

2981101

B2

Stfy

Renewal of the Canadian Biotechnology Strategy

PUBLIC OPINION RESEARCH

PN 4231/4230

DSS FILE NUMBER: 04CB.U1400-7-0689/01

PRESENTED TO THE
CANADIAN BIOTECHNOLOGY STRATEGY TASK FORCE
GOVERNMENT OF CANADA

NOVEMBER 1998



ENVIRONICS
RESEARCH GROUP

Environics Research Group Limited (Ottawa)
350 Albert Street Suite 1800 Ottawa Ontario Canada K1R 1A4
tel: 603-230-5089 fax: 613-230-3836 <http://www.environics.net>

Table of Contents

A.	Integrated Executive Summary	5
1.0	INTRODUCTION	7
2.0	QUANTITATIVE RESEARCH (NATIONAL TELEPHONE SURVEY)	8
3.0	QUALITATIVE RESEARCH (FOCUS GROUPS)	13
B.	Quantitative Research (National Telephone Survey)	17
1.0	INTRODUCTION TO THE QUANTITATIVE RESEARCH	19
2.0	SCIENCE AND SOCIETY	20
2.1	Is Canada Competitive in the Area of Science and Technology?	20
2.2	Impact of New Technologies on Jobs	22
2.3	General Attitudes toward Science	24
2.4	Demographic Differences in Attitudes toward Science and Society	26
2.5	Pro-science Canadians and Science Sceptics	27
3.0	BIOTECHNOLOGY: FAMILIARITY, AWARENESS AND PRIORITIES	28
3.1	Familiarity with Biotechnology	28
3.2	Testing General Knowledge	30
3.3	Testing Specific Knowledge	31
3.4	Priorities for Biotechnology Research	33
4.0	ETHICAL QUESTIONS AND CONCERNS	35
4.1	Attitudinal Segmentation	38
5.0	CONSUMER ISSUES	43
5.1	Purchasing Behaviour	43
5.2	Consumer Orientations	44
5.3	Food Product Labels	45
5.4	Likely Use of Potential Information Channels on Biotechnology Food Products	46
6.0	FORESTRY ISSUES	48
6.1	Maintaining Biodiversity	48
6.2	Bacterial Pest Control	49
6.3	Faster-Growing Trees	51
7.0	INTELLECTUAL PROPERTY AND BIOTECHNOLOGY	54
7.1	Perceptions of Patent Protection	55
7.2	Attitudes toward Potential Biotechnology Patents	56
7.3	Ethical Considerations in the Patent Process	59
8.0	GOVERNMENT ROLES	60

8.1	Perceptions of the Current Federal Government Role	60
8.2	Roles and Responsibilities	63
8.3	Preferred Federal Government Research Orientation	68
9.0	THE ADVISORY BODY	69
10.0	HIERARCHY OF CREDIBILITY	71
11.0	SOURCES OF INFORMATION ABOUT BIOTECHNOLOGY	74
12.0	METHODOLOGY	76
12.1	Sampling	76
12.2	Interviewing	77
12.3	Explanation of Summary Measures	78
C.	Qualitative Research (Focus Groups)	79
1.0	INTRODUCTION TO THE QUALITATIVE RESEARCH	81
2.0	INITIAL IMPRESSIONS OF BIOTECHNOLOGY	83
3.0	LANGUAGE ISSUES	84
4.0	PUBLIC CONSULTATION, EDUCATION AND PARTICIPATION	85
5.0	THE ADVISORY BODY	86
6.0	REGULATION AND INSTITUTIONS	88
7.0	CANADA'S ROLE IN BIOTECHNOLOGY	89
8.0	RISKS AND BENEFITS	90
9.0	VALUES	91
10.0	PROPOSED VISION, OBJECTIVES AND PRINCIPLES	92
11.0	PARTICIPANT PRIORITIES	93
APPENDIX A		
QUANTITATIVE RESEARCH INSTRUMENTS		95
	Biotech Questionnaire	97
APPENDIX B		
QUALITATIVE RESEARCH INSTRUMENTS		105
	Recruiting Guide	107
	Moderator's Guide	109

A.
Integrated
Executive Summary

1.0 Introduction

In 1997, the Government of Canada initiated a review of the Canadian Biotechnology Strategy (CBS) and set up an inter-departmental task force to address the need for a renewed mandate in this area. This public opinion research project is only one part of this larger review, which includes a round table consultation process with stakeholders, sectoral consultations, and consultations with provincial governments.

In addition to determining the acceptability of the various roles that government undertakes in the regulation and promotion of this sector, the general public is a consumer of the majority of products and services that are affected by biotechnology.

In order to obtain the results summarized in this report, Environics Research Group Ltd interviewed 1,503 adult Canadians in March 1998 regarding their attitudes and opinions related to the Canadian Biotechnology Strategy and on general issues that affect its development and promotion. Over the course of the 26-minute interview, Canadians were asked to provide their input on the biotechnology issues that are currently confronting the government.

The telephone survey was followed by a series of ten focus group sessions which were held between April 28 and May 4, 1998 at five locations across Canada (Halifax, Montreal, Toronto, Saskatoon and Vancouver).

Participants were recruited according to a variety of criteria, including familiarity with biotechnology, perception of federal government performance on biotechnology¹, and opinion-leader status. As well, quotas were used to ensure a rough gender parity among participants and a range of ages and education levels.

Over the course of a two-hour session, participants were asked to discuss a variety of topics related to the Canadian Biotechnology Strategy, from basic awareness of biotechnology to specific areas related to the development and implementation of the strategy.

As recent headlines remind us, the general public is being confronted by a number of ethical choices as a result of new developments in biotechnology that must be translated into public policy. In these areas, an understanding of public opinion is vital. However, as is indicated by the results of this study, there are conflicting attitudes regarding the potential of biotechnology which are strongly and sincerely held by many Canadians. Further, there is ambivalence about the role of technology in general, especially with concern to the impact that it may have on job opportunities and the pace of societal change.

1 Attitudinal criteria can be an important factor in recruiting participants for focus group sessions. With regard to familiarity with biotechnology and perception of federal government performance, care was taken to select participants who fell into the "middle ground" in both areas. This allows for a more representative group and prevents the dominance of one or more fixed viewpoints in the discussion.

2.0 Quantitative Research (National Telephone Survey)

SCIENCE AND SOCIETY

Despite the fact that most Canadians believe that we are competitive in the area of science and technology, optimism about the future is somewhat muted. This is not only true about our relative competitiveness with regard to the rest of the developed world; it is also reflected in the perceived impact that the adoption of technology has on jobs within an industrial sector. Currently, there is a belief that the adoption of new technologies will decrease the overall number of jobs in a given industrial sector (46 percent) instead of increasing the overall number of jobs (32 percent). With few exceptions, a belief that technological advancement in industry will result in a net job loss is prevalent throughout all sectors of Canadian society.

Even with these concerns, there is a consensus among Canadians (87 percent) that "We must pursue opportunities presented by new technologies to maintain our current quality of life in Canada."

BIOTECHNOLOGY: FAMILIARITY, AWARENESS AND PRIORITIES

A sizeable minority of Canadians (45 percent) describe themselves as familiar with biotechnology at varying levels of confidence. However, only one in 20 Canadians, or six percent, would go so far as to categorize themselves as "very familiar" with this discipline. As might be expected, education levels play a very important role in determining overall awareness of the field.

Since 1994, there has been an increased awareness in the products that could be produced through the use of biotechnology. With regard to specific products, awareness is highest for applications that may have some impact on personal health or health-care delivery. Awareness is lower for those products which are remote to an individual's own concerns. For example, only 13 percent of Canadians say they are very aware of 'trees that grow faster' while twice as many are very aware of biotechnology used to prevent and treat disease (24 percent).

As with awareness, Canadians tend to place a much higher priority on developing biotechnological products that promise a higher quality of life for the individual and for our society. Highest priority goes to medical and health applications that treat and prevent disease (89 percent saying high priority) and environmental-crisis applications (73 percent), such as bacteria to clean up oil slicks, toxic spills or contaminated sites. By contrast, those choices that pose ethical dilemmas or appear remote from everyday life or in the self-interest of a specific industry or producer-group are accorded a much lower priority. Yet, even lower-priority research areas are given considerable attention, which suggests that Canadians do not necessarily want to close the laboratory door on promising biotechnological applications.

ETHICAL QUESTIONS AND CONCERNS

When discussing the ethical implications of biotechnology, a clear hierarchy is evident. Canadians are willing to proceed with a more aggressive biotechnology agenda involving plants, especially if some positive goal is a result. However, Canadians are somewhat ambivalent about the role of animals in relation to biotechnology, especially with regard to the transfer of human genetic material. Although many Canadians would cautiously concede that animals could be involved in the development of biotechnology products, this ambivalence could easily turn into opposition if it is perceived that animals are being unnecessarily abused or mistreated.

There is a strong consensus among Canadians that rejects the notion that the benefits of human cloning outweigh any potential disadvantages and that parents should be permitted to select the sex or other traits of their children prior to conception.

Concerns about the ethical use of biotechnology were also evident in the focus group sessions that were undertaken following the telephone survey.

CONSUMER ISSUES

A slight majority of Canadians (52 percent) said that they very often read the list of ingredients contained on food product labels. Almost three out of ten Canadians (29 percent) said that they sometimes read the list of ingredients while a further one-fifth of Canadians say they read this list rarely (12 percent) or never (seven percent).

In general, Canadians are satisfied with the adequacy of the information contained on food product labels. A majority of Canadians (54 percent) believe that food product labels contain the right amount of information while an additional six percent believe that there is too much information on food product labels. Almost two out of five Canadians (39 percent) say there is not enough information on food product labels. Although significant minorities disagree, a majority of Canadians in every demographic category express satisfaction with the adequacy of information that is contained on food product labels.

Looking at information channels, food product labels were seen to be the channel of information that Canadians would be most likely to use to inform themselves about the use of biotechnology (58 percent saying very likely), followed by toll-free telephone numbers (24 percent) and tear-off sheets (23 percent). Only one-fifth of Canadians (18 percent) said that they would be very likely to use the Internet.

Although food product labels are given prominence in this role, other potential channels should not be discounted. Those who are least likely to report reading food ingredient lists (i.e., those in the lower income and education groups as well as people between 18 and 29 years of age) express an interest in the use of toll-free telephone numbers and the Internet, respectively.

FORESTRY ISSUES

Nine out of ten Canadians (90 percent) said that maintaining the variety of plants and wildlife was either a very important consideration (43 percent) or a somewhat important consideration (47 percent) when it comes to assessing potential biotechnology products for use in the wild. Any product that would limit biodiversity in any given area, or that would destabilize the food chain, would not be considered acceptable to the vast majority of Canadians.

As a part of this study, attitudes towards two potential biotechnology products for use in Canadian forests were tested. Similar majorities support the use of a bacterial pest control product targeted to insects harmful to trees (75 percent) and the use of faster-growing trees (78 percent). Support for the use of both these products has increased since 1994.

If people believe that harmful insects would eventually develop resistance to a new bacterial pest control, a plurality of Canadians (43 percent) say it would make them less likely to support its introduction. Canadians saw the possible reduction in the use of chemical pesticides as a persuasive argument for its use, with seven out of ten (71 percent) Canadians saying they would be more likely to support the product under this condition.

The ability of the faster-growing trees to pass on their modified genes through reproduction to related species was not seen as a concern, and a slight majority of people (52 percent) would be more likely to support the use of these trees knowing that their genes are passed on through reproduction. Three-quarters (75 percent) of Canadians surveyed said that they would more likely support the introduction of gene-altered trees into Canadian forests if these trees would more quickly restore forests that had been logged.

INTELLECTUAL PROPERTY AND BIOTECHNOLOGY

A strong majority of Canadians (71percent) believe that patents allow inventors to reap the rewards from their investments. In contrast, only 24 percent of Canadians agreed with the statement "patents prevent wide societal benefits." Perceptions of patent protection are also affected by impressions of who would benefit. For example, support for patent protection increases when linked to broader societal benefits (e.g., encouraging research for a more competitive agricultural sector) and decreases for cases where the benefits would be restricted to a few.

Canadians are not prepared to accept patents on animals that have been modified through the use of biotechnology. Although Canadians are opposed to recognizing intellectual property rights with regard to animals, there are signs that they are ready to proceed with some form of patent protection with regard to new plant species developed through the use of biotechnology. For example, three-quarters of Canadians (74 percent) agree that granting patents on new plants is necessary to encourage globally competitive agricultural research. However, this support is tentative and highly conditional in nature.

There is broad agreement (94 percent) that ethical considerations should be taken into account when determining whether or not to grant a patent. As well, strong interest exists to use a "public interest test" as part of the patent process.

GOVERNMENT ROLES

Although a plurality of Canadians (46 percent) believe that the federal government plays a major role in regulating biotechnology, they were less confident of the federal government's performance in this area. Twenty-eight percent of Canadians felt that the government was doing a very good job (four percent) or a good job (24 percent) in this area. A significant minority (43 percent) of Canadians felt that the federal government was doing a fair job, with a further 12 percent of Canadians providing a poor performance rating.

Seven out of ten Canadians are unaware that the federal government is responsible for the safety of new food products in Canada. Only 12 percent of Canadians correctly identified Health Canada as the department responsible for regulating food product safety. A further 19 percent knew that the federal government has regulatory responsibility for ensuring food product safety but were unsure of the specific organization tasked with this responsibility within the government.

A question regarding levels of confidence in the federal government's food safety testing of products developed through biotechnology was asked of participants. Although a clear majority of Canadians (87 percent) expressed some level of confidence in federal government food safety testing, only one-quarter of Canadians said they were very confident (25 percent).

Canadians were asked which institutions should have the primary responsibility for ten specific roles or activities. They were asked to choose between the government, business and non-profit associations. In all of the ten areas tested, a significant majority of Canadians indicated that the federal government should take primary responsibility. Non-profit associations could also play a useful role in a few of these areas, such as providing consumer information or ensuring the environmental safety of biotechnology products.

With regard to the research priorities of the federal government, Canadians were evenly split between choosing research that supports the regulation of the health, safety and environment of Canadians (41 percent) and research that had a more immediate commercial application and job creation potential (42 percent). A further 13 percent of Canadians, including one-quarter of Canadians with a "pro-science" orientation, chose basic science as their priority.

THE ADVISORY BODY

Nine out of 10 Canadians (92 percent) support the creation of an external advisory body to advise the federal government on biotechnology issues, particularly those that impact on health, safety and the environment.

When asked about the composition of this advisory body and what kind of advisors should play the predominant role, experts from scientific and academic circles received the most support (44 percent), followed by prominent community representatives (29 percent) and representatives from the business, manufacturing and production sectors (eight percent).

In response to an open-ended question on the topic, Canadians said that they would want an advisory body to address issues related to the government regulation of health, safety and the environment as the top priority (25 percent). This was followed by general safety issues (12 percent), ethical and social concerns (11 percent), and the potential negative environmental impact of biotechnology (nine percent). It is noteworthy that issues that have received attention in the popular media (e.g., cloning, the ethical treatment of animals and xenotransplantation) did not emerge in response to this top-of-mind question.

HIERARCHY OF CREDIBILITY

The following table ranks the relative credibility of various groups and organizations with regard to biotechnology issues. The higher the number, the greater the perceived credibility.

Credibility Index

(Average of % saying "very trustworthy" and % saying "a great deal of expertise")

Health-care Professionals	53
University Professors or Scientists	50.5
Industry Scientists	39
Government Scientists	38
Environmental Groups	27.5
Farm Group Leaders	26.5
Consumer Groups	22
Executives of Biotechnology Companies	21.5
Animal Rights Activists	13.5
Government Employees	9
News Reporters	6.5

It should be noted that, with one exception, all of the groups and organizations tested in this study are seen to be reasonably trustworthy and possess a certain amount of expertise. Only news reporters were seen to be deficient in the areas of trust (50 percent saying not at all/not very trustworthy) and expertise (54 percent saying not much/no expertise). All other categories were seen to be at least somewhat trustworthy and possess some expertise by a majority of Canadians.

In general, levels of perceived credibility are significantly higher in Quebec than elsewhere in the country.

SOURCES OF INFORMATION ABOUT BIOTECHNOLOGY

A plurality of Canadians (43 percent) say that major news sources such as newspapers (22 percent) and television news programs (21 percent) are their main source of information about science, technology and biotechnology. Newspapers (27 percent) and television news (24 percent) also provide a strong secondary source of information about these areas.

Television plays an even greater role than might be assumed, with almost one-third of the public (28 percent) saying they get their information about technology and biotechnology from science and nature programs, either as a main source of information (11 percent) or a secondary source (17 percent).

Those people who say they are familiar with biotechnology rely less on television news as their main information source than do other Canadians. Those most familiar with biotechnology also rely far less on newspapers as a main source of information (six percent) compared to the general population (22 percent). This group is far more likely to obtain their information from science journals (15 percent) and school/university (14 percent). They are also more likely to report a higher reliance on the Internet as their main source of information (eight percent) than the general public (four percent).

3.0 Qualitative Research (Focus Groups)

INITIAL IMPRESSIONS OF BIOTECHNOLOGY

Initial impressions of biotechnology fell into three general categories: the historical uses of biotechnology, health-related items and media-related mentions. In the latter case, participants pointed to issues such as cloning or other biotechnology outcomes that had been given recent profile in the media (e.g., human longevity, potential cures).

With regard to the possible advantages, participants tended to focus on potential health-care advances that could be provided through biotechnology. Other possible advantages of biotechnology, such as the development of new food products, better crops, possible environmental benefits and improved quality of life, were mentioned, but were in the minority when compared to health-related possibilities of biotechnology.

Potential disadvantages of biotechnology focussed on the possible negative impact on society related to the introduction of human cloning and the implementation of eugenic selection. General concerns regarding public safety, most often related to health failures or possible unknown side effects, were also mentioned in this section but to a lesser extent.

Just as possible economic benefits were missing from the discussion of possible advantages of biotechnology, concerns about a possible negative impact on the environment were largely absent among the top-of-mind concerns of participants.

PUBLIC CONSULTATION, EDUCATION AND PARTICIPATION

When asked about the role that individuals could play in biotechnology, the consumer role predominates. However, it was felt that individuals did not currently have enough information to make informed choices as consumers. A lack of reliable information is also seen to undermine the ability of individuals to monitor the activities of large companies and the government with regard to biotechnology.

There was unanimous agreement about the need for an ongoing public education program about biotechnology. This program should be balanced in nature, outlining the benefits as well as the risks. Although the federal government was seen to have primary responsibility for this task, it was also thought that non-governmental organizations should be involved.

Participants were emphatic that the federal government should make information more accessible to the general public, not only in the way that this information is distributed but also in the tone and content of the information products.

It was strongly felt that the federal government should consult with the public on the decisions that it makes with regard to biotechnology. However, participants also expressed reservations about the sincerity of government and the potential influence of the corporate sector on the consultation process.

THE ADVISORY BODY

There was a great deal of interest in, and support for, the creation of an independent external body to advise the government and the general public on biotechnology. Participants felt that, in order to be effective, this body must be seen to be neutral with regard to the political interests of government and the interests of the biotechnology companies. There was general agreement that representatives of the general public should join independent experts, either drawn from universities or from the health profession, as members of this advisory body. Openness and transparency, as well as ongoing public consultation, were seen as key factors in providing legitimacy to the advisory body.

REGULATION AND INSTITUTIONS

Although there was a consensus that there is "room for improvement," most participants in the sessions across Canada expressed comfort and confidence in the way that the federal government currently regulates for the health, safety and environment of Canadians. This belief was especially true in comparison with the perceived regulatory regimes of other countries (comparisons with the United States were most frequently mentioned by participants).

There was a consensus in all sessions that the federal government should have primary responsibility for the regulation and development of biotechnology in Canada. As well, the concept of "leading from the middle" was well received by participants.² There were no concerns that adopting a partnership approach, or "leading from the middle," would result in an abdication of federal government responsibility in this area.

There was strong support for the need for Canada to be seen as an international leader in biotechnology, not only in the quality of Canadian products and research but also in the stringency of our standards and regulations. In addition to a preference for a leadership role with regard to biotechnology, there was also strong agreement with the need for commonly accepted international standards in this area.

Looking at international roles, initial reactions focused on Canada's traditional role in providing humanitarian aid to countries in need. Further, there was a sense that Canada could play a constructive capacity-building role, primarily through training local scientists and assisting in the development of regulatory standards and policies.

RISKS AND BENEFITS

There was a general belief in all sessions that current methods of assessing the risks and benefits of consumer products would be unable to deal with an area that is as unique and as new as biotechnology. In addition to providing accurate and balanced information, accountability and responsibility were also seen to be factors in building confidence in a biotechnology risk assessment and management system.

² Essentially, "leading from the middle" was defined as the federal government acting as a catalyst to build a consensus between business, universities, and the public sector so that we could all move forward together on biotechnology issues.

VALUES

The following values were seen to be paramount in the development of a biotechnology strategy for Canada. These are (in no particular order): public safety, environmental protection and biodiversity, quality of life, human dignity and the sanctity of life, ethical leadership, and public awareness, education and involvement.

There was general agreement that ethics should be integrated into the development of a biotechnology strategy. The development of an ethical code and policy for biotechnology was seen to be an area of responsibility for the advisory body. There was also a general consensus that the advisory body may provide useful guidance on the integration of ethical considerations into the patenting process.

PROPOSED VISION, OBJECTIVES AND PRINCIPLES

Participants were given a draft copy of a vision, objectives and principles for the Canadian Biotechnology Strategy to read. Once they had read through the document, they were asked to choose between the following proposed visions:

"For Canada to be a world leader in biotechnology and, through it, to enhance the quality of life of Canadians in terms of health, safety, the environment and economic development."

Or

"To enhance the quality of life of Canadians in terms of health, safety, the environment and economic development through the responsible use of biotechnology and thus become a world leader in its applications."

Participants expressed a clear preference for the second version of the proposed vision, largely due to two factors: the perceived precedence of quality of life and the inclusion of the phrase "responsible use" in the second version. It should be noted that many participants saw the wording of these options as interchangeable, with brevity seen as the main strength of the first version.

As well, participants were asked to provide an assessment of how well the document summarized the previous discussion on biotechnology and the concerns they had with regard to this area. Opinion was virtually unanimous that the document did a good job outlining their concerns and opinions with regard to a biotechnology strategy for Canada.

Criticism of the document was minimal and largely confined to fleshing out the section on beliefs and values or reworking the language so that it was more direct and concise. A greater emphasis on public education and awareness was also mentioned by participants, especially those in the Montreal sessions.

B.
Quantitative Research
(National Telephone Survey)

1.0 Introduction to the Quantitative Research

We live in a changing world and the pace of this change is accelerating. Part of this change has led to a dramatically increased quality of life for many Canadians, with new scientific discoveries contributing to personal well-being, better health care and new opportunities for employment and entrepreneurship. On the other hand, many Canadians view these changes with suspicion, fearing that the good things we enjoyed in the past may not have a place in this fast-paced world.

In 1983, the Government of Canada initiated a strategy in the area of biotechnology to respond to the change that was occurring then. At that time, traditional forms of biotechnology, such as the selective breeding of livestock or the use of living organisms like yeast in brewing or baking, were giving way to new forms of biotechnology, such as genetic manipulation and in vitro fertilization. The new possibilities presented by these advances were accompanied by concerns over the introduction of new and untried methods into our economy and our environment.

In addition to providing a regulatory framework that would allow for the development of a biotechnology industry in a safe, responsible manner, a Canadian Biotechnology Strategy would also identify and promote those areas where Canada was seen to possess a strategic advantage.

Like many other high technology areas, the development of the biotechnology industry in Canada has experienced a boom over the past 15 years. New techniques, whether developed in Canada or from discoveries made abroad, have created new opportunities and new challenges.

In 1997, the Government of Canada initiated a broader review of the Canadian Biotechnology Strategy (CBS) and set up an inter-departmental task force to address the need for a renewed mandate in this area. This public opinion research project is only one part of this larger review, which also includes a round table consultation process with stakeholders and qualitative research.

In addition to determining the acceptability of the various roles that government undertakes in the regulation and promotion of this sector, the general public is a consumer of the majority of products and services that are affected by biotechnology.

In addition to providing an overview of current public opinion, this study also tracks changes in public opinion which may have taken place since 1994, the time of an earlier study undertaken by Optima Research Consultants. It is a reflection of the rapid change that is happening in this field to note that only a few topic areas covered in that study were deemed to be still current only four years later.

As recent headlines remind us, the general public is being confronted by a number of ethical choices as a result of new developments in biotechnology that must be translated into public policy. In these areas, an understanding of public opinion is vital. However, as is indicated in the results of this study, there are conflicting attitudes regarding the potential of biotechnology, which are strongly and sincerely held by many Canadians. Further, there is ambivalence about the role of technology in general, especially with concern to the impact that it may have on job opportunities and the pace of societal change.

In order to obtain the results used in this report, Environics Research Group Ltd interviewed 1,503 adult Canadians regarding their attitudes and opinions on a number of areas related to the Canadian Biotechnology Strategy as well as on general issues that affect the development and promotion of this strategy. Over the course of the 26-minute interview, Canadians were asked to provide their input on the biotechnology issues that are currently confronting the government.

2.0 Science and Society

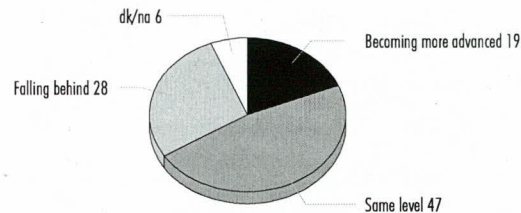
There is no doubt that Canadians wish our country to pursue the advantages that may accrue from a biotechnology policy. Although the focus is split between a desire to maintain a strong regulatory system and the possibility of greater economic opportunity, there are a number of underlying concerns that should be addressed.

This section of the report examines basic attitudes toward science in Canada. In addition to asking about perceptions of our competitiveness with our major trading partners and the impact of technology on jobs, we asked a battery of questions designed to probe underlying attitudes toward the role of science in our society.

2.1 IS CANADA COMPETITIVE IN THE AREA OF SCIENCE AND TECHNOLOGY?

When compared to our major trading partners in the developed world, there is a sense that Canada is relatively competitive with regard to our use of science and technology. A plurality of Canadians (47 percent) say that Canada competes in this area on the same level as countries such as France or the United States. However, those who say that we are falling behind our colleagues in the developed world (28 percent) outnumber those who say we are becoming more advanced (19 percent). One in twenty Canadians (6 percent) could not make an assessment of our relative competitiveness in this area.

Is Canada Competitive in Science and Technology?



Q.1

With regard to other developed countries, like the United States or France, how does Canada compare in making use of science and technology. Are we becoming more advanced, are we on the same general level or are we falling behind?

Concern that Canada is falling behind in the area of science and technology is most pronounced among people between 50 and 65 years of age (36 percent).

Education level also affects the perception of Canada's competitiveness in the area of science and technology. The survey results show that confidence that Canada is leading the way in this area decreases as education levels rise. However, as the following table demonstrates, increasing education levels tend to reinforce a belief that Canada is *as competitive* as the other developed nations in the area of science and technology. Concern about Canada falling behind remains fairly level across all education levels.

There is also a contrast in the way that perception of the federal government's performance in this area affects impressions of Canada's overall competitiveness in science and technology. Those who believe that the federal government is doing a good or very good job in the area of regulating and promoting biotechnology are more likely than the overall population to believe that our country is becoming more advanced than other developed nations (24 percent). This group is also less likely to believe our competitive position is eroding (19 percent). A plurality of those who believe that the federal government is doing a poor job in this area believe that we are falling behind other developed nations in the area of science and technology (48 percent).

Opinion leaders³ are less likely than other groups to state that Canada is maintaining a competitive position in this area (41 percent). However, there is no consensus among this group with regard to the erosion of our competitive position (35 percent) or whether we are becoming more advanced in the area of science and technology (24 percent).

Perception of Canada's Competitiveness in Science and Technology by Education Level

	MORE ADVANCED	SAME LEVEL	FALLING BEHIND	DON'T KNOW
Canada	19	47	28	6
Less than High School	21	39	30	10
High School	20	48	27	5
Community College	22	47	25	6
Some University	20	45	28	6
Undergraduate Degree	16	52	30	3
Post-graduate Studies	7	58	32	3

Q.1

With regard to other developed countries, like the United States or France, how does Canada compare in making use of science and technology. Are we becoming more advanced, are we on the same general level or are we falling behind?

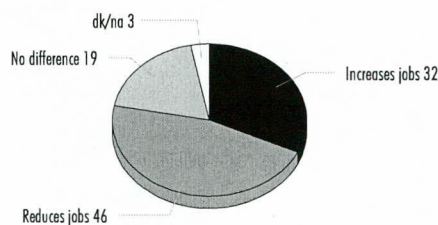
³ Opinion leaders are those people within the general population who spend at least some time thinking about or discussing public policy issues, who openly express these opinions to others and who have some sense of personal efficacy when it comes to issues affecting their community. This important attitudinal group has an impact on the formation of public opinion on topics where attitudes have not hardened or matured. A description of this custom summary measure can be found in 12.0 Methodology.

2.2 IMPACT OF NEW TECHNOLOGIES ON JOBS

Despite the fact that most Canadians believe that we are competitive in the area of science and technology, optimism about the future is somewhat muted. This is not only true about the relative competitiveness with regard to the rest of the developed world; it is also reflected in the perceived impact that the adoption of technology has on jobs within an industrial sector. Currently, there is a belief that the adoption of new technologies will decrease the overall number of jobs in a given industrial sector (46 percent) instead of increasing the overall number of jobs (32 percent). With few exceptions, a belief that technological advancement in industry will result in a net job loss is prevalent throughout all sectors of Canadian society.

One-fifth of the population (19 percent) believe that there will be no overall difference in the number of jobs in an industry as a result of the adoption of technology.

Impact of New Technology on Jobs



Q.2

When an industry adopts new technology, jobs can be created or jobs can be lost. Do you think the introduction of new technology increases the overall number of jobs, reduces the number of jobs, or is there no difference in the number of jobs created?

Women (51 percent) are more likely than are men (41 percent) to express concerns about the impact of new technologies on jobs.

As well, anxiety about technology and jobs is higher among those who feel that they may be left behind by new advances in industry. A majority of those over the age of 65 (52 percent) as well as those with a high school education or less (52 percent) believe that the adoption of new technologies by industry will result in fewer, rather than in more, jobs. Pessimism about the impact of technology on jobs tends to decrease as education levels rise.

Anxiety about the potential negative impact that technology may have on jobs is higher in Quebec (52 percent) and in British Columbia (49 percent) than among Canadians overall (46 percent).

In contrast, Albertans tend to believe that the adoption of new technologies will result in a net gain in the number of jobs (42 percent) rather than a net loss of jobs (36 percent). This attitude may be due to the prominent role that technology plays in the natural resource industries in this province combined with the strong economic growth that Alberta is currently experiencing.

Although they are not as optimistic as Albertans, Ontarians (35 percent) are more likely than are Canadians in general (32 percent) to believe in the positive impact that technology may have on jobs. This view is slightly stronger in the Greater Toronto Area (36 percent).

Optimism about technology and jobs is highest among those with an undergraduate university degree (43 percent). This is one of the few groups, along with those in households with incomes greater than \$70,000 per year, where optimism about the impact of technology on the net number of jobs is virtually equal to the level of pessimism (41 percent).

Although the belief that the adoption of new technology will result in a net loss of jobs is pervasive, opinion leaders (37 percent) tend to be more optimistic than non-opinion leaders (31 percent) about the job creation possibilities of new technologies. Those who say they are very familiar with biotechnology are more likely to be optimistic about the impact of technology on jobs (41 percent) than are those who are unfamiliar with biotechnology (30 percent).

Those who do express optimism about the impact of technology on jobs may be doing so because of higher levels of awareness concerning biotechnology and biotechnology products. For example, almost one-half (48 percent) of those expressing optimism also say that they are at least somewhat familiar with biotechnology. Further, this group was also more aware of a number of biotechnology products tested in this study.

Perceptions of science are also important in the way that Canadians view the impact of new technologies on jobs. Those who express a very positive view about science and its relationship with our society express confidence that adopting new technologies will result in more jobs for Canadians (47 percent). Those who express scepticism about science are prone to take the opposite view, saying that the adoption of new technologies will result in a net loss of jobs (54 percent).

Impact of New Technologies on Jobs by Orientation Toward Science⁴

	PRO-SCIENCE	SCIENCE SCEPTICS
Increases jobs	47	23
Reduces jobs	34	54
No difference	19	20
Don't know	1	3

Q.2

When an industry adopts new technology, jobs can be created or jobs can be lost. Do you think the introduction of new technology increases the overall number of jobs, reduces the number of jobs, or is there no difference in the number of jobs created?

⁴ As with the opinion-leader grouping, orientations toward science are created by a combination of responses to questions within the survey questionnaire. Please refer to the Explanation of Summary Measures contained in 12.0 Methodology.

2.3 GENERAL ATTITUDES TOWARD SCIENCE

It is important to understand the way that Canadians generally view science if we are to understand the context in which decisions about biotechnology policy are made. To this end, we asked survey respondents a number of general questions about science and the role that it may play in our society.

First of all, while there may be moral concerns about the ends to which science is used, there is a consensus that science itself is morally neutral. An overwhelming number of Canadians (89 percent) agreed with the statement that "Science is neither good nor bad; it is people who decide the ends for which science is used." A majority of Canadians (56 percent) strongly agreed with this statement. Ten percent of Canadians said that they disagreed with this statement, with only three percent saying that they strongly disagreed.

Further, despite the concerns that Canadians may have about the impact of new technologies on jobs, there is a consensus among Canadians (87 percent) that "We must pursue opportunities presented by new technologies to maintain our current quality of life in Canada." A plurality of

Canadians (47 percent) strongly agree with this statement. Of the 13 percent of Canadians who disagree, only three percent strongly disagree with this statement.

While a majority of Canadians agree with the remaining four statements regarding the role of science in our society, the same level of consensus does not exist as with the previous two statements.

For example, while 58 percent of Canadians are willing to concede that "decisions about science and technology are best left to the experts," the fact that only 27 percent of Canadians strongly agree suggests that overall support for this belief may be conditional. Disagreement with this statement also tends to be conditional, with only 15 percent of respondents saying that they strongly disagree and 26 percent saying that they disagree somewhat with this statement.

As well, opinion appears to be divided on the ability of technology to solve the problems that we face as a society. A slight majority of Canadians (56 percent) agree with the statement that "Most problems can be solved by applying more advanced technologies." In comparison, a strong minority (43 percent) disagrees with this statement. Although a division appears in responses to this question, opinions on this

Attitudes Toward Science and Society

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	DK/NA
Science itself is neither good nor bad; it is people who decide the ends for which science is used	56	33	7	3	1
We must pursue opportunities presented by new technologies to maintain our current quality of life in Canada	47	40	10	3	1
Decisions about science and technology are best left to the experts	27	31	26	15	1
As a society, we rush to embrace new ideas too quickly	25	38	27	9	1
People would be better off if they lived a simple life without so much technology	23	31	27	18	1
Most problems can be solved by applying more advanced technologies	16	40	30	13	1

Q.3-8

Here are some statements concerning science and technology. You do not have to be an expert to answer. For each, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree. How about...?

statement are not strongly polarized, with 16 percent saying that they strongly agree and 13 percent saying that they strongly disagree.

As the responses to the previous questions indicate, Canadians tend to have positive views about science and the opportunities that it may offer. However, just as there are concerns that adopting new technologies may have a negative impact on jobs, there are concerns that, as a society, we tend to embrace new ideas too quickly. Although a majority of Canadians (63 percent) agree with this latter view, only one-quarter of this group, or 25 percent of Canadians overall, strongly agree with this statement. Two out of five Canadians (36 percent) disagree that our society is too hasty in adopting new ideas, with nine percent saying that they strongly disagree with this view.

A slight majority of Canadians (54 percent) agree with the statement that "we would be better off if we lived a simpler life without so much technology." As with the previous three statements, agreement with this statement appears to be conditional and, although a substantial minority (45 percent) disagrees with this statement, there is a lack of polarization on these issues.

Three of the questions in this section⁵ appeared in a similar form in a study conducted by Optima Consultants in 1994. A comparison of the responses to these questions suggests that attitudes toward the role of science in our society have remained fairly stable over the past four years.

Although there have been slight shifts in the results since 1994, it should be noted that these are within the margin of error for both of these quantitative research projects.⁶

Changes in Attitudes Toward Science and Technology

	STRONGLY DISAGREE		STRONGLY AGREE	
	1994	1998	1994	1998
Decisions about science and technology are best left to the experts	13	15	29	27
People would be better off if they lived a simpler life without so much technology	18	18	21	23
Most problems can be solved by applying more advanced technologies	12	13	15	16

Q.3-8

Here are some statements concerning science and technology. You do not have to be an expert to answer. For each, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree. How about...?

⁵ Respondents to the 1994 Optima Consultants study were asked to respond on a five-point scale, where one meant they strongly disagreed and five meant they strongly agreed, to the following three questions: "Most problems can be solved by applying more advanced technology," "Decisions about science and technology are best left to the experts," and "People would be better off if they lived a simpler life without so much technology." Although the differences in the response categories mean that the overall results are not strictly comparable, this is compensated for by only comparing the results given for the "strongly agree" and "strongly disagree" categories.

⁶ The margin of error for the 1994 Optima Consultants study was +/- 3.0%, 19 times out of twenty. The margin of error for this study is +/- 2.6%, 19 times out of twenty.

2.4 DEMOGRAPHIC DIFFERENCES IN ATTITUDES TOWARD SCIENCE AND SOCIETY

It should be noted that no single demographic or regional factor consistently drives attitudes toward responses in this set of questions. Although education levels do have some influence on the responses to these questions, they are not as powerful or pervasive as they might be.

For example, although belief in the neutrality of science increases as education levels rise, this is the only topic area where education levels play such a strong role in determining the response to the statement.

Increased levels of education and income result in a decreased willingness to leave decisions about science and technology to the experts. This may be the combination of an increased capacity to make informed decisions about this area as a result of higher levels of education as well as a heightened sense of personal efficacy brought about by higher levels of income.

As well, faith that applying more advanced technology can solve most problems is more prevalent among Canadians who are less well educated and have lower annual household incomes.

Income also plays an important role regarding attitudes toward societal change. As income levels rise, agreement with the statement that Canadian society is in too much of a rush to embrace new ideas tends to decline (34 percent among those with annual household incomes of less than \$20,000 strongly agree with this statement compared to only 16 percent among those with annual household incomes over \$70,000).

Age plays a more important role in the way Canadians responded to statements concerning the need to pursue the opportunities presented by technology and the impact of technology on quality of life.

For example, agreement with the statement that "We must pursue opportunities presented by new technologies to maintain our current quality of life in Canada" increases with the age of the respondent. One-third of those 18 to 29 years of age (34 percent) say they strongly agree with this statement, compared to over one-half of those 65 years of age and older (53 percent).

Regional differences are also important in responses to this statement. Agreement with this statement is strongest in Ontario (54 percent saying they strongly agree) and in Atlantic Canada (50 percent) and is weakest in Quebec (40 percent saying they strongly agree) and in Western Canada (42 percent).

Likewise, age and region play a role in responses to the statement that "People would be better off if they lived a simpler life without so much technology." Agreement with this statement is very intense among those 65 years of age and older (68 percent saying that they strongly agree), residents of Manitoba (63 percent) and rural Canadians (60 percent). Canadians with annual household incomes of less than \$20,000 (63 percent) are also more likely than those in other income brackets to strongly agree with this statement.

There are also significant differences in the way that men and women perceive these statements. While there is overall agreement among men and women about the neutrality of science and the negative impact of excessive technology, women are more likely than are men to leave decisions about science and technology to experts. As well, they are more likely to express caution about the impact of technology and new ideas on society and individual lives. On the other hand, men exhibit a stronger faith than do women that most problems can be solved with the greater application of technology and that there is an economic imperative that should drive our pursuit of new technologies.

2.5 PRO-SCIENCE CANADIANS AND SCIENCE SCEPTICS

This battery of questions allowed the creation of two custom summary measures, pro-science and science sceptics, that are used in the analysis. Essentially, those who exhibit stronger faith in science, the benefits of science, and the scientific process are gathered into the "pro-science" group while those who express concern about the impact of science and are doubtful about its benefits are gathered into the "science sceptic" group. These groups respectively represent 14 percent and ten percent of the total population.

There are some slight demographic differences between these two groups. Pro-science respondents tend to be slightly younger and have slightly higher incomes than do those in the science sceptic group. Science sceptics tend to be slightly better educated.

The most significant difference between these two groups is with regard to their gender composition. The pro-science group is composed of 55 percent of men and 45 percent of women. These percentages are reversed with regard to science sceptics.

More information on the composition of these groups can be found in the Explanation of Summary Measures in 12.0 Methodology.

Attitudes Toward Science and Society by Gender (% saying strongly agree)

	TOTAL	MEN	WOMEN	GAP
Decisions about science and technology are best left to the experts	27	23	30	+7
As a society, we rush to embrace new ideas too quickly	25	22	27	+5
People would be better off if they lived a simpler life without so much technology	23	22	24	+2
Science itself is neither good nor bad; it is people who decide the ends for which science is used	56	57	56	-1
Most problems can be solved by applying more advanced technology	16	18	14	-4
We must pursue opportunities presented by new technologies to maintain our current quality of life in Canada	47	52	42	-10

Q.3-8

Here are some statements concerning science and technology. You do not have to be an expert to answer. For each, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree. How about...?

3.0 Biotechnology: Familiarity, Awareness and Priorities

This chapter examines current levels of familiarity and knowledge with regard to biotechnology. As well, the awareness of a number of current and potential biotechnology products was tested among Canadians. The final section of this chapter undertakes a brief examination of the research priorities of Canadians with regard to biotechnology.

3.1 FAMILIARITY WITH BIOTECHNOLOGY

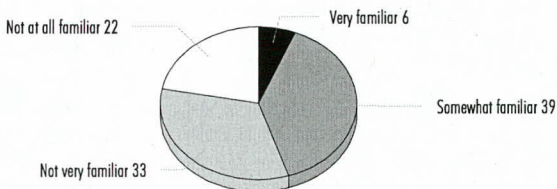
A sizeable minority of Canadians (45 percent) describe themselves as familiar with biotechnology at varying levels of confidence. Only one in 20 Canadians, or six percent, would go so far as to categorize themselves as very familiar with this discipline, with a further 39 percent saying that they are somewhat familiar with biotechnology. A majority of Canadians (55 percent) say they are either not very (33 percent) or not at all (22 percent) familiar with biotechnology.

As might be expected, education levels play a very important role in determining overall awareness of the field. Canadians with a university degree are more than twice as likely to say they are familiar with biotechnology (66 percent) than are those who have only a high school education or less (30 percent).

Gender is another major determining factor. Men (50 percent) are more likely than women (41 percent) to consider themselves familiar with biotechnology, and three times as many men (nine percent) as women (three percent) ranked themselves at the high end of the scale, or "very familiar."

Albertans (54 percent) and British Columbians (46 percent) are most likely to say they are familiar with biotechnology while Atlantic Canadians report the lowest levels of familiarity (41 percent).

Familiarity with Biotechnology



Q.9

Biotechnology is the application of science to living organisms to develop new products and processes. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with biotechnology?

Surprisingly, age does not appear to play a major role with regard to a person's familiarity with biotechnology.

There is a strong case to be made that higher education breeds familiarity with biotechnology, though not necessarily specific knowledge. The survey demonstrates rather dramatically that education levels strongly, and consistently, determine perceived levels of awareness. For instance, 28 percent of respondents with only a high school education considered themselves familiar with biotechnology, less than half the level of familiarity found among those with an undergraduate degree (66 percent) or post-graduate studies (68 percent).

Familiarity with biotechnology is also high among opinion leaders (67 percent) compared to non-opinion leaders (43 percent). Similarly, those who have demonstrated some form of environmental leadership tend to be more knowledgeable about biotechnology (59 percent) than those who have not (42 percent).

Interestingly, those who fall into the pro-science category are far less familiar (36 percent) than those who are sceptical about science (54 percent). One can speculate that perhaps those who are concerned or critical about scientific progress either are more informed, or, at the very least, believe themselves to be more informed about biotechnology issues.

As noted previously, Canadians who optimistically believe that technology will increase jobs come across as more familiar with biotechnology (48 percent) than the general population.

Familiarity of Biotechnology by Education Level

(Combined Percentage of Very Aware and Somewhat Aware)

	%
Less than High School	33
High School	28
Community College	43
Some University	53
Undergraduate Degree	66
Post-graduate Studies	68

Q.9

Biotechnology is the application of science to living organisms to develop new products and processes. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with biotechnology?

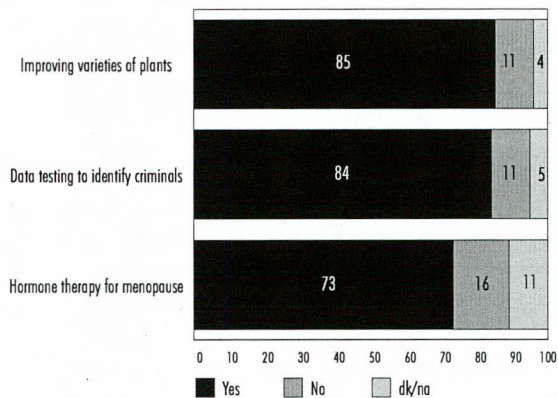
3.2 TESTING GENERAL KNOWLEDGE

As well as allowing respondents to provide a self-assessment with regard to their familiarity with biotechnology, a knowledge test was administered to assess the true level of awareness in this area. Care was taken to eliminate guesswork in the yes-no answers that were required by the knowledge test. In addition, answers to an additional knowledge test about the organization responsible for determining food product safety were taken into account. Unfortunately, when the calculations were complete, a mere eight percent of Canadians (117 respondents out of an unweighted sample of 1503) were able to answer all the questions correctly. This contrasts to the significantly higher percentage of Canadians who said they were familiar with biotechnology (45 percent) but similar to the percentage of those who said they were very familiar with biotechnology (six percent).

Given the benefit of the doubt, Canadians did quite well, with a high percentage (73 to 85 percent) correctly attributing applications of biotechnology in the high-profile areas of DNA testing to identify criminals, improvement of varieties of plants and hormone therapy for menopausal women.

Analysis of these responses reveals that education level is the most significant factor in a correct response, and community size has some impact, with rural residents being slightly less knowledgeable than are Canadians in general. The only question that revealed a gender split is the question on hormone therapy, with women more likely to give a correct answer (77 percent) than men (69 percent).

Knowledge Test



Q.10-12

I am going to read a list of items. To the best of your knowledge, do you think each of the following involves the use of biotechnology? How about...?

3.3 TESTING SPECIFIC KNOWLEDGE

So far, education levels have been shown to strongly influence Canadians' familiarity with and general knowledge of biotechnology. Interestingly, education levels do not play the same significant role when Canadians are asked a series of specific questions pertaining to the field. In this case, other factors, such as gender, appear to be influencing awareness of products that could be, or are currently, on the market.

Of these products, we found that awareness is highest for applications that may have some impact on personal health or health-care delivery, in particular the treatment and prevention of diseases and the diagnosis of disease through genetic testing. Those are the two biotechnology applications that Canadians are most aware of, but at most only one-quarter of Canadians consider themselves "very aware" of any of these products.

The more remote a product is the less likely people are to be aware of it. For example, only 13 percent are aware of 'trees that grow faster' while twice as many are aware of biotechnology used to prevent and treat disease (24 percent).

Unlike the knowledge test and familiarity with biotechnology, education does not appear to be a significant factor driving awareness of these products. Other factors, such as gender and opinion-leader status, appear to be more significant than education level in driving awareness.

Although levels of awareness are relatively equal between men and women with regard to the use of biotechnology for the diagnosis, treatment and prevention of disease, men are more aware of biotechnology products that have a commercial application.

As the table on the next page indicates, those who have opinion-leader status are more likely to be aware of these potential biotechnology products than non-opinion leaders.

Since 1994, there has been an increased awareness of the products that could be produced through the use of biotechnology. Comparing the current results on four of the items tested above with similar items tested in the 1994 Optima Consultants Study, awareness has increased most dramatically with regard to trees that have been genetically modified to

Awareness of Biotechnology Products

	VERY AWARE	SOMEWHAT AWARE	NOT VERY AWARE	NOT AT ALL AWARE	DK/NA
Treatment and prevention of diseases	24	56	12	7	1
Diagnosis of disease through genetic testing	21	50	16	13	<1
Bacteria that clean up environmental problems, such as oil slicks, toxic spills or contaminated sites	20	44	19	18	-
Insect resistant crops that would reduce the need for chemical pesticides	18	47	17	17	1
Organs which can be transplanted from animals into humans	15	49	18	18	-
Trees that grow faster	13	32	26	28	1

Q.13-18

Here is a list of products or processes that have been or could be developed through the use of biotechnology. Please tell me if you are very aware, somewhat aware, not very aware, or not at all aware of each of the following. How about...?

grow faster (up 19 percent) and bacteria that could be used to clean up environmental problems (up 19 percent). Awareness has also increased with regard to the development of insect resistant crops (up five percent) and the use of genetic testing to diagnose disease (up three percent) but not at the same rate. However, it could be argued that the latter two items have less room to improve on already high levels of awareness.

Awareness of Specific Biotechnology Products by Gender

(Percent saying 'very aware')

	TOTAL	MALE	FEMALE	GENDER GAP
Treatment and prevention of diseases	24	24	25	+1
Diagnosis of disease through genetic testing	21	20	21	+1
Organs transplanted from humans into animals	15	17	13	-4
Insect resistant crops	18	23	14	-9
Bacteria that clean up environmental problems	20	25	15	-10
Trees that grow faster	13	18	8	-10

Awareness of Specific Biotechnology Products - Opinion Leaders

(Percent saying 'very aware')

	TOTAL	OPINION LEADERS	NON-OPINION LEADERS
Treatment and prevention of diseases	24	36	23
Diagnosis of disease through genetic testing	21	36	19
Bacteria that clean up environmental problems	20	33	19
Insect resistant crops	18	46	16
Organs transplanted from humans into animals	15	24	14
Trees that grow faster	13	28	11

Q.13-18

Here is a list of products or processes that have been or could be developed through the use of biotechnology. Please tell me if you are very aware, somewhat aware, not very aware, or not at all aware of each of the following. How about...?

3.4 PRIORITIES FOR BIOTECHNOLOGY RESEARCH

As with awareness, Canadians tend to place a much higher priority on biotechnological products that promise the greatest improvement in quality of life for individuals and society as a whole. Highest priority goes to medical and health applications that treat and prevent disease (89 percent saying high priority) and environmental-crisis applications (73 percent), such as bacteria to clean up oil slicks, toxic spills or contaminated sites.

By contrast, those choices that pose ethical dilemmas or appear remote from everyday life or in the self-interest of a specific industry or producer-group are accorded a much lower priority. Yet, even lower-priority research areas are given considerable attention, which suggests that Canadians do not necessarily want to close the laboratory door on promising biotechnological applications as diverse as insect resistant crops (63 percent), faster-growing trees (30 percent) and animal to human organ transplantation (29 percent).

Similarly, two-thirds of Canadians (68 percent) consider the diagnosis of disease by genetic testing a high priority, and that rises to nine out of 10 (90 percent) in households with children under age 18. Age plays a smaller role than one would assume in determining research priorities, but gender is a significant factor with women more likely than men to look favourably on applications that are beneficial to health and the environment.

Priorities for Biotechnology Research

	HIGH PRIORITY	MEDIUM PRIORITY	LOW PRIORITY	DK/NA
Treatment and prevention of diseases	89	10	1	<1
Bacteria that clean up environmental problems, such as oil slicks, toxic spills or contaminated sites	73	23	4	1
Diagnosis of disease through genetic testing	68	26	5	1
Insect resistant crops that would reduce the need for chemical pesticides	63	30	6	<1
Trees that grow faster	30	43	26	1
Organs which can be transplanted from animals into humans	29	39	32	1

Q.19-24

I would now like to get your opinion about the important areas for research into biotechnology. Please tell me if you feel that each of the following should be a high priority, a medium priority or a low priority. How about...?

One might assume that age plays a major role in determining the public's attitude to biotechnological products, but that does not appear to be true. As demonstrated in the following table, Canadians of all ages are receptive to biotechnological advances, particularly to those products that deliver a broad benefit to society. The youngest age group (18 to 29) gave their highest priority to the treatment and prevention of diseases (92 percent) compared to 84 percent for the oldest population group sampled, those 65 and over. Yet both young and old place the same importance on the diagnosis of disease through genetic testing (66 percent and 65 percent respectively), suggesting that factors other than age determine priority. Bacteria that would assist environmental clean-up scored across the age board as the second highest priority after the treatment and prevention of disease.

Gender is a more significant determinant than age. As the following table demonstrates, women are more likely than men to consider medical and health applications a priority. Both men (87 percent) and women (91 percent) accord the treatment and prevention of disease their highest priority, but the gap widens with regard to the diagnosis of disease through genetic testing, 63 percent among men compared to 72 percent for women.

Environmental applications are considered equally important by both sexes, although women are more inclined to see a possible long-term benefit from insect resistant crops that would reduce pesticide dependence (67 percent) compared to men (60 percent). On the other hand, more men (34 percent) than women (25 percent) consider faster-growing trees a priority.

Priorities for Biotechnology Research by Age (Percent saying high priority)

	18 TO 29	30 TO 39	40 TO 49	50 TO 65	65 AND OLDER
Treatment and prevention of diseases	92	91	86	88	84
Bacteria that clean up environmental problems such as oil slicks	74	71	71	74	76
Diagnosis of disease through genetic testing	66	70	66	70	65
Insect resistant crops that would reduce the need for chemical pesticides	49	61	68	72	74
Trees that grow faster	31	22	32	30	37
Organs which can be transplanted from animals into humans	38	30	24	29	15

Priorities for Biotechnology Research by Gender (Percent saying high priority)

	TOTAL	MALE	FEMALE	GENDER GAP
Diagnosis of disease through genetic testing	68	63	72	+9
Insect resistant crops	63	60	67	+7
Treatment and prevention of diseases	89	87	91	+4
Organs transplanted from humans into animals	29	27	30	+3
Bacteria that clean up environmental problems	73	73	72	-1
Trees that grow faster	30	34	25	-9

Q.19-24

I would now like to get your opinion about the important areas for research into biotechnology. Please tell me if you feel that each of the following should be a high priority, a medium priority or a low priority. How about...?

4.0 Ethical Questions and Concerns

The advent of more advanced techniques, such as the transfer of genetic material from one species to another to create a new species or the possibility of human cloning, has changed the nature of the discussion about the potential uses of biotechnology. This discussion is no longer confined to esoteric academic debates or the realm of science fiction. In many ways, the discussion of ethical concerns related to biotechnology has shifted from "what if" to "what is."

In order to capture the range of opinions that may exist on this subject, Canadians were asked to agree or disagree with a number of statements that took a strong, even provocative, position on some topical ethical questions. The response categories to these statements were structured in such a way as to allow an attitudinal segmentation of these results, which is discussed later in this section.

Essentially, the results presented in this section reinforce the notion of a clear hierarchy within the realm of biotechnology. Canadians are willing to proceed with a more aggressive biotechnology agenda involving plants, especially if some positive altruistic goal is a result. When asked if they agreed or disagreed that "biotechnology should be used to produce high-yield crops as part of the solution to world hunger," 69 percent of Canadians said they agreed with this statement, with two-fifths of Canadians (39 percent) saying that they strongly agreed.

Looking at the accompanying table, it is evident that Canadians are somewhat ambivalent about the role of animals but are firm when it comes to disagreeing that the potential benefits of human cloning outweigh potential disadvantages or that parents should be allowed to select the sex or other traits of their children.

Ethical Viewpoints

	MEAN
Biotechnology should be used to produce high-yield crops as part of the solution to world hunger	7.4
The well-being of humans is more important than the well-being of animals	6.4
Transferring human genes into animals should not be allowed for whatever reason	5.8
Using animals for medical research is not justifiable	4.9
We should restrict experimenting with human genes, even if that means we would miss out in discovering cures for certain diseases	4.6
The potential benefits of human cloning outweigh the potential disadvantages	2.8
People should be allowed to choose the sex or other traits of their baby prior to conception	2.2

Q.25-31

Here are some statements that touch on ethical issues. Using a scale of one to ten, where one means that you disagree strongly and ten means that you agree strongly, please tell me how strongly you agree or disagree with the following statements. How about...?

There are a number of factors that affect responses to the statement that “the well-being of humans is more important than the well-being of animals.” Canadians between the age of 18 and 29 are evenly divided on this question but, as the age of the respondent increases, a consensus about the supremacy of human well-being tends to build.

Opinion leaders are more likely to agree with this statement (Mean 6.8, strongly agree 40 percent) than are non-opinion leaders (Mean 6.4, strongly agree 31 percent).

As could be expected, those who demonstrate personal environmental leadership⁷ are less likely to agree (Mean 5.8, strongly disagree 23 percent) than are those who do not demonstrate this behaviour (Mean 6.5, strongly disagree 14 percent).

As mentioned previously, there is a strong consensus that disagrees that the possible benefits of human cloning outweigh the potential disadvantages and with allowing parents to select the sex or other traits of their children prior to conception. Opposition to human cloning is higher among women (63 percent strongly disagree) than among men (56 percent strongly disagree).

Although there is not a significant gender difference in responses to the statement regarding the potential genetic manipulation of children by their parents, there is a difference between those who have children under the age of 18 in the home and those who do not. Those who do have children are more opposed to this possibility (79 percent strongly disagree) than are those who do not (71 percent strongly disagree).

Agreement with the Statement “The well-being of humans is more important than the well-being of animals” by Age

	STRONGLY AGREE	SOMEWHAT AGREE	NEITHER	SOMEWHAT DISAGREE	STRONGLY DISAGREE
Total	32	18	28	7	15
18 to 29	20	16	31	9	24
30 to 39	29	20	28	8	15
40 to 49	33	20	28	5	13
50 to 65	36	18	27	8	9
65 and older	51	12	23	2	11

Q.25-31

Here are some statements that touch on ethical issues. Using a scale of one to ten, where one means that you disagree strongly and ten means that you agree strongly, please tell me how strongly you agree or disagree with the following statements. How about... The well-being of humans is more important than the well-being of animals?

⁷ For more information on this custom summary measure, please refer to the Explanation of Summary Measures contained in 12.0 Methodology.

Even though opposition to allowing the transfer of human genetic material to animals generally outweighs support for this option, there is a significant difference in responses to this statement with regard to age. A majority of Canadians between 18 and 29 years of age (53 percent) agree that this inter-species transfer of material should be forbidden. However, as the age of the respondent increases, so does the willingness to disagree with this statement.

However, the age differences in response to this question may reflect the responses that were given to the question regarding the comparative importance of the well-being of animals versus the well-being of humans. Younger Canadians are more likely to provide responses that respect

presumed animal rights than are older Canadians. For example, younger Canadians are slightly more likely to agree that the use of animals for medical research is not justifiable and are more likely to disagree that human well-being should take precedence over animal well-being.

Although these results would indicate that older Canadians, especially those 65 years of age and older, would accept the inter-species transfer of genetic material, it is more likely that this response reflects an impression among older Canadians that it is more acceptable to use animals in the endeavour to improve the human condition.

Agreement with the Statement "Transferring human genes into animals, for whatever reason, should not be allowed" by Age

	STRONGLY AGREE	SOMEWHAT AGREE	NEITHER	SOMEWHAT DISAGREE	STRONGLY DISAGREE
Total	36	10	15	10	28
18 to 29	37	16	16	13	16
30 to 39	35	9	17	11	27
40 to 49	41	10	14	10	24
50 to 65	32	8	18	6	35
65 and older	33	6	11	7	42

Q.25-31

Here are some statements that touch on ethical issues. Using a scale of one to ten, where one means that you disagree strongly and ten means that you agree strongly, please tell me how strongly you agree or disagree with the following statements. How about... Transferring human genes into animals, for whatever reason, should not be allowed.

4.1 ATTITUDINAL SEGMENTATION

In order to examine attitudinal differences between subgroups in the population that might differ with regard to their general orientation to technology and biotechnology, we conducted a segmentation analysis. In this instance, the segmentation is designed to group individuals into clusters that are homogeneous with regard to their attitudes, values and ethics regarding technology in general and biotechnology in particular. The segmentation proceeds in several steps.

First, two sets of items, those assessing attitudes toward technology in general (Q3 to Q8), and those assessing the perceived ethicality of various biotechnological outcomes and practices (Q25 to Q31), were examined for their intercorrelations both within and between the two sets. On the basis of correlations observed, it appeared that there might be general underlying attitudinal and ethical orientations that would describe several items simultaneously. As a result, a principal components analysis was conducted on each set of items separately. Each analysis resulted in three underlying factors.

The meaning of these factors ran roughly parallel for the two sets. In each set a very negative, technophobic factor emerges and a more positive factor of technophilia appears. However, the positive factor is most properly described as being less negative rather than truly positive in any absolute sense. Finally there is evidence of a third factor in each set that is similar: this factor consists of contents regarding the instrumentality of technology/biotechnology.

To conduct a segmentation based on respondents' scores on these underlying attitude orientations to technology/biotechnology, factor scores were computed that represent the strength or weakness (relative to all others in the sample) of each respondent on each of the six factors. The factors in fact serve as new, hierarchically derived variables that become the basis for segmentation.

Cluster analysis, using SPSS v.7.5 K-means cluster, was executed in order to generate solutions of various cluster sizes. In particular, clusters of size 3, 4, 5, 6, and 7 were all run. The

selection of the final solution size was done on judgment, which is standard practice in segmentation work. The size selected weighs the needs for marketing and communications to relatively few audiences against the need for an articulated space of respondents' mental postures on the issue.

Upon discussion, there was a strong case to be made for retaining as many clusters (segments) as possible. Therefore a cluster solution of 6 segments was proposed.

A second approach to the data was also run, this time driven by more theoretical considerations. When attitudes toward issues such as technology are conceived not as bipolar in nature (good versus bad), but instead as bivariate in form (i.e., good and bad attitudinal judgments are possible, independently of one another), interesting descriptive possibilities emerge.

If a person can feel neither positively nor negatively predisposed to biotechnology, they are defined as being indifferent according to this scheme. If they feel both strong support and strong opposition at one and the same time, then they are classed as "ambivalent," or conflicted on the issue. If they know at least a little about the topic, but have not been motivated to come to an evaluation, then they are studiously neutral. Finally, a prevalence of one affective orientation over the other leads to the two more familiar states of favourability and opposition.

When writing statements in attitudinal assessment, it is often impossible to frame them in neutral terms. Instead, a provocative notion to which the respondents must react is often put forward. These question stems can often be easily classified as being in favour of or opposed to the issue in broad terms. If we first ensure that the items designed to "pull" in each direction in fact do so (confirming this with intercorrelation analyses and factor or principle components analyses), we can construct indexes of "positivity" and "negativity" on the issue. So long as these are relatively uncorrelated, they constitute independent assessments of the separate degrees of support for, and opposition to, the issue in question. Not all issues can be assessed in this way, for in some the inverse correlation between positive reactions and negative ones is quite strong: in other words,

people's minds and hearts are made up in one direction or the other.

However, on controversial, new or otherwise complex issues, people may be usefully classified along these lines. As the issue emerges they often adopt a "default" attitude (or placeholder position) that is often normative (an "ideal" or socially desirable position) or based on only scant knowledge and information. However, as they learn more, and become more invested in the issue (if it is ego-involving, personally relevant), they will soon "attitude" (used as a verb) the topic, coming to some overall sense of their support for, or opposition to, the issue or proposition in question. This evaluation process will tend to sum up their feelings and beliefs along one direction of the usual bipolar representation of the attitude.

Biotechnology is both new and controversial. On many social issues of this nature, ones that involve deep moral and ethical issues surrounding human life and death (e.g., euthanasia, capital punishment, abortion, organ donation, etc.), people find it very hard to be "simple minded." Instead they tend to have complex attitudes wherein they hold to both positions of opposition and support at one and the same time. They rationalize this apparent inconsistency in their beliefs and feelings by inventing boundary conditions on when they deem a negative attitude to be appropriate for interpreting and reacting to the particular manifestation of the issue and when they see a positive stance as being more suitable.

In an ever-increasingly complex world, devoid of moral absolutes, where pluralistic acceptance of differences is expected and mutual accommodations are sought as a matter of course, people's attitudes are often molded to the situations of their lives. Often the values and attitudes they express are mixed or in competition, and so individuals need attitudes that are complex enough to be flexibly adaptable to their needs. Attitude systems based on ideologically held value systems are largely a thing of another time.

It is our contention, therefore, that biotechnology is a social issue area that possesses all the markers of complexity in people's attitudes. The theoretical scheme detailed in this section is designed to capture this complexity in a meaningful way. The analysis attempts to classify individuals into meaningful, mostly homogeneous attitudinal groups, and estimate the sizes of those groups.

DESCRIPTION OF ATTITUDINAL GROUPS

GROUP 1 - CRITICAL SKEPTICS

Comprising 15 percent of the overall population, this group is strongly critical of the role of experts and expresses a lack of faith in science and technology. As well, Critical Skeptics are pessimistic about the economic benefits that may arise from new technologies, believe that society is too ready to embrace change and fear that adopting new technologies will reduce job opportunities. Although they are not enamoured with science, this group maintains that science is morally neutral.

Critical Skeptics are less persuaded by moral arguments in the pursuit of biotechnology. However, they are more flexible with regard to the transfer of human genes into animals. This group is less likely than other groups to believe that human well-being should take precedence over animal well-being.

GROUP 2 - SCIENCE OPTIMISTS

Science Optimists (12 percent) possesses a strong faith in the ability of technology to solve problems and are respectful of the decision-making ability of experts. This group believes that increased use of technology increases job opportunities and that the pursuit of technology is necessary to maintain our current quality of life. This group exhibits a mild belief that the use of animals for medical research is unjustifiable. However, they are strongly persuaded by moral arguments to validate the use of biotechnology.

Science Optimists are ready to push the boundaries of current society and consider some scientific options that others find distasteful. This is the only attitudinal group to believe that the advantages of human cloning outweigh the disadvantages and that parents should be allowed to choose the sex and other traits of their children prior to conception.

GROUP 3 - CONFIDENT TECHNOPHILES

Although they are critical of experts, Confident Technophiles (22 percent) reject the attitude that people would be better off if they "lived a simpler life without so much technology." Comfortable with the pace of social change, this group also believes that the pursuit of technology results in increased job opportunities and a greater ability to maintain our current quality of life. Further, this group is flexible with regard to experimenting with human genes, the transfer of human genes into animals and the use of animals for medical research. This group also believes in the inherent moral neutrality of science.

GROUP 4 - HUMAN PROTECTIONISTS

One-fifth of Canadians (19 percent) fall into the category of Human Protectionists. Members of this group are strongly critical of experts and are sceptical about the ability of technology to solve problems. As well, they are uncomfortable about the pace of societal change. Although they believe in the moral neutrality of science, they are strongly resistant to any part of biotechnology that affects the current composition of the human body. In addition to rejecting experimentation, for whatever reason, with human genes, they stridently reject the transfer of human genes to animals, or allowing parents to choose the sex or other traits of their children prior to conception. As well, they do not accept that the benefits outweigh the disadvantages when it comes to human cloning.

GROUP 5 - SCIENCE MORALISTS

As their name implies, Science Moralists (10 percent) differ from other Canadians in one unique aspect - their belief that science does have an inherent moral orientation, good or bad. Although they do exhibit a mild antipathy to experts and the role of technology, Science Moralists are ambivalent about the pace of societal change. This group strongly disagrees with the concept that the benefits of human cloning outweigh the disadvantages, but expresses average attitudes on many of the other attitudinal and ethical parameters tested in this study.

GROUP 6 - TENTATIVE SUPPORTERS

Although this group has a strong faith in science and in experts, Tentative Supporters (23 percent) display a mild technophobia when it comes to the role that technology plays in society. They reluctantly accept that technology provides benefits, but believe that there is a price that must be paid, either in the rapid pace of social change or the decreased access to jobs. This group is most likely to believe that human well-being should take precedence over animal well-being and are swayed by moral arguments in support of biotechnology. They are, however, very resistant to allowing parents to choose the sex and other traits of their children prior to conception and are not persuaded that the possible benefits of human cloning outweigh the potential disadvantages.

Demographic Characteristics of Attitudinal Groups

CHARACTERISTIC	CRITICAL SKEPTICS	SCIENCE OPTIMISTS	CONFIDENT TECHNOPHILES	HUMAN PROTECTIONISTS	SCIENCE MORALISTS	TENTATIVE SUPPORTERS
Education		Less well-educated	University degree and Post Secondary education	Well-educated		Community College and High School
Age	Generation X, Late Boomers			Youngest		Boomers
Children in Home					Fewest children in home	Most children in home
Household Income		Lower income	Higher income		Middle income	Low middle income
Gender			Predominantly Men	Predominantly Women		Predominantly Women
Regional Distribution	Fewer in Quebec, More in Ontario and Western Canada, More rural	More in Quebec	More in Ontario, More Urban	Fewer in Quebec, More in Ontario and British Columbia (esp. in Toronto & Vancouver)	More in cities between 100K and 1 Million in size	More in Quebec, Fewer in Ontario

5.0 Consumer Issues

The development of biotechnology products presumes that there will be a market for these products and a consumer. This chapter will examine a number of issues related to the introduction of food products developed through biotechnology. Although specific product examples are not tested, a number of factors related to the potential acceptability of these products are examined, including attitudes toward purchasing behaviour and consumer information issues. With regard to consumer information, attitudes toward the use and informational adequacy of food product labeling, as well as some possible channels that could be used to provide consumer information on biotechnology used in food products, are investigated in this chapter.

5.1 PURCHASING BEHAVIOUR

It is often difficult to predict true purchase behaviour when it comes to the development of new products. Occasionally, products that received high levels of approval at a conceptual level fail to achieve the level of expected sales. Likewise, there are products that succeed in the marketplace despite prognostications of consumer resistance. A careful review of research methodology indicates that a more reliable approach to predicting consumer behaviour is to link existing behaviour on relevant products with an assessment of possible future behaviour.

In this study, current purchasing behaviour with regard to organic food products is used to obtain an assessment of the possible acceptance of food products that involve biotechnology. Many of the food products that we currently consume involve the use of more traditional methods of biotechnology, such as the selective breeding of livestock or food crops. As well, the agri-food industry is a prominent consumer of pesticides, herbicides, and antibiotics. Observing current behaviour with regard to organic food products can be a reliable indicator of the potential acceptance or rejection of food products that employ more modern biotechnology techniques. Those who currently purchase organic foods can be seen as those who would be most resistant to purchasing foods produced through biotechnology.

Almost one-third of Canadians (30 percent) responded that they purchased organic food products in the week prior to the interview.⁸ Six in ten Canadians reported that they did not purchase any organic food products; a further ten percent could not make a definite assessment either way in this regard.

Canadians who demonstrate a more strategic orientation toward their consumer purchases are more likely to have made an organic food purchase in the past week (36 percent) than are those who make purchasing decisions that are driven more by price or aesthetic considerations (21 percent).

8 For the purposes of this study, organic food products were defined as having been produced without the use of chemicals or pesticides.

The incidence of purchasing organic foods in the week prior to the interview is also higher among those who are very familiar with biotechnology (38 percent) and those with annual household incomes greater than \$70,000 (38 percent). This latter finding is not surprising given the price differential that often exists between organic and non-organic foods.

5.2 CONSUMER ORIENTATIONS

Canadians were also asked to provide a self-assessment of their consumer orientation. Put simply, they were asked which factors were most important to the way they made their consumer choices, low price and good appearance or values-based considerations, such as buying products to support local producers or companies whose values they support.

This latter group, who take a "strategic" approach to their purchasing decisions, compose a slight majority of the adult Canadian population (52 percent). Those who are driven more by consumption-oriented factors, such as price or appearance, make up 41 percent of the overall population. A further five percent of Canadians said that both factors contributed to their purchasing decisions, while two percent said that neither factor played a role when they were buying food products.

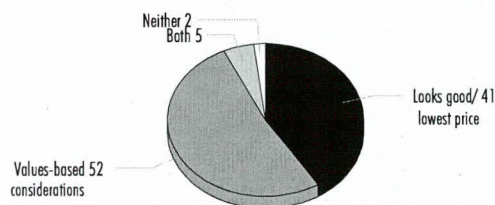
It is assumed that "strategic" consumers, those who support their values with their purchasing decisions, will react differently to the introduction of new food products which incorporate the more modern elements of biotechnology than those who are consumption-oriented. However, just as consumption-oriented Canadians may be attracted to products that may offer a lower price or more pleasing appearance, strategic consumers may wish to purchase products produced through biotechnology if they believe they are in accord with their values-based concerns.

Although men appear to be driven more by consumption-oriented factors than are women, age appears to be the critical factor with regard to the way Canadians approach food purchases. Younger Canadians tend to focus more on price or appearance (51 percent) than on strategic

considerations (43 percent). However, as the age of the respondent increases, so does a willingness to include other considerations as part of the decision-making process.

Opinion leaders (64 percent) are more likely than non-opinion leaders (50 percent) to adopt a "strategic" approach to their purchasing decisions.

Consumer Orientation



Consumer Orientation by Age

	LOW PRICE/ APPEARANCE	VALUES-BASED CONSIDERATIONS
Total	41	52
18 to 29	51	43
30 to 39	44	46
40 to 49	38	54
50 to 65	35	56
65 and Older	35	56

Q.33

When it comes to making a decision to buy food products, some people just buy what looks good to them or concentrate on getting the lowest price. Other people focus more on other considerations, such as buying local products or supporting companies whose values they agree with. Which is the closest to the way that you decide?

5.3 FOOD PRODUCT LABELS

Canadians were asked a variety of questions concerning food product labels and their use. When it comes to reading the list of ingredients on food product labels, a slight majority of Canadians (52 percent) said that they engage in this activity very often. Almost three out of ten Canadians (29 percent) said that they sometimes read the list of ingredients, while a further one-fifth of Canadians say they read this list rarely (12 percent) or never (seven percent).

Women (61 percent) are more likely than men (43 percent) to say that they very often read the list of food product ingredients. Age is also a factor with regard to this activity, with those over 65 years of age more likely (61 percent) than those between 18 and 29 years of age (41 percent) to frequently engage in this activity. It should be noted that health factors, which tend to increase with age, may act as the motivation for this activity as older Canadians try to restrict their intake of specific food ingredients, such as sodium or fat, in their diet.

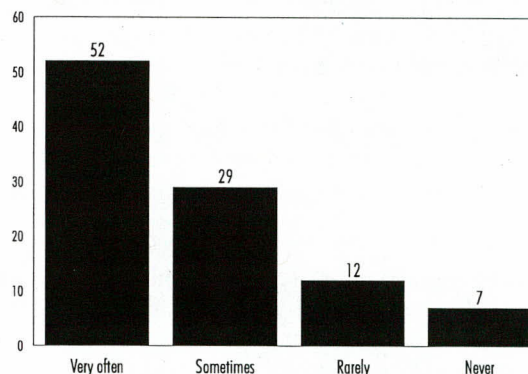
Education also plays a role, with those with at least some university education more likely to read food ingredient lists than are other Canadians.

Reading food ingredient labels demonstrates a care and concern about the food that Canadians consume. Opinion leaders are more likely to engage in this activity (62 percent saying very often) than are non-opinion leaders (51 percent). As well, those who are at least somewhat familiar with biotechnology are more likely to frequently read food ingredient lists (61 percent) than are those who are not very (51 percent) or not at all (37 percent) familiar.

As could be expected, consumer orientation plays a significant role with regard to this activity. While almost two-thirds of strategic consumers (64 percent) say they very often read the list of ingredients, slightly over one-third of consumption-driven consumers (36 percent) read ingredient lists on a frequent basis.

In general, Canadians are satisfied with the adequacy of the information contained on food product labels. A majority of Canadians

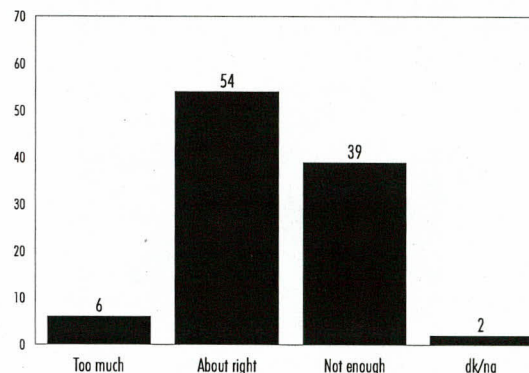
Use of Ingredient Lists on Food Product Labels



Q.42

In Canada, ingredients must be listed on food product labels. How often do you read the list of ingredients when deciding what products to buy? Would that be very often, sometimes, rarely or never?

Informational Adequacy of Food Product Labels



Q.43

When it comes to identifying the contents of food products, do you think that labels now provide too much information, about the right amount of information, or not enough information?

(54 percent) believe that food product labels contain the right amount of information, while an additional six percent believe that there is too much information on food product labels. Almost two out of five Canadians (39 percent) say there is not enough information on food product labels. The remaining two percent of Canadians cannot make an assessment in this area.

Although significant minorities disagree, a majority of Canadians in every demographic category express satisfaction with the adequacy of information that is contained on food product labels.

Those who feel that the federal government does a poor job of regulating biotechnology are the most dissatisfied (62 percent) with the adequacy of information on food product labels. Other groups which express a higher than average dissatisfaction with the informational adequacy of food product labels include: people who demonstrate personal environmental leadership (49 percent), those with annual household incomes less than \$20,000 (47 percent), opinion leaders (46 percent), residents of Ontario (44 percent) and those 65 years of age or older (44 percent).

5.4 LIKELY USE OF POTENTIAL INFORMATION CHANNELS ON BIOTECHNOLOGY FOOD PRODUCTS

This study also explored the likely use of a number of information channels which consumers could use to inform themselves about the use of biotechnology in the food products they purchase. The options tested included the use of toll-free telephone numbers ("1-800" numbers), tear-off sheets that would be posted near the relevant food item (similar to price reduction coupons), World Wide Web sites on the Internet, and food product labels.

Of the four options tested, food product labels were seen to be the channel of information that Canadians would be most likely to use (58 percent saying very likely), followed by toll-free telephone numbers (24 percent) and tear-off sheets (23 percent). Only one-fifth of Canadians (18 percent) said that they would be very likely to use the Internet as a channel for information about biotechnology used in food products.

Food product labels were seen to be an especially important channel of information for those demonstrating personal environmental leadership (75 percent saying very likely), strategic consumers (65 percent very likely), and opinion leaders (64 percent).

The appeal of toll-free telephone numbers as a potential channel of consumer information increases with age, from 19 percent among those between 18 and 29 years of age reporting that they would be very likely to use this method to 31 percent among those 65 years of age and older. However, the appeal of this format decreases as education levels rise.

Potential Use of Selected Information Sources on Biotechnology Used in Food Products

	VERY LIKELY	SOMEWHAT LIKELY	NOT VERY LIKELY	NOT AT ALL LIKELY	DK/NA
Labels on food products	58	31	7	4	<1
"1-800" telephone lines	24	27	28	21	<1
Tear-off cards on grocery shelves	23	32	25	18	2
Web sites on the Internet	18	25	19	37	1

Q.44-47

A variety of sources could provide information on biotechnology used in food products. For each of the following, please tell me if you would be very likely, somewhat likely, not very likely or not at all likely to use that information source? How about...?

The use of a toll-free number as an information channel has more appeal in Atlantic Canada (31 percent saying they would be very likely to use this format), Quebec (30 percent) and rural Canada (29 percent). Residents of the three most western provinces are the least likely to express an interest in this format (14 percent saying very likely).

As with the use of toll-free telephone numbers, the potential use of tear-off sheets increases with age, rising from 20 percent among those between 18 and 39 years of age to 29 percent among those 65 years of age and older.

Although the use of World Wide Web sites on the Internet was the least favoured channel of information for Canadians in general, this format is more appealing to those between the age of 18 and 29 (28 percent saying very likely to use) than either toll-free lines (19 percent) or tear-off sheets (20 percent). The appeal of the Internet as a channel of information decreases with age. Urban residents report they are more likely to use this channel of information (20 percent saying very likely to use) than are rural Canadians (14 percent).

There is a significant gender difference with regard to the potential use of these channels of information. As the following table indicates, women are more likely than men to express an interest in using three of the potential information channels (food product labels, toll-free lines, and tear-off sheets) and express the same level of interest as men with regard to the fourth (Internet). This should not be surprising given that women report a greater frequency of use with regard to food ingredient lists.

Overall, opinion leaders and those demonstrating personal environmental leadership report that they would be more likely to use these channels of information than would those who are not.

Although food product labels are seen to be the most likely channel of information that could be used to inform consumers about the use of biotechnology in food products, other potential channels should not be discounted. Those who

are least likely to report reading food ingredient lists, such as those in the lower income and education groups, express an interest in the use of toll-free telephone numbers. Another demographic segment that is least likely to read product labels, people between 18 and 29 years of age, shows a greater interest in the Internet as a source for this information.

Potential Use of Information Channel by Gender (% saying very likely)

	TOTAL	MEN	WOMEN	GENDER GAP
Food Product Labels	58	50	65	+15
Tear-off Sheets	23	16	28	+12
Toll-free Telephone Numbers	24	22	26	+4
Internet Sites	18	19	17	-2

Q.44-47

A variety of sources could provide information on biotechnology used in food products. For each of the following, please tell me if you would be very likely, somewhat likely, not very likely or not at all likely to use that information source? How about...?

6.0 Forestry Issues

One of the areas where products developed through the use of biotechnology could make a significant impact is in the Canadian forest industry. Just as there are opportunities, there are also concerns related to the introduction of products into an uncontrolled environment. This chapter examines attitudes toward the maintenance of biodiversity as well as two biotechnology products that could contribute to a stronger forest industry.

6.1 MAINTAINING BIODIVERSITY

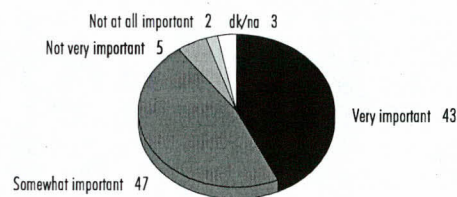
To lead off this section, we asked respondents about the importance of maintaining biodiversity when introducing a new biotechnology product into the environment. The term "biodiversity" was defined for participants as referring to the variety of plants and wildlife in a given area.

When asked if maintaining biodiversity should be an important consideration when introducing new products, nine out of ten Canadians (90 percent) said that maintaining the variety of plants and wildlife was either a very important consideration (43 percent) or a somewhat important consideration (47 percent). Only five percent of Canadians said that maintaining biodiversity was not an important consideration, while a further two percent said it is not at all an important consideration. Three percent of Canadians answered "Did Not Know" to this question.

With such a strong level of overall support, it is not surprising that maintaining biodiversity is seen to be a high priority among all demographic groups.

Maintaining biodiversity was seen to be especially important to opinion leaders. Nearly three out of five opinion leaders (57 percent) believe that maintaining biodiversity should be a very important consideration when developing

Importance of Biodiversity



Q.35

The term "biodiversity" refers to the variety of plants and wildlife in a certain area. When it comes to determining the acceptability of a new product developed through biotechnology, should maintaining biodiversity be a very important consideration, a somewhat important consideration, a not very important consideration or a not at all important consideration?

and introducing new biotechnology products. In contrast, only 41 percent of non-opinion leaders said it was a very important consideration to maintain biodiversity when introducing new products.

It is often believed that Canadians living in rural areas are more supportive of biodiversity than are other Canadians. However this conclusion is not supported by our data. Although rural Canadians support maintaining biodiversity (49 percent saying very important) their level of support is not significantly greater than that found among Canadians living in urban areas (47 percent saying very important).

Any product that would limit biodiversity in any given area, or would destabilize the food chain, would not be considered acceptable to the vast majority of Canadians.

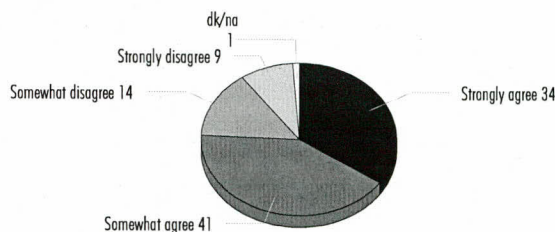
6.2 BACTERIAL PEST CONTROL

As a part of this study, two potential biotechnology products for use in Canadian forests were tested. This section examines the use of a pest control product using bacteria targeted to a specific insect.

In response to an initial question, three-quarters of Canadians (75 percent) believe that a bacterial pest control product that targets only those insects harmful to trees should be used in their forests. This support is divided between 34 percent of Canadians who strongly agree and 41 percent of Canadians who somewhat agree that this product should be allowed for use. In contrast, 14 percent of Canadians somewhat disagree and nine percent strongly disagree that a bacterial pest control product should be used in Canadian forests. Only one percent of Canadians did not know or did not answer this question.

Although there is little difference between men and women with regard to overall support for allowing the use of this product, men are more intense in their support for this product than are women. As well, those who have a pro-science orientation are most likely to express enthusiasm for this product (43 percent strongly agree), while science sceptics are likely to be more cautious (25 percent strongly agree).

Support for Use of a Bacterial Pest Control Product in Canadian Forests



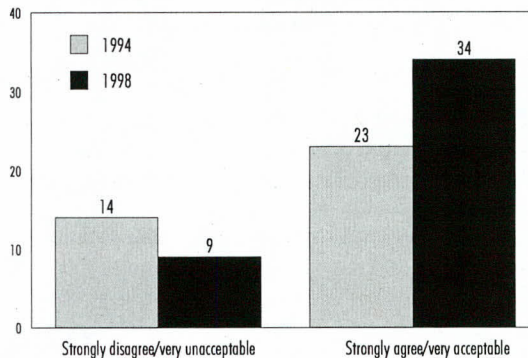
Q.36

Forests can be protected from some insects by using chemical pesticides. Some of these pesticides also kill insects that do not attack the forests. A bacterial pest control product has been created to target only those particular insects that are harmful to the trees. Knowing this, do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that this product be allowed for use in Canadian forests?

There are indications that the acceptability of using a bacterial pest control product in Canadian forests has increased slightly over the past four years. Comparing the current results to a similar question used in the earlier Optima Consultants study, one-third of Canadians (33 percent) strongly agree that the use of this product should be allowed, up ten points from the 23 percent of Canadians who said that this product was very acceptable in 1994. Further, only nine percent of Canadians strongly disagree with the use of this product compared to 14 percent who found this product very unacceptable four years ago.

Two statements regarding this bacterial pest control product were tested with Canadians to see how they might affect support for or opposition to the use of this product. If people believe that harmful insects would eventually develop resistance to a new bacterial pest control product, a plurality of Canadians (43 percent) say it would make them less likely to support its introduction. More women (46 percent) than men (41 percent) would be less likely to support introducing a bacterial pest control product under these circumstances. Although developing resistance to pest control products is a natural process and ensures the continuing presence of the insect in the food chain, the idea of an insect becoming resistant to a pest control product may touch on fears that arise when a strain of harmful bacteria becomes resistant to antibiotics. The idea of a pesticide-resistant "superbug" in Canadian forests could undermine support for the introduction of this product.

Changes in Attitude Toward Use of a Bacterial Pest Control Product in Canadian Forests



Q.36

Forests can be protected from some insects by using chemical pesticides. Some of these pesticides also kill insects that do not attack the forests. A bacterial pest control product has been created to target only those particular insects that are harmful to the trees. Knowing this, do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that this product be allowed for use in Canadian forests?

Impact of Statements on Support for the Use of a Bacterial Pest Control Product in Canadian Forests

	MORE LIKELY	LESS LIKELY	MAKES LITTLE DIFFERENCE	DK/NA
Insects would eventually develop a resistance to the bacterial pest control product	27	43	29	2
This product would replace chemical pesticides	71	18	9	2

Q.37-38

Here are some statements about a bacterial pest control product. For each, please tell me if this information would make you more likely to support or less likely to support allowing this product, or would it make little difference to your opinion? How about...?

Fifty percent of science sceptics would be less likely to support the introduction of a bacterial pest control if harmful insects would eventually develop resistance. In contrast, fully 40 percent of pro-science individuals would still support introduction of a bacterial pest control product under these circumstances.

Canadians saw the possible reduction in the use of chemical pesticides as a result of this new bacterial pest control product as a persuasive argument supporting the introduction of this product. When asked if they would support the introduction of a bacterial pest control product if it meant using less chemical pesticides, seven out of ten (71 percent) Canadians said they would be more likely to support its introduction. Unlike the previous question, there was no significant difference in response by gender.

While clear majorities of Canadians support the replacement of chemical pesticides with bacterial pest control products, support rises with education. For example, while 63 percent of Canadians with less than high school education say they would be more likely to support the introduction of this product if it resulted in reduced usage of chemical pesticides, support increases to 77 percent among those who have undertaken post-graduate studies.

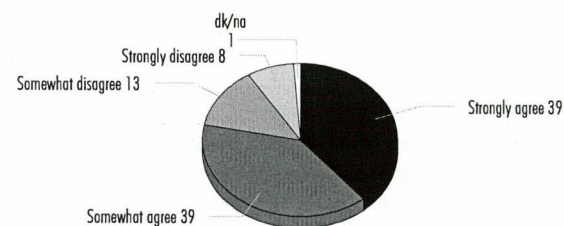
6.3 FASTER-GROWING TREES

This study also investigated attitudes toward the introduction of a tree that would be genetically modified to grow faster.

In response to an initial question citing some of the benefits that may result from using these trees, a large majority of Canadians (78 percent) said that they would support the use of these gene-altered faster-growing trees in our forests. Thirty-nine percent of Canadians strongly agree with the use of these trees, while 39 percent of Canadians say they would somewhat agree. In contrast, 13 percent would somewhat disagree and eight percent would strongly disagree with the use of these trees in Canadian forests. Only one percent did not know or would not answer the question.

More males (45 percent) than females strongly agree (33 percent) with the introduction of faster-growth trees.

Support for Use of Genetically Modified Faster-Growing Trees in Canadian Forests



Q.39

By modifying their genes, trees can be made to grow faster. This would increase the number of mature trees available for reharvesting. These trees would also absorb more of the atmospheric carbon that contributes to global warming. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that these faster-growing trees be planted in Canada?

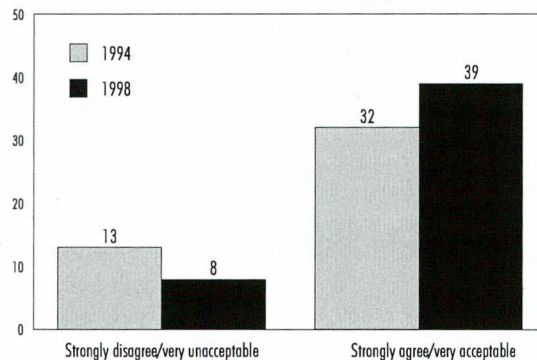
While support for the introduction of these faster-growing trees is broadly distributed across educational lines, there are significant differences in the intensity of support between people who have undertaken post-graduate studies and people who have less than a high school education. In other words, a higher education level leads to stronger positive opinions on the introduction of faster-growing trees.

Over three-quarters of opinion leaders (77 percent) either strongly agree (45 percent) or somewhat agree (32 percent) that faster-growing trees should be planted in Canada. Although a similar number of non-opinion leaders also agreed with this proposal, their support for the use of this product is less intense, with responses more evenly distributed among those that strongly agree (38 percent) or somewhat agree (39 percent). In contrast, only 11 percent of opinion leaders somewhat disagree with using faster-growing trees, while the same number strongly disagree with this proposal.

Fully 50 percent of those with a pro-science attitude strongly agree with planting genetically modified trees, while a further 33 percent somewhat agree with the idea. In contrast, only 29 percent of science sceptics strongly agree with the planting of faster-growing trees, while 41 percent somewhat agree.

As with the bacterial pest control product, support for the use of genetically modified faster-growing trees has increased since 1994. Those most in support of using these trees has grown by seven percentage points over the past four years, while strong opposition has decreased by a similar amount (five percent).

Changes in Attitude Toward the Use of Genetically Modified Faster-Growing Trees in Canadian Forests



Q.39

By modifying their genes, trees can be made to grow faster. This would increase the number of mature trees available for reharvesting. These trees would also absorb more of the atmospheric carbon that contributes to global warming. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that these faster-growing trees be planted in Canada?

The ability of the faster-growing trees to pass on their modified genes through reproduction to related species was not seen as a concern. A slight majority of people (52 percent) said that they would be more likely to support the introduction of faster-growing trees if it meant that these trees would pass on their genes when they reproduced with other trees. Exactly two-thirds of individuals with a pro-science orientation (66%) would be more likely to support the introduction of these trees if they could pass on their genes. In contrast, only a significant minority (38 percent) of science sceptics would be more likely to support the introduction of faster-growing trees if they could pass on their fast-growth genes.

Three-quarters (75%) of Canadians surveyed said that they would more likely support the introduction of gene-altered trees into Canadian forests if these trees would more quickly restore forests that had been logged. Only nine percent of Canadians said they would be less likely to support the introduction of faster-growing trees despite the fact that this would permit quicker reforestation. Sixteen percent said it would make little difference to their opinion.

While all demographic groups had strong majorities supporting the introduction of faster-growing trees into Canadian forests, those individuals with a pro-science orientation were the most likely to support such a policy (86%).

Impact of Statements on Support for the Use of Genetically Modified Faster-Growing Trees in Canadian Forests

	MORE LIKELY	MAKE LITTLE DIFFERENCE	LESS LIKELY	DK/NA
Faster-growing trees would quickly restore forests that have been logged	75	16	9	1
These trees would pass on their fast-growing genes when they reproduce with other trees	52	29	16	2

Q.40-41

Here are some statements concerning these faster-growing trees. For each, please tell me if this information would make you more likely to support or less likely to support the use of these trees, or would it make little difference to your opinion? How about...?

7.0 Intellectual Property and Biotechnology

The protection of property is one of the principles of liberal democracy. A subsidiary principle is the right to develop and profit from one's ideas. A great deal of effort, both on the part of the legislatures and the courts, has been focussed on the need to protect the intellectual property rights of inventors. Usually, this protection takes the form of a patent, trademark or copyright. The individual right to protect property and profit from its use is sometimes seen to conflict with the wider society's rights to ensure the protection and well-being of its citizenry.

The consideration of an intellectual property regime that would govern the use of biotechnology must balance these two principles. In this section, we first study how Canadians view the principle of patent protection and then follow up with several specific case studies.

7.1 PERCEPTIONS OF PATENT PROTECTION

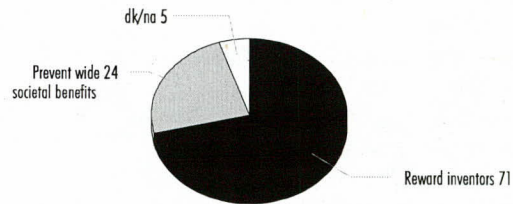
We asked Canadians if patent protection is necessary to allow inventors to reap the rewards from their investments or if patents prevent wide societal benefits. A strong majority of Canadians (71 percent) believe that patents should reward inventors by allowing them to reap the rewards from their investments. In contrast, only 24 percent of Canadians agreed with the statement "patents prevent wide societal benefits." Only five percent did not know or did not answer the question.

Support for patent protection was strongest amongst those with post-graduate degrees (77 percent) and lowest amongst those with less than high school education (63 percent). In contrast, one-fifth of those who had undertaken post-graduate studies (18 percent) believed that patents prevent wide societal benefits, while 26 percent of those with less than high school education concurred with this statement.

As household income rises so do levels of support for patent protection.

Surprisingly, there is little difference in the perception of patents by orientation toward science. Both science sceptics (75 percent) and those with a pro-science approach (72 percent) showed similar levels of support for patent protection. In contrast, only 22 percent of science sceptics and 25 percent of those identified as being pro-science believed that patents prevent wide societal benefits.

Attitudes Toward Patent Protection



Annual Household Income and Perceptions of Patent Protection

	REWARD INVESTORS	PREVENT BENEFITS	DON'T KNOW
Under 20K	63	30	7
20K-30K	69	26	6
30k-40K	73	26	2
40K-50K	71	25	4
50K-70K	75	23	2
Over 70K	76	20	4

Q.48

Some people say that patent protection is necessary because it allows the patent holder to reap the rewards of their effort and investment in creating the invention. Others say that patents unnecessarily prevent society from widely benefiting from greater access to new inventions. Which viewpoint is closest to your own?

7.2 ATTITUDES TOWARD POTENTIAL BIOTECHNOLOGY PATENTS

We asked Canadians six questions designed to test attitudes towards specific policy issues. The questions also test ethical limits of their support for biotechnological patent protection.

Canadians were asked if it were permissible to patent a new species of chimpanzee or guinea pig that included human genes. The intention behind these two questions was to determine if Canadians would differentiate between an animal that was closely related to man and an animal that was commonly associated with medical experimentation. We found that seven out of ten Canadians were opposed to the idea of patenting either new species, with almost one-half of Canadians (48 percent) strongly opposed to this idea. The type of animal that would be patented did not matter in the minds of Canadians.

Likewise, two-thirds of Canadians (65 percent) do not believe that granting a patent on an animal modified through the use of biotechnology is similar to granting a patent on a consumer product. A significant minority (41 percent) strongly disagree with this statement, while a further 24 percent somewhat disagree. In contrast, only eight percent of Canadians strongly agree that there is no real difference, while 22 percent somewhat disagree.

Attitudes Toward Patents and Biotechnology

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	DK/NA
We should not grant patents on new species of chimpanzee that includes human genes	48	19	11	17	3
We should not grant patents on new species of guinea pig that includes human genes	48	20	15	14	4
Patents allow multinational companies to charge higher than necessary prices for new products	34	34	16	13	3
Some technologies should not be patented because it is not in the public's interest	32	36	17	12	3
Granting patents on new plants is necessary to encourage globally competitive agricultural research	26	48	15	8	3
It's okay for someone to have a patent on a new plant modified through the use of biotechnology	17	50	18	11	4
Granting a patent on an animal modified through the use of biotechnology is no different than granting a patent on a consumer product	8	22	24	41	4

Q.49-54

Now I would like to discuss patents in relation to biotechnology. Please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements. How about...?

As the following table demonstrates, opposition to treating a patent on an animal modified by the use of biotechnology in a manner similar to a patent on a consumer product increases and intensifies as the education level of the respondent increases.

Opinion leaders were more likely to strongly reject this statement (53 percent) than non-opinion leaders (40 percent). Not surprisingly, 57 percent of science sceptics also strongly disagree with the granting of a patent on an animal modified using biotechnology. As could be expected, only 31 percent of individuals with a pro-science attitude strongly disagree with this statement. Those with a pro-science attitude were more likely to agree (38 percent) with this statement than were science sceptics (20 percent).

This statement highlights one of the few differences between people living in urban and rural Canada. People living in cities with over one million inhabitants were more likely to strongly disagree (48 percent) with this statement than those living in rural areas (38 percent). Likewise, people living in rural areas were more likely to agree with this statement (32 percent) than people living in the major urban centres (25 percent).

As it currently stands, Canadians are not prepared to accept patents on animals that have been modified through the use of biotechnology.

Perceptions of patent protection are also affected by impressions of who would benefit, with support higher for patent protection linked to broader societal benefits and lower for cases where the benefits would be restricted to a few. Canadians were asked if they thought that patents allowed multinational companies to charge higher prices than necessary for new products. Two-thirds of Canadians (68 percent) believed this to be the case, with 34 percent of Canadians in strong agreement with this statement. In contrast, only 13 percent strongly disagree and 16 percent somewhat disagree. Three percent did not know.

Opposition to Animal/Consumer Product Comparison by Education Level

	SOMEWHAT DISAGREE	STRONGLY DISAGREE
Less than High School	23	34
High School	26	40
Community College	24	40
Some University	21	46
Undergraduate Degree	25	44
Post-graduate Studies	24	55

Q.50

Now I would like to discuss patents in relation to biotechnology. Please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements. How about... granting a patent on an animal modified through the use of biotechnology is no different than granting a patent on a consumer product?

Opinion leaders are more apt to strongly agree (47 percent) that patents permit multinational companies to charge more than is necessary for new products than are non-opinion leaders (32 percent). As might be expected, 41 percent of science sceptics believe that patents allow multinationals to charge more than they should, while only 29 percent of those with pro-science views believe this to be the case.

Strong interest exists to use a "public interest test" as part of the patent process. Fully 68 percent of Canadians believe that some technologies should not be patented because it is not in the public's interest. Thirty-two percent of Canadians strongly agree with this statement, while 36 percent somewhat agree. In comparison, 12 percent strongly disagree and 17 percent somewhat disagree. Three percent did not know. However, responses to this question do not reveal whether a patent should be withheld to permit the broad distribution of the technique or product or if it should be withheld to prevent the manufacture of said item.

People who have undertaken post-graduate studies are more likely to strongly agree (39 percent) that some technologies should not be patented than are people with less than high school education (26 percent).

Although opinion leaders and non-opinion leaders express similar levels of agreement with this statement, opinion leaders are more firm in their view that it is in the public's interest to withhold patents from certain technologies (42 percent). Individuals identified as being pro-science are less likely to strongly agree (26 percent) than are science sceptics (36 percent) that some technologies should not be patented if they are not in the public's interest.

Canadians are opposed to recognizing intellectual property rights with regard to animals that have been modified, but there are signs that they are ready to proceed with some form of patent protection with regard to new plant species developed through the use of biotechnology. A strong majority of people either strongly agree (26 percent) or somewhat agree (48 percent) that granting patents on new plants is necessary to encourage globally competitive agricultural research. By contrast, only eight percent of Canadians strongly disagree with this statement, while another 15 percent somewhat disagree. Despite similar levels of agreement overall, men are more intense in their agreement (31 percent) than are women (22 percent).

The development of new plants that would improve Canada's globally competitive agriculture research should have resonance in rural Canada. However, this is not the case. Only 27 percent of people living in rural Canada strongly agree with the granting of patents to encourage globally competitive agricultural research, the same number as those who live in major urban centres. The same argument holds true with people who somewhat agree (47 percent in both cases).

Although there is a certain level of support for granting patents on plants, this support is tentative and conditional. Two-thirds of Canadians (67 percent) agree with the proposition that "it is okay for someone to have a patent on a plant modified through the use of biotechnology," but only 17 percent say they strongly agree. A smaller number of Canadians (11 percent) strongly disagree with this proposition. Eighteen percent of Canadians say they somewhat disagree with this proposition. These levels of support are consistent across all demographic groups.

7.3 ETHICAL CONSIDERATIONS IN THE PATENT PROCESS

Canadians were nearly unanimous (94 percent) when asked about the importance of ethical considerations when determining whether or not to grant a patent. Three out of five Canadians (61 percent) said that ethical considerations were very important; an additional one-third of Canadians (33 percent) said they are somewhat important. Only three percent of Canadians believe that ethical considerations are not very important when granting a patent, while a further two percent said they were not at all an important consideration.

More women (66 percent) than men (56 percent) think ethical considerations are very important when granting a patent.

As education levels increase so too does the feeling that ethical considerations are a very important factor in granting a patent.

Opinion leaders were unanimous in saying that ethical considerations were either a very important consideration (75 percent) or a somewhat important consideration (25 percent) in determining whether or not to grant a patent.

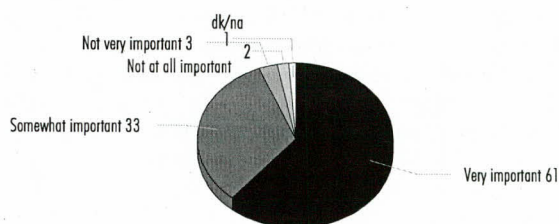
Non-opinion leaders were slightly more evenly divided between those who strongly believed that ethical considerations were a very important consideration (60 percent) or a somewhat important consideration (34 percent) when determining whether or not to grant a patent.

People identified as having a pro-science attitude are also nearly unanimous that ethical considerations should play an important role in determining whether or not to grant a patent. However, they are more evenly split between those who believe it to be a very important consideration (51 percent) or a somewhat important consideration (49 percent). Science sceptics believe that ethical considerations are a very important consideration (71 percent) or a somewhat important consideration (23 percent) when determining whether or not patents should be granted.

There is broad agreement that ethical considerations should be taken into account when determining whether or not to grant a

patent. As noted in the previous section, there also appears to be a desire to incorporate a public interest test in the granting process.

Importance of Ethical Considerations in Granting Patents



Importance of Ethical Considerations by Education Level

	VERY IMPORTANT	SOMEWHAT IMPORTANT
Less than High School	51	40
High School	59	36
Community College	62	32
Some University	67	30
Undergraduate Degree	66	30
Post-graduate Studies	70	27

Q.55

When it comes to determining if a patent should be granted or not, what role should ethical considerations play? Should they be a very important consideration, a somewhat important consideration, a not very important consideration or a not at all important consideration?

8.0 Government Roles

Government is an important partner in the development of biotechnology. It conducts basic research, invests in research and development, regulates products and provides consumer information. This chapter examines the awareness and perception of current federal government roles in the area of biotechnology. As well, Canadians were asked to provide their preferences as to which sector of Canadian society, the government, business or non-profit associations, should have primary responsibility in ten specific areas. Lastly, Canadians were asked to express their preference with regard to the scientific research activities of the federal government.

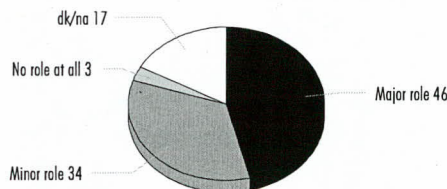
8.1 PERCEPTIONS OF THE CURRENT FEDERAL GOVERNMENT ROLE

A strong plurality of Canadians (46 percent) states that the federal government currently plays a major role in regulating biotechnology. An additional one-third of Canadians (34 percent) believe that the federal government only plays a minor role in regulating biotechnology, with a further three percent saying that it plays no role at all. One-sixth of Canadians (17 percent) could not make an assessment of the federal government's role in this area.

More men (39 percent) than women (30 percent) believe that the federal government plays only a minor role in biotechnology regulation. People who had undertaken post-graduate studies were more likely to state that the federal government plays a major role (51 percent) than those with less than a high school education (41 percent).

A majority (57 percent) of opinion leaders believe that the federal government plays a major role in regulating biotechnology in Canada. In contrast, 45 percent of non-opinion leaders, still a plurality, hold a similar view. Those with a pro-science orientation (48 percent) are more likely than science sceptics (34 percent) to say that the federal government plays a major role in regulating biotechnology.

Perceived Federal Government Regulatory Role



Q.56

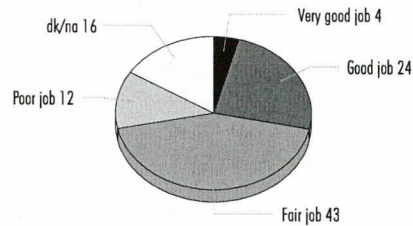
Thinking of the development of biotechnology in Canada, does the federal government play a major role, a minor role, or no role at all in regulating the development of biotechnology in Canada?

Although Canadians believe that the federal government has a role to play in regulating biotechnology, they were less confident of the federal government's performance in this area. When asked to assess the federal government's performance, 28 percent of Canadians felt that the government was doing a very good job (four percent) or a good job (24 percent) in this area. A significant minority (43 percent) of Canadians felt that federal government was doing a fair job. Twelve percent of Canadians stated that the federal government was doing a poor job regulating biotechnology. As with the previous question, one-sixth of Canadians (16 percent) did not know, or would not say, how the federal government is doing in this area.

These perceptions of federal government performance are consistent across all demographic groups.

Those who are considered knowledgeable about biotechnology give a significantly higher rating of federal government performance than do other Canadians. This group is three times as likely as Canadians in general to say that the federal government is doing a very good job in this area (12 percent), with a further 30 percent saying that federal government performance in this area is good. Although a similar percentage of "knowledgeable" Canadians say that the federal government is only doing a fair job in this area (39 percent), negative assessments of federal government performance in this area (8 percent) are lower than for the non-knowledgeable group (12 percent).

Perceived Federal Government Performance as Regulator



Q.57

Overall, do you think the federal government is doing a very good job, a good job, a fair job or a poor job of regulating the development of biotechnology?

Seven out of ten Canadians are unaware that the federal government is responsible for the safety of new food products in Canada. Only 12 percent of Canadians correctly identified Health Canada as the department responsible for regulating the safety of new food products. A further 19 percent knew that the federal government has regulatory responsibility for ensuring food product safety but were unsure of the specific organization tasked with this responsibility within the government.

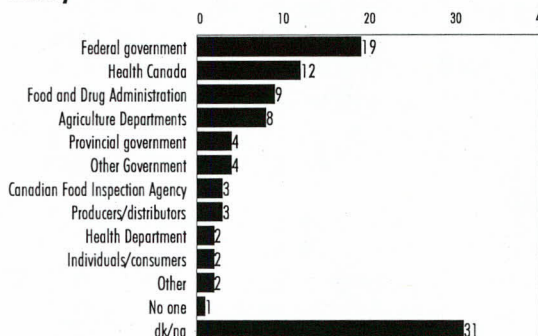
Nine percent of Canadians believed the body responsible for ensuring the safety of new food products in Canada was the Food and Drug Administration, the name of the body that regulates food product safety in the United States.

Once a product has been developed through the use of biotechnology, it must be evaluated and determined to be safe by the federal government before being allowed for sale or use in Canada. We asked Canadians how confident they were regarding product safety.

Although a clear majority of Canadians (87 percent) expressed some level of confidence in federal government food safety testing, only one-quarter of Canadians said they were very confident (25 percent). A further 62 percent said that they were somewhat confident with federal government safety testing. Only 12 percent of Canadians expressed a lack of confidence in this area, with two percent stating that they were not at all confident with federal government safety testing.

Opinion leaders express a high level of confidence (39 percent saying very confident) with federal government safety testing, while only 24 percent of non-opinion leaders hold the same view.

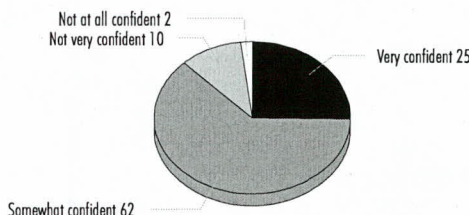
Organization Responsible for Determining Food Safety



Q.34

Who, if anyone, is responsible for determining the safety of new food products in Canada?

Confidence in Federal Government Safety Testing



Q.69

Once a product that has been developed through the use of biotechnology has been evaluated as safe by the federal government, how confident are you regarding the safety of the product? Very confident, somewhat confident, not very confident or not at all confident about the product's safety?

8.2 ROLES AND RESPONSIBILITIES

Canadians were asked which institutions should have the primary responsibility for ten specific roles or activities. They were asked to choose between the government, business and non-profit associations. In all of the ten areas tested, a significant majority of Canadians indicated that the federal government should take primary responsibility. However, the results suggest that non-profit associations could play a useful role in a few of these areas, such as providing consumer information or ensuring the environmental safety of biotechnology products. Although there has been greater interest in, and use of, private and public sector partnerships recently, only a small minority of Canadians believe that business should have a primary role in these areas.

When asked who should have the primary responsibility for making and enforcing regulations concerning the safe use of biotechnology, four out of five Canadians (80 percent) said that primary responsibility should rest with government. Fourteen percent believe that primary responsibility should rest with non-profit organizations. Only five percent of Canadians suggest primary responsibility for regulating biotechnology should rest with business.

Roles and Responsibilities - Regulation of Biotechnology

	GOVERNMENT	NON-PROFIT ASSOCIATIONS	BUSINESSES	DK/NA
Making and enforcing regulations concerning the safe use of biotechnology	80	14	5	2
Determining the safety of products produced through biotechnology	69	20	11	1
Setting standards for consumer information about products produced through biotechnology	62	24	13	2
Assessing new biotechnology products to ensure they do not harm the environment	61	29	10	1
Consulting the public on how best to regulate biotechnology products and uses	57	28	13	2
Setting up an industry code of practice for biotechnology	56	18	23	2

Q.58-67

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about...?

As education levels rise so too does the desire to have government play the primary role in regulating biotechnology. The confidence in business to take the primary role in making and enforcing regulations concerning biotechnology falls as education levels rise.

Eighty-seven percent of opinion leaders believe that the government should play a primary role in regulating biotechnology compared to 80 percent of non-opinion leaders.

Over two-thirds (69 percent) of Canadians state that the government should have the primary responsibility to determine the safety of products produced using biotechnology. Twenty percent of Canadians believe that non-profit associations should take the lead role in determining the safety of products produced using biotechnology, with a further 11 percent of Canadians assigning this responsibility to business. These perceptions are similar across all demographic groups.

A majority of Canadians (62 percent) believe that the government should be the institution that has primary responsibility in setting standards for consumer information about products produced using biotechnology. However, this is one area where non-governmental organizations were thought to play a role. Nearly one-quarter of Canadians (24 percent) said that setting standards for consumer information about products produced using biotechnology should rest primarily with non-profit associations. Thirteen percent said business should take the lead in setting standards for consumer information on products produced with biotechnology.

Slightly more men (65 percent) than women (59 percent) believe that government should take the lead role in setting standards for consumer information in this area.

We found that as education levels increase, so too does the desire to see the government take a lead role in setting standards. There is a corresponding drop-off in levels of support for business taking the lead. As education levels increase, the percentage of those wishing to see non-profit associations involved in this area remains fairly consistent.

Preferred Biotechnology Regulator by Education Level

	GOVERN- MENT	BUSINESS	NON- PROFIT ASSNS
Less than High School	75	7	17
High School	82	3	13
Community College	79	6	13
Some University	81	3	15
Undergraduate Degree	82	3	14
Post-graduate Studies	89	2	8

Q.58-67

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about making and enforcing regulations concerning the safe use of biotechnology?

Setting Standards on Consumer Information on Biotechnology Products by Education Level

	GOVERN- MENT	BUSINESS	NON- PROFIT ASSNS
Less than High School	59	18	20
High School	59	14	25
Community College	62	13	23
Some University	62	14	24
Undergraduate Degree	66	10	24
Post-graduate Studies	71	3	26

Q.62

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about setting standards for consumer information about products produced through biotechnology?

Opinion leaders (68 percent) are more likely to want the government to take the lead role in setting standards for consumer information than are non-opinion leaders (61 percent).

Sixty-one percent of Canadians believe that the government should have the primary role in assessing new biotechnology products to ensure they do not harm the environment. Twenty-nine percent of Canadians believe the non-profit sector should have primary responsibility for ensuring products produced using biotechnology do no harm to the environment. Ten percent of Canadians state that business should take a lead role in ensuring biotechnology products are assessed to ensure that they do no environmental damage.

When asked who should take primary responsibility in consulting the public on how to regulate biotechnology products and uses, a majority of Canadians (57 percent) believe that government should take the lead role. Twenty-eight percent of Canadians feel that the non-profit associations should be out in front on such consultations, while only 13 percent of Canadians believe that business should have primary responsibility in this area.

As one's education level increases so too does the desire to see the government take the lead role in consulting Canadians, with a corresponding decline in the number who believe that business should take the lead in consulting Canadians.

When asked who should have the primary responsibility for setting up an industry code of practice for biotechnology, a majority of Canadians (56 percent) expressed a preference for the government in this role. A significant minority of Canadians (23 percent) state that business should take the lead in developing a code of conduct for the biotechnology industry, suggesting that this is one area where the government could profitably involve business in a subsidiary regulatory role.

Eighteen percent of Canadians believe that non-profit associations should have primary responsibility for establishing an industry code of conduct. These preferences remain consistent across all demographic groups.

Biotechnology could have far-reaching effects on Canadians and their society. We asked a series of questions designed to determine who should have the primary responsibility to ensure the widest possible benefits are drawn from emerging biotechnologies.

Primary Responsibility to Consult the Public on the Regulation of Biotechnology Products and Uses by Education Level

	GOVERN- MENT	BUSINESS	NON-PROFIT ASSOCIATIONS	DK/NA
Less than High School	51	19	25	5
High School	57	11	29	2
Community College	56	14	28	2
Some University	61	12	27	1
Undergraduate Degree	56	13	21	-
Post-graduate Studies	65	5	30	-

Q.58

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about consulting the public on how best to regulate biotechnology products and uses?

One of the reasons people feel uneasy about new technology is that it raises fears of economic uncertainty. We asked Canadians who should have the primary responsibility for making sure that Canada benefits from biotechnology. A strong majority of Canadians (71 percent) feel the government is primarily responsible for ensuring that the country benefits widely from these new technologies. Sixteen percent of Canadians believe that business should have primary responsibility to ensure that all of Canada benefits, while twelve percent believe that non-profit associations should ensure that the benefits of biotechnology are widely shared.

A strong majority of individuals with pro-science attitudes (80 percent) believe that the responsibility for ensuring Canada maximises benefits from biotechnology should rest with government, compared to 70 percent of science sceptics.

When asked who should be spending money to educate the public about biotechnology, a majority of Canadians (60 percent) said the government should take the lead. Nearly a quarter of Canadians (24 percent) stated that business should take primary responsibility for spending money to ensure that Canadians are

educated about biotechnology. Non-profit associations were chosen by 14 percent of Canadians to take the lead in funding education about biotechnology.

More women (65 percent) than men (54 percent) said that government should take the lead in funding education. On the other hand, 29 percent of men said that business should fund the lion's share of educating the public on biotechnology issues, while only 20 percent of women concurred.

A majority of Canadians (58 percent) believe that the government should have the primary responsibility for ensuring that ethical considerations are taken into account in biotechnology research. Three out of ten Canadians (29 percent) say that non-profit associations should be charged with ensuring that ethical considerations are taken into account in biotechnology research. Only 11 percent of Canadians believe that business should take primary responsibility for ensuring ethics in biotechnology. As with providing consumer information and ensuring environmental safety, non-profit associations could play a helpful role in this area.

Roles and Responsibilities - Biotechnology and Society

	GOVERNMENT	NON-PROFIT ASSOCIATIONS	BUSINESSES	DK/NA
Making sure that Canada gets the economic benefits of biotechnology	71	12	16	2
Spending money to educate the public about biotechnology	60	14	24	2
Ensuring that ethical considerations are taken into account in biotechnology research	58	29	11	2
Ensuring that new developments in biotechnology contribute to our overall quality of life	57	26	14	2

Q.58-67

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about...?

Here, too, we see that as levels of education increase so too does the desire to see government take primary responsibility in this area.

Two-thirds (66 percent) of people identified as being pro-science indicate that the government should take primary responsibility for ensuring that ethical considerations are taken into account in biotechnology research. In contrast, 58 percent of science sceptics feel the same.

A majority of Canadians (57 percent) believe that it is the government's primary responsibility to ensure that new developments in technology contribute to our overall quality of life. Twenty-six percent of Canadians believe that the non-profit associations should take primary responsibility for ensuring that new developments contribute to our overall quality of life, while business is looked to by 14 percent of Canadians. These levels of support cross all demographic lines.

Primary Responsibility for Ethical Stewardship by Education Level

	GOVERNMENT	BUSINESS	NON-PROFIT ASSOCIATIONS	DON'T KNOW
Less than High School	51	35	19	5
High School	57	28	12	2
Community College	58	30	9	3
Some University	62	32	5	1
Undergraduate Degree	56	33	10	1
Post-graduate Studies	66	27	7	-

Q.60

Who should have the primary responsibility for undertaking the following specific roles or activities — the government, businesses, or non-profit associations, such as consumer or environmental groups? How about ensuring that ethical considerations are taken into account in biotechnology research?

8.3 PREFERRED FEDERAL GOVERNMENT RESEARCH ORIENTATION

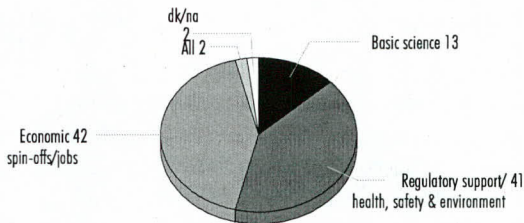
There are a number of areas where the federal government invests in research and development. There is basic research, which expands our level of knowledge. There is research to support the regulatory process and contribute to health, safety and the environment. There is also research that creates more immediate economic spin-offs, including jobs. We asked Canadians which of these three areas should be the highest priority for the government.

Canadians were almost evenly split between choosing research that supports the regulatory role and helps improve our health, safety and environment (41 percent) and research that has a more immediate commercial application, which would result in economic spin-offs or jobs (42 percent). A further 13 percent of Canadians chose basic science as their priority. Two percent of Canadians said we should concentrate on all three priorities equally, while a further two percent of respondents did not know where to place the government's research priority.

There is an interesting contrast between those with a pro-science orientation and science sceptics with regard to the research priorities of the government. Forty-six percent of individuals identified as being pro-science stated that they would like to see the government concentrate on scientific research that would lead to economic spin-offs and jobs. One-third of Canadians in this group (36 percent) want the government to concentrate on research into science that has regulatory, or health, safety and environmental, impacts. In keeping with their faith in science, one-quarter of pro-science Canadians (23 percent) want the government to concentrate on basic research.

In keeping with their suspicions regarding the promise of science, a majority of science sceptics (53 percent) want the government to concentrate on research that supports the regulatory process and contributes to our health, safety and the environment. A significant minority (37 percent) of science sceptics prefer that the government focus on research that would lead to economic spin-offs and jobs. Only six percent of science sceptics want the government to focus on basic research.

Federal Government Priorities for Research and Development



Q.68

There are a number of areas where the federal government invests in research and development. There is basic science, which expands our level of knowledge and can lead to new discoveries. There is research to support the regulatory process and contribute to our health, safety and the environment. There is also research with more immediate economic spin-offs that could lead to job creation. Which area do you think should be the highest priority for government?

9.0 The Advisory Body

Canadians appear to strongly support the creation of an external advisory body to advise the federal government on biotechnology issues, particularly those that impact on health, safety and the environment. Nine out of 10 Canadians (92 percent) agree on the need for such an advisory body, and one in two (49 percent) express strong agreement. Only three percent of the general public would strongly disagree with its creation.

Women (54 percent) are more likely than men (46 percent) to be strongly supportive of the creation of an external advisory body. Support rises with education level, but not necessarily with household income.

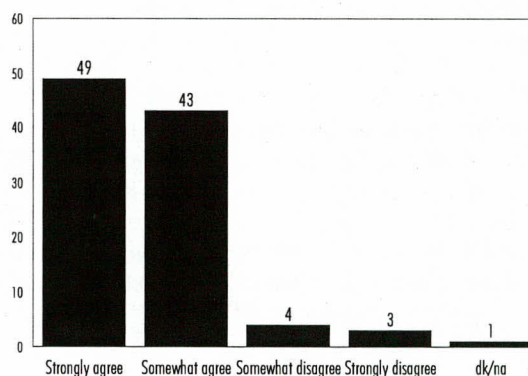
Canadians were also asked about the composition of this advisory body and what kind of advisors should play the predominant role. They were asked to choose between experts, community representatives, or the business or producer community as to which should be predominantly selected for this advisory body.

Experts from scientific and academic circles received the most support (44 percent), followed by prominent community representatives (29 percent). Less than ten percent of respondents (eight percent) say representatives from the business, manufacturing and production sectors should primarily compose the membership of the advisory body.

Canadians are concerned about several major issues relating to biotechnology and view the safeguarding of human health and the environment as a priority. They also believe that the federal government has a role to play in regulation, and positively view the setting up of an external body to advise the government in this complex area.

In response to an open-ended question on the topic, Canadians said that they would want an advisory body to address the government regulation of health, safety and the environment as the top priority (25 percent). As well, they would like the advisory body to address general safety issues (12 percent), ethical and social concerns (11 percent) and the potential negative environmental impact of biotechnology (nine percent).

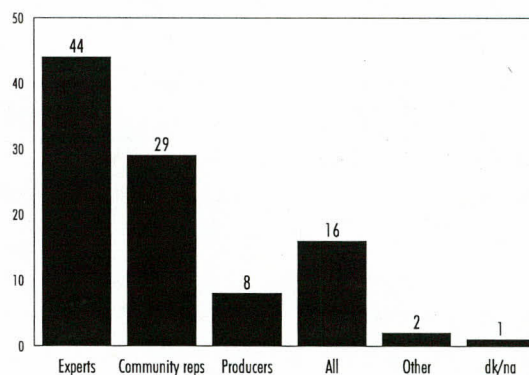
Need for External Advisory Body



Q.70

The federal government is considering setting up a new external advisory body to provide advice on a wide range of biotechnology issues. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that an advisory body is needed?

Composition of Advisory Body Membership

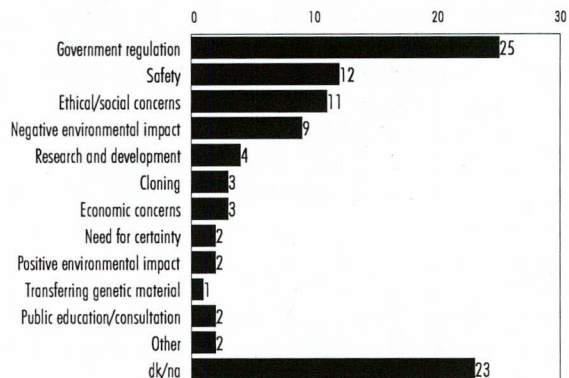


Q.71

Thinking about the people who could be selected to participate in this body, do you think that it should be mostly composed of experts, that is, people drawn from scientific and academic circles, producers, such as businesses or manufacturers, or community representatives, such as prominent individuals, environmental or consumer groups, or local associations?

Interestingly, those issues which have received attention in the popular media – for example, cloning, the ethical treatment of animals and xenotransplantation (animal to human) – were not considered important top-of-mind biotechnology issues by Canadians. It should also be noted that this question appeared in the last quarter of the survey after issues such as human cloning and genetic manipulation were discussed. Yet, these issues do not provoke a top-of-mind response with regard to the activities of the advisory body.

Most Important Issue for Advisory Body



Q.72

What is the most important issue or concern related to biotechnology that the advisory body should address?

10.0 Hierarchy of Credibility

With increasing interest in science policy as reported in the media, as well as the ongoing debate about some of the more sensational elements of biotechnology, it is important to undertake an assessment of the credibility of the variety of organizations and groups that comment on these issues. In order to establish the relative credibility of the groups and organizations, Canadians were asked to assess the trustworthiness and the perceived level of expertise of these groups. In all, 11 different categories representing a range of groups and organizations were tested.

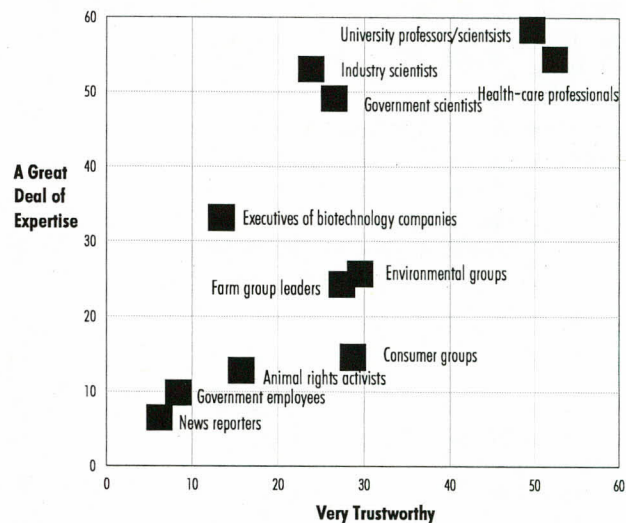
A review of existing research in the areas of biotechnology and science policy indicates that asking for an assessment of trustworthiness alone is not enough to establish the credibility of a particular group or organization. Given that biotechnology is a highly complex area, perceptions of expertise play a vital role in determining the level of perceived credibility that these groups and organizations possess.

The following graph indicates the hierarchy of relative credibility on issues regarding biotechnology. Those groups that are seen to be most trustworthy and to have high levels of expertise, such as health professionals or university professors and scientists, are seen to be more credible than those groups which are deficient in one or both of these areas.

It should be noted that, with one exception, all of the groups and organizations tested in this study are seen to be reasonably trustworthy and possess a certain degree of expertise in the area of science and technology. Only news reporters were seen to be deficient in the areas of trust (50 percent saying not at all/not very trustworthy) and expertise (54 percent saying not much/no expertise).

With regard to overall perceptions, advocacy groups (consumer groups, environmental groups and animal rights activists) are perceived to be more trustworthy than having scientific or technical expertise. It is interesting to note that respondents who adopt a more "strategic" orientation to food purchases assign a slightly higher credibility rating to consumer groups (23.5 net rating) than do those who have a more consumption-driven orientation (20.5 net rating).

Hierarchy of Credibility



Q.73-83

A number of people, institutions and organizations comment on issues related to science, technology and biotechnology. For each of the following, please tell me if you believe they are very trustworthy, somewhat trustworthy, not very trustworthy or not at all trustworthy. How about ...?

Q.84-94

These issues can also be very technical and expertise is important. Please tell me if you think each of the following has a great deal of expertise, some expertise, not much expertise or no expertise at all. How about...?

Perceptions of expertise are important factors in determining the overall credibility of industry, government and university scientists, as well as executives of biotechnology firms.

There is a notable regional difference in the perceptions of credibility. In general, levels of perceived credibility are significantly higher in Quebec than elsewhere in the country. As well, there is a slight change in the ordinal ranking of these groups, with executives of biotechnology companies and farm group leaders improving their standings relative to the other groups and organizations tested.

One possible explanation for the dramatically heightened levels of credibility for biotechnology executives in Quebec may be related to the prominence of pharmaceutical companies as part of the provincial economy.

Credibility Index — Quebec

(Average of % saying "very trustworthy" and % saying "a great deal of expertise")

	REST OF CANADA	QUEBEC	RANK IN QUEBEC
Health-care Professionals	53	64.5	1
University Professors or Scientists	50.5	62.5	2
Industry Scientists	39	50	3
Government Scientists	38	44	4
Environmental Groups	27.5	39	7
Farm Group Leaders	26.5	43.5	5
Consumer Groups	22	29	8
Executives of Biotechnology Companies	21.5	42	6
Animal Rights Activists	13.5	25.5	9
Government Employees	9	15.5	10
News Reporters	6.5	11	11

Q.73-83

A number of people, institutions and organizations comment on issues related to science, technology and biotechnology. For each of the following, please tell me if you believe they are very trustworthy, somewhat trustworthy, not very trustworthy or not at all trustworthy. How about ...?

Q.84-94

These issues can also be very technical and expertise is important. Please tell me if you think each of the following has a great deal of expertise, some expertise, not much expertise or no expertise at all. How about...?

Two other factors greatly affect perceptions of the credibility of the groups tested in this section, opinion-leader status and respondent knowledge. Those who are considered opinion leaders are willing to assign higher levels of credibility to these groups than are non-opinion leaders, with impressions of animal rights activists the only exception.

As the following table indicates, respondent knowledge results in dramatically increased impressions of credibility for health-care professionals, government scientists and university professors or scientists.

Credibility Index — Opinion Leaders vs. Non-opinion Leaders

(Average of % saying "very trustworthy" and % saying "a great deal of expertise")

	CANADA	OPINION LEADERS	NON-OPINION LEADERS
Health-care Professionals	53	60.5	52.5
University Professors or Scientists	50.5	62.5	49.5
Industry Scientists	39	48.5	38
Government Scientists	38	44.5	37.5
Environmental Groups	27.5	28.5	27
Farm Group Leaders	26.5	36.5	25.5
Consumer Groups	22	28	23.5
Executives of Biotechnology Companies	21.5	22.5	21
Animal Rights Activists	13.5	13	13.5
Government Employees	9	14	9
News Reporters	6.5	9.5	6.5

Credibility Index — Knowledgeable vs. Non-knowledgeable

(Average of % saying "very trustworthy" and % saying "a great deal of expertise")

	CANADA	KNOWLEDGEABLE	NON-KNOWLEDGEABLE
Health-care Professionals	53	67.5	52.5
University Professors or Scientists	50.5	63	49.5
Industry Scientists	39	40.5	38.5
Government Scientists	38	46	37.5
Environmental Groups	27.5	27	27.5
Farm Group Leaders	26.5	26	26.5
Consumer Groups	22	21	22
Executives of Biotechnology Companies	21.5	22	21
Animal Rights Activists	13.5	14.5	13
Government Employees	9	14.5	9
News Reporters	6.5	8.5	6.5

11.0 Sources of Information about Biotechnology

As our survey has shown, less than one-half of Canadians (45 per cent) consider themselves familiar with biotechnology and, of that group, only about one in twenty say they are very familiar (six percent) with this area. People were asked to give their main and secondary information sources on issues dealing with science, technology or biotechnology. Their open-ended responses provided a wide option of sources that ranged from newspapers and the Internet, to health professionals and word of mouth.

A plurality of Canadians (43 percent) say that major news sources such as newspapers (22 percent) and television news programs (21 percent) are their main source of information about science, technology or biotechnology. Newspapers (27 percent) and television news (24 percent) also provide a strong secondary source of information about these areas.

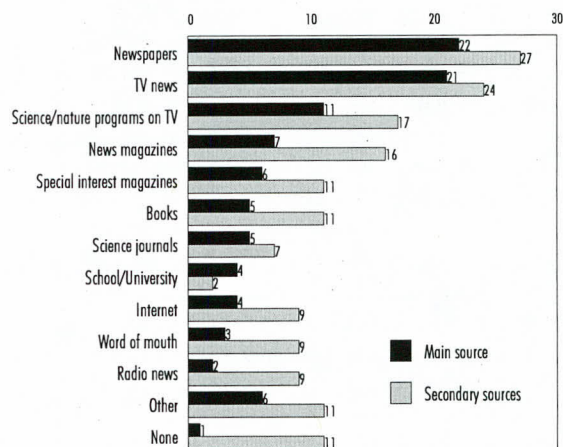
Television plays an even greater role than might be assumed, with almost one-third of the public (28 percent) saying they get their information about technology and biotechnology from science and nature programs. These programs provide a main source of information for one in ten Canadians (11 percent) and are a secondary source for an additional 17 percent.

When radio news (two percent) and science or nature programs on radio (one percent) are included, mainstream electronic media becomes the main information provider for one in three Canadians (35 percent).

People also cited as their main source, news magazines (seven percent), special interest magazines (six percent), books (five percent) and science journals (five percent). A newer entry in the information field, the Internet, was cited as a main source or a secondary source by a small minority of Canadians (four percent and nine percent, respectively).

Those people who say they are familiar with biotechnology rely less on television news as their main information source than do other Canadians.

Sources of Information



Q.95

What is your main source of information about issues dealing with science, technology or biotechnology? Do you get information from any other sources?

The pattern of information consumption is even more striking for the one in 20 Canadians who consider themselves very familiar with the area. The main information source for this group is science journals (15 percent) and school/university (14 percent). Reliance on television news as a main source of information is almost half (12 percent) the levels recorded for the general population (21 percent).

Those most familiar with biotechnology also rely far less on newspapers as a main source of information (six percent) compared to the general population (22 percent). They are also more likely to report a slightly higher reliance on the Internet as their main source of information (eight percent) than are the general public (four percent).

Main Information Sources by Level of Familiarity

(Percent saying main source)

	TOTAL	VERY FAMILIAR	SOMEWHAT FAMILIAR	NOT VERY FAMILIAR	NOT AT ALL FAMILIAR
Newspapers	22	6	20	27	23
TV News	21	12	16	22	31
Science or Nature TV Programs	11	7	11	11	10
News Magazines	7	6	8	9	5
Special Interest Magazines	6	11	8	4	3
Books	5	5	6	6	4
Science Journals	5	15	6	3	1
School/University	4	14	6	1	2
Internet	4	8	5	2	2

Q.95

What is your main source of information about issues dealing with science, technology or biotechnology? Do you get information from any other sources?

12.0 Methodology

The chapter provides information regarding the methodology used to obtain the results used in this study. Environics Research Group Ltd is a member of the Canadian Association of Marketing Research Organizations (CAMRO) and adheres to the standards for data collection and analysis set out by this organization.

12.1 SAMPLING

SAMPLE SELECTION

The sampling model relies on stratification of the population by 10 regions [Atlantic Canada, Metropolitan Montreal, the rest of Quebec, Metropolitan Toronto, the rest of Ontario, Manitoba, Saskatchewan, Alberta, Metropolitan Vancouver, and the rest of British Columbia].

Environics uses a modified Waksburg-Mikofsky sample selection technique. This method involves a two-stage cluster sample that utilizes a currently listed telephone number in the first stage and a randomly generated cluster of numbers in the second stage. This procedure ensures that the sample will include both unlisted numbers and numbers listed after directory publication.

From within each multi-person household contacted, respondents 18 years of age or older were screened for random selection using the "most recent birthday" method. The use of this technique produces results that are as valid and effective as enumerating all persons within a household and selecting one randomly.

Margins of Error

	UNWEIGHTED [N = 1,503]	WEIGHTED [N = 1,503]	APPROX. MARGIN OF ERROR*
CANADA	1,503	1,503	2.5
Atlantic Provinces	134	125	8.3
Quebec	400	395	4.9
Ontario	450	562	4.6
Manitoba	101	58	9.8
Saskatchewan	103	52	9.8
Alberta	139	135	8.0
British Columbia	176	194	7.4
Montreal	165	152	7.7
Toronto	149	192	8.0
Vancouver	90	92	10.5

* 19 times out of 20

12.2 INTERVIEWING

Experienced telephone interviewers at the Environics central location in Toronto conducted the survey. The survey questionnaire was pre-tested (15 interviews in English and 10 interviews in French) before the commencement of full-scale interviewing. Due to the complex nature of biotechnology and related issues, care was taken throughout the design process to ensure that the language of the survey questionnaire would be accessible to a wide range of respondents. The interview averaged 26 minutes in length.

Field supervisors were present at all times to ensure accurate interviewing and recording of responses. A minimum of ten percent of all interviews were unobtrusively monitored on-line in accordance with the standards set out by the Canadian Association of Marketing Research Organizations (CAMRO).

COMPLETION RESULTS

The following table presents the detailed completion results.

The effective response rate for the survey is 13 percent, calculated as the number of completed interviews (1,503) divided by the total sample (15,312) minus the non-valid/non-residential numbers, the numbers not in service and the numbers from households that presented a language barrier (6,271).

The actual completion rate is 27 percent.

A sample of 1,503 persons within the population produces a sampling error of plus or minus 2.5 percent in 95 out of 100 samples. The margins are wider for demographic subsamples.

	N	%
Number of calls	15,312	100
Households not eligible	45	*
Non-residential/ not in service	5,800	38
Language barrier	426	3
Subtotal	6,271	41
New Base (15,312 - 6,271)	9,041	100
No answer/line busy/ respondent not available	3,464	38
Refusals	4,074	45
Subtotal	7,538	83
Net Completions (9,041 - 7,538)	1,503	17
Completion Rate (1,503/(9,041 - 3,464))		27

12.3 EXPLANATION OF SUMMARY MEASURES

A number of summary measures (categories which combine the responses of two or more questions) are used in the analysis of this survey to capture the complexity of pre-existing attitudes that may, or may not, affect the way that Canadians view biotechnology and the issues that surround this topic area. These measures should not be confused with single questions, such as those concerning competitive position or consumer orientation.

This section explains how the summary measures are generated.

KNOWLEDGE SUMMARY

In order to qualify as knowledgeable, respondents had to correctly answer the three knowledge test questions and correctly identify Health Canada as the organization that determines the safety of new food products in Canada. This category was generated to provide a counterpoint to those who identify themselves as familiar with biotechnology but who may have incomplete or partial information about this area. Eight percent of Canadians qualify under this category.

OPINION LEADER

To determine opinion-leader status, respondents were asked three questions concerning their civic behaviour and participation in public policy issues. In order to achieve this status, respondents had to report that they thought or talked about public policy issues frequently, that they communicated their opinions publicly, and that they felt some personal efficacy with regard to issues affecting their community or country. Understanding the attitudes and opinions of this group often gives some idea about the eventual direction of a public debate on new or emerging issues, such as biotechnology. It should be noted that opinion leaders are not found exclusively among members of the elite but are found in every section of Canadian society. Eight percent of Canadians are considered opinion leaders.

ENVIRONMENTAL LEADERSHIP

This summary measure was created by selecting those who indicated that they purchased organic products in the week prior to their interview and who said that maintaining biodiversity should be the most important consideration when introducing new biotechnology products. Although this measure does not capture the complexity of personal environmental leadership, it does provide an indication of attitudes among those who are highly motivated in this regard. This group composes 15 percent of the overall population.

ORIENTATION TOWARD SCIENCE

This summary measure was created from responses to the attitudinal questions related to science found near the beginning of the interview. Those who exhibited strong and consistently positive attitudes toward science were gathered into the pro-science group, while those who exhibited strong and consistently negative attitudes were gathered into the science sceptic group. People who expressed ambivalent or indifferent attitudes on one or more questions were excluded from these groupings. Those who fall into the pro-science group compose 14 percent of the population, while science sceptics compose approximately ten percent of the population.

ETHICAL ORIENTATIONS

This set of measures is generated from a cluster analysis of the results obtained in the section regarding attitudes toward science as well as the battery of ethical questions. This analytical technique uses an iterative process to assess the relative importance of attitudinal factors in question responses and to gather similar determining factors into coherent attitudinal groups. This complex process is undertaken by computer according to the parameters determined by the research analysts. As is noted in 4.1 Attitudinal Segmentation, a number of parameters and segmentations were tested to provide the optimal grouping of Canadians by their responses to these questions.

C.
QUALITATIVE RESEARCH
(Focus Groups)

1.0 Introduction to the Qualitative Research

The following results are based on a series of ten focus group sessions which were held between April 28 and May 4, 1998 at five locations across Canada. Over the course of a two-hour session, participants were asked to discuss a variety of topics related to the Canadian Biotechnology Strategy, from basic awareness of biotechnology to specific areas related to the development and implementation of the strategy.

Participants were recruited according to a variety of criteria, including familiarity with biotechnology, perception of federal government performance on biotechnology⁹, and opinion-leader status. As well, quotas were used to ensure a rough gender parity among participants and a range of ages and education levels. All of these demographic characteristics were seen to be significant factors with regard to attitudes toward biotechnology as shown in the previous telephone survey.

The dates, locations and primary recruiting criteria for the various groups are outlined in the following table.

In each location, one session was held with opinion leaders and one session was held with non-opinion leaders. Three questions, similar to those used in the telephone survey, were used to determine opinion-leader status. These questions, which can be found in Appendix B - Qualitative Research Instruments, measure the engagement, involvement and self-rated personal influence of individuals. Those who are most aware of public policy issues, who communicate their opinions outside their immediate circle of family and friends, and who feel some ability to effect change in their community are considered opinion leaders. It should be noted that, although there is a slight skew toward higher education levels among opinion leaders, representatives of this influential group are found in all segments of Canadian society.

In addition, the sessions were segmented by urban and rural residence in both Saskatoon and Halifax.

Focus Group Sessions

DATE	LOCATION	TIME	PRIMARY CRITERIA
April 28, 1998	Toronto	6:00 - 8:00 8:00 - 10:00	Non-opinion leaders Opinion leaders
April 29, 1998	Saskatoon	6:00 - 8:00 8:00 - 10:00	Non-opinion leaders (Rural) Opinion leaders (Urban)
April 30, 1998	Vancouver	6:00 - 8:00 8:00 - 10:00	Non-opinion leaders Opinion leaders
May 4, 1998	Montreal	6:00 - 8:00 8:00 - 10:00	Non-opinion leaders Opinion leaders
May 4, 1998	Halifax	6:00 - 8:00 8:00 - 10:00	Opinion leaders (Rural) Non-opinion leaders (Urban)

⁹ Attitudinal criteria can be an important factor in recruiting participants for focus group sessions. With regard to familiarity with biotechnology and perception of federal government performance, care was taken to select participants who fell into the "middle ground" in both areas. This allows for a more representative group and prevents the dominance of one or more fixed viewpoints in the discussion.

Overall, the groups were well attended, with an average of just over 10 participants per session. Although the topics covered in the focus group sessions were initially seen to be highly technical and forbidding, participants for the most part quickly warmed up to the topic and were eager to discuss the issues outlined in the discussion agenda.

It is important to note that many participants felt a sense of alienation with regard to biotechnology. These participants felt that the area was not only highly technical but remote from their daily lives. In addition, they also felt that they lacked the basic knowledge to make informed comments regarding the issues at hand and that those involved with biotechnology, the federal government included, did little to provide the general public with needed information on the topic. However, they did positively respond to encouragement to provide an opinion based on their current level of knowledge.

As suggested by the results from the telephone survey, opinion leaders were more familiar with biotechnology and attendant issues. As well, they were more prone to engage in a free-flowing discussion on the topics presented throughout the session.

Both groups in Saskatoon appeared well informed about biotechnology, especially with regard to the impact of biotechnology on agricultural issues. In contrast, participants in Halifax were the most reluctant to engage in a discussion about biotechnology issues.

2.0 Initial Impressions of Biotechnology

To start off each session, participants were asked about their top-of-mind impressions when they heard the word "biotechnology." These initial responses fell into three general categories: the historical uses of biotechnology, such as the use of biotechnology to produce vaccines or the use of living organisms to make a variety of food products; health-related items; and media-related mentions. In the latter case, participants pointed to issues such as cloning ("Dolly" – in reference to the cloned sheep – being the phrase most often mentioned in the sessions) or other biotechnology outcomes that had been given recent profile in the media (e.g. human longevity, potential cures).

Once the participants were canvassed for their top-of-mind awareness of biotechnology, they were read the following definition of biotechnology:

"Biotechnology is the application of science and engineering in the direct or indirect use of living organisms or parts or products of living organisms in their natural or modified forms. Biotechnology is not new. People have long used yeast, a living organism, to make bread, beer and wine, bacteria to make yogurt, and bacteria and fungi to make cheese. More complex activities such as the production of antibiotics, vaccines and enzymes have also been used for many years, as has the selective breeding of plants and animals. Biotechnology's newer techniques include the use of DNA to detect inherited diseases, the modification or duplication of genetic information, or its transfer from one organism to another."

Participants were then asked if any other items or processes involving biotechnology came to mind. In most of the sessions, participants were able to add to their initial list of items or processes. These aided mentions were usually more sophisticated than the initial mentions.

Participants' views were then probed about the possible advantages and disadvantages of biotechnology. With regard to the possible advantages, participants tended to focus on potential health-care advances that could be provided through biotechnology, such as the development of new cures for diseases, organs that could be transplanted from animals into humans, and the possible extension of human life.

Other possible advantages of biotechnology included the development of new food products, better crops, possible environmental benefits, and improved quality of life. However, these mentions were in the minority when compared to the health-related possibilities of biotechnology.

Further, there was an understanding that health-related advances in biotechnology could be a mixed blessing. Participants in both Saskatoon and Vancouver discussed the possible negatives of excessively prolonging human life. As well, a few participants raised concerns about the ethical use of animals in the pursuit of better health for humans.

It should also be noted that, in a number of sessions, participants were willing to engage in a discussion of trade-offs with regard to biotechnology. Acceptance of some of the more controversial elements of biotechnology is generally higher if they would make a significant difference to a person's quality of life, would result in a cure or mitigate a chronic health condition.

Potential economic benefits, such as increased job opportunities or a more competitive high technology sector, were rarely spontaneously mentioned in relation to the top-of-mind advantages of biotechnology, with the exception of the Montreal sessions.

With regard to the potential disadvantages of biotechnology, concerns were primarily focussed on the possible negative impact on society related to the introduction of human cloning and the implementation of eugenic selection. Almost every session included mentions of "playing God," "creating a master race," or "Hitler" as part of the discussion in this area.

General concerns regarding public safety, most often related to health failures or possible unknown side effects, were also mentioned in this section but to a lesser extent.

Just as possible economic benefits were missing from the discussion about the possible advantages of biotechnology, concerns about a possible negative impact on the environment were largely absent among the top-of-mind concerns of participants.

3.0 Language Issues

A brief section on language issues followed the discussion of top-of-mind perceptions of biotechnology. Participants were asked to state the images or ideas that would be conveyed by the phrase "genetically modified" in relation to a product that had been produced through biotechnology.

With only one exception (the Halifax opinion-leader session), there was a general opinion that the designation "genetically modified" was either neutral or negative in orientation. Although there were positive individual responses, judgements that this phrase was equivalent to "tampering" or "completely against nature" were either accepted or were not challenged by other participants. In the above-mentioned Halifax session, participants replied that the phrase had strong positive connotations.

In contrast, the phrase "genetically enhanced" was received more positively. Although there were a few comments that this phrase contained "spin" or that it took an overly positive point of view, "genetically enhanced" was generally seen in a positive light, "an improvement upon nature."

Participants had greater difficulty coming up with another descriptive phrase that could be applied to products developed through biotechnology. Other phrases that were offered by participants included "genetically altered," "synthetic," and "artificial." None of these phrases were embraced by the other participants in the sessions in which they were offered.

There was a general opinion, spontaneously raised by participants, that products produced through biotechnology should be identified in some manner and that information about the process used in its production should be readily available to the consumer. Due to the time constraints of these sessions, this topic could not be more fully explored when raised by participants.

4.0 Public Consultation, Education and Participation

When asked about the role of individuals in making decisions about biotechnology, participants usually first pointed to their role as consumer. Making consumer choices was seen to be the most powerful tool that individuals had at their disposal to influence the direction of biotechnology in this country.

Although other roles were suggested, such as the role of individuals as "monitors" over the corporate citizenship of biotechnology companies or the political system, the consumer role was seen as the predominant role for individuals. Further, participants saw this not as a passive role but as a potential avenue for consumer activism.

However, it was also felt that consumers did not currently have enough information to make an informed choice about the potential uses of biotechnology, either in food products or in other consumer products. As well, a lack of reliable information is also seen to undermine the ability of individuals to monitor the activities of large companies and the government with regard to biotechnology.

There was unanimous agreement about the need for an ongoing public education program on biotechnology. It was recommended that this program be balanced in nature, outlining the benefits as well as the risks of biotechnology. Although the federal government was seen to have primary responsibility for this task, it was also thought that non-governmental organizations should be involved.

One avenue for a public education program on biotechnology was through the public school system. It was felt that students would be more receptive to information in this area, especially if it were integrated into the science curriculum. As well, it was thought that parents and families would indirectly benefit from a public education program on biotechnology delivered through the school system. No discussion of provincial jurisdiction of the school system was undertaken in relation to this concept.

Despite the strong desire for a public education program, many participants were sceptical about the way the federal government tries to communicate with the general public. The

government is seen to be talking at, rather than talking with, its citizens. Some participants criticized government-sponsored television advertisements related to social marketing goals (e.g. tobacco use reduction) as expensive and ineffective. Participants were emphatic that the federal government should make information more accessible to the general public, not only in the way that this information is distributed (the Internet was seen to be a possible channel of information) but also in the tone and content of the information products.

It was strongly felt that the federal government should consult with the public on the decisions that it makes with regard to biotechnology. Although participants offered few suggestions as to how they should be consulted, there was a general feeling that the people should be heard on this issue.

However, just as participants were sceptical about the ability of the federal government to truly communicate with Canadians on the substance of the issues surrounding biotechnology, they also have reservations about the consultation that the federal government would undertake in this area. A number of participants believe that the companies that are the most involved with biotechnology would persuasively lobby for decisions that would benefit their corporate interests to the detriment of the general public. As well, many participants thought that the federal government is powerless to prevent the large corporations from getting their way because these companies would simply move their jobs and investments elsewhere. Suspicion of biotechnology companies was absent in the Montreal sessions.

With regard to the need for public education and public consultation, there was recognition that individual Canadians also had a responsibility in this area. This view was strongly held by a number of participants in all the sessions across Canada. In this regard, most participants said that Canadians would "meet the government halfway" if it were to engage in a public education and consultation initiative.

5.0 The Advisory Body

There was a great deal of interest in the creation of an independent external body to advise the government and the general public on biotechnology in Canada. In a number of sessions, participants spontaneously raised the need for an independent committee prior to its introduction by the moderator. Moreover, this concept received strong initial endorsement from participants as soon as it was raised in the discussion, either by a participant or by the session moderator.

However, it is significant that, as soon as initial support is expressed, concerns were raised about the composition of this body. There was a high level of concern that its membership would either be politicized or provide another avenue for corporate influence over decisions concerning biotechnology. Participants felt that, in order to be effective, this body must be seen to be neutral with regard to the political interests of government and the interests of the biotechnology companies.

There was general agreement that representatives of the general public should join independent experts, either drawn from universities or from the health profession, as members of this advisory body. It was also felt that educators could play an important role, given the importance most participants placed on public education and awareness with regard to biotechnology. Further, participants felt, especially in Saskatoon and Vancouver, that the membership of this body should reflect the regional and social diversity of the country.

There was strong support in all groups for interaction between the advisory body and the general public. In fact, most participants bristled at the possibility that this advisory body would confine itself to advising the government, especially when placed in the overall context of low public awareness and individual influence on biotechnology issues. In addition to providing an opportunity to address the concerns of ordinary Canadians, the advisory body was seen as the preferred body to supervise and promote public education and consultation on biotechnology.

With regard to the approach that the advisory body could take in building a policy framework for biotechnology, participants were provided with two options. The first approach would address the broader issues related to biotechnology. The advisory body would integrate the need for stewardship and economic growth with the social and ethical priorities of Canadians into one vision to guide the development of biotechnology. The other approach would see the advisory body select a group of specific emerging issues (Dolly, the cloned sheep, was provided as one example) and render decisions on a case-by-case basis. This latter approach would build an overall policy by addressing the most pressing needs first.

Although they were asked to make a choice between these options, most participants did not see these approaches as mutually exclusive. In fact, the consensus in a majority of the sessions supported a combination of both options.

The next most favoured option was to proceed on a case-by-case basis. This approach was largely driven by the concerns of participants with some of the "hot button" issues related to biotechnology, such as cloning, the possible genetic manipulation of humanity, eugenics and ethical concerns in general. It was felt that the case-by-case approach would provide precedents or milestones that would lead to the evolution of a broader policy framework consistent with the priorities and values of Canadians.

There was general agreement that the advisory body be composed of a broadly based membership with an emphasis on independent experts (defined as individuals with specific expertise in biotechnology, ethics or health, without any vested corporate or political interests). Members of the general public should also be invited to participate in the advisory body. There was little support for the inclusion of representatives from industry or government in the advisory body.

The need for openness and transparency, as well as ongoing public consultation, were seen as key factors in providing legitimacy to the advisory body.

Many participants were willing to go beyond a policy role with regard to the mandate of the advisory body. In a majority of sessions, participants wanted to invest the advisory body with regulatory powers over the development of biotechnology. Not content with the moral authority that an advisory body would have in its pronouncements, some participants wanted to grant the body power to veto corporate activities or compel action by Parliament. Although this desire is most likely a function of the suspicion that participants have towards the operations of the government and private sector, it does point out concern for the protection of the public interest in the development of a biotechnology strategy in Canada.

It should be noted that the discussion of an independent advisory body on biotechnology had an impact on the subsequent discussion in most sessions. Whenever a difficult or controversial subject was raised, participants tended to state that the advisory body should be tasked with finding a solution. Although some participants saw the assignment of these responsibilities as a positive choice, there was a sense that the advisory body became a "catch-all" for the concerns of the participants.

6.0 Regulation and Institutions

Although there was a consensus that there is "room for improvement," most participants in the sessions across Canada expressed comfort and confidence in the way that the federal government currently regulates for the health, safety and environment of Canadians. This belief was especially true in comparison with the perceived regulatory regimes of other countries (comparisons with the United States were most frequently mentioned by participants).

This is not to say that participants heaped praise on the federal government for the way that it regulates in these areas. In fact, a few participants offered harsh criticism of the federal government for the way that it monitors the quality of food products and the regulation of new and patented pharmaceuticals in Canada.

In the latter case, the government was seen as unnecessarily delaying the introduction of beneficial new drugs in Canada that were available in the United States or elsewhere. However, while most participants were content to let criticisms of food regulation pass unchallenged, they were willing to engage in a discussion of the merits of careful and time-consuming testing with regard to the approval of new pharmaceuticals. Although a number of health failures were mentioned as part of this discussion (e.g. thalidomide, tainted blood), there was a sense that the federal government still retained the confidence of Canadians to regulate in this area.

With regard to their comfort and confidence with the regulation of health, safety and the environment, participants freely admitted that their judgements of federal government performance in these areas are based on relatively scant knowledge. While increased public awareness in this area was seen to be beneficial, participants could not offer concrete suggestions as to how this would be achieved.

There was a consensus in all sessions that the federal government should have primary responsibility for the regulation and development of biotechnology in Canada. It should be noted that a provincial government role for biotechnology did not figure prominently in any of the discussions, not even in Montreal.

While the federal government is seen to have primary responsibility for the regulation and development of biotechnology, this role did not preclude building partnerships in order to achieve Canada's biotechnology goals. Although an atmosphere of fiscal restraint was seen as one of the factors supporting a partnership approach, this took second place to the perceived benefits of working cooperatively with other governments, the private sector and universities. The wide distribution of the possible benefits of biotechnology was also seen as one of the major advantages of the partnership approach.

In this regard, the concept of "leading from the middle" was well received by participants once they were given an explanation as to how this concept worked.¹⁰ When asked if adopting a partnership approach or "leading from the middle" was code for the abdication of federal government responsibility, no participants expressed concerns that this would be the case.

¹⁰ Essentially, "leading from the middle" was defined as the federal government acting as a catalyst to build a consensus between business, universities, and the public sector so that we could all move forward together on biotechnology issues.

7.0 Canada's Role in Biotechnology

Participants were asked to discuss a number of items related to the perception of Canada's role in biotechnology in the context of global markets and responsibilities.

There was strong support for the need for Canada to be seen as an international leader with regard to biotechnology, not only in the quality of Canadian products and research but also in the stringency of our standards and regulations. Even though a "high standards, high quality" approach to biotechnology may result in a competitive disadvantage with products produced in the United States, participants felt that this disadvantage would be short-term in nature, with potential consumers eventually migrating to the better Canadian product. A few participants stated that any measure that would compromise the quality or standards of Canadian products should be rejected regardless of the economic impact.

In addition to a preference for a leadership role with regard to biotechnology, there was also strong agreement with the need for commonly accepted international standards in this area. While some participants felt that this goal would be difficult to achieve, others pointed out areas where Canada had played a leading role in effecting change around the world. Although these areas are unrelated to biotechnology, both Canada's peacekeeping efforts and the recent ban on landmines were seen as an indication of the success that we could achieve in this area. Even those participants who were most critical of the possibility of creating international standards were supportive of efforts to seek a consensus in this area.

Participants were then introduced to the concept of mutual recognition agreements with other countries. The phrase "mutual recognition agreement" was not mentioned. Instead, a description of the substance of these agreements¹¹ was provided to participants. Although a few participants expressed concerns that these agreements might undermine

Canadian sovereignty, there was a general acceptance that these agreements may provide some cost savings to Canadian taxpayers. However, it should be noted that participants required assurances that testing and product quality would remain at higher "Canadian" standards and that the provisions regarding standards and testing contained in these agreements would be mutually verifiable.

To conclude this section of the discussion, participants were asked if Canada had any obligations to the developing world with regard to biotechnology. Initial reactions focused on Canada's traditional role in providing humanitarian aid to countries in need. Participants indicated that they thought that biotechnology could produce higher-yield crops that would result in greater food aid to these nations.

However, as the discussion progressed, many participants talked about the need to ensure that any biotechnology exports or aid to these countries be done in a manner appropriate to their customs and ecology. Further, there was a sense that Canada could play a constructive role in helping the developing world help themselves with regard to biotechnology, primarily through training local scientists and assisting in the development of regulatory standards and policies. This capacity-building role was seen to be consistent with our current international role, and participants felt it would result in economic advantages over the long term.

With regard to our international role in biotechnology, some participants felt that we needed to focus on addressing domestic concerns before we would be ready to promote an international role. There were also concerns that Canadian companies would apply different standards to products produced for export than those produced for domestic consumption, a practice that they felt should be disallowed.

¹¹ Participants were asked if Canada should seek out countries that have equivalent standards, testing and protection with regard to biotechnology with a view to making treaties with these countries so that we would end the duplication and expense of both countries testing similar products. This did not mean that we would necessarily approve products that they approved. This discussion was placed in a context of mutual inspection of testing facilities. A variety of European, South American and Asian countries were used as examples.

8.0 Risks and Benefits

Participants were then taken through a discussion of the potential benefits of biotechnology as well as the ability of the current regulatory system to deal with the potential risks associated with biotechnology.

With regard to the potential benefits, most participants reiterated the health benefits that would come with advances in biotechnology. As well, when prompted by the moderator, most participants said that economic benefits would also accrue to Canada with the further development of biotechnology. Although the chief economic benefit was seen to be in the creation of a more competitive high technology sector in Canada, some participants did believe that increased jobs, especially jobs for non-technical staff, would be one of the positive outcomes of a biotechnology strategy.

The discussion then turned to an examination of the potential risks of biotechnology. As with the benefits, participants once again brought forward the societal concerns related to cloning and genetic manipulation. Unlike the initial discussion of the disadvantages of biotechnology, concern about the environment was raised at this point in a number of sessions. The primary concern was with regard to the impact of introducing genetically modified plants into the wild and the need to protect biodiversity. As with the results from the telephone survey, participants placed a great deal of emphasis on maintaining biodiversity as part of Canada's biotechnology strategy.

In addition to concerns about the environment, there were also concerns about the unknown long-term impact of biotechnology on individuals and society. Once again, previously unforeseen health failures (e.g. Hepatitis C, thalidomide) were brought forward as examples of where science was unable to predict or prevent human tragedies.

There was a general belief in all sessions that the current methods of assessing the risks and benefits of consumer products would be unable to deal with an area that is as unique and as new as biotechnology. Participants did not have a strong understanding of the way that the current system operates, but were sufficiently concerned about biotechnology to request that the risk assessment and management system be reviewed with the intention of adding new procedures to deal with this area.

One key element to building confidence in the way that the federal government assesses the risks and benefits of biotechnology is the availability of information. As in the discussion about public awareness and education, participants wanted the "straight goods" on biotechnology products in order to assist them in making informed choices as consumers. Access to balanced and accurate information on biotechnology products is felt to be fundamental to this. As well, since biotechnology is related to health benefits and concerns, health professionals should be involved in providing information to Canadians in this area.

Accountability and responsibility were also seen to be factors in building confidence in a risk assessment and management system for biotechnology.

9.0 Values

Participants were asked about the values that should be uppermost in the development of a biotechnology strategy for Canada. While participants expressed a number of values, certain values were given priority in all sessions. These include the following primary values (in no particular order):

- Public safety
- Environmental protection and biodiversity
- Quality of life
- Human dignity and the sanctity of life
- Ethical leadership
- Public awareness and education
- Public involvement

All of the above values were seen to be essential to the development of an appropriate biotechnology strategy for Canada. Other important values were also enunciated by participants, but were not mentioned in every session. These include:

- Equality of access to biotechnology products
- Corporate responsibility
- International responsibility
- Caution
- Promotion of scientific research
- Need for certainty regarding the long-term effects of biotechnology
- Ethical use of animals
- Integrity
- Honesty

There was general agreement that ethics, which was defined for participants as the consistent application of principle, should be integrated into the development of a biotechnology strategy. It was also agreed that developing an ethical framework was not a simple matter, especially considering the diverse and pluralistic society that exists in Canada. However, a number of professional organizations have developed ethical guidelines for their members, and this was seen as a useful starting point for the inclusion of ethics in biotechnology.

The development of an ethical code and policy for biotechnology was seen to be an area of responsibility for the advisory body. There was also a general consensus that the advisory body may provide useful guidance on the integration of ethical considerations into the patenting process.

The discussion on biotechnology patents was difficult for many participants, largely due to a lack of understanding or awareness of the patenting process or the relative advantages and disadvantages of protecting intellectual property.

Opinions on the intellectual property rights of inventors also tended to change based on the interventions of the participants. For example, participants might reject a patent for a health cure because of perceptions that it would allow the company that held the rights to the product to make profits from illness. However, when put in the context that the company had a right to recoup money invested in finding a cure or, more importantly for participants, refusing a patent would discourage future health research, participants would change their minds and support the need for patents.

While some participants wanted to develop a more flexible approach to the granting of patents, largely dependent on non-rational factors (e.g., antipathy to large corporations, perceived appropriateness of the product, perceived social or individual need), there was general recognition that a consistent policy was required. Once again, the advisory body was seen to be the appropriate body to determine how ethical considerations could be integrated into the patenting process.

10.0 Proposed Vision, Objectives and Principles

Participants were given a copy of a draft vision, objectives and principles for the Canadian Biotechnology Strategy to read. Once they had read through the document, they were asked to choose between the following proposed visions:

"For Canada to be a world leader in biotechnology and, through it, to enhance the quality of life of Canadians in terms of health, safety, the environment and economic development."

or

"To enhance the quality of life of Canadians in terms of health, safety, the environment and economic development through the responsible use of biotechnology and thus become a world leader in its applications."

Participants expressed a clear preference for the second version of the proposed vision largely due to two factors: the perceived precedence of quality of life and the inclusion of the phrase "responsible use" in the second version. It should be noted that many participants saw the wording of these options as interchangeable, with brevity seen as the main strength of the first version.¹²

As well, participants were asked to provide an assessment of how well the document summarized the previous discussion on biotechnology and the concern they had with regard to this area. Opinion was virtually unanimous that the document did a good job outlining their concerns and opinions with regard to a biotechnology strategy for Canada.

Criticism of the document was minimal and largely confined to fleshing out the section on beliefs and values or reworking the language so that it was more direct and concise. A greater emphasis on public education and awareness was also mentioned by participants, especially those in the Montreal sessions.

In all, participants were pleasantly surprised with the content and direction of this document.

¹² The first vision is the one presented for discussion in the CBS Roundtable Consultation Document. The second vision presented came from "what we heard" in the multistakeholder round table consultations. The focus group sessions provided an opportunity to test both versions of the vision statement.

11.0 Participant Priorities

To conclude the discussion, participants were asked to engage in a role-playing exercise regarding the advisory body. They were asked what specific policy area would be their top priority if they were called upon to serve as a member of the advisory body.

For the most part, participants divided their attention into two areas, the need for public education/awareness and the requirement to protect the health and safety of Canadians. For some, this latter concern was focused on ensuring a strong regulatory system. Others were more focused on product testing and research into new cures and techniques.

Promotion of the environment, securing economic benefits and ethical leadership were also seen to be priorities for participants but to a much lesser extent than health and safety or public awareness and education.

Only a few participants said they would focus their attention on building a strong international regime for biotechnology or intellectual property issues.

APPENDIX A
QUANTITATIVE RESEARCH INSTRUMENTS

BIOTECH QUESTIONNAIRE
FIELD VERSION
MARCH 12, 1998

Good afternoon/evening. My name is
 () of the Environics Research
 Group Ltd. We are conducting a survey on
 behalf of the Government of Canada. All your
 responses will be kept strictly confidential.

[Household Screener]

1. With regard to other developed countries,
 like the United States or France, how does
 Canada compare in making use of science
 and technology? Are we becoming more
 advanced, are we on the same general level
 or are we falling behind?

Becoming more advanced
Same level
Falling behind
Don't know

2. When an industry adopts new technology,
 jobs can be created or jobs can be lost. Do
 you think the introduction of new
 technology increases the overall number of
 jobs, reduces the number of jobs, or is there
 no difference in the number of jobs created?

Increases jobs
Reduces jobs
No difference

Here are some statements concerning science
 and technology. You do not have to be an expert
 to answer. For each, please tell me if you
 strongly agree, somewhat agree, somewhat
 disagree or strongly disagree. How about...?
 (RANDOMIZE)

3. Most problems can be solved by applying
 more advanced technology
 4. Decisions about science and technology are
 best left to the experts
 5. People would be better off if they lived a
 simpler life without so much technology
 6. We must pursue opportunities presented by
 new technologies to maintain our current
 quality of life in Canada
 7. Science itself is neither good nor bad; it is
people who decide the ends for which
 science is used
 8. As a society, we rush to embrace new ideas
 too quickly

9. Biotechnology is the application of science to
 living organisms to develop new products
 and processes. Would you say you are very
 familiar, somewhat familiar, not very
 familiar, or not at all familiar with
 biotechnology?

Very familiar
Somewhat familiar
Not very familiar
Not at all familiar

I am going to read a list of items. To the best of
 your knowledge, do you think each of the
 following involves the use of biotechnology?
 How about...? (PROBE: YES OR NO)

10. DNA testing to identify criminals
 11. Improving varieties of plants
 12. Hormone therapy for menopausal women

Here is a list of products or processes that have been or could be **developed through the use of biotechnology**. Please tell me if you are very aware, somewhat aware, not very aware, or not at all aware of each of the following. How about...? (RANDOMIZE)

13. Insect resistant crops that would reduce the need for chemical pesticides
14. Trees that grow faster
15. Bacteria that clean up environmental problems, such as oil slicks, toxic spills, or contaminated sites
16. Organs which can be transplanted from animals into humans
17. Diagnosis of disease through genetic testing
18. Treatment and prevention of diseases

I would now like to get your opinion about the important areas for research into biotechnology. Please tell me if you feel that each of the following should be a high priority, a medium priority or a low priority. How about...? (RANDOMIZE)

19. Insect resistant crops that would reduce the need for chemical pesticides
20. Trees that grow faster
21. Bacteria that clean up environmental problems, such as oil slicks, toxic spills, or contaminated sites
22. Organs which can be transplanted from animals into humans
23. Diagnosis of disease through genetic testing
24. Treatment and prevention of diseases

Here are some statements that touch on *ethical* issues. Using a scale from one to ten, where one means that you disagree strongly and ten means that you agree strongly, please tell me how strongly you agree or disagree with the following statements. How about...? (RANDOMIZE)

25. We should restrict experimenting with human genes, even if that means we would miss out on discovering cures for certain diseases.
26. The well-being of humans is more important than the well-being of animals.
27. Using animals for medical research is **not** justifiable.
28. Biotechnology should be used to produce high-yield crops as part of the solution to world hunger.
29. The potential benefits of human cloning outweigh the potential disadvantages.
30. People should be allowed to choose the sex or other traits of their baby prior to conception.
31. Transferring human genes into animals **should not** be allowed for whatever reason.
32. In the past week, did you purchase any organic food products, that is, food produced without the use of chemicals or pesticides?

Yes

No

Don't know

33. When it comes to making a decision to buy food products, some people just buy what looks good to them or concentrate on getting the lowest price. Other people focus more on other considerations, such as buying local products or supporting companies whose values they agree with. Which is the closest to the way that you decide?

Looks good or focus more on lowest price

Focus more on other considerations

Neither (VOLUNTEER ONLY)

Both (VOLUNTEER ONLY)

Don't know

34. Who, if anyone, is responsible for determining the safety of new food products in Canada? (DO NOT READ - PRECODE OPEN-END)

Federal government
Provincial government
Health Canada
Canadian Food Inspection Agency
Other _____
Don't know

35. The term "biodiversity" refers to the variety of plants and wildlife in a certain area. When it comes to determining the acceptability of a new product developed through biotechnology, should maintaining biodiversity be a very important consideration, a somewhat important consideration, a not very important consideration or a not at all important consideration? 35b

Very important consideration
Somewhat important consideration
Not very important consideration
Not at all important consideration
Don't know

36. Forests can be protected from some insects by using chemical pesticides. Some of these pesticides also kill insects that do not attack the forests. A bacterial pest control product has been created to target only those particular insects that are harmful to the trees.

36. Knowing this, do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that this product be allowed for use in Canadian forests?

Strongly agree
Somewhat agree
Somewhat disagree
Strongly disagree
Don't know

Here are some statements about a bacterial pest control product. For each, please tell me if this information would make you more likely to support or less likely to support allowing this product, or would it make little difference to your opinion? How about...? (ROTATE)

37. Insects would eventually develop a resistance to the bacterial pest control product.
38. This product would replace chemical pesticides.

39. By modifying their genes, trees can be made to grow faster. This would increase the number of mature trees available for reharvesting. These trees would also absorb more of the atmospheric carbon that contributes to global warming. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that these faster-growing trees be planted in Canada?

Strongly agree
Somewhat agree
Somewhat disagree
Strongly disagree
Don't know

Here are some statements concerning these faster-growing trees. For each, please tell me if this information would make you more likely to support or less likely to support the use of these trees, or would it make little difference to your opinion? How about...? (ROTATE)

40. These trees would pass on their fast-growth genes when they reproduce with other trees.
41. Faster-growing trees would quickly restore forests that have been logged.
42. In Canada, ingredients must be listed on food product labels. How often do you read the list of ingredients when deciding what products to buy? Would that be...?

Very often
Sometimes
Rarely
Never
Don't know

43. When it comes to **identifying the contents** of food products, do you think that labels now provide too much information, about the right amount of information, or not enough information?

Too much
About right
Not enough
Don't know

A variety of sources could provide information on biotechnology used in food products. For each of the following, please tell me if you would be very likely, somewhat likely, not very likely or not at all likely to use that information source. How about...? (RANDOMIZE)

- 44. "1-800" telephone lines
- 45. Labels on food products
- 46. Tear-off cards on grocery shelves
- 47. Web sites on the Internet

48. Here are some questions about patents and intellectual property. Some people say that patent protection is necessary because it allows the patent holder to reap the rewards of their effort and investment in creating the invention. Others say that patents unnecessarily prevent society from benefiting from greater access to new inventions. Which viewpoint is closest to your own?

Patents reward inventors
Patents prevent wide societal benefits
Don't know

Now I would like to discuss patents in relation to biotechnology. Please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements. How about...? (RANDOMIZE)

- 49. It's okay for someone to have a patent on a new plant modified through the use of biotechnology.
- 50. Granting a patent on an animal modified through the use of biotechnology is **no** different than granting a patent on a consumer product.
- 51. Some technologies **should not** be patented because it is not in the public's interest.
- 52. We **should not** grant patents on a new species of (ROTATE) chimpanzee/guinea pig that includes human genes.
- 53. Patents allow multinational companies to charge higher than necessary prices for new products.
- 54. Granting patents on new plants is necessary to encourage globally competitive agricultural research.
- 55. When it comes to determining if a patent should be granted or not, what role should ethical considerations play? Should they be a very important consideration, a somewhat important consideration, a not very important consideration or a not at all important consideration?

Very important consideration
Somewhat important consideration
Not very important consideration
Not at all important consideration
Don't know

56. Thinking of the development of biotechnology in Canada, does the federal government play a major role, a minor role, or no role at all in regulating the development of biotechnology in Canada?

Major role
Minor role
No role at all
Don't know

among churches

14

57. Overall, do you think the *federal* government is doing a very good job, a good job, only a fair job or a poor job of regulating the development of biotechnology?

Very good job
Good job
Only a fair job
Poor job
Don't know

Who should have PRIMARY responsibility for undertaking the following specific roles or activities – the government, businesses, or non-profit associations, such as consumer or environmental groups? How about...?
(RANDOMIZE)

- 58. Consulting the public on how best to regulate biotechnology products and uses
- 59. Spending money to educate the public about biotechnology
- 60. Ensuring that ethical considerations are taken into account in biotechnology
- 61. Determining the safety of products produced through biotechnology
- 62. Setting standards for consumer information about products produced through biotechnology
- 63. Making and enforcing regulations concerning the safe use of biotechnology
- 64. Ensuring that new developments in technology contribute to our overall quality of life
- 65. Making sure that Canada gets the economic benefits of biotechnology
- 66. Setting up an industry code of practice for biotechnology
- 67. Assessing new biotechnology products to ensure they do not harm the environment

68. There are a number of areas where the federal government invests in research and development. There is basic science, which expands our level of knowledge and can lead to new discoveries. There is research to support the regulatory process and contribute to our health, safety and the environment. There is also research with more immediate economic spin-offs that could lead to job creation. Which area do you think should be the highest priority for government? (READ) *bgb*

Basic science/new discoveries
Regulatory/Health, safety & environment
Economic spin-offs/Jobs
All (VOLUNTEER ONLY)
None (VOLUNTEER ONLY)
Don't know

69. Once a product that has been developed through the use of biotechnology has been evaluated as safe by the federal government, how confident are you regarding the safety of the product? Very confident, somewhat confident, not very confident or not at all confident about the product's safety?

Very confident
Somewhat confident
Not very confident
Not at all confident
Don't know

70. The federal government is considering setting up a new external advisory body to provide advice on a wide range of biotechnology issues. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that an advisory body is needed?

Strongly agree
Somewhat agree
Somewhat disagree
Strongly disagree

71. Thinking about the people who could be selected to participate in this body, do you think that it should be mostly composed of *experts*, that is, people drawn from scientific and academic circles, *producers*, such as businesses or manufacturers, or *community representatives*, such as prominent individuals, environmental or consumer groups, or local associations?

Experts

Producers

Community representatives

All (VOLUNTEER ONLY)

None (VOLUNTEER ONLY)

*Other (VOLUNTEER ONLY/
SPECIFY _____)*

Don't know

72. What is the most important issue or concern related to biotechnology that the advisory body should address? (PRECODE OPEN-END)

Cloning

Transferring genetic material from one species to another

Science (research and development)

Ethical/Social concerns in general

Ethical treatment of animals

Government regulation of health, safety and environment

Intellectual property rights/patents

Public consultation

Public education/information

Economic concerns

Industry code of practice

Negative environmental impact

Positive environmental impact

Other _____

Slom 73+083

A number of people, institutions and organizations comment on issues related to science, technology and biotechnology. For each of the following, please tell me if you believe they are very trustworthy, somewhat trustworthy, not very trustworthy or not at all trustworthy. How about...? (RANDOMIZE)

73. News reporters

74. Industry scientists

75. Government scientists

76. Executives of biotechnology companies

77. Government employees

78. Consumer groups

79. University professors or scientists

80. Farm group leaders

81. Health-care professionals (doctors, nurses, etc.)

82. Environmental groups

83. Animal rights activists

Slom 84+099

These issues can also be very technical and expertise is important. Please tell me if you think each of the following has a great deal of expertise, some expertise, not much expertise or no expertise at all. How about...? (RANDOMIZE)

84. News reporters

85. Industry scientists

86. Government scientists

87. Executives of biotechnology companies

88. Government employees

89. Consumer groups

90. University professors or scientists

91. Farm group leaders

92. Health-care professionals (doctors, nurses, etc.)

93. Environmental groups

94. Animal rights activists

95. What is your main source of information about issues dealing with science, technology or biotechnology? (DO NOT READ - CODE ONE) Do you get information from any other sources? (CODE ALL THAT APPLY)

MAIN SOURCE OTHER SOURCES

TV news
Radio news
Science or nature
 programs on TV
Science or nature
 programs on radio
Newspapers
News magazines
Special interest
 magazines
Science journals
Medical journals
Books
Internet
Word of mouth
Health professionals
Other (Please specify _____)

96. How much of your spare time would you say you spend talking, reading, or thinking about issues that affect your community, your province, or Canada as a whole? Do you spend a lot of time, some time, very little time, or no time at all?

A lot of time
Some
Very little
No time at all

97. How often do you openly express your opinions on public issues to people other than your family and friends? This would include contacting public figures by letter or phone, writing letters to the editor, signing petitions, or attending public meetings and rallies. Do you do ANY of these things very often, sometimes, rarely, or never?

Very often
Sometimes
Rarely
Never

98. As an individual, how much influence do you believe you can have on the outcome of the public issues you care about? Would that be a lot of influence, some influence, very little influence, or no influence at all?

A lot of influence
Some influence
Very little influence
No influence at all

DEMOGRAPHICS

And now, I'd like to ask you some questions about you and your household. Please be assured that all your responses will be kept entirely anonymous and absolutely confidential.

99. What is the highest level of education that you have reached? (DO NOT READ - SELECT ONE ONLY)

Some elementary (Grades 1-6)
Completed elementary (Grade 7 or 8)
Some high school (Grades 9-11)
Completed high school (Grades 12 or 13)
Community college, vocational, trade school
Some university
Complete university (Bachelor's Degree)
Post-graduate/professional school (Master's Degree, Ph.D., etc.)
No schooling
VOLUNTEERED
DK
Refuse

100. In what year were you born?

SPECIFY _____ DK/NA

101. Are you a parent of any children under the age of 18?

Yes
No

102. For statistical purposes only, we need information about your income. All individual responses will be kept confidential. Please tell me which category applies to your total household income before taxes for 1997. (READ - CIRCLE ONE ONLY.)

Under \$10,000
\$10,001 to \$20,000
\$20,001 to \$30,000
\$30,001 to \$40,000
\$40,001 to \$50,000
\$50,001 to \$60,000
\$60,001 to \$70,000
\$70,001 to \$80,000
\$80,001 to \$90,000
\$90,001 to \$100,000
\$100,000 and over
DK
REFUSE

103. Those are all the questions I have. Now, in case my supervisor would like to verify that I conducted this interview with you, may I please have your first name only, or your initials?

Name: _____

104. And just to check that I've dialled the right number, is this (READ TELEPHONE NUMBER AND RECORD)

105. If we have any further questions, may we call you back?

Yes
No

Thank you very much for your participation.

106. NOTE SEX...DO NOT ASK

Male
Female

107. Community size (system-code)

1 million or more
100 thousand to one million
25 thousand to 100 thousand
10 thousand to 25 thousand
5 thousand to 10 thousand
Less than 5 thousand
Don't know

108. Province of Residence (system-recorded):

British Columbia
Alberta
Saskatchewan
Manitoba
Ontario
Quebec
New Brunswick
Nova Scotia
Prince Edward Island
Newfoundland
Yukon
Northwest Territories

109. Region (RE-CODE)

British Columbia
Prairie Provinces
Ontario
Quebec
Atlantic Canada

110. Language of Interview (SYSTEM-CODE)

French
English

APPENDIX B
QUALITATIVE RESEARCH INSTRUMENTS

RECRUITING GUIDE

Good afternoon/evening. My name is () of the Environics Research Group, a professional public opinion research firm. From time to time, we get opinions by sitting down and talking with a group of people.

We are having a discussion session and are calling to find out if someone in your household can participate. These sessions take about two hours and those who qualify and attend will receive \$40.00 as a token of our appreciation.

I would like to ask you a few questions to see if you qualify to attend.

[Household Screener]

Are you, or is any member of your household, employed in the area of science or engineering or involved with an environmental, consumer rights, or animal rights group?

IF YES, THANK AND TERMINATE. IF NO, CONTINUE

Have you participated in a focus group or discussion group within the past year?

IF YES, THANK AND TERMINATE. IF NO, CONTINUE

Biotechnology is the application of science to living organisms to develop new products and processes. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with biotechnology?

Very familiar	THANK AND TERMINATE
Somewhat familiar	CONTINUE
Not very familiar	CONTINUE
Not at all familiar	THANK AND TERMINATE

Overall, do you think the **federal** government is doing a very good job, a good job, only a fair job or a poor job of regulating the development of biotechnology?

Very good job	THANK AND TERMINATE
Good job	CONTINUE
Only a fair job	CONTINUE
Poor job	THANK AND TERMINATE
Don't know	THANK AND TERMINATE

How much of your spare time would you say you spend talking, reading, or thinking about issues that affect your community, your province, or Canada as a whole? Do you spend a lot of time, some time, very little time, or no time at all?

A lot of time	Opinion Leader
Some	Opinion Leader
Very little	Non-opinion Leader
No time at all	Non-opinion Leader

How often do you openly express your opinions on public issues to people **other** than your family and friends? This would include contacting public figures by letter or phone, writing letters to the editor, signing petitions, or attending public meetings and rallies. Do you do ANY of these things very often, sometimes, rarely, or never?

Very often	Opinion Leader
Sometimes	Opinion Leader
Rarely	Non-opinion Leader
Never	Non-opinion Leader

As an individual, how much influence do you believe you can have on the outcome of the public issues you care about? Would that be a lot of influence, some influence, very little influence, or no influence at all?

A lot of influence	Opinion Leader
Some influence	Opinion Leader
Very little influence	Non-opinion Leader
No influence at all	Non-opinion Leader

Note: To qualify as an opinion leader, participants must provide a positive answer to ALL three questions. Those who do not qualify are considered non-opinion leaders.

Demographic Quotas

NOTE SEX...DO NOT ASK (Need a 50/50 split)

Male
Female

What is the highest level of education that you have reached? (DO NOT READ - Need a distribution of education ranges)

Some elementary (Grades 1-6)
Completed elementary (Grade 7 or 8)
Some high school (Grades 9-11)
Completed high school (Grades 12 or 13)
Community College, vocational, trade school
Some university
Complete university (Bachelor's Degree)
Post-graduate/professional school (Master's Degree, Ph.D., etc.)
No schooling
VOLUNTEERED
DK
Refuse

In what year were you born? (Need a range of ages for each group)

SPECIFY _____

(For HALIFAX and SASKATOON) Would you say that you live in an urban or rural area? (Need one group of each in these locations)

Urban
Rural

Focus Group Sessions

DATE	LOCATION	TIME	INSTRUCTIONS
April 28, 1998	Toronto	6:00 - 8:00	Non-opinion leaders
		8:00 - 10:00	Opinion leaders
April 29, 1998	Saskatoon	6:00 - 8:00	Non-opinion leaders (Rural)
		8:00 - 10:00	Opinion leaders (Urban)
April 30, 1998	Vancouver	6:00 - 8:00	Non-opinion leaders
		8:00 - 10:00	Opinion leaders
May 4, 1998	Montreal	6:00 - 8:00	Non-opinion leaders
		8:00 - 10:00	Opinion leaders
May 4, 1998	Halifax	6:00 - 8:00	Opinion leaders (Rural)
		8:00 - 10:00	Non-opinion leaders (Urban)

MODERATOR'S GUIDE

RENEWAL OF THE CANADIAN BIOTECHNOLOGY STRATEGY

Moderator's Guide

Field Version
April 28, 1998

Introduction 5 Minutes 0:00

Hello, my name is _____. I work for the Environics Research Group Ltd, a national public opinion research firm.

We do telephone surveys; from time to time, we do focus groups. Focus groups allow us to get more detail on topics and issues than we can from telephone surveys (e.g., thoughts, feelings and opinions).

We are not here to reach a consensus. Everyone will have the opportunity to participate. There are no right or wrong answers - you help me by giving me your opinions, thoughts and ideas. It is important to respect the view of others in the room. We can disagree without being disagreeable.

This meeting will be tape-recorded in order to help me write my report later. Indicate that there are observers (if any) behind the one-way mirror. Everything discussed here will be kept in complete confidentiality - no names will be attached to the results in any way. Feel free to use your first name only.

Round table introductions. Start with Moderator, each giving brief sketch of what they do, length of residence in city, and favourite activity.

Top-of-Mind Issues 10 Minutes 0:05

1ab First of all, what comes to mind when I say the word "biotechnology?" What does it mean to you? 1b

2a Biotechnology is the application of science and engineering in the direct or indirect use of living organisms or parts or products of living organisms in their natural or modified forms. Biotechnology is not new. People have long used yeast, a living organism, to make bread, beer and wine, bacteria to make yogurt, and bacteria and fungi to make cheese. More complex activities such as the production of antibiotics, vaccines and enzymes have also been used for many years, as has the selective breeding of plants and animals. Biotechnology's newer techniques include the use of DNA to detect inherited diseases, the modification or duplication of genetic information, or its transfer from one organism to another.

2ab Now that you have seen and heard this definition, is there anything else that comes to mind when I say "biotechnology?" 2b

3 What would be some of the advantages of biotechnology?

4 What would be some of the disadvantages of biotechnology?

Language Issues 5 Minutes 0:15

When I say that something has been "genetically modified," what images or thoughts come to mind?

How about if I say that something has been "genetically enhanced?"

How would you define products where biotechnology has been applied?

**Public Consultation,
Education and
Participation**

10 Minutes 0:20

What is the role of individual Canadians with regard to **decisions** about biotechnology? Where do we fit as individuals?

Do you want to be involved in making decisions about biotechnology?

How would this be accomplished?

When it comes to making decisions about biotechnology, how should the federal government involve the general public?

How important should public consultation be?

Is there a need for an ongoing public education program on biotechnology?

What should public education focus on? What do you need to know more about?

Who should be involved in a public education program about biotechnology?

The Advisory Body 15 Minutes 0:30

The federal government is setting up an external body to provide advice on biotechnology and related issues. This body would provide advice to ministers on the ethical, social and regulatory aspects, as well as the economic, scientific, environmental and health aspects, related to biotechnology consistent with the principles of sustainable development. The advisory body could examine the potential risks and benefits of this emerging technology and the public's understanding and confidence in biotechnology. This body would not arbitrate regulatory decisions, but provide advice on larger policy directions.

Do you approve or disapprove of the decision to set up the advisory body? Why?

What should be the top priority for this external advisory body?

Who should make up the advisory body?

Probe: neutral experts, stakeholders, and general public?

How should this body interact with Canadians at large? Should it reach out to Canadians or restrict its deliberations to its own expertise?

There are two approaches that the advisory body could take to fulfil its mandate. The first is to address broader issues, such as integrating stewardship, economics, social and ethical concerns into one vision to guide the development of biotechnology in Canada. The other is to select a group of specific issues (such as Dolly, the cloned sheep) and render decisions on a case-by-case basis. Which approach should the advisory body take? Why?

What would be the advantage of taking the broader approach? The case-by-case approach?

One operating model has been suggested for the advisory body. This would see neutral, expert members of the body operating in an open, transparent process that would engage Canadians in an ongoing public dialogue on biotechnology for the purpose of influencing the

broad policy framework. The public and government can request items be placed on their agenda. Do you think this is a good approach? Why/Why not? 22b

230b Do you think this approach is workable? Why/Why not? 23b

Regulation and Institutions

20 Minutes

0:45

240b The federal government currently regulates to protect health, safety and environment. Are you comfortable with the way the federal government regulates these areas? Why/why not? 24b

25 Do you have confidence in the regulatory system?

26 What would increase your confidence?

29 What do you need to know about the way things are regulated?

28ab The federal government has many roles. In addition to its stewardship role, the federal government has responsibility to stimulate economic growth, ensure that ethical and social considerations are taken into account, and more. Others, such as business, provincial governments and the general public, also play a role. In general, do you think the federal government is taking a leadership role with regard to biotechnology? Is this role appropriate? 28b 28a

29ab A great deal of emphasis is placed on building partnerships, sometimes between different levels of government and sometimes between governments and the private sector, in order to maximize the benefits of new technologies. Is this emphasis appropriate? Why/why not? 29b 29a

30 What are the benefits/disadvantages of these partnerships?

31a-c Some say that the federal government needs to "lead from the middle" on biotechnology issues. That is, the federal government needs to build consensus so that industry, government and citizens can move forward together. Do you approve or disapprove of this approach? 31a

31b Is this approach possible? If not, why not? 31c

How important is it to have commonly accepted international standards when it comes to biotechnology? Why/Why not? 32b 32a

33 Should Canada make agreements with countries that have equivalent standards and protection that recognize the testing that they do, and the testing that we do, to avoid duplication and expense? [Note to Moderator: This does not include the approval process.]

Canada's Role in Biotechnology

15 Minutes

1:05

34 When it comes to an area like biotechnology, which is global in scope, how should we see ourselves?

35 How should we position ourselves in relation to biotechnology? 35a

Regulatory standards 37b
Product quality 37c
Capacity-building (International and domestic) 37d

36 How should we position ourselves with regard to the United States and Europe?

37a Do we have any obligations to developing countries with regard to biotechnology? What might these be? [Note to Moderator: This could include providing access to technology and new developments, training their regulators, or ensuring that biotechnology does not create new dependencies.] 37b

Risks and Benefits

15 Minutes

1:20

Biotechnology is an emerging field that presents great potential for economic and health benefit. However, as it is a new technology, there exists some uncertainty about potential health and environmental risks.

38ab What are the main areas where biotechnology could be used to benefit the health of Canadians? Are there others? 38a 38b

39ab Are there any economic benefits to developing a strong, competitive biotechnology industry in Canada? Why/Why not? 39a 39b

40 As a new and not fully understood technology, is it possible that biotechnology products may present new hazards not associated with existing products?

41 What are your specific concerns regarding these new products? 50a

42ab Do we need to develop new methods to address unique concerns about the risks and benefits of biotechnology products? Why/Why not? 51ab 42a 42b

43 Given that the present system involves scientific testing and analysis in determining the potential risks and benefits, what other criteria may be important in this process? 43a 43b 43c

Are there any other criteria? 43b
Probe: Information (Example: Drug side-effects) 43c 54

Values 10 Minutes 1:35

44ab When it comes to developing a biotechnology strategy, what values should be uppermost in driving our policy? Why/why not? 44a 44b

45 How should we incorporate ethics, which is the consistent application of principles, in our decision-making system? After all, an action that you might consider ethical others may not.

46 Should the advisory body be tasked with developing a broad ethical framework?

47 I invent something new, so I get a patent in Canada. I go around the world and get patents in every other country as proof of ownership. Once this is done, I can start selling the product or the rights and hopefully start making money. Should ethics be involved when the government grants a patent in the area of biotechnology?

48 If so, what would be an example of ethical considerations used to deny a patent?

49ab Would there be a need for a specific body to review the ethical considerations of a patent claim? Why/Why not? 49a 49b

CBS Vision, Objectives and Principles

10 Minutes

1:45

Handout *Vision, Objectives and Principles* document. Give participants three minutes to read.

Under proposed vision, which do you prefer, One or Two? Why/why not? 50a 50b

Given everything that we have discussed so far, do you think this document summarises the discussion and your concerns? Why/why not? 51a 51b

52 Is there anything missing that should be here?

53 Is there anything that should be struck out?

Wrap-up

5 Minutes

1:55

If you were a member of the group advising the federal government on biotechnology, what would be your first priority? (Ask of each participant. Try to get them to focus on a specific policy area. For example, if they say "safety", ask them what risk areas they are specifically concerned about.)

Thank you for your help.