology-related patent applications made by this business:

i. In the last year ending June 30 1999

ii. In the last 5 years

Part 5 Financial and Trade Information

18 Please provide financial information for **total business** activity and the estimated amount for biotechnology activity.
 Note: Please report data for the accounting year ended 30 June 1999 or the latest financial year for which records are available. Do NOT include sales and operations of your subsidiaries located outside New Zealand.

What is the end-date of the accounting year you will report for: / / 1999

19 Total income: (If this information is not available, please make a careful estimate.)

Total	% Biotechnology
\$ <input type="text"/>	<input type="text"/> %

20 Total expenditure: (If this information is not available, please make a careful estimate.)

Total	% Biotechnology
\$ <input type="text"/>	<input type="text"/> %

21 What is the total amount exported by this business as a percentage of total production of goods / services? (If this information is not available, please make a careful estimate.)

%

22 Biotechnology-related exports of this business as a percentage of total production: (If this information is not available, please make a careful estimate.)

%

Part 6 Intellectual Property (IP) Rights and Patents

23 Has this business ever had to abandon or not start a biotechnology development activity because further work was blocked by IP Rights or some knowledge protected by another organisation?

Yes

No → Go to question 25

24 Tick as many spaces as you need to show which of these reasons caused this?

Was unable to purchase this IP	<input type="checkbox"/>
Was unable to licence this IP	<input type="checkbox"/>
Any other reason	<input type="checkbox"/>

Answer each of these questions for each process listed.

In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

5 DNA Based: Technology using chemistry of DNA as a major component (continued)

Biotechnology Processes	Was this process used in operations by this business during the accounting year?
Please see page 2 for the definition of biotechnology processes	
9. Gene Therapy Replacement of a defective gene in an organism suffering from a genetic defect	<input type="radio"/> Yes → <input type="radio"/> No →
10. Rational Drug Design Analysis of the structures of active sites of enzymes and receptors in order to design pharmacologically active synthetic molecules	<input type="radio"/> Yes → <input type="radio"/> No →
11. Other (Please specify) <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<input type="radio"/> Yes → <input type="radio"/> No →

6 Biochemistry / Immunochemistry Based: Technology which utilises immunochemistry / antibodies or enzymes as a major component

1. Vaccines The agent containing antigens produced from killed, attenuated or live pathogenic micro-organisms or their genetic material used to stimulate the immune system to protect the host	<input type="radio"/> Yes → <input type="radio"/> No →
2. Immune Stimulants Compounds that induce the immune system to produce antibodies or antibody containing lymphocytes	<input type="radio"/> Yes → <input type="radio"/> No →
3. Drug Design and Delivery Development of drugs where the raw materials and/or processes involve the use of biotechnology	<input type="radio"/> Yes → <input type="radio"/> No →
4. Combinatorial Chemistry An approach to chemical synthesis that enables the creation of large numbers of organic compounds by putting chemical building blocks together in every possible combination. It is used to synthesise novel compounds, which are screened, or tested, against biological targets as part of the drug discovery process	<input type="radio"/> Yes → <input type="radio"/> No →

Part 4 Strategic Partnership / Alliance

15 In the last 3 years, did this business have any partnership / alliance 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 No → Go to question 18

16 Tick as many spaces as you need to show the purposes of these partnership / alliance(s).

- i. Product / process development.....
- ii. Clinical / field trial.....
- iii. Manufacturing.....
- iv. Marketing / distribution.....
- v. Regulatory affairs.....
- vi. Finance.....
- vii. Other (Please specify).....

17 Tick as many spaces as you need to show which of these New Zealand and overseas organisations this business made partnership / alliance(s) within the last 3 years?

1. New Zealand organisations:

- i. Crown Research Institute.....
- ii. University.....
- iii. Polytechnic.....
- iv. Related-business research / Professional Association.....
- v. Unrelated-business research / Professional Association.....
- vii. Other (Please specify).....

2. Overseas organisations:

	Australia	USA	Europe	Asia	Other
i. University.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii. Other organisations (Please specify)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13 In the last 3 years, has this business implemented a new or a significantly improved bio-industry sector **product / service**?

Yes → How many?

No

14 In the next 3 years, does this business plan to implement a new or a significantly improved bio-industry sector **product / service**?

Yes → How many?

No

Answer each of these questions for each process listed.

In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

6 Biochemistry / Immunochemistry Based (continued)

Biotechnology Processes Please see page 2 for the definition of biotechnology processes	Was this process used in operations by this business during the accounting year?
5. Diagnostic Tests A test used to determine the source of a problem or a method of determining the nature of a disease by analysing the symptoms	<input type="radio"/> Yes  <input type="radio"/> No 
6. Peptide / Protein Synthesis Procedure to link two or more amino acids joined by a linkage called a peptide bond	<input type="radio"/> Yes  <input type="radio"/> No 
7. Peptide / Protein Sequencing The process of determining the sequence of a polypeptide or cluster of polypeptides, or the process of creating a new substance from precursor molecules	<input type="radio"/> Yes  <input type="radio"/> No 
8. Cell Receptors Functional proteinaceous structures found in the membrane (surface) of cells that tightly bind specific molecules (organic, protein or viruses)	<input type="radio"/> Yes  <input type="radio"/> No 
9. Cell Signalling The mechanism used by cells to induce or trigger events at remote sites within cells	<input type="radio"/> Yes  <input type="radio"/> No 
10. Bio-sensing Use of biological molecules (eg enzymes, antibodies) in conjunction with a transducer to low level detection of substances such as sugars and proteins in body fluids, pollutants in water etc.	<input type="radio"/> Yes  <input type="radio"/> No 
11. Pheromones Compounds emitted by insects and spread through the air for the purpose of attracting the opposite sex	<input type="radio"/> Yes  <input type="radio"/> No 
12. Three Dimensional Molecular Modelling Description of the characteristics of molecules through a 3D spatial representation	<input type="radio"/> Yes  <input type="radio"/> No 

4. Food Processing (eg using enzymes, bacteria and yeast culture)

- i. **Brewing / Wine producing**.....
- ii. **Baking**.....
- iii. **Dairy**
- iv. **Functional Foods / Nutraceuticals**
(eg probiotics, unsaturated fatty acids, unspecified food additives)

5. Aquaculture

- i. **Fish health** (eg diagnostics, therapeutics).....
- ii. **Broodstock genetics**
(eg tracking superior traits, genetic modification / engineering).....
- iii. **Bioextraction**
(eg carageenan from seaweed, antifreeze proteins from fish, flavours).....

6. Mining / Energy / Petroleum / Chemicals

- i. **Microbiologically enhanced petroleum / mineral recovery**
- ii. **(Cleaner) Industrial Processing**
(eg biodesulphurisation, bio-cracking, bio-recovery)

7. Forest Products

- i. **Silviculture**
(eg tissue culture, somatic embryogenesis, genetic markers, genetic engineering).....
- ii. **(Cleaner) Industrial Processing**
(eg biopulping, biobleaching, biological prevention of sapstain)

8. Environment

- i. **Biofiltration**
(eg treatment of organic emissions to air / water).....
- ii. **Bioremediation and Phytoremediation**
(eg cleanup of sewage water and toxic waste sites using micro-organisms)
- iii. **Diagnostics**
(eg detection of toxic substances using bioindicators, biosensors, immunodiagnostics)
- iv. **Custom Synthesis - Chemical or Biological**
(eg peptides, proteins, nucleotides, hormones, growth factors, biochemicals)

9. Other (Please specify)

Please go to next page 

9 If this business neither presently nor in the next 3 years plans to use any of the modern biotechnology processes listed in part 2, go to part 10 on page 28, sign at the end and return the questionnaire using the pre-paid envelope provided.

10 In the last 3 years, did this business implement a new or significantly improved biotechnology **process** in the production line?

Yes → How many processes?

No → Go to question 12

11 How many of these new or significantly improved processes were:

i. New to this business

ii. New to New Zealand

iii. New to the world

Part 3 Bio Industry Sector

12 Tick as many spaces as you need to show the bio-industry sectors that best describe the products and/or services produced by this business.

1. Human Health-Bio

- i. **Diagnostics**
(eg immunodiagnostics, geneprobcs, biosensors, medical laboratory).....
- ii. **Therapeutics**
(eg vaccines, immune stimulants, biopharmaceuticals, rational drug design, drug delivery, combinatorial chemistry).....
- iii. **Gene Therapy**
(eg gene identification, gene constructs, gene delivery, gene replacement).....

2. Bio-Informatics

- i. **Genomics and Molecular Modelling**
(eg DNA/RNA/protein sequencing & databases for genetic information from humans, plants, animals and micro-organisms).....

3. Ag-Bio

- i. **Plant Biotechnology**
(eg tissue culture, embryogenesis, genetic markers, genetic engineering).....
- ii. **Animal Biotechnology** (eg diagnostics, therapeutics, embryo transplantation, genetic markers, genetic engineering).....
- iii. **Biofertilizers / Biopesticides / Bioherbicides / Biological Feed Additives / Microbial Pest Control** (eg bacteria, fungi, yeasts).....
- iv. **Non-Food Applications of Agricultural Products**.....

Answer each of these questions for each process listed.

In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>





















Part 2 Use of Biotechnology Processes by This Business

Answer each of these questions for each process listed.

For each process listed, work across these pages to answer every question in the column headings.

Answer each of these questions for each process listed.

6 Biochemistry / Immunochemistry Based (continued)

Biotechnology Processes <small>Please see page 2 for the definition of biotechnology processes</small>	Was this process used in operations by this business during the accounting year?	In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
		Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
13. Structural Biology The study of the three dimensional structures of biological molecules (such as proteins) and their mutual interactions as a means of understanding the functions of these molecules within the cell	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
14. Antigens A substance that stimulates the production of specific neutralising antibodies in an immune response. Any chemical substance, usually protein that interacts with an antibody	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
15. Monoclonal Antibodies A monoclonal antibody is a highly specific antibody which is derived from a line of specialised cells and which recognises only one specific complimentary antigen	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
16. Antibodies Proteins that circulate in the blood stream and bind to foreign invading substances (antigens eg bacteria, toxins, certain viruses) with a great deal of specificity	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
17. Microbiology / Microbial Ecology Study of organisms that are too small to be seen with the naked eye	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
18. Biomaterials Any biologically derived material which is used for its material properties rather than its biological properties	<input type="radio"/> Yes  <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No 	<input type="radio"/>	<input type="radio"/>
19. Other (Please specify) <div style="border: 1px solid black; height: 40px; width: 100%; margin-top: 5px;"></div>	<input type="radio"/> Yes  <input type="radio"/> No 						

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

Part 2 Use of Biotechnology Processes by This Business

Answer each of these questions for each process listed.

8 Bioprocessing Based (continued)

Biotechnology Processes <small>Please see page 2 for the definition of biotechnology processes</small>	Was this process used in operations by this business during the accounting year?	In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
		Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
17. Bioindicators The use of organisms to indicate the status of an environment	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
18. Micro-selected Breeding of Plants and Animals Using modern biotechnological tools to accelerate selection	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
19. Natural Products Chemistry The study of a biological material or a biologically-derived material using analytic methods, normally being the isolation and identification of the novel chemicals within a biological material	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
20. Microbio-inoculants Naturally occurring bacterial inoculates used to promote plant growth	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
21. Somatic Embryo-genesis Propagation of genetically desirable plant and tree lineages by tissue culture methods	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
22. Other (Please specify) <div style="border: 1px solid black; height: 20px; width: 100%; margin-top: 5px;"></div>	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>

Please go to next page →

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

Part 2 Use of Biotechnology Processes by This Business

Answer each of these questions for each process listed.

7 Environmental Biotechnologies: Biotechnologies used for pollution control

Biotechnology Processes <small>Please see page 2 for the definition of biotechnology processes</small>	Was this process used in operations by this business during the accounting year?	In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
		Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
1. Bioaugmentation The process of increasing the efficiency of the naturally occurring microbial population to concentrate or accumulate specific compounds. This is usually achieved by adding nutrients, oxygen or water	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
2. Bio-reactors Enclosed containers in which micro-organisms are maintained under controlled conditions for the purpose of creating or destroying specific compounds	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
3. Biological Gas Cleaning The use of micro-organisms to break down or degrade hazardous substances in a gas stream into less hazardous or non-toxic substances	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
4. Bio-remediation The use of naturally occurring or genetically modified micro-organisms to breakdown or degrade hazardous substances into less hazardous or non-toxic substances	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
5. Phytoremediation The use of plants to treat or clean environmental pollution	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
6. Other (Please specify) <div style="border: 1px solid black; height: 20px; width: 100%; margin-top: 5px;"></div>	<input type="radio"/> Yes → <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No →	<input type="radio"/>	<input type="radio"/>

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

Part 2 Use of Biotechnology Processes by This Business

Answer each of these questions for each process listed.

8 Bioprocessing Based (continued)

Biotechnology Processes Please see page 2 for the definition of biotechnology processes	Was this process used in operations by this business during the accounting year?	In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
		Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
9. Biotransformation Conversion of one chemical or material into another using a biological catalyst	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
10. Bio-leaching Use of micro-organisms to leach metals from ore	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
11. Bio-pulping The use of enzymes to degrade wood structures to produce pulp for paper making purposes	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
12. Bio-bleaching The use of enzymes to bleach paper fibre	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
13. Bio-desulphurisation The removal of organic or inorganic sulphur from coal by bacterial or soil micro-organisms	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
14. Bio-pesticide Manufacturing Biological pest control through the use of naturally occurring microbes or bacteria	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
15. Extraction / Concentration / Purification / Separation The retrieval of a compound of interest from a raw material	<input type="radio"/> Yes <input type="radio"/> No						
16. Biofiltration The treatment of sewage or industrial wastewaters using active biomass growing on a solid support	<input type="radio"/> Yes <input type="radio"/> No						

Please go to next page

Part 2 Use of Biotechnology Processes by This Business

For each process listed, work across these pages to answer every question in the column headings.

Part 2 Use of Biotechnology Processes by This Business

Answer each of these questions for each process listed.

8 Bioprocessing Based: Processing of any natural material of biological origin

Biotechnology Processes <small>Please see page 2 for the definition of biotechnology processes</small>	Was this process used in operations by this business during the accounting year?	In which stage has this process been used?			If NOT used, does this business plan to use this process in the next three years?	If no plan to use in the next 3 years, this is because:	
		Research & product / process development	Part of the production process	Part of the product sold		It has no application to this business	It is not cost-effective
1. Cell Culture A population of cells grown for microbiological testing, cell culture development or in fermenters to study their biology or to manufacture products	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
2. Tissue Culture A technique for growing cells from multi-cellular organisms in an artificial medium	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
3. Embryo Culture A technique for growing embryos from multi-embryo organisms in an artificial medium	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
4. Cell Manipulation Ability to grow and modify a range of cell types under laboratory conditions	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
5. Tissue Manipulation Ability to grow and modify a range of tissue types under laboratory conditions	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
6. Embryo Manipulation Ability to grow and modify a range of embryo types under laboratory conditions	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
7. Fermentation Micro-organic process in which the metabolism of sugars for energy is accompanied by the formation of alcohol and/or lactic acid and solvents. Include processes such as wine, cheese and yoghurt making, brewing, yeast production etc.	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>
8. Bioprocessing Production stages that include fermentation, recovery and purification	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/>	<input type="radio"/>