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Wave 7

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Public Opinion Research Into Biotechnology Issues

Presented to the Biotechnology Assistant Deputy Minister Coordinating Committee (BACC), Government of Canada

December 2002

Seventh Wave Report – Executive Report

Prepared for the Biotechnology Assistant Deputy Minister Coordinating Committee, Government of Canada, by Pollara Research and Earnscliffe Research and Communications.

46 Elgin St. Suite 200 Ottawa, Ontario K1P 5K6 Tel: 613 563-4455 Fax: 613 236-9546

Introduction

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The seventh wave was completed in early November, 2002 and was comprised of two separate instruments:

- a telephone survey of 1200 Canadians;
- three sets of focus groups (a total of 6 groups) to support the survey.

The research was designed to accomplish three major objectives:

- to track sentiment on a range of biotechnology issues, using a baseline of data developed in previous waves of research;
  - to assess opinion more comprehensively in discrete areas, including GM food labeling and trade issues, as well as patenting related issues; and
  - to investigate communications issues associated with stewardship of the technology.

The telephone work began on October 3, 2002, and ended on October 14, 2002. The survey reports on the views of a random sample of 1200 Canadians and carries a margin of error for the national sample of +/- 2.8%, nineteen times out of twenty.

Three nights of focus groups (six groups in all) were conducted in Vancouver, Toronto, and Montreal between October 15, 2002 and October 30, 2002.

The focus groups followed a set agenda for discussion and probed in more detail opinion underlying the results of the telephone surveys. Each night comprised a group of approximately ten participants drawn from the general population and a group of similar size of *Involved Canadians*, our proprietary population segmentation of Canadians who are significantly more interested and involved in public policy issues.

This report combines the results of the telephone survey and the focus groups. It indicates where the focus group discussions either elaborated or deviated from the survey results.

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Elly Alboim (elly@earnscliffe.ca)
Jeff Walker (jwalker@earnscliffe.ca)
Don Guy (Dguy@pollara.ca)

Executive Summary

Trend Lines

This wave of research marks a subtle but important shift in public perceptions of biotechnology. Biotechnology is maturing as an issue -- most people have now read or heard something about it, and know some of the pros and cons involved. There is a very clear sense of inevitability about the technology now, demonstrated best in focus groups where discussions have largely shifted from whether the technology will be accepted to how it will be managed.

Overall opinion towards biotechnology – its processes, products and/applications – has remained fairly stable over the past three years, with a slight increase in support in this most recent wave. Canadians continue express about two to one support for the technology. Although there is a small segment, in the range of 10%, which is strongly opposed to biotechnology.

However, one of the more notable subtexts identified in this research is that the degree to which support is articulated appears to be growing. Those who support biotechnology, about 60% of the population, are increasingly willing to defend it in a discussion, whereas in previous waves of research the small group of strongly opposed would not have their views challenged in focus groups.

Many, particularly those who are more highly engaged and educated, believe that biotechnology will be central to Canada's future economic success -- a large majority want the country to be a world leader in the technology so that they and Canada as a whole can gain its benefits. In this survey, it was found that Canadians are willing to allow government to contribute to private sector venture capital funds earmarked for Canadian biotech R&D.

However, there continue to be areas of biotechnology, chiefly in the areas of cloning and GM food, where there are strong reservations among significant pockets of the populace about the potential risks involved. In this wave of research, almost half of the population expressed some level of discomfort with GM food.

This issue of informed choice plays an important role in how Canadians wish decision-making about biotechnology, and GM food specifically, to occur. The research shows that Canadians expect that ethical considerations will guide the development of these technologies, but they are loath to allow the ethical standards of one person or group to determine whether a product should be allowed for all. The only exception to this rule is with regard to human cloning where people strongly advocate an outright ban. The preference of the vast majority is for individuals to make their own choices, based on their own ethical standards.

Awareness and Familiarity

Canadians exhibit a blend of high awareness of biotechnology mixed with low levels of engagement and knowledge. Polling data and focus group discussions show that a clear majority of Canadians have heard about and discussed the issue of biotechnology. Nevertheless, the number of people who say they are very familiar with biotechnology remains below 10%. Most find the area very complex — involving so many applications and so many issues that they suggest it is difficult to follow closely.

Although there remain low levels of reported familiarity and interest about the subject, focus groups often reveal that people are actually more informed about the subject than they give themselves credit for. This increased knowledge among interested people about these technologies is contributing to the "maturing" of the issues in the minds of many. Heightened awareness is driving the growth of more complex, nuanced and moderate views. And, with the exception of GM food, heightened awareness correlates with higher levels of comfort with most aspects of the technology.

A significant number, totaling almost half of the survey sample, indicated that they recalled seeing or hearing about a recent Canadian achievement in this area in recent months. Among involved Canadians, the number totaled almost six in ten, again a very strong indication of increasing recognition among Canadians of the growing importance of this field.

The focus groups strongly reinforced this important finding. In this wave of focus groups, there was a notably higher level of recognition of Canadian achievements. According to focus group respondents, in some regions of the country, notably British Columbia, Alberta, and Quebec, respondents are noticing growing media coverage of the work of university scientists and researchers.

Applications

Attitudes regarding biotechnology applications remain unchanged, although the 3 new applications tested in this wave of research produced some important findings.

As discussed in previous reports, the vast majority of Canadians resist offering systemic views on biotechnology applications. Most people evaluate each application on its individual merits, employing a core analytical framework to assess applications on a case-by-case basis.

People come to views about applications using an implicit risk/benefit calculation, with their conclusion driven by an assessment of the marginal personal benefit conveyed by

the application. In other words: "do the potential benefits of the application (compared to non-GM products already available) outweigh the potential risks to myself or my family?" In simple terms, the larger and more personal the anticipated benefit, the more acceptable the risk and the higher the level of support for a given application.

The most prevalent negative driver in the realm of biotechnology is concern about long-term risks and unknowable outcomes that these technologies may produce — in particular, potential long-term risks to human health and the environment. The more intrusive the application, the higher the life form it involves and the larger the degree to which the application crosses boundaries separating plants, animals and humans, the larger the perceived risk.

To most Canadians, the acceptability and approval of biotechnology products and processes is largely a technical and scientific issue with relatively few significant moral or philosophical determinants. The vast majority believes that science should be the primary guide to decision-making about biotechnology applications.

- The proposed uses or outcomes have to be within a range of acceptability. Good science will not trump highly contentious applications that seem to fail the risk/benefit test.
- Biotechnology products have to meet higher scientific standards than non-biotech products.
- Long-term research into potential impacts is important to the credibility of the regulatory system.

More than 40 current and prospective biotechnology applications in health, environment and agriculture have been tested in the research. What has emerged is a clear hierarchy of support that finds health applications at the top, environmental applications in the middle range, and agricultural and food applications with decidedly lower levels of support.
The three new applications introduced in this wave of research each were acceptable to a majority, though there was a range of reservations expressed.

- The first, "products that use gm grains, forest products and other agricultural products to generate energy" garnered high levels of support, totaling more than eighty per cent of the sample, with only 14% opposed.

- The second, "bioplastics, which involve the use of genetically modified bacteria or plants to produce plastic products", received 3:1 support in the survey. In focus groups, this application was met with very strong interest and appeal among those who are generally supportive of biotechnology, and fairly high levels of concern among those who are generally opposed to biotechnology.

- The third, "a reverse engineering technology that would remove genetically modified elements from a plant" received about 2:1 support, which is more opposition than most other applications tested in this or other waves of research. Both the survey and focus group discussions revealed that those who are most concerned about GM food have no less concern about foods produced in this way than about standard GM methods, and some say they are more concerned because now "at least two genes have been modified, rather than one".

GM Food and Labeling

This research wave tracked several questions involving genetically modified food and food labeling. The results indicate that Canadians may be becoming somewhat more uncomfortable with GM foods. More than half said they were uncomfortable with the idea of buying GM food, with one in four saying that they are very uncomfortable.

There is little question that GM food is among the least acceptable of all biotechnology applications. This probably reflects, in part, wider concerns about food ingredients. Focus group discussion indicates that many people are quite concerned about chemical additives, pesticides and other potential dangers in the food they eat.

There appear to be other issues at work as well. Focus group discussion consistently reveals that people increasingly know that they are eating GM food but in spite of higher levels of awareness, they know of few benefits of GM food. Indeed, most believe that GM foods are of lower quality than other foods.

Informed choice is the key driver of opinion on the issue of GM food and by consequence, GM food labeling. As found in previous waves of research, there continues to be widespread demand for GM food labeling. People feel strongly that they have a right to choose to eat GM food or not and that is enabled by the creation of a labeling system.

The number of Canadians who seek a labeling system for GM food continues to be high, and the issue shows no sign of abating. In focus groups, as soon as discussion about GM food is joined, a substantial majority begin talking about the importance of GM food labeling and often begin asking pointed questions about government's oversight role in this area.

The underlying issue that strongly emerges in focus group discussion of labeling is not the long-term risk of GM foods but the principle of informed consumer choice. Even those people who are comfortable with GM foods generally believe that everyone has the right to know whether there are GM ingredients in his or her food. The strong, un-

nuanced views that emerged reflect the core strength of the principle of the consumer's right to know and choose.

Moreover, few people see much point in voluntary systems of labeling rather than mandatory systems. It is the outcome of full compliance that most people want and mandatory labeling is the common sense proposition to achieve that end.

Government Priorities/Performance

In this survey, respondents were invited to evaluate current performance and future priorities for government. The results suggest that Canadians continue to place the highest priority on ensuring health and environmental risks are being managed for both the near and longer term. Other priorities, such as reaping the economic benefits of the technology, are important but not as important as those stewardship activities.

In terms of performance, Canadians believe that government performs best at garnering the economic benefits of the technology for Canada and Canadians. In past waves of research, government ratings on stewardship of health and the environment ranked quite low in relation to other areas but in this wave, it appears that perceptions in this area have improved and while not at ideal levels, are moving in the right direction.

The current government policy approach to biotechnology continues to be accepted by a wide majority of Canadians. There is broad support for a two-track policy approach which includes a strong regulatory and scientific oversight system for long-term surveillance and research, in concert with measures designed to foster the development of the technology and the industry. Almost nine in ten agree that "the primary role of government in this field is to gain the benefits while managing the risks," suggesting that gaining the benefits is an acceptable and appropriate objective to strive for, as long as stewardship is diligently pursued. People don't see stewardship and promotion as a "zero-sum" game – both can and should be pursued, but primacy is assigned to the stewardship function because the newness of the technology is seen to have the potential to create negative side-effects for people and the environment.

Economic Benefits

Nevertheless, Canadians very much want government to ensure they reap the benefits of what they see as truly important scientific breakthroughs, particularly in health and medicine. They also want to ensure that Canada is at the forefront of scientific research internationally because of the economic benefits it can bring and because it can help to address perceptions of a "brain drain" of bright young Canadians to other countries.

To achieve these ends, two quite specific measures that could be undertaken to foster the development of the biotechnology industry were tested in this wave of research. Opinions diverged significantly on the two ideas, where one was widely supported and the other widely opposed.

The measure that was widely supported in the survey and in the focus groups was the idea of government contributing to a pool of Canadian private sector venture capital that would be earmarked for biotechnology R&D. In all, more than three in four respondents supported this measure, while fewer than one in five opposed it. The focus groups explained the underlying rationale. The first reason is that it appears to provide a remedy to what many believe is a frequent problem for Canadian companies and researchers – access to capital. There is a widely shared belief that being a small country beside such a large and rich country as the United States, Canadians have difficulty getting the resources needed to make their businesses work, particularly in the area of biotechnology where there are many start-ups.

The measure that was widely opposed in the survey and in the focus groups was the idea of fast-tracking approval of products produced using biotechnological methods. People already harbour concerns about the stringency of government product approval processes, both because they perceive there to be a lack of available resources for government scientists, and because they perceive that industry "lobbying" influences the process. So the idea of speeding up the approval process is a measure that many are reluctant to approve. Indeed, they equate slower approval with more thorough study and analysis, increasing the likelihood of a product's safety.

DNA Mapping and Patenting

In this wave of research, a limited number of questions were tracked with regard to DNA mapping and the patenting of genes as well as higher life forms. These questions were first asked two years ago, in the fall of 2000 in the aftermath of the announcement of the mapping of the human genome.

In terms of mapping human DNA, 72% say that there are more benefits than drawbacks, while 14% say there are more drawbacks than benefits. Focus groups concur – virtually all participants believed that the mapping of the human genome would lead to significant medical breakthroughs that will outweigh the potential drawbacks.

The idea of patenting genes with particular traits was met with more resistance in this wave than when it was originally asked in 2000. In this survey, a plurality of the sample, 46%, said there are likely more risks than benefits to allowing such patenting, up from 37% in 2000.

In focus groups, discussions yielded more detailed prevailing views on patenting. The most important finding is that Canadians are ill informed about the purpose of patenting and misunderstand some of its most fundamental elements.

Once people in focus groups were informed about what patenting is and some of the pros and cons of having a patenting system in place, there was about a 65-35 split between support and opposition to patenting genes.

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Once people in focus groups were informed about what patenting is and some of the pros and cons of having a patenting system in place, there was about a 65-35 split between support and opposition to patenting genes.

Detailed Findings

Awareness and familiarity

This wave of research marks a subtle but important shift in public opinion about biotechnology. It appears that biotechnology is maturing as an issue with people – most have now read or heard something about it, and know some of the pros and cons involved. There is a very clear sense of inevitability about the technology now, demonstrated best in focus groups where discussions have largely shifted from whether the technology will be accepted to how it will be managed.

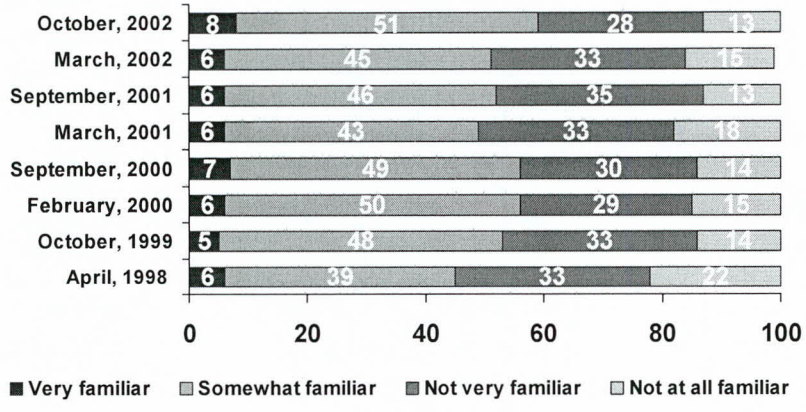
Canadians exhibit a blend of high awareness of biotechnology mixed with low levels of engagement and knowledge. Polling data and focus group discussions show that a clear majority of Canadians have heard about and discussed the issue of biotechnology. Nevertheless, the number of people who say they are very familiar with biotechnology remains below 10% (8%). Most find the area very complex — involving so many applications and so many issues that they suggest it is difficult to follow closely.

Although there remain low levels of reported familiarity and interest about the subject, focus groups often reveal that people are actually more informed about the subject than they give themselves credit for. This increased knowledge among interested people about these technologies is contributing to the "maturing" of the issues in the minds of many. Heightened awareness is driving the growth of more complex, nuanced and moderate views. And, with the exception of GM food, heightened awareness correlates with higher levels of comfort with most aspects of the technology.

In focus groups, discussion reveals that a significant number of people, primarily the *Involved Canadians*, actually know the subject area quite well and are quite comfortable with it. Members of the general public are less aware of its scope and how pervasive some of the applications are. However, even among this segment of the populace, there is higher actual familiarity than what people report initially.

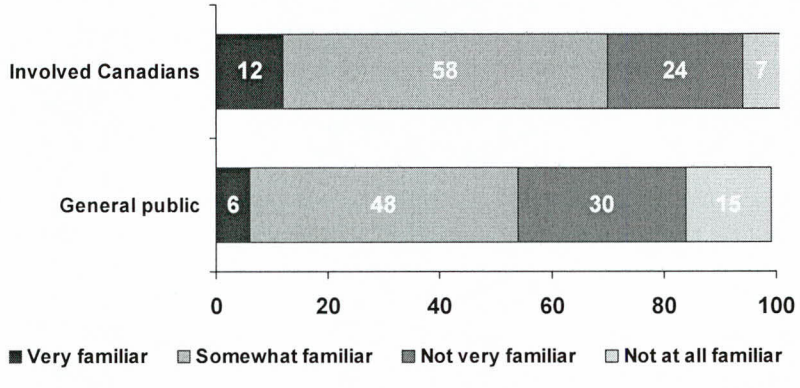
Familiarity with Biotechnology

Would you say you are very familiar, somewhat familiar, not very familiar or not at all familiar with biotechnology?



Familiarity – Involved Canadians

Would you say you are very familiar, somewhat familiar, not very familiar or not at all familiar with biotechnology?



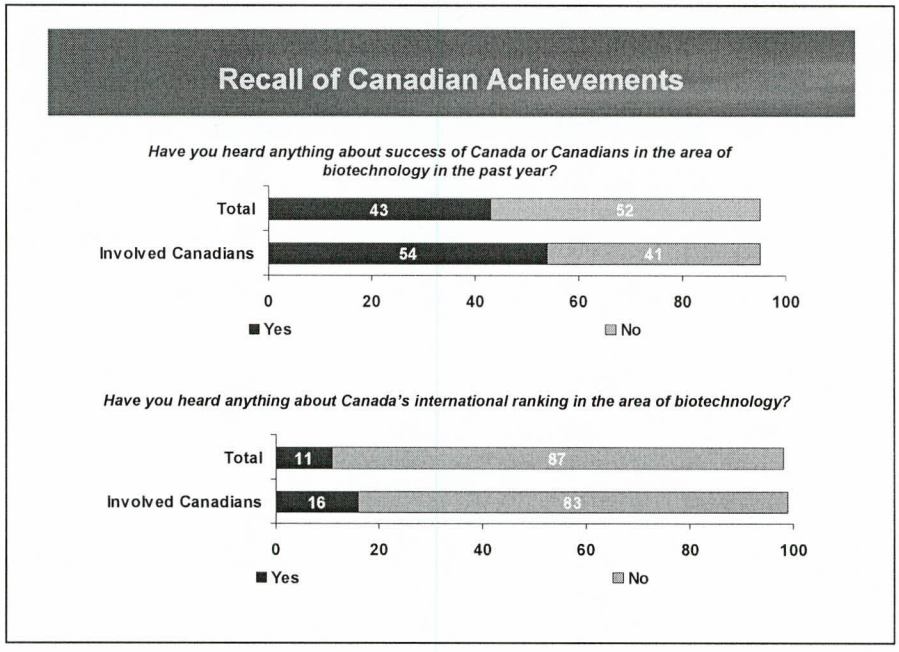
Recall of Canadian Achievement in Biotechnology

Two new measures of awareness and familiarity were introduced in this wave of research. These measures focus on Canadian achievements in biotechnology.

The first question asked Canadians if they had read or heard about any Canadian achievements in the area of biotechnology over the past year. A significant number, totaling almost half of the survey sample, indicated that they recalled seeing or hearing about a recent Canadian achievement in this area. Among involved Canadians, the number totaled almost six in ten.

The focus groups strongly reinforced this finding. There was a notably higher level of recognition of Canadian achievements in this area than in previous waves of research. In some regions of the country, notably British Columbia, Alberta and Quebec, people suggest that they have noticed growing media coverage of the work of local university scientists and researchers. Importantly, this often correlates highly with a strong belief in the ability of Canada, and Canadian researchers, to be world leaders.

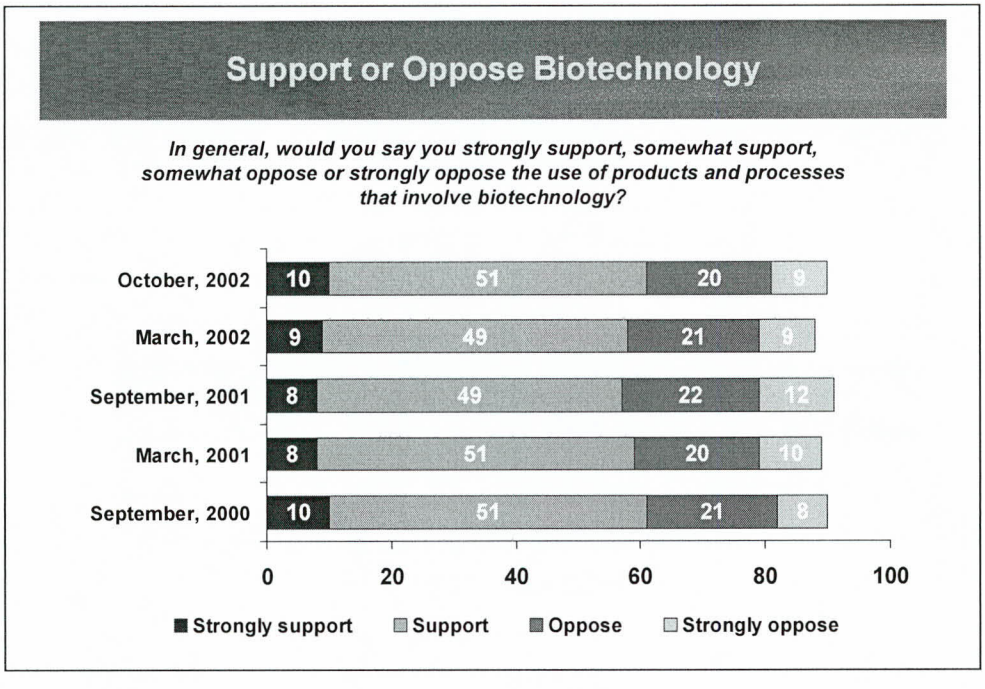
The second new awareness measure arose from the Bio 2002 conference in the summer of 2002, where one of the major media storylines focused on the fact that Canada is ranked second in the world in the number of biotechnology companies, which previous research had indicated was a very powerful message. In total, 13% of the sample recalled hearing about this international ranking, rising to 17% among Involved Canadians. This is a fairly significant level of recall from just one major media event.



Top of the mind impressions

Top of the mind impressions of the word "biotechnology" continue to be largely neutral to positive. A plurality (43%) of Canadians express neutrality while those saying they are positively inclined to the word outnumber those who are opposed by about two to one (31%-18%).

When asked directly whether they support or oppose biotechnology, most Canadians respond that they support the technology, by a margin of two to one. That ratio has not changed significantly in five waves of research. As the graph below illustrates, there remains a core of approximately 10% of the population who are strongly opposed to biotech as a whole.



Biotechnology Applications

Wave seven revisited six biotechnology applications, as well as testing three new ones. The survey and focus groups found the normal pattern of acceptability – the more personal the benefits, the higher the level of agreement with their use. The test people employ is a "marginal personal benefit" test -- best illustrated by the following question:

Do the potential benefits of the application (compared to non-GM products already available) outweigh the potential risks to me and my family?

Over the seven waves of research, a clear hierarchy of acceptability has emerged. Applications promising health and medical benefits rank highest in acceptability, followed by those with environmental benefits. Applications involving the genetic modification of food or agricultural products receive the least support, particularly if the benefits that are derived are predominately economic and seem to accrue primarily to producers.

Of the six applications tracked from previous waves of research, the potential cure for Type 1 diabetes, pharmaceuticals that contain gm material, and the use of GM bacteria to break down pollutants received levels of acceptance that surpassed 80%. Strong disagreement with their use was less than 5%.

By and large, most applications are found to be acceptable by more than two thirds of the population. There are some significant exceptions, however. One of these is cloning animals for food, which in this survey met 75% opposition, including 38% who strongly oppose this application.

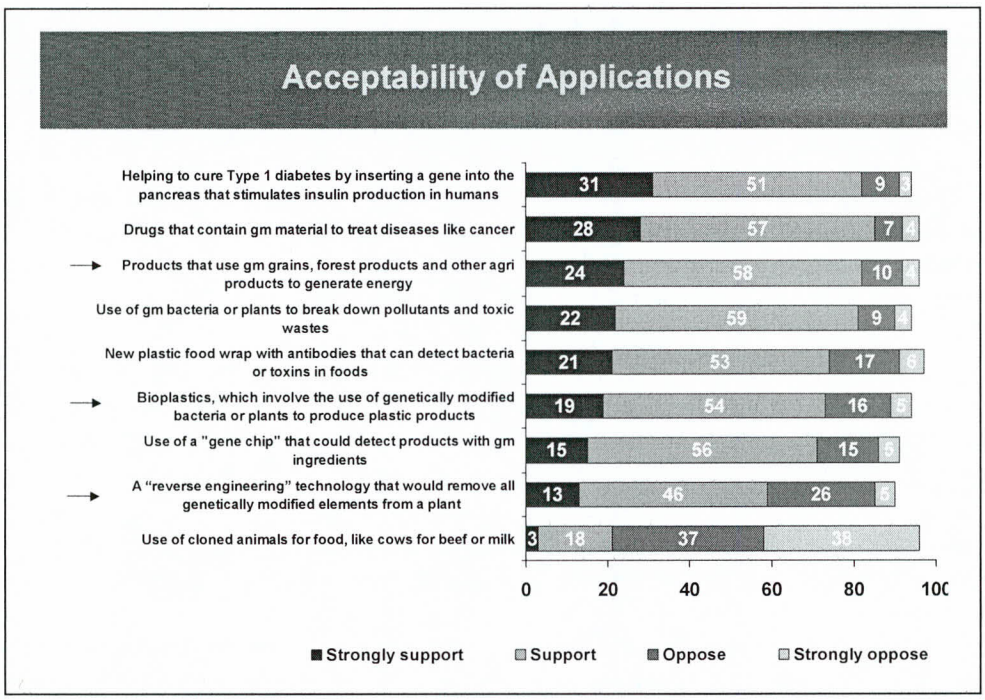
The three new applications introduced in this wave of research found varying degrees of support. These applications are marked in the graph below with an arrow.

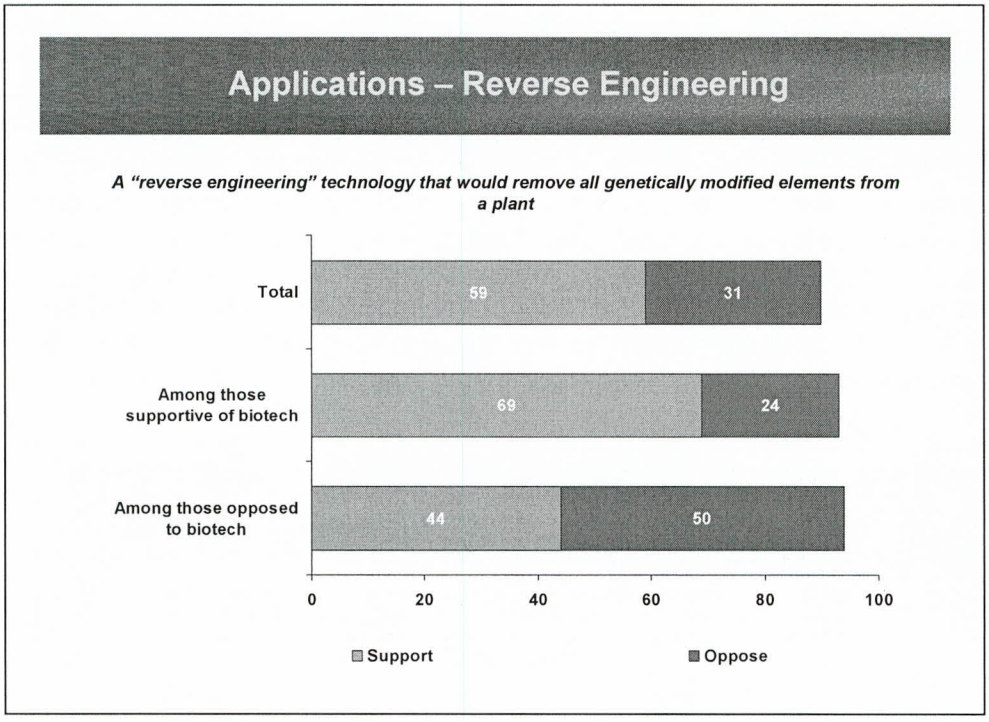
The first, "*products that use gm grains, forest products and other agricultural products to generate energy*" garnered high levels of support, totaling more than eighty per cent of the sample, with only 14% opposed. These types of biomass energy sources are met with high levels of support, for numerous reasons, from the fact that they come from renewable resources to the fact that they help contribute to the agricultural and forest industries in Canada, both of which are important to the economy.

The second, "*bioplastics, which involve the use of genetically modified bacteria or plants to produce plastic products*", received 3:1 support in the survey. In focus groups, this application was met with very strong interest and appeal among those who are generally supportive of biotechnology, and fairly high levels of concern among those

who are generally opposed to biotechnology. This is one of the next generation of biotechnology applications that feels like "science fiction" and fosters a profound sense of unease among some and a strong sense of wonder about the power of scientific technology among others.

The third, "*a reverse engineering technology that would remove genetically modified elements from a plant*" received about 31% opposition, which represents more opposition than most other applications tested in this or other waves of research. Both the survey and focus group discussions revealed that those who are most concerned about GM food have no less concern about foods produced in this way than about standard GM methods. In fact, some say they are more concerned because now "*at least two genes have been modified, rather than one*".



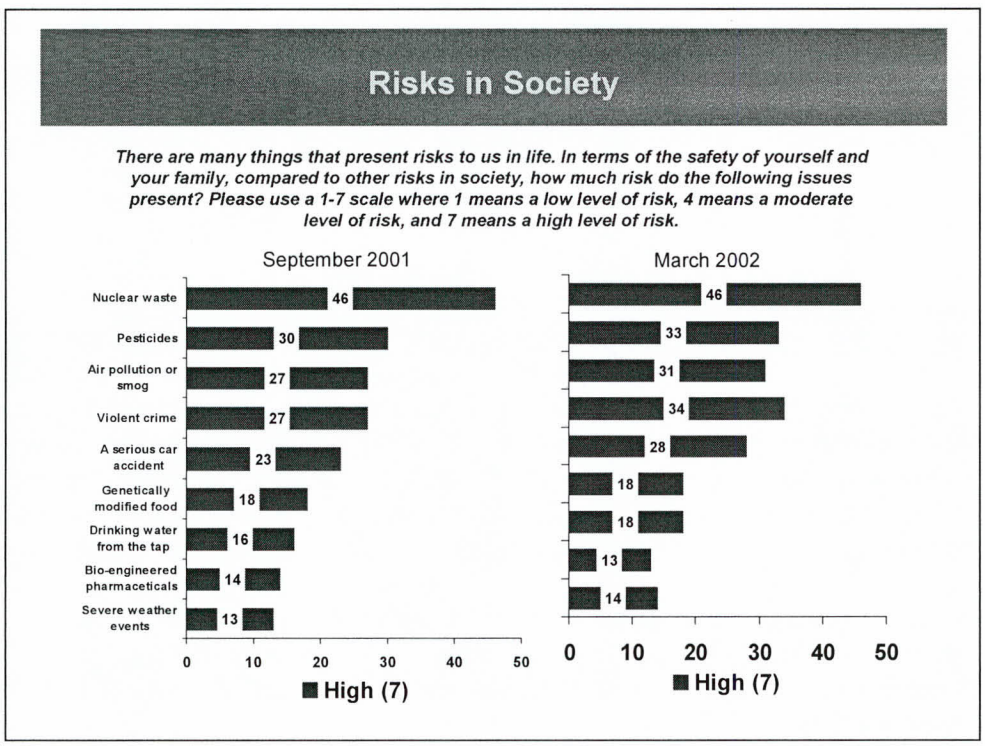


As people think through applications and evaluate potential benefits, they tend to believe that on balance, the technology will provide more benefits than drawbacks. But a "movement toward the middle" is clearly evident and has been throughout this tracking research. Partly that is a reflection of a broader understanding that some of the benefits continue to be more promise than reality and partly that is the result of continuing worry that not enough is known about the long term risks associated with genetic modification.

While not studied extensively in wave 7, comprehensive work in the first six waves of this research program indicated that the long-term risks of biotechnology are the largest drivers of concern, centering around unknowable outcomes and the perceived irreversibility of impacts.

As people evaluate the potential risk, it is long-term health risks that are seen to raise the largest concerns, much more so than environmental risks or ethical concerns. That is true of all applications other than the cloning of human beings or entire animals where ethical concerns become paramount. In the final analysis, it is the risk/benefit equation that people use to decide on the acceptability of any particular application.

To provide a context and to assess the power of the risk side of the risk/benefit equation, the research situated the risks of biotechnology against other risks in society. That was first done in wave 5 and repeated in wave six. The results are highly consistent and show that the risks of genetic modification are assessed to be decidedly lower than those of many other risks. In focus groups, participants did not spontaneously raise the risks of biotechnology in top of mind responses to probes about what risks people perceive to them and their families. Further, there is generally a resigned acceptance that modern life is replete with risks and technological change is inevitable. That, combined with the fact that the risks of GM products stand on a lower tier of risks, helps to explain the trend towards supporting the applications of biotechnology and the relatively muted deep-seated opposition to most of them.



Government Roles and Responsibilities

In this survey, federal government performance and priorities were rated by respondents both overall and in 13 separate categories, ranging from ensuring that long-term health impacts are addressed to attracting foreign investment in the biotechnology industry. The list of categories is as follows:

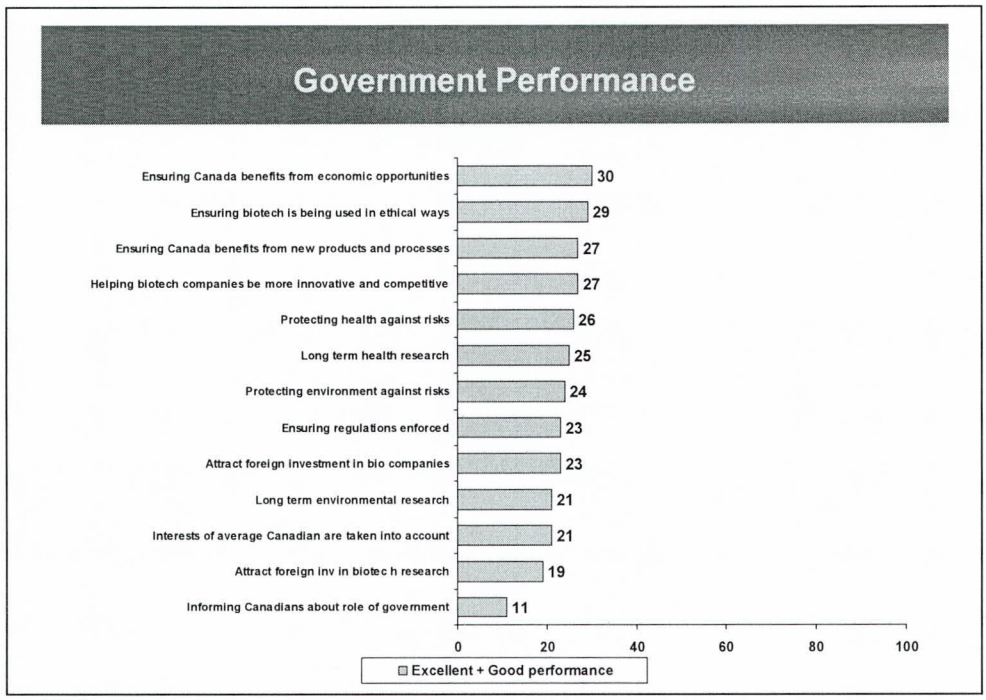
- *Ensuring that the interests of the average Canadian are taken into account as policies are developed for the use of biotechnology*
- *Ensuring that Canada benefits from the economic opportunities which biotechnology offers*
- *Ensuring that the health of Canadians is protected against risks associated with biotechnology*
- *Ensuring that the environment in Canada is protected against risks associated with biotechnology*
- *Ensuring that Canada benefits from the new products and processes which biotechnology offers*
- *Ensuring that Canadians are informed about the role of government in biotechnology*

- *Making sure that regulations on biotechnology are being enforced*
- *Ensuring that any long-term impacts of biotechnology on the environment are being studied and addressed*
- *Ensuring that any long-term impacts of biotechnology on human health are being studied and addressed*
- *Helping Canadian biotechnology companies become more innovative and competitive*
- *Ensuring that biotechnology is being used in ethical ways*
- *Attracting foreign investment to help develop biotechnology research in Canada*
- *Attracting foreign investment to help develop biotechnology companies in Canada*

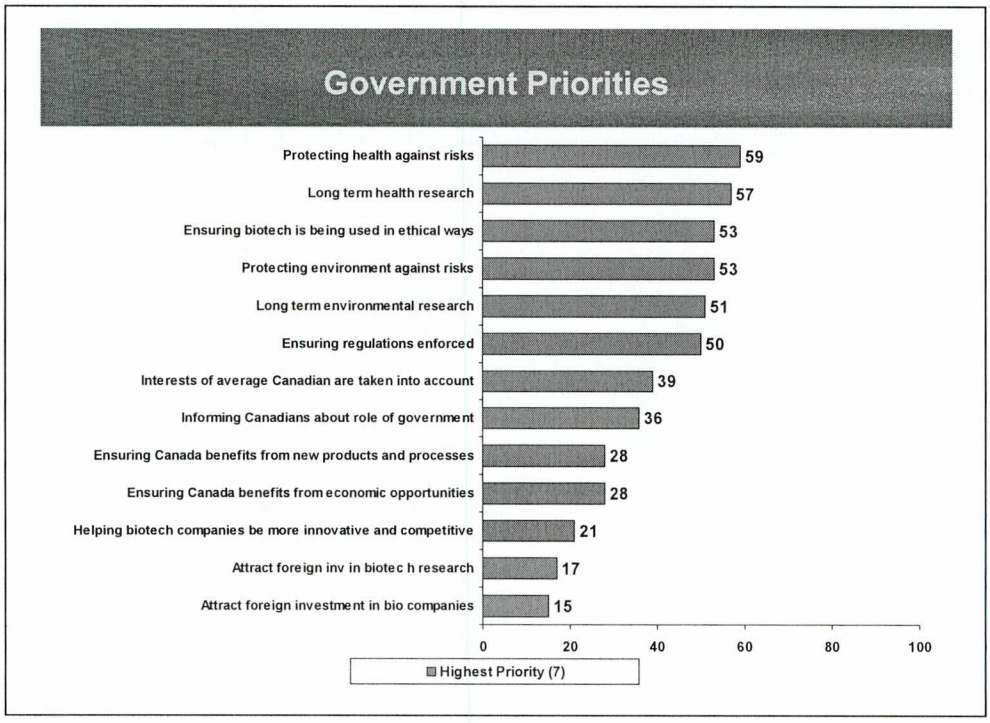
The data indicates that government of Canada is still not recognized by most Canadians as playing a significant role in any area related to biotechnology, a situation that has not changed since this tracking research was introduced in 1999. Awareness of the federal government's responsibilities is minimal, and awareness of actions it has taken with regard to either stewardship or promotion of the technology is negligible.

Because awareness levels are so low, performance ratings are generally mixed to poor, with relatively few assigning government excellent or good ratings, and most assigning ratings of fair or poor. Overall performance ratings for government on biotechnology are 2% excellent, 21% good, 43% fair and 21% poor, with 14% who offered no answer.

Nevertheless, there is a clear hierarchy of perceived government performance, a hierarchy that remains largely unchanged since the same questions were asked in the fall of 2001. This hierarchy gives government highest marks in the area of generating economic benefits to Canada and Canadians from the technology, and lowest marks to informing Canadians about the government roles and responsibilities.

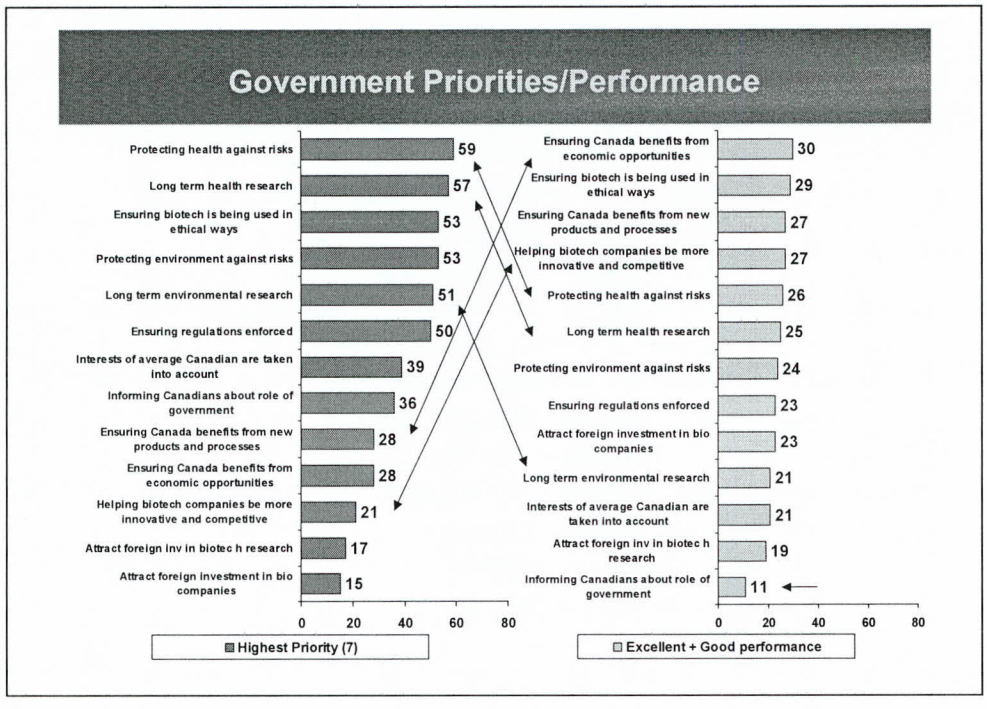


Turning now to the priorities Canadians assign to government, Canadians tend to assign top priority to near and longer term stewardship of the technology, for both human health and the environment. The other major priority that Canadians assign to government is to ensure that biotechnology research is being done in ethical ways. Focus groups indicate that many Canadians are particularly concerned about issues involving the cloning of humans, and there is a widespread sense that no government authority is taking a strong stand to ensure that human cloning is not done in Canada.



Another way of looking at this data is to compare and contrast the priorities Canadians assign to government with its performance.

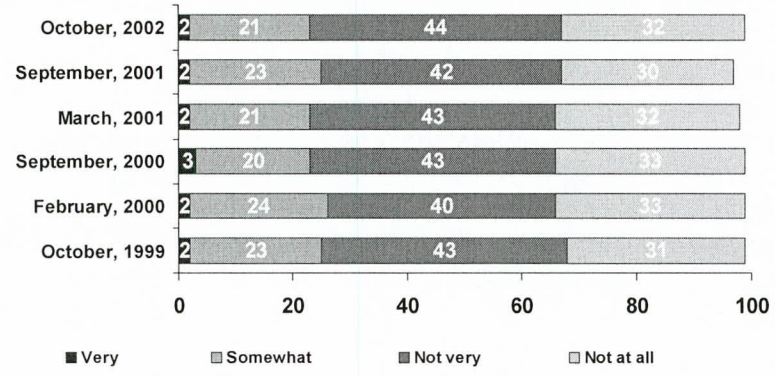
Looking at the graph below, preferred government priorities are on the left and perceived government performance is on the right. The arrows between the two graphs indicate those categories with the most notable gaps between priority and performance rankings. As the graph illustrates, the priority Canadians assign to garnering the economic benefits of the technology is much lower than their perception of government performance in this area. Conversely, perceptions of government performance in the areas of long term research (stewardship) tend to lag behind their primacy in terms of priority.



The research points to a number of key reasons why Canadians tend to assign the highest priority to stewardship. The data is clear about the level of concern about long-term risks but there are other contributing factors as well. Likely the most important of these is that people don't know how the regulatory system works. Respondents were asked how familiar they are with how the federal government regulates biotechnology, and 2% said they were very familiar, compared to 74% who say they are not very or not at all familiar, numbers that have barely changed in 3 years.

Familiarity - Regulatory System

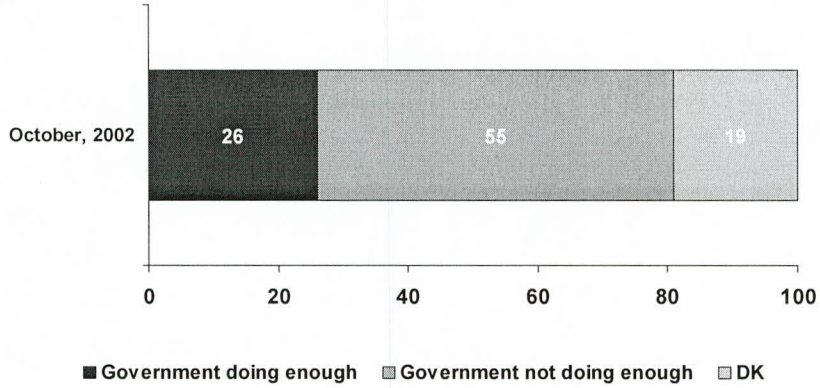
How familiar would you say you are with the ways in which the federal government regulates biotechnology?



Not surprisingly therefore, when asked directly whether they felt government was doing enough to monitor the impacts of biotechnology, more than half said government is probably not doing enough.

Government studying impacts?

Which of the following two statements most closely reflects your view: The government of Canada does an effective job of studying and monitoring the impact of biotechnology products OR The government of Canada does not do enough to study and monitor the impact of biotechnology products



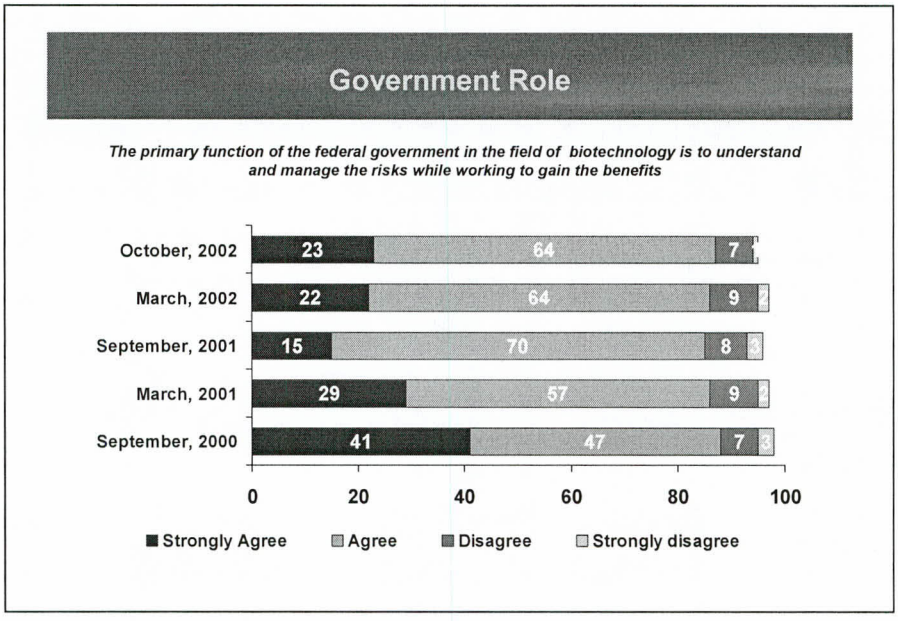
Focus groups point to another emerging contributory factor. More people are seeing and hearing more about the technology, but are hearing very little from government about the stewardship oversight role it is playing. Focus group discussions indicate that the absence of labels on GM food is contributing to this perception.

This lack of awareness of government activity, combined with growing knowledge about the technology and its implications, contributes to concern about stewardship.

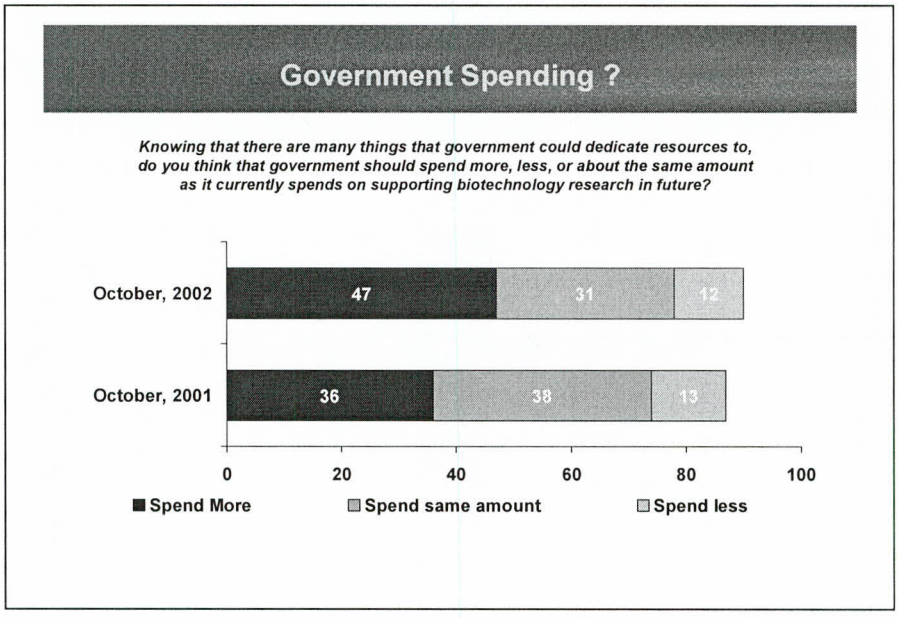
While there is clearly a sense of concern about these technologies and the ability of government to manage them, in focus groups and in previous survey work Canadians have consistently indicated that Canada's regulatory system is working as well as can be expected. Drawing on knowledge they have about other regulatory areas like the drug approval process, most assume that food products on the shelves must be safe and that they have been tested for safety by the government. Focus group discussions have established that most people believe that somewhere, someone is in charge and doing their job properly.

The data makes it clear that although Canadians expect their federal government to provide active stewardship in the near and long term, they also want to play a role in encouraging R&D and the promotion of biotechnology.

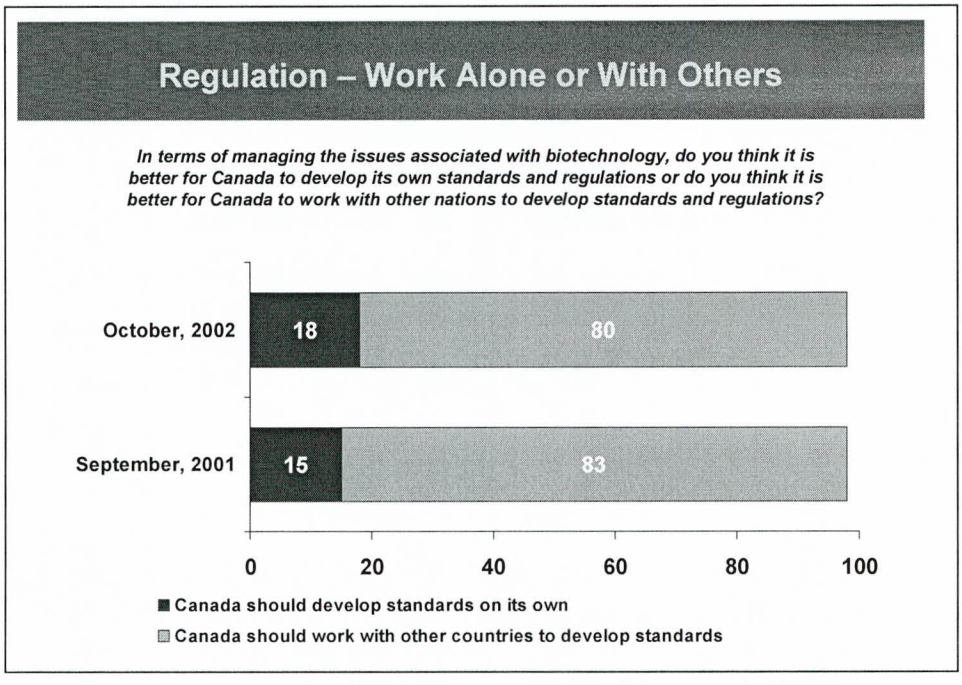
Most Canadians believe there is an important public interest in gaining the benefits of biotechnology – that biotechnology is one of the next major technological waves. As a result, Canadians overwhelmingly endorse the current positioning that the primary function of the federal government in the field of biotechnology is to understand and manage the risks while working to gain the benefits.



As further evidence of the support for significant government commitment to biotechnology, willingness to allow government to dedicate more resources to biotechnology has increased significantly in the past year – only 12% say it should spend less and 31% say it should spend the same amount.



On a separate issue, Canadians clearly prefer that government work closely with other countries to develop standards and regulations, rather than developing those standards and regulations on its own.



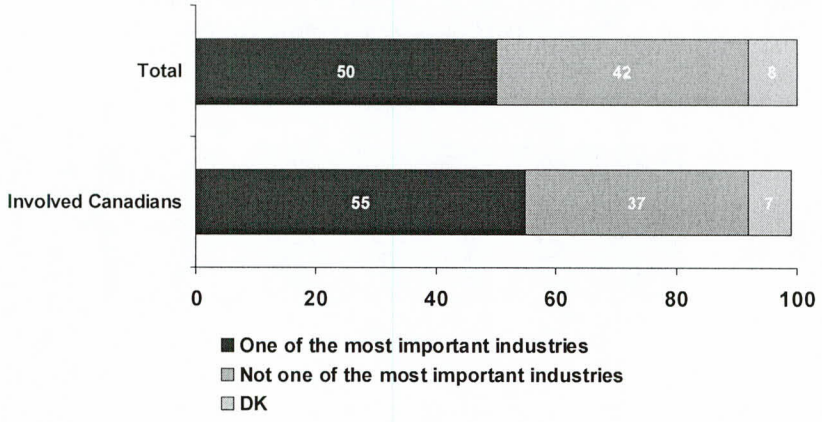
Specific Issues – Biotechnology and the Economy

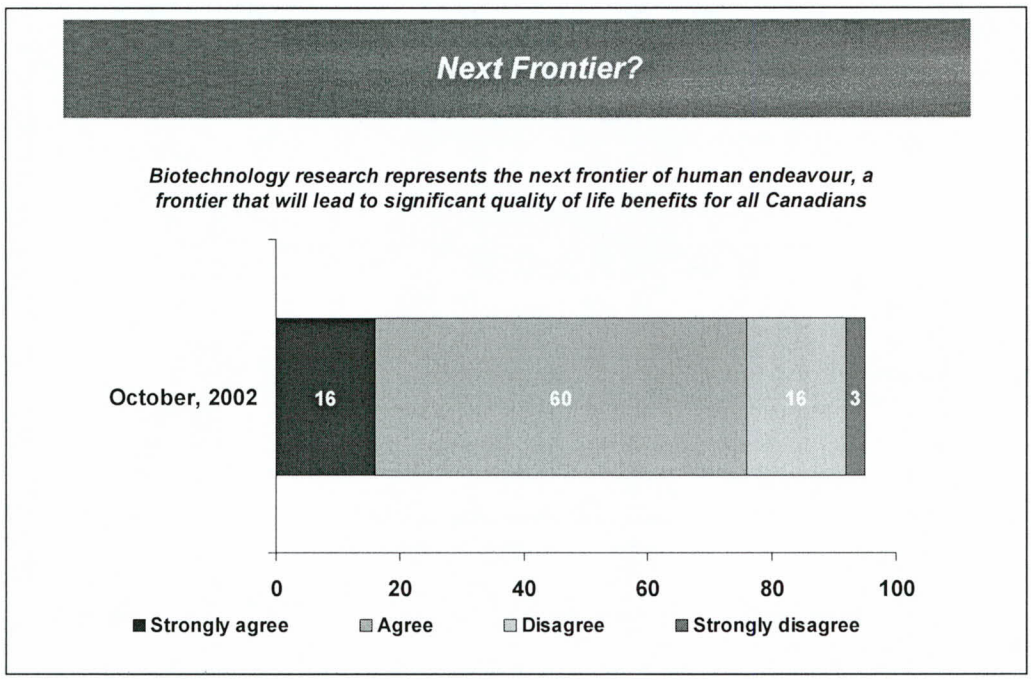
Wave seven asked a series of questions relating to biotechnology and the economy, including the role of government in supporting the biotechnology industry. Previous waves of research have established that Canadians view the economic benefits to be derived from biotechnology as secondary to health, medical and environmental benefits. Nevertheless they are seen to be growing in importance, especially in the context of growing public knowledge of Canadian capacity in this area.

Most people readily agree that biotechnology is a leading edge technology that will be critical to the future success of the Canadian economy. That is even more pronounced among Involved Canadians. Canadians tend to see it as a source of discovery, innovation, jobs and economic growth.

Importance to Future Economy

Which of the following two statements most closely reflects your view: Biotechnology will be one of the most important sources of jobs and economic growth in the 21st century OR Biotechnology might be seen as important now, but probably won't be one of the most important sources of jobs and economic growth in the 21st century

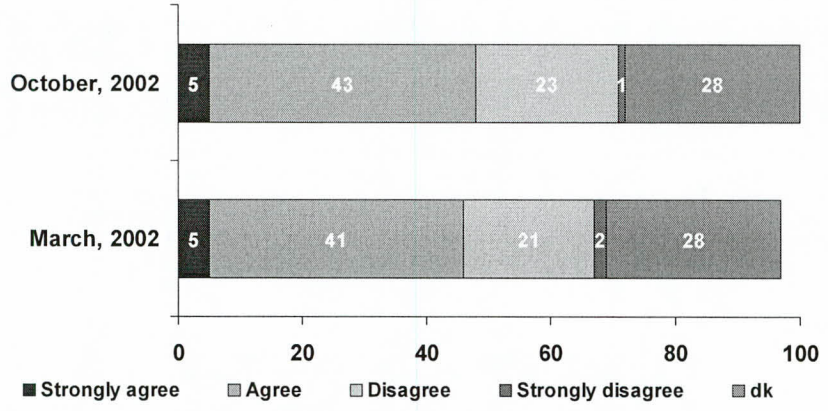




Most Canadians don't know or don't believe that Canada is among the world's biotechnology leaders though they want it to be so – eight in ten agree that is a goal they would support. By a two to one margin Canadians say they want Canadian leadership because they want to realize the promise of health and economic benefits. Focus group discussion shows that people are quite surprised to hear about Canada's relative standing, including be home to the second largest number of biotechnology companies in the world – they tend to presume that the U.S. and some European countries would be further ahead. That is largely based on the fact that few had heard much about a Canadian biotechnology industry or its achievements.

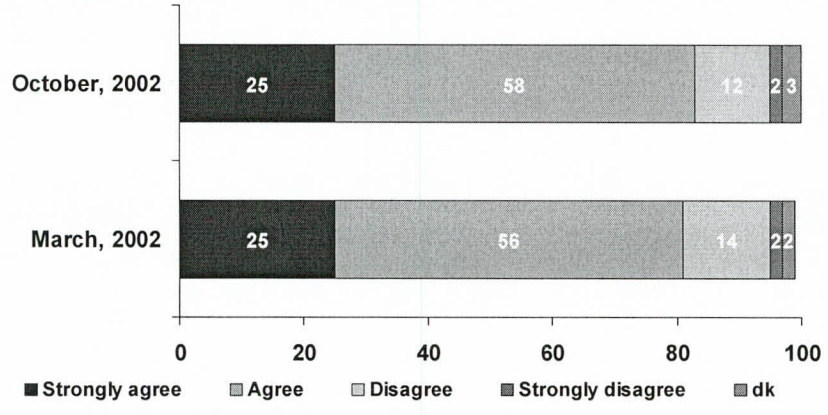
World Leader?

Canada is among the world leaders in biotechnology research

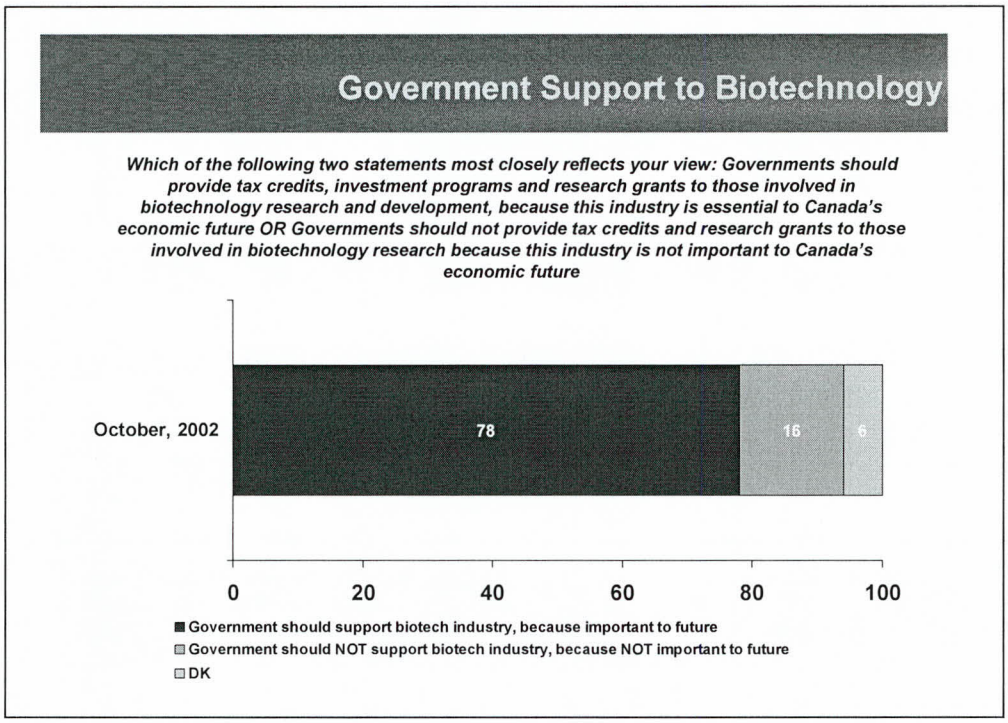


Should be World Leader?

Canada SHOULD BE among the world's leaders in the field of biotechnology research



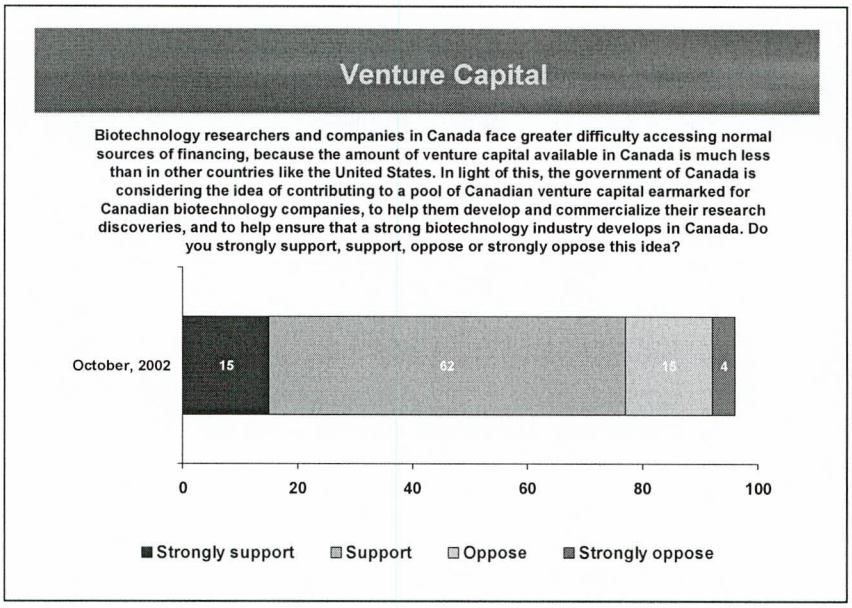
Previous research has shown that most believe the government has a role to play in fostering the biotechnology industry. Although they believe that the private sector will drive investment and growth, most people believe government involvement and support can shorten the time required for the industry to reach critical mass and success, bringing more products to Canadians and creating more economic benefits.



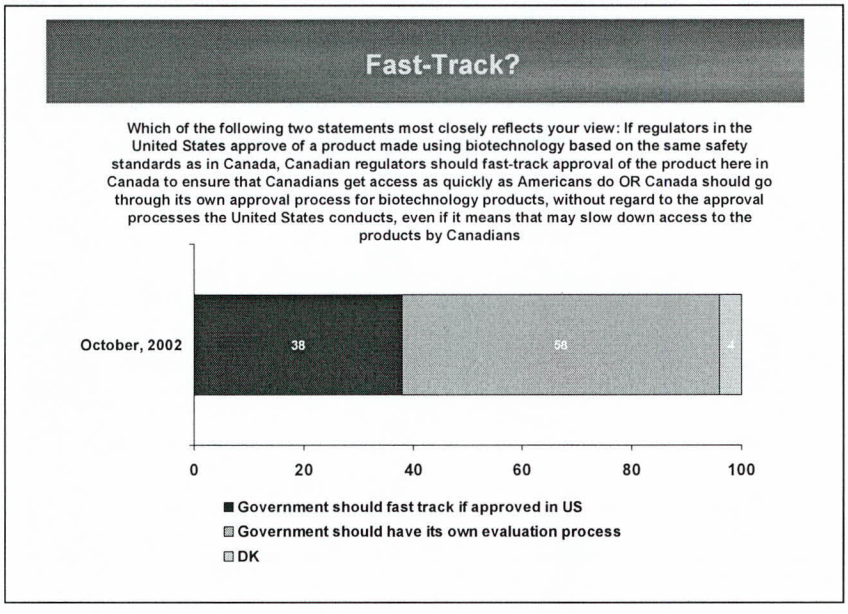
Two quite specific measures that could be undertaken by government to foster the development of the Canadian biotechnology industry were tested in this wave research. Opinions diverged significantly on the two ideas, one was widely supported and the other widely opposed.

The measure that was widely supported in the survey and in the focus groups was the idea of government contributing to a pool of Canadian private sector venture capital that would be earmarked for biotechnology R&D. In all, more than three in four respondents supported this measure, while fewer than one in five opposed it.

The focus groups explained why this idea was so widely supported. It appears to provide a remedy to what many believe is a frequent problem for Canadian companies and researchers – access to capital. There is a widely shared belief that being a small country beside such a large and rich country as the United States, Canada has difficulty getting the resources needed to make our businesses work, particularly in the area of biotechnology where there are many start-ups.



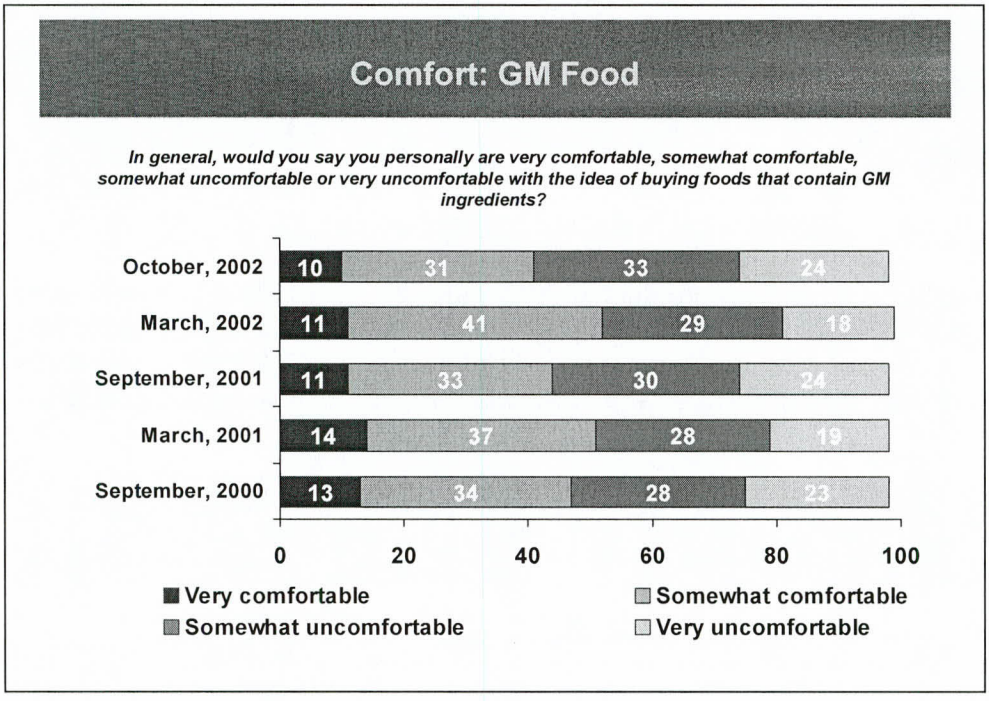
The measure that was widely opposed in the survey and in the focus groups was the idea of fast-tracking the approval of products produced using biotechnological methods. People already harbour concerns about the stringency of government product approval processes, both because they perceive there to be a lack of available resources for government scientists and because they perceive that industry "lobbying" influences the process. The idea of speeding up the approval process is a measure that many are reluctant to accept. In fact, many equate slower approval with more thorough evaluation for safety.



Specific Issues – GM Food and Food Labeling

GM Food

This research wave tracked several questions involved genetically modified food and food labeling. The results indicate that Canadians may be becoming more uncomfortable with GM foods. More than half said they were uncomfortable with the idea of buying GM food, with one in four saying that they are very uncomfortable.



Focus group discussion consistently reveals that people increasingly know that they are eating GM food but in spite of higher levels of awareness, they see few benefits. Indeed, most believe that GM foods are of lower quality than other foods.

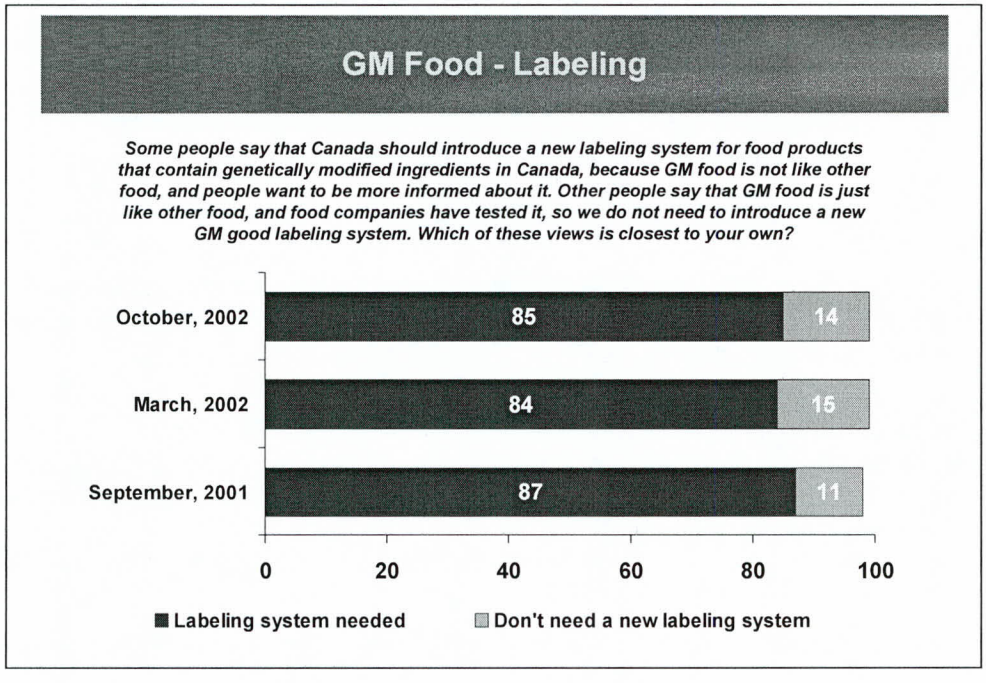
There appear to be other issues at work as well. Wider concerns about food ingredients were prevalent in focus groups. Discussions indicate that many people are quite concerned about chemical additives, pesticides and other potential dangers in the food they eat, aside from GM ingredients.

Labeling

Wave seven probed the question of GM food labeling as well.

In the groups, a sizeable number of people indicated that they currently read food labels, though they do so primarily for nutritional content. Most people said they were interested in things like fat, sugar and carbohydrate levels.

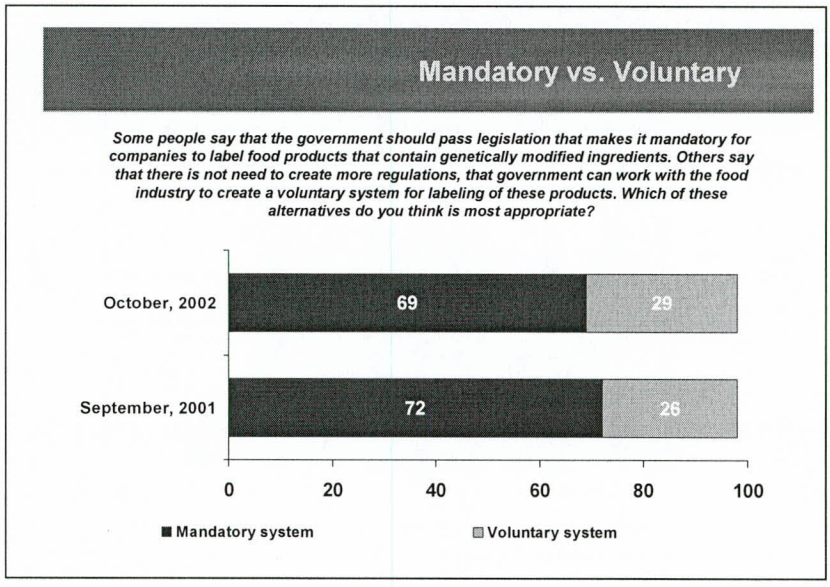
When asked what further information they would like to see on labels, two or three people in each group mentioned GM ingredients. And as soon as discussion was joined, a substantial majority expressed a preference for GM food labeling. In some groups, there was palpable anger at the fact that GM foods have not been labeled.



There were virtually no arguments that move people away from endorsing GM labeling. People tended to dismiss arguments about the difficulty and cost of segregating food all along the production chain. Those with lower income did express a fair level of concern about having to pay as much as 10% for their food to pay for labeling but ultimately that moved few people to change their minds.

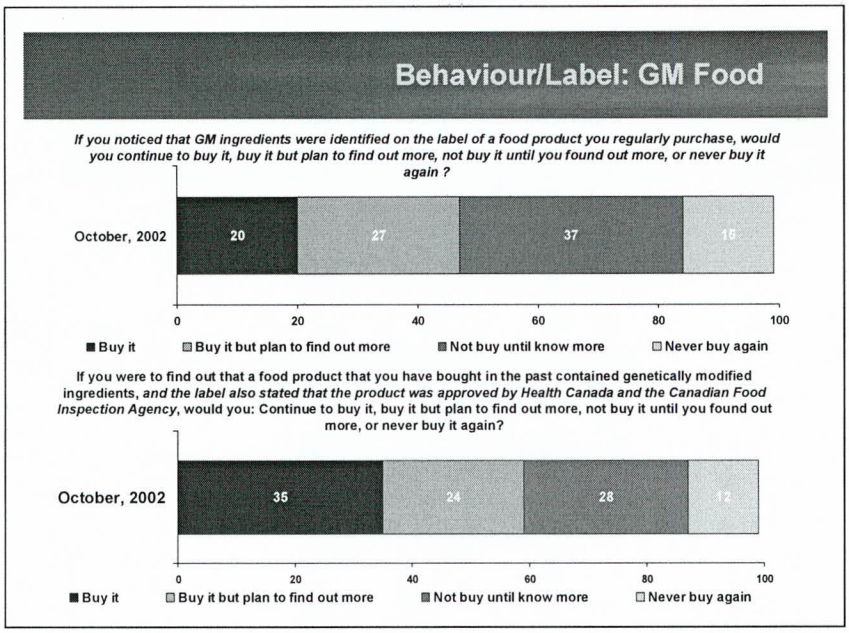
Few people see much point in voluntary systems of labeling rather than mandatory systems. It is the outcome of full compliance that most people want, and they believe

that mandatory labeling is the only way to ensure that this occurs in a timely and thorough fashion.



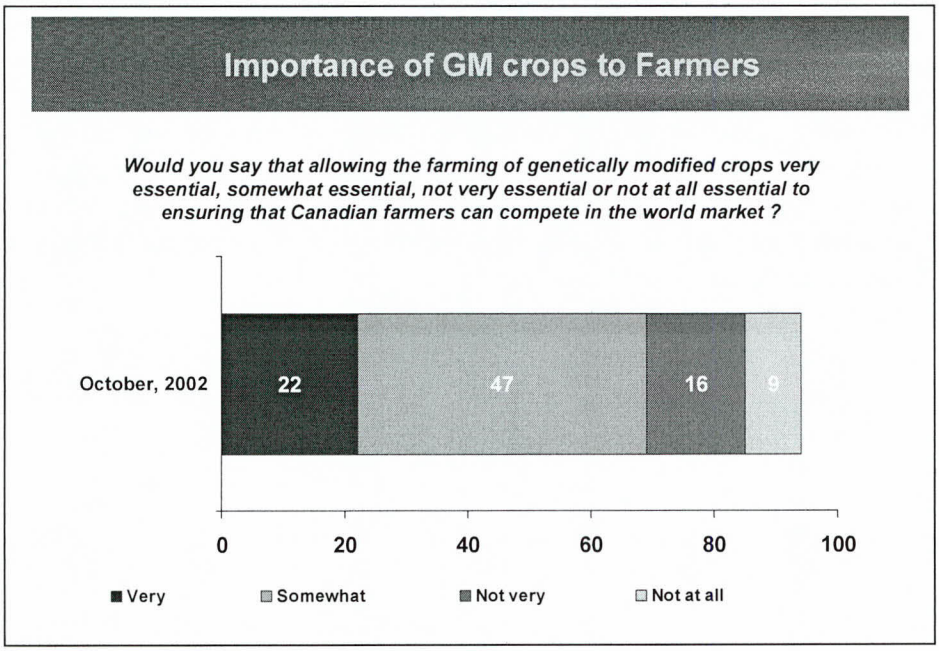
As has been indicated in our previous studies, the underlying issue that emerges in discussion of labeling is less about the long-term risk of GM foods and more about the principle of informed consumer choice. Even those people who are comfortable with GM foods generally believe that everyone has the right to know whether there are GM ingredients in their food. The strong, un-nuanced views that emerged reflect the core strength of the principle of the consumer's right to know and choose.

Finally, reaction was gathered to the idea that GM food products would be given an approval label from Health Canada and the Canadian Food Inspection agency as well as a GM label. A significant number (15%) were more likely to buy the product if such a label were introduced, but almost half of respondents said they would not buy until they knew more about it, or never purchase it again.

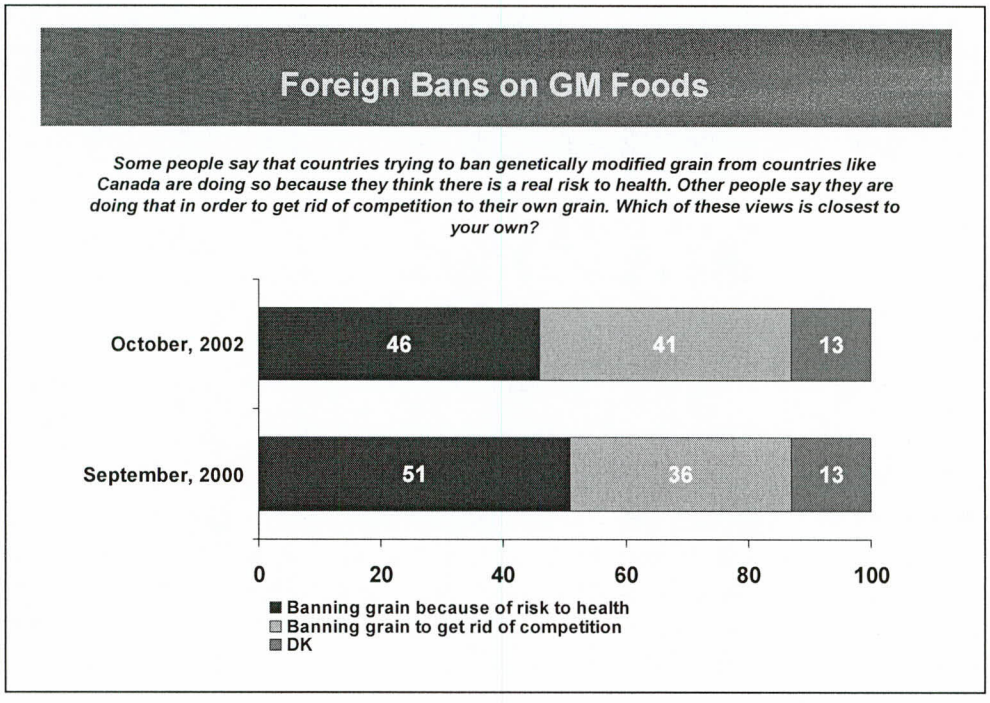


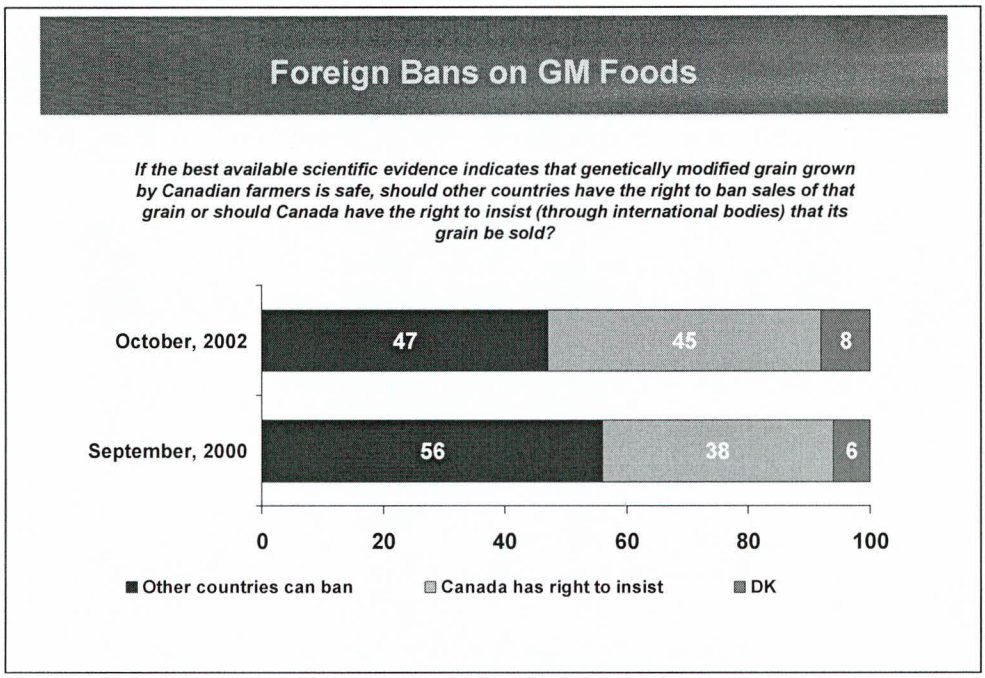
Specific Issues – GM Food And Farmers

However, many Canadians believe that farming of GM food will be essential to the long-term economic health of Canadian farmers.



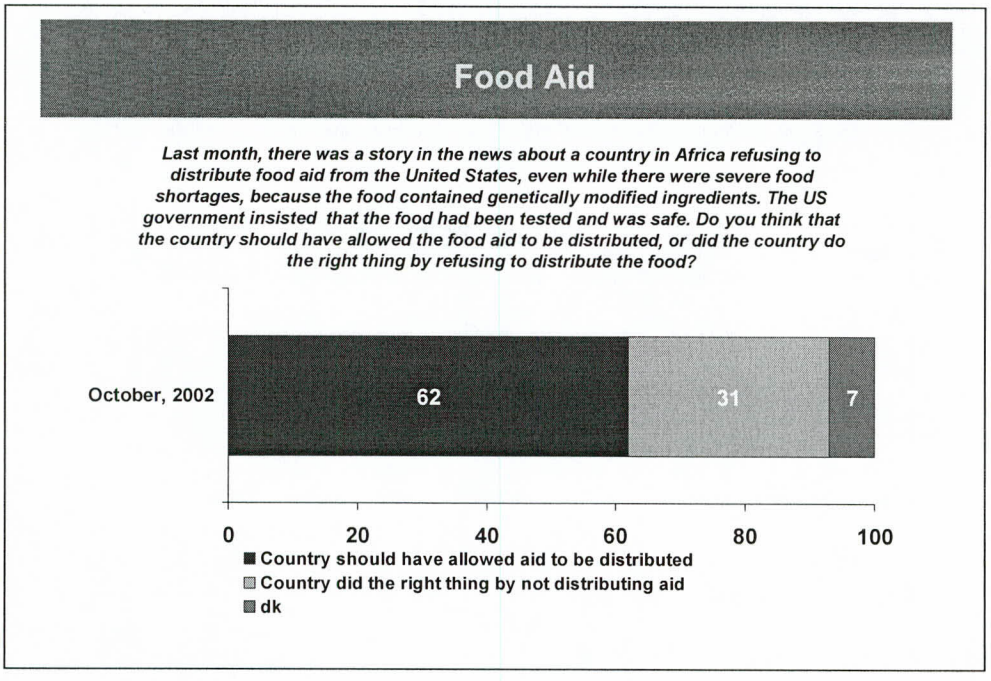
How far does that recognition lead people in terms of their willingness to support the advancement of these foods in Canada and internationally? The discomfort outlined in the section above suggests not very far and their attitude toward the sale of GM foods to other countries suggests the same. A majority believe that countries have a right to impose bans on GM food, and as importantly, they believe that the bans have been introduced because of potential health risks.





However, it is clear that people do see GM food as having potential benefits in future, in both developed and developing countries. In focus groups, most people acknowledge that GM technologies are likely to become more prevalent in future and are accepting of that fact, as long as they are satisfied that enough testing is done of the health and environmental impacts of these foods.

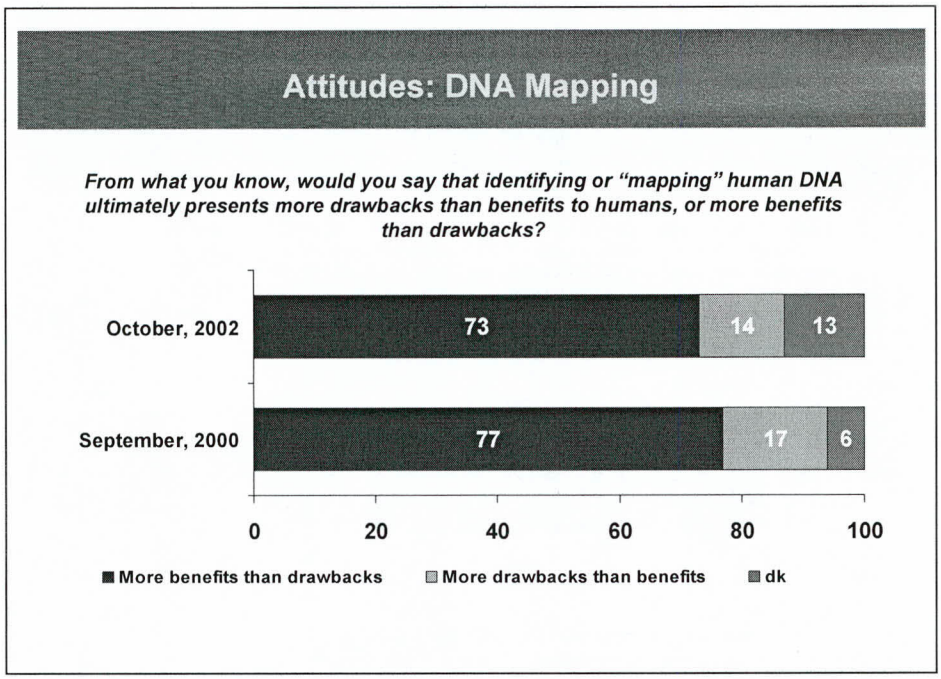
Finally, they believe that there are some circumstances where the benefits are so significant that they outweigh the risks. So when asked whether the country in Africa whose people were starving should have allowed shipments of food aid that included GM food, two thirds said yes.



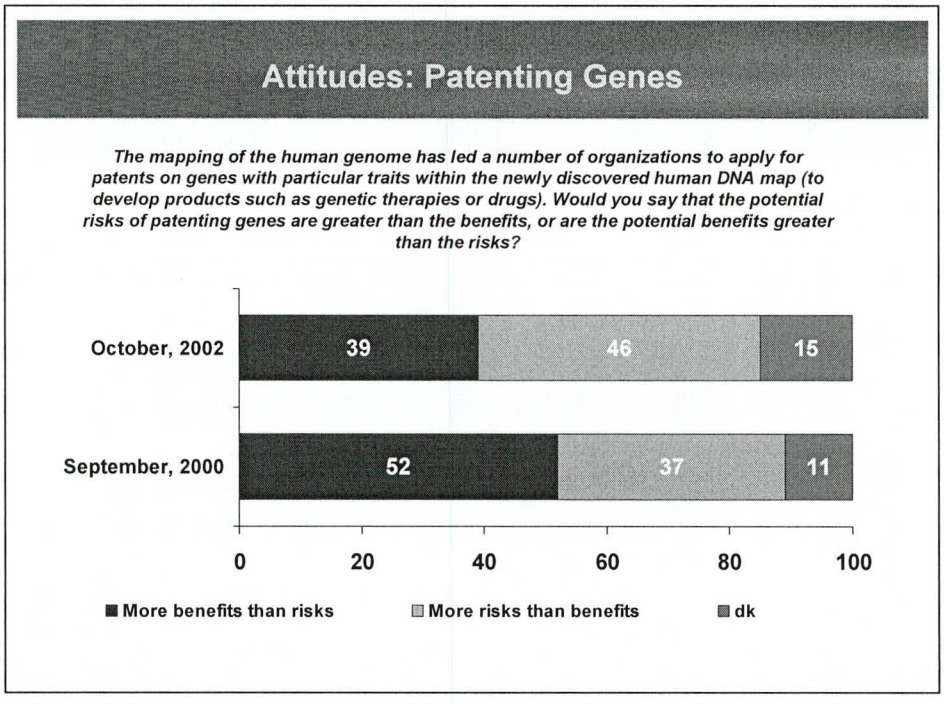
Specific Issues – DNA Mapping and Patenting

In this wave of research, a limited number of questions were tracked with regard to DNA mapping and the patenting of genes as well as higher life forms. These questions were first asked two years ago, in the fall of 2000, in the aftermath of the announcement of the mapping of the human genome.

In terms of mapping human DNA, 72% say that there are more benefits than drawbacks, while 14% say there are more drawbacks than benefits. That adds up to 5:1 in support of this application of biotechnology, consistent with what the data indicated two years ago. Focus group participants concur with this – virtually all believe that the mapping of the human genome will lead to significant medical breakthroughs that will outweigh the potential drawbacks.



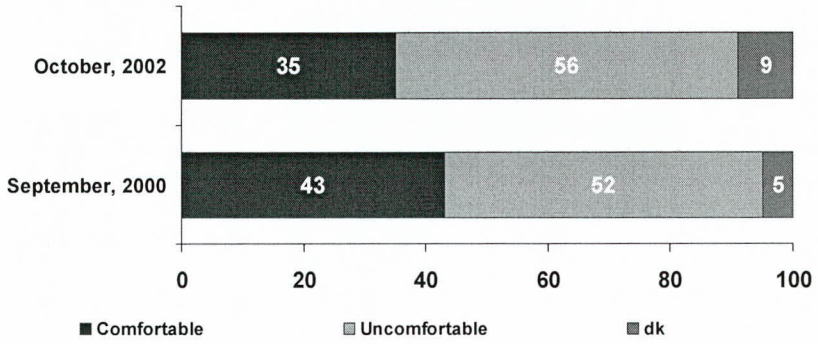
The idea of providing patent protection on genes genetically modified to produce particular traits in order to develop products such as genetic therapies or drugs was met with more resistance in this wave than when it was originally asked in 2000. In this survey, a plurality of the sample, 46%, said there are likely more risks than benefits in allowing such patenting, up from 37% in 2000.



In addition, the idea of offering patent protection in general for biotechnology inventions found significant resistance. Some say that there is something wrong with patenting an animal or plant while a greater number express concern about patenting with regard to access, believing that patents should not be allowed because it might mean that only those who are able to pay high prices for the products will receive them.

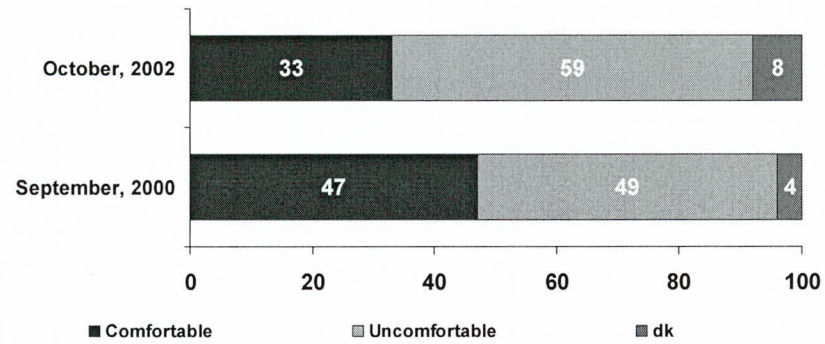
Attitudes: Patent Protection (1)

Some people feel that the idea of patent protection is necessary in the field of biotechnology because we need to encourage inventions in this area for all the benefits they can bring. Others are uncomfortable with the idea of providing patent protection in the area of biotechnology, because there is something wrong with the idea of patenting parts of a life form such as an animal or plant. Which is closest to your view?



Attitudes: Patent Protection (2)

Some people feel that the idea of patent protection is necessary in the field of biotechnology because we need to encourage inventions in this area for all the benefits they can bring. Others are uncomfortable with the idea of providing patent protection in the area of biotechnology, because the benefits of new inventions might only be available to those who can afford to pay more. Which is closest to your view?



In focus groups, discussions yielded more detailed prevailing views on patenting. Most importantly, Canadians are ill informed about the purpose of patenting, and misunderstand some of its most fundamental elements.

- Many people do not understand that patents are only allowable for inventions, not discoveries;
- Many people do not understand that there are time limits on patents;
- Not a single person in any of the groups realized that patenting makes the invention public and therefore promotes more research using that public information – many instinctively believe that patenting inhibits research, because a person or company has a monopoly on it;
- People don't understand the trade-off downsides of not allowing patenting in areas like pharmaceuticals and biotechnology. Many think that as many products and treatments now would be invented and marketed without a patenting system, and many don't realize that the alternative to patenting would be a system of trade secrets, where information about inventions is not made public.

Once people were informed about patenting and the pros and cons of having a patenting system in place, there was about a 65-35 split between support and opposition to patenting in the area of biotechnology.

Specific Issues – Stewardship storyline

The government of Canada stewardship communications document that was tested in the focus groups got a passing grade, although not much more. Most characterized it as an "introduction" and expected that much more information would be made available in addition to the document. Involved Canadians were most critical of the document and most interested in seeing more detailed information about the stewardship regime, particularly the studies that are done on products as part of the approval process.

What people were asking for was the ability to access more detailed information about various issues from the document. For example, they wanted the document to cite web site addresses at the end of different paragraphs.

The best information in the document was the description of the product approval process and the description of the various government departments involved in regulating biotech.

The weakest part was the discussion of government's commitment to long-term research. Several of the more informed respondents in every group suggested that $90 million was "peanuts" compared to how important the issue is.

In addition, the "strategy" that Environment Canada outlined in the document was singled out by a few people as weak. In the words of one respondent, "this information tells me that government must really not be doing much in this area, because they would talk about more than just a strategy if they were doing more". Canadians tend to come at these kinds of materials with a fair amount of skepticism, and react badly to phrases like "developing a strategy" are used to describe the activities pursued.

Overall, there were a lot of questions raised about the credibility of material like this storyline from government – it wasn't so much about the document itself but the latent skepticism that Canadians have toward government that fueled questions. People frequently used lines like "if its true....then it is interesting, but I don't know whether this is true or not".

What this means is that information has to meet a relatively high test of detail and specificity in order to satisfy expectations. This means that documents may have to be made slightly longer, or web-based versions must contain links to more detailed information in order to receive positive reaction from the public.

Appendix A

Biotechnology Wave 7 Survey
Interview Schedule

Biotechnology Wave 7 Survey Interview Schedule

1. Some/other people say that while the country has some problems, Canada is generally headed in the right direction at the current time. Other/some people say that there are more things going badly than well in Canada right now and that the country is headed in the wrong direction. Which of those two statements is closer to your own opinion?

Headed in Right Direction	61
Headed in Wrong Direction	33
Don't Know/Refused	6

2. When you hear the word biotechnology, do you have a positive, neutral, or negative reaction?

Positive Reaction	31
Neutral Reaction	43
Negative Reaction	18
Don't Know/Refused	8

3. Over the last three months, have you heard about any stories or issues involving biotechnology?

Yes	46
No	51
Don't know/Refused	3

4. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with biotechnology?

Very Familiar	8
Somewhat Familiar	51
Not Very Familiar	28
Not At All Familiar	13
Don't know/Refused	0

5. In general, would you say you strongly support, somewhat support, somewhat oppose or strongly oppose the use of products and processes that involve biotechnology?

Strongly support	10
Somewhat Support	51
Somewhat Oppose	20
Strongly Oppose	9
Don't know/Refused	10

6. Over the past year or two, can you recall seeing hearing about any success stories about scientific breakthroughs in the area of biotechnology or genomics in Canada?

Yes	43
No	52
Don't know/Refused	5

7. (IF YES) What do you recall? (OPEN-ENDED) ANY OTHERS.

8. Do you recently recall seeing or hearing anything regarding Canada's international ranking or rating in the area of biotechnology research?

Yes	11
No	87
Don't know/Refused	2

9. What do you recall? (OPEN-ENDED) ANY OTHERS

Please tell me if you strongly agree, agree, disagree or strongly disagree with the use of biotechnology in each of the following ways. (ROTATE)

10. Bioplastics, which involve the use of genetically modified bacteria or plants to produce plastic products that can be used as a substitute for plastics made from non-renewable resources like petroleum

Strongly Agree	19
Agree	54
Disagree	16
Strongly Disagree	5
Don't know/Refused	7

11. Bioremediation, which involves the use of genetically modified bacteria or plants to break down pollutants and toxic wastes

Strongly Agree	22
Agree	59
Disagree	9
Strongly Disagree	4
Don't know/Refused	6

12a&b

12 A) The use of cloned animals as a source of food, such as using cloned cows as a source of beef or milk

Strongly Agree	3
Agree	18
Disagree	37
Strongly Disagree	38
Don't know/Refused	3

12 B) The use of a "gene chip" that would enable scientists to detect products that contain genetically modified ingredients

Strongly Agree	15
Agree	56
Disagree	15
Strongly Disagree	5
Don't know/Refused	8

13a&b)

13 A) Drugs that contain genetically modified material to treat diseases like cancer

Strongly Agree	28
Agree	57
Disagree	7
Strongly Disagree	4
Don't know/Refused	4

13 B) Taking human genes that fight disease and inserting them into plants, to help grow medicines for human consumption

Strongly Agree	15
Agree	52
Disagree	19
Strongly Disagree	8
Don't know/Refused	6

14a&b

14 A) A new type of plastic food wrap that contains antibodies that can automatically detect bacteria or toxins in food.

Strongly Agree	21
Agree	53
Disagree	17
Strongly Disagree	6
Don't know/Refused	3

14 B) Biofuels, such as ethanol, which are products that utilize genetically modified grains, forest products and other agricultural products to generate energy

Strongly Agree	24
Agree	58
Disagree	10
Strongly Disagree	4
Don't know/Refused	4

15 A "reverse engineering" technology that would remove all genetically modified elements from a plant after they had achieved their purpose – in the case of corn, for example, this would mean removal of the genetically modified trait that enabled it to resist a particular pest before the corn was harvested and distributed to consumers.

Strongly Agree	13
Agree	46
Disagree	23
Strongly Disagree	9
Don't know/Refused	8

16 The use of genetically modified bacteria in mouthwash, to eliminate the bacteria that cause tooth decay.

Strongly Agree	13
Agree	51
Disagree	22
Strongly Disagree	9
Don't know/Refused	6

17. The genetic modification of stem cells from bone marrow to develop cells that can treat certain forms of blindness.

Strongly Agree	26
Agree	58
Disagree	7
Strongly Disagree	4
Don't know/Refused	5

(END OF ROTATION)

18. (T) Overall, from what you know, do you think the federal government is doing an excellent, good, fair or poor job of handling its responsibilities in the area of biotechnology?

Excellent	2
Good	21
Fair	42
Poor Job	21
Don't know/Refused	14

19. (T) Would you say you are very familiar, somewhat familiar, not very familiar or not at all familiar with ways in which biotechnology is regulated in Canada?

Very Familiar	2
Somewhat Familiar	21
Not Very Familiar	44
Not At All Familiar	32
Don't know/Refused	1

Please rate the federal government's performance in each of the following areas related to biotechnology. For each, please indicate whether you think the government has done an excellent, good, fair or poor job. (ROTATE)

20. (T) Ensuring that the interests of the average Canadian are taken into account as policies are developed for the use of biotechnology

Excellent	2
Good	19
Fair	34
Poor Job	33
Don't know/Refused	13

21. (T) Ensuring that Canada benefits from the economic opportunities which biotechnology offers

Excellent	2
Good	28
Fair	35
Poor Job	15
Don't know/Refused	20

22. (T) Ensuring that the health of Canadians is protected against risks associated with biotechnology

Excellent	4
Good	22
Fair	35
Poor Job	24
Don't know/Refused	15

23. (T) Ensuring that the environment in Canada is protected against risks associated with biotechnology

Excellent	3
Good	21
Fair	34
Poor Job	27
Don't know/Refused	16

24. (T) Ensuring that Canada benefits from the new products and processes which biotechnology offers

Excellent	1
Good	26
Fair	40
Poor Job	14
Don't know/Refused	19

25. (T) Ensuring that Canadians are informed about the role of government in biotechnology

Excellent	1
Good	10
Fair	32
Poor Job	47
Don't know/Refused	9

26. (T) Making sure that regulations on biotechnology are being enforced

Excellent	2
Good	21
Fair	35
Poor Job	20
Don't know/Refused	22

27. (T) Ensuring that any long-term impacts of biotechnology on the environment are being studied and addressed

Excellent	2
Good	19
Fair	36
Poor Job	27
Don't know/Refused	16

28. (T) Ensuring that any long-term impacts of biotechnology on human health are being studied and addressed.

Excellent	2
Good	23
Fair	33
Poor Job	26
Don't know/Refused	16

29. (T) Helping Canadian biotechnology companies become more innovative and competitive.

Excellent	3
Good	24
Fair	34
Poor Job	14
Don't know/Refused	3

30 (T) Ensuring that biotechnology is being used in ethical ways

Excellent	3
Good	26
Fair	35
Poor Job	20
Don't know/Refused	15

Hab

31 a) Attracting foreign investment to help develop biotechnology research in Canada

Excellent	2
Good	19
Fair	31
Poor Job	14
Don't know/Refused	34

31. b) Attracting foreign investment to help develop biotechnology companies in Canada

Excellent	3
Good	20
Fair	33
Poor Job	18
Don't know/Refused	26

In the future, how much priority do you feel the federal government should attach to each of the following activities? Again, please use a scale of 1-7, where 1 is the lowest priority, and 7 is the highest priority. (ROTATE)

32. (T) Ensuring that the interests of the average Canadian are taken into account as policies are developed for the use of biotechnology

Lowest Priority	4
2	5
3	5
4	13
5	17
6	16
Highest Priority	39
Don't know/Refused	1

33. (T) Ensuring that Canada benefits from the economic opportunities which biotechnology offers

Lowest Priority	6
2	4
3	8
4	12
5	25
6	16
Highest Priority	28
Don't know/Refused	2

34. (T) Ensuring that the health of Canadians is protected against risks associated with biotechnology

Lowest Priority	4
2	3
3	5
4	8
5	9
6	11
Highest Priority	59
Don't know/Refused	1

35. T) Ensuring that the environment in Canada is protected against risks associated with biotechnology.

Lowest Priority	3
2	4
3	5
4	8
5	10
6	14
Highest Priority	53
Don't know/Refused	1

36. (T) Ensuring that Canada benefits from the new products and processes which biotechnology offers

Lowest Priority	4
2	6
3	6
4	11
5	27
6	15
Highest Priority	28
Don't know/Refused	2

37. (T) Ensuring that Canadians are informed about the role of government in biotechnology.

Lowest Priority	5
2	6
3	5
4	9
5	21
6	16
Highest Priority	36
Don't know/Refused	1

38. (T) Making sure that regulations on biotechnology are being enforced.

Lowest Priority	3
2	4
3	5
4	7
5	12
6	17
Highest Priority	50
Don't know/Refused	1

39 (T) Ensuring that any long-term impacts of biotechnology on the environment are being studied and addressed

Lowest Priority	3
2	4
3	6
4	8
5	12
6	16
Highest Priority	51
Don't know/Refused	1

40 (T) Ensuring that any long-term impacts of biotechnology on human health are being studied and addressed

Lowest Priority	3
2	4
3	5
4	7
5	12
6	12
Highest Priority	57
Don't know/Refused	2

41 (T) Helping Canadian biotechnology companies become more innovative and competitive

Lowest Priority	6
2	6
3	8
4	14
5	27
6	16
Highest Priority	21
Don't know/Refused	2

42 (T) Ensuring that biotechnology is being used in ethical ways.

Lowest Priority	3
2	4
3	4
4	9
5	11
6	14
Highest Priority	53
Don't know/Refused	1

43ab

43 A) Attracting foreign investment to help develop biotechnology research in Canada

Lowest Priority	7
2	6
3	7
4	16
5	27
6	15
Highest Priority	17
Don't know/Refused	4

43 B) Attracting foreign investment to help develop biotechnology companies in Canada

Lowest Priority	7
2	7
3	10
4	21
5	27
6	10
Highest Priority	15
Don't know/Refused	4

(END OF ROTATION)

44 (T) In general, would you say that the regulatory system for biotechnology products in Canada is stronger, weaker, or about the same as it is in other countries?

Stronger	24
Weaker	20
About the Same	29
Don't know/Refused	26

45 (T) In terms of managing the issues associated with biotechnology, do you think it is best that Canada work on its own to develop appropriate standards and regulations or do you think it is best that Canada work with other nations to develop international agreements on standards and regulations?

Best That Canada Work on Its Own	18
Best That Canada Work With Other Nations	80
Don't know/Refused	2

Please tell me whether you strongly agree, agree, disagree, or strongly disagree with each of the following statements: (ROTATE)

46 (T) The primary function of the federal government in the field of biotechnology is to understand and manage the risks while working to gain the benefits?

Strongly Agree	23
Agree	64
Disagree	7
Strongly Disagree	1
Don't know/Refused	5

47 (T) Biotechnology research represents the next frontier of human endeavour, a frontier that will lead to significant quality of life benefits for all Canadians

Strongly Agree	16
Agree	60
Disagree	16
Strongly Disagree	3
Don't know/Refused	6

48 (NEW) The government of Canada should be involved in supporting the development of new health, environmental and agricultural biotechnology products, because the products that are develop will provide significant benefits to Canadians

Strongly Agree	26
Agree	59
Disagree	11
Strongly Disagree	3
Don't know/Refused	2

49 (T) Canada is among the world's leaders in biotechnology research

Strongly Agree	5
Agree	43
Disagree	23
Strongly Disagree	1
Don't know/Refused	28

50. (T) Canada should be among the world's leaders in biotechnology research

Strongly Agree	25
Agree	58
Disagree	12
Strongly Disagree	2
Don't know/Refused	3

END OF ROTATION

Slab

51. A) Which of the following two statements most closely reflects your view: Governments should provide tax credits, investment programs and research grants to those involved in biotechnology research and development, because this industry is essential to Canada's economic future OR Governments should not provide tax credits and research grants to those involved in biotechnology research because this industry is not important to Canada's economic future

Governments Should Provide Tax Credits	78
Governments Should Not Provide Tax Credits	16
Don't know/Refused	6

51 B) Which of the following two statements most closely reflects your view: Governments should provide tax credits, investment programs and research grants to those involved in biotechnology research and development, because this industry is essential to Canada's economic future OR Governments should not provide tax credits and research grants to those involved in biotechnology research because it should not subsidize industries, even if they might be very important to Canada's economy

Governments Should Provide Tax Credits	67
Governments Should Not Provide Tax Credits	28
Don't know/Refused	5

52 (NEW) Which of the following two statements most closely reflects your view: If regulators in the United States approve of a product made using biotechnology based on the same safety standards as in Canada, Canadian regulators should fast-track approval of the product here in Canada to ensure that Canadians get access as quickly as Americans do OR Canada should go through its own approval process for biotechnology products, without regard to the approval processes the United States conducts, even if it means that may slow down access to the products by Canadians

Canadian Regulators Should Fast-Track Approval Of Product	38
Canadian Should Go Through Its Own Approval Process for Biotech	58
Don't know/Refused	4

53 (NEW) Which of the following two statements most closely reflects your view: The government of Canada does an effective job of studying and monitoring the impact of biotechnology products OR The government of Canada does not do enough to study and monitor the impact of biotechnology products

The Govt of Canada Does an Effective Job Of Studying	26
The Govt of Canada Does Not Do Enough To Study & Monitor	55
Don't know/Refused	19

54 (NEW) Which of the following two statements most closely reflects your view: Biotechnology will be one of the most important sources of jobs and economic growth in the 21st century OR Biotechnology might be seen as important now, but probably won't be one of the most important sources of jobs and economic growth in the 21st century

Biotech Will Be One of The Most Important Sources of Jobs	50
Biotech Might Be Seen as Important Now, But Probably Won't	42
Don't know/Refused	8

55 (NEW) Knowing that there are many things that government could dedicate resources to, do you think that the government of Canada should spend much less, less, the same amount, more, or much more on biotechnology research in future?

Much Less	4
Same Amount	8
More	31
Much More	38
Don't know/Refused	9

56 (NEW) Biotechnology researchers and companies in Canada face greater difficulty accessing normal sources of financing, because the amount of venture capital available in Canada is much less than in other countries like the United States. In light of this, the government of Canada is considering the idea of contributing to a pool of Canadian venture capital earmarked for Canadian biotechnology companies, to help them develop and commercialize their research discoveries, and to help ensure that a strong biotechnology industry develops in Canada. Do you strongly support, support, oppose or strongly oppose this idea?

Strongly Support	15
Oppose	62
Strongly Oppose	15
Don't know/Refused	4

END OF ROTATION

57 (T) Have you heard of an international study called the Human Genome Project, which involves the mapping of human DNA?

Yes	70
No	28
Don't know/Refused	2

58 (T) From what you know, would you say that identifying or "mapping" human DNA ultimately provides more benefits than drawbacks, or more drawbacks than benefits to humans?

More Benefits Than Drawbacks	73
More Drawbacks Than Benefits	14
Don't know/Refused	13

59 (T) The mapping of the human genome has led a number of organizations to apply for patents on genes with particular traits within the human DNA map (in order to develop things like genetic therapies or drugs). Would you say that the potential risks of patenting human genes are greater than the benefits, or are the benefits greater than the risks?

Risk Of Patenting Human Genes Are Greater Than Benefits	46
Benefits Greater Than Risks	39
Don't know/Refused	15

60a Most new inventions are protected by what are called patents. Patents ensure that inventors are rewarded by making sure that their inventions cannot be copied for a period of time. However, it also means that until the patent expires, the inventor controls the availability and price of the invention.

60ab

60b Some people feel that the idea of patent protection is necessary in the field of biotechnology because we need to encourage inventions in this area for all the benefits they can bring. Others are uncomfortable with the idea of providing patent protection in the area of biotechnology, because there is something wrong with the idea of patenting parts of a life form such as an animal or plant. Which is closest to your view?

Some People Feel That Idea of Patent Protection is Necessary	35
Others Are Uncomfortable With The Idea of Patent Protection	56
Don't know/Refused	9

61 Some people feel that the idea of patent protection is necessary in the field of biotechnology because we need to encourage inventions in this area for all the benefits they can bring. Others are uncomfortable with the idea of providing patent protection in the area of biotechnology, because the benefits of new inventions might only be available to those who can afford to pay more. Which is closest to your view?

Some People Feel That Idea of Patent Protection is Necessary	33
Others Are Uncomfortable With The Idea of Patent Protection	59
Don't know/Refused	8

62 (T) In general, would you say you personally are very comfortable, somewhat comfortable, somewhat uncomfortable, or very uncomfortable with the idea of buying foods that contain genetically modified ingredients?

Very Comfortable	10
Somewhat Comfortable	31
Somewhat Uncomfortable	33
Very Uncomfortable	24
Don't know/Refused	2

63ab

63. A) If you noticed that GM ingredients were identified on the label of a food product you regularly purchase, would you continue to buy it, buy it but plan to find out more, not buy it until you found out more, or never buy it again?

Continue To Buy It	20
Buy It But Plan To Find Out More	27
Not Buy It Until You Found Out More	37
Never Buy It Again	15
Don't know/Refused	1

63. B) If you noticed that GM ingredients were identified on the label of a food product you regularly purchase and the label also stated that the product was approved by Health Canada and the Canadian Food Inspection Agency, would you continue to buy it, buy it but plan to find out more, not buy it until you found out more, or never buy it again?

Continue To Buy It	35
Buy It But Plan To Find Out More	24
Not Buy It Until You Found Out More	28
Never Buy It Again	12
Don't know/Refused	1

64. (T) Some people say that Canada should introduce a new labeling system for food products that contain genetically modified ingredients in Canada, because gm food is not like other food, and people want to be more informed about it. Other people say that GM food is just like other food, and food companies have tested it, so we do not need to introduce a new GM food labeling system. Which of these views is closest to your own?

Canada Should Introduce New Labeling System	85
No Need To Introduce New Labeling System	14
Don't know/Refused	1

65. (T) It has been suggested that the introduction of a labeling system for GM food would increase the overall cost of food, primarily because GM and non-GM food would have to be segregated at the farm and in processing. It has been estimated that food would likely end up costing about 10% more.

Worth Paying 10% More	58
Not Worth Paying 10% More	36
Don't know/Refused	5

66. (T) Some people say that the government should pass legislation that makes it mandatory for companies to label food products that contain genetically modified ingredients. Others say that there is no need to create more regulations that government can work with the food industry to create a voluntary system for labeling of these products. Which of these alternatives do you think is most appropriate?

Govt Should Pass Legislation That Makes It Mandatory	69
There Is No Need To Create More Regulations	29
Don't know/Refused	3

67. (NEW) Would you say that allowing the farming of genetically modified crops very essential, somewhat essential, not very essential or not at all essential to ensuring that Canadian farmers can compete in the world market?

Very Essential	22
Somewhat Essential	47
Not Very Essential	16
Not At All Essential	9
Don't know/Refused	5

68. (T) If the best available scientific evidence indicates that genetically modified grain grown by Canadian farmers is safe, should other countries have the right to ban sales of that grain or should Canada have the right to insist (through international bodies) that its grain be sold?

Other Countries Have Right To Ban Sales Of That Grain	47
Canada Have The Right To Insist That Its Grain Be Sold	45
Don't know/Refused	8

69. (T) Some people say that countries trying to ban genetically modified grain from countries like Canada are doing so because they think there is a real risk to health. Other people say that they are doing that in order to get rid of competition to their own grain. Which of those two views is closest to your own?

Some People Say They Countries Trying To Ban GM Grain	41
Other People Say They Are Doing That In Order To Get Rid	46
Don't know/Refused	13

70. (NEW) Last month, there was a story in the news about a country in Africa refusing to distribute food aid from the United States, even while there were severe food shortages, because the food contained genetically modified ingredients. The US government insisted that the food had been tested and was safe. Do you think that the country should have allowed the food aid to be distributed, or did the country do the right thing by refusing to distribute the food?

Country Should Have Allowed Food Aid To Be Distributed	62
Country Did The Right Thing By Refusing To Distribute	31
Don't know/Refused	7

Appendix B

Biotechnology Wave 7 Focus Groups
Moderator's Guide

Biotechnology Wave 7 Focus Groups
Moderator's Guide Draft 2

Introduction and Warm-up (5 min)

- The moderator will take a few minutes to go around the table and ask respondents to introduce themselves, and outline a few ground rules: want to ensure that people share their views openly, let everyone participate, want people to talk about their views, not "other people's views", ensure that we don't want people to "debate" each other – everyone's views are valid, there are no right or wrong answers
    - The moderator will also point out that there is a one-way mirror, observers in the back, and audio and video taping, but ensure that all discussion is confidential

General Impressions (15 min)

1ab
- I'm going to say a word to you, and after I say it, I want you to write down the first thoughts that come to mind right away, and whether the word/phrase has a negative connotation, a positive connotation or no connotation.
    - 1a Biotechnology
    - 1b Genomics

2a *Definition: Biotechnology is an umbrella term covering a broad spectrum of scientific applications used in many sectors, such as health, natural resources, and agriculture. It involves the use of living organisms, or parts of living organisms, to provide new methods of production and make new products. Biotechnology is sometimes referred to as life sciences, genetic modification, genomics or proteomics. It includes numerous applications, everything from cross-breeding plants to genetic testing to screen for inherited diseases.*

2ab

Applications (20 min)

2b
- Biotechnology has applications in a number of fields. Can you recall any that you have heard of?

3a
3ab
- How familiar are you with this subject? Is this the first time you have discussed it, or have you talked about it before? 3b

stem We would like to hear your response to various applications of biotechnology. For each of the following, *please tell me if you feel that this type of application is acceptable, or not acceptable to you*. For Each:

- What are some of the risks associated with these products? (b) Who takes those risks? (c)

(a)

- What are some of the benefits? Who benefits?
- Why do you say that?

(DISCUSS 3-4, ROTATED FOR EACH GROUP)

- Bioplastics, which involve the use of genetically modified bacteria or plants to produce plastic products that can be used as a substitute for plastics made from non-renewable resources like petroleum.
- The use of cloned animals as a source of food, such as using cloned cows as a source of beef.
- A genetically modified animal that produces a human protein to be used for medical purposes. For instance, tPA which assists in the dissolution of blood clots.
- Biofuels, such as ethanol, which are products that utilize genetically modified grains, forest products and other agricultural products to generate energy
- A "reverse engineering" technology that would remove all genetically modified elements from a plant after they had achieved their purpose – in the case of corn, for example, this would mean removal of the genetically modified trait that enabled it to resist a particular pest before the corn was harvested and distributed to consumers.
- The use of genetically modified bacteria in mouthwash, to eliminate the bacteria that cause tooth decay.
- The genetic modification of stem cells from bone marrow to develop cells that can treat certain forms of blindness

Perceptions - Roles and Responsibilities of The Federal Government (20 min)

- From what you know, what are the responsibilities of the federal government in the area of biotechnology? (PROBE STEWARDSHIP/SCIENCE/SUPPORT TO INDUSTRY) NOTE: DEFINE STEWARDSHIP AS REGULATIONS AND RESEARCH TO ENSURE SAFETY OF PRODUCTS
- How do these biotechnology products (examples: food/health/environment) become available in Canada? Do you know if we have laws or rules that govern products made through biotechnology?
- What would you say are the priorities the federal government should pursue in this area going forward? (handout, ask participants to rank priorities). Discuss top 2 and bottom 2 priorities for each person, why those were chosen.

Stewardship Narrative (30 min)

I am going to provide you with a handout that describes some of the major elements of Canada's regulatory (or stewardship) system for biotechnology. What

I would like you to do is read it, and provide feedback about its contents (HAND OUT THE THREE PAGER) See Biotech Story Line

Please circle or underline the parts or sections that strike you as interesting or important.

Questions:

14 1. When you read it, does it make sense to you?
15 2. What are the one or two main messages that it delivers?
16 3. Is it credible (or believable) to you, or not?
17 4. Does it provide you with information or a message that you have/have not heard about this subject?

18 Overall, does it suggest that the government of Canada is paying necessary attention to the management or stewardship of these technologies, or not?

19ab If no, why not? 19a What would you want the government to be doing more on? 19b

Innovation/R&D/Biotech as leading edge industry (30 min)

20a→c When you think about the future world economy, and what sectors are going to be leaders, which ones come to mind? 20a What about the Canadian economy? 20b Will it be same/different? 20c

21ab Where do you think biotechnology will be? 21a Is it a leading-edge technology? 21b

22a→d How extensive is the Canadian biotech industry? 22a Are we world leaders in this area? 22b Where do you think Canada ranks compared to other industrialized countries? 22c What countries are world leaders in this area? 22d

23a b Have you heard of any Canadian research breakthroughs in biotechnology? 23a What about Canadian scientists who are world leaders in this field, or companies that have become international successes in this area? 23b

24a ~~24~~ Should we in Canada try to be world leaders in this area? 24a Do we have the capacity 24b (skills, knowledge, infrastructure) to do it? If no, what do we need to work on? 24c

25a→d What is the best reason why Canada should be a leader in this area? 25a Probe specifically:

- 25b To secure the health and other benefits of these technologies for Canadians
- 25c To provide economic benefits to the economy
- 25d To provide high technology, well paying jobs for Canadians

26ab What role can government play in helping 26a to ensure that biotechnology is a leading industry in Canada's future? What are some of the arguments for and against government playing this kind of role? 26b

Appendix C

Biotechnology Stewardship Story Line

27a-e I'm going to give you a series of things government could do to help develop research and development in biotechnology in Canada, to produce the type of "critical mass" in the size of the industry that is essential to developing a long-term future in this area. For each, I would like to get a reaction:

- 27a Venture capital support – providing incentives to people who invest money to support companies that are just starting out and are at high risk of not succeeding in turning ideas and inventions into profitable products or services.
- 27b Research & Development tax credits – providing increased tax deductions to people who carry out research and development
- 27c Speed up the regulatory process for drug approvals to ensure that Canadians have faster access to the safe drugs they need, creating a better climate for research in pharmaceuticals.
- 27d Adapt intellectual property policies to enable Canada to be a world leader on emerging issues, such as new life forms. Patent term extensions. This would create additional incentives to researchers because they would benefit longer from holding patents. Right now the law guarantees exclusive ownership for 20 years from filing but people lose the first 7 years of development because of the research and approval process, so it is really about 13 years (companies invest roughly 800 million to develop a drug)
- 27e Increased support for research in Canada to sustain and strengthen Canadian research discoveries. Research grants – providing more direct support to researchers themselves

GOVERNMENT OF CANADA STEWARDSHIP OF BIOTECHNOLOGY

Canada recognizes that biotechnology will have an impact on this century as dramatic and far reaching as that of computers and telecommunications on the last.

- New research techniques and technologies in the area of genetics are increasing the frontiers of our knowledge almost exponentially.

- New discoveries, cures and breakthroughs are emerging at an unprecedented historical pace, holding the promise of breathtaking advancements in fields as diverse as health care, agriculture, energy, sustainable development of natural resources, protection of our environment and many others.

As the home to the second largest number of biotechnology companies in the world, Canada is well positioned to reap these benefits in future.

Canada understands that the pace of change in this field demands an increased responsibility on the part of government to ensure that the technologies are used wisely and safely – to strike an appropriate balance between the detection and management of risk and the development of new discovery.

New areas of exploration in biotechnology, such as genetically modified organisms (GMOs), genomics, and stem cell research demand a considered and scientifically rigorous framework for approval and long term research into the impacts of these technologies.

The cornerstone of Canada's stewardship model is a safety and regulatory infrastructure that places a premium on the health of Canadians and our environment, now and into the future.

Two key regulatory agencies deal with the safety of biotechnology products and applications:

The Health Protection and Food Branch, Health Canada. This agency is responsible for, among other things, maintaining the safety and efficacy of drugs, food, natural health products, medical devices, biologics and related biotechnology products in the Canadian marketplace and health system

The Canadian Food Inspection Agency. This arm's length agency is responsible for the enforcement of food safety and nutritional quality standards as established by health Canada through independent inspection and means.

Environment Canada. Environment Canada is responsible for maintaining enforcement of environmental standards under the Canadian Environmental Protection Act.

All products developed through biotechnology must be rigorously studied and approved by these regulatory agencies before they can be made available to the Canadian public:

- In order for a genetically modified food product or health product (like a new drug) to be approved in Canada, first the federal government, through Health Canada, sets safety standards that the product must meet. Scientific research is conducted on the product for 5-10 years, in labs, as well as in field tests, by scientists who work for biotechnology companies. The companies then submit their research findings to a team of government scientists at the Canadian Food Inspection Agency, along with Health Canada in the case of food and Health Canada alone in the case of drugs. This team evaluates the research to determine whether the research methodology was sound and whether the results meet the government safety standards. If it meets those standards, then the product is allowed to be made available in Canada.

Canada is also acting to develop innovative approaches to some of the most challenging issues and debates that biotechnology has raised. In this respect, the government has placed particular emphasis on planning now for issues that may lie ahead, with a new initiative to study the long-term impacts of these products on health and the environment. This kind of long-term research involves leading edge scientists and researchers. The government of Canada has earmarked $90 million to facilitate such long-term research and policy development. The two most significant initiatives being undertaken are:

- Health Canada is conducting research, in conjunction with international experts, to develop better regulatory policies for determining the long-term safety of genetically modified foods and monitoring for unexpected adverse or beneficial effects.

- Environment Canada is developing a strategy to monitor and study the long-term ecosystem effects of GMOs. This strategy is being developed in consultation with other government agencies and departments that have responsibilities in this area, including the Departments fisheries and oceans, industry, and agriculture.

Canada's biotechnology stewardship includes a number of new initiatives to ensure better coordination of information, resources and policy direction. These are designed to reinforce public trust by increasing transparency and accountability of decisions made.

To ensure expert scientific insight on both existing practices and on looming challenges related to biotechnology, the federal government has established a number of mechanisms for ongoing outreach and consultation. In addition to scientific information generated internally through a number of departments and agencies, the government has relied on:

- The Canadian Biotechnology advisory council (CBAC). CBAC is an independent expert committee of leading scientists, academics, ethicists, environmentalists, members of the public and industry, which has been charged with the task of consulting with Canadians and advising the government on how to reap the benefits of biotechnology while managing the risks that it presents.

- The Council of Science and Technology Advisors (CSTA). CSTA was established in 2000 to develop the principles and guidelines for the effective use of science and technology advice in a wide variety of disciplines including biotechnology.

Canada also works through its membership and participation in numerous international settings to influence stewardship regimes internationally. These include:

- The Cartagena Protocol on Biosafety – which established a "precautionary" approach to regulation in the developing world.

- The CODEX Alimentarius Commission – which has helped develop an international standard for food safety.

- The Global Environment Facility – which helps fund regulatory systems for countries around the world.

The bottom line is that Canada is trying to create an environment where the medical, scientific benefits of biotechnology can be achieves at the same time the safety, health and well being of the public is given maximum protection.