W5
2011201
B2
15
lfg

PUBLIC OPINION RESEARCH INTO BIOTECHNOLOGY ISSUES

FIFTH WAVE

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

December 2001

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

The opinions and statements in this publication do not necessarily reflect the policy of the Government of Canada.

Table of Contents

Introduction 4

Executive Summary 5

Quantitative Findings 11

- Awareness and Familiarity 11
- Top-of-Mind Impressions 14
- Biotechnology Applications 15
- Evaluating Risk 19
- Government Performance 27
- Government Priorities 28
- The Regulatory System 29
- The Precautionary Principle 37
- Specific Issues – GM Food 38
- Specific Issues – Labeling 38
- Specific Issues – Genetic Modified Crops 44
- Specific Issues – Stem Cell Research 46
- Specific Issues – Information Seeking 49

Qualitative Findings 51

- Awareness and Familiarity 51
- Support/Opposition 52
- Applications 53
- Risk 55
- Stem Cell Research 56
- Government Roles and Responsibilities 57
- GM Food Labeling 58

Appendix A – Interview Schedule 59

Appendix B – Moderator's Guide 86

Introduction

Earnscliffe Research and Communications is pleased to present this report on a public opinion research program conducted in the fall of 2001 for the Assistant Deputy Minister Coordinating Committee (BACC). This was the fifth wave of a series begun in the fall of 1999. This wave was comprised of two separate instruments:

- a telephone survey of 1200 Canadians;
- five sets of focus groups (a total of 10 groups) to support the survey.

The research was designed to accomplish two major objectives:

- to track sentiment on a range of biotechnology issues, using a baseline of data developed in previous waves of research; and
- to assess opinion more comprehensively in two discrete areas, stem cell research and GM food labeling.

The research probed a number of areas of investigation in order to develop a comprehensive analysis of current opinion on biotechnology. The areas included:

- overall awareness and familiarity;
- perceived risks, benefits and drawbacks;
- attitudes towards a variety of biotechnology applications;
- assessments of government performance in biotechnology, and preferred roles and priorities for government; and
- information-seeking behaviour.

The telephone work began on September 26, 2001, and ended on October 4, 2001. The survey reports on the views of a random sample of 1200 Canadians and carries a margin of error for the national sample of +/- 3.1%, nineteen times out of twenty.

Five nights of focus groups (10 groups in all) were conducted in Halifax, Montreal, Toronto, Saskatoon and Vancouver between October 22, 2001 and October 30, 2001.

The focus groups followed a set agenda for discussion and probed in more detail the opinion underlying the results of the telephone survey. Each night comprised a group of approximately 10 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.

Further information can be obtained from Earnscliffe Research and Communications. Please contact either of the following at our offices, (613) 233-8080, or via e-mail:

Elly Alboim (elly@earnscliffe.ca)
Jeff Walker (jwalker@earnscliffe.ca)

Executive Summary

Trend Lines

The overall results were highly consistent with those of previous waves, indicating a continuing positive predisposition to biotechnology. There were no significant new trend lines that emerged in this inquiry but there was further evolution in tendencies that have emerged over time.

Opinion towards biotechnology – its processes, products and applications -- continues to become more considered and nuanced even though detailed understanding and engagement remain very low. More Canadians are gravitating towards the middle of the opinion spectrum on a variety of issues, reflecting the degree to which they carry mixed views about some of those issues and their determination to evaluate all they hear on a case-by-case basis. Generally, that movement towards the middle comes from those who have been strongly supportive of the technology. Nevertheless, there is no significant increase in opposition other than in the area of genetically modified food, where negative opinion has been increasing modestly.

Fear of long-term risk to human health continues to be the main driver of concern about the technology. The test for acceptability of its products and processes continues to be the extent to which there is the fact or promise of a "marginal personal benefit" that accrues to the individual. The larger the benefit (and there is a clearly articulated hierarchy of benefits, beginning with health and medical benefits), the more likely it is to alter the risk/benefit equation towards acceptance.

And although there continues to be virtually no detailed understanding or knowledge of the federal government's regulatory practices and imperatives, there is a sense that the systems are sound and food on the shelves is safe. However, consistent with the more considered views that are emerging, there is a preference that the government increase its emphasis on the stewardship role.

Awareness and Familiarity

There continues to be a curious blend of high awareness of biotechnology mixed with low levels of interest, engagement and knowledge. The results show that a clear majority of Canadians have discussed the issue – even more so among Involved Canadians. Nevertheless, there has been very little change in the number of people who say they are very familiar with biotechnology, probably the best indicator of strong interest and engagement. Generally, people don't see the prospect of any immediate personal interaction with biotechnology and, as a result, don't see the point in expending significant time on finding out more. This is quite clearly not the case among those with a strong vested interest in biotechnology. They tend to be those who have direct experience with serious illness or genetic disorder that might be affected by new

discoveries or those who are implacably hostile to biotechnology, fearing irreversible damage to human health or the environment.

Top-of-Mind Impressions

Most Canadians are positively disposed to biotechnology. As a word, it engenders mostly positive or neutral reactions – a bit of a follow-on halo effect from Canadians' overwhelming presumption that there will be significant positive impacts from the expansion of high technologies. When asked specifically whether they support or oppose products and processes involving biotechnology, the third that expressed a positive top-of-mind reaction grows to almost 60%. There has been a small increase in opposition to biotechnology over the past year with women, older Canadians and people with lower income tending to be more negative than the average. This seems to correlate with somewhat increasing levels of discomfort with and opposition to genetically modified food.

Biotechnology Applications

The survey tested 16 current and prospective biotechnology applications to see whether people agreed with their use. Canadians insist on evaluating biotechnology applications on a case-by-case basis. Each case is approached with a virtually explicit risk/benefit analytical framework. The risk part of the equation is driven by the general presumption that there *is* currently unknowable, long-term potential risk to human health that might well be irreversible. The arbiter yardstick then applied to the equation is the *marginal personal benefit.* 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?" A hierarchy emerges where health and medical applications demonstrate the greatest marginal personal benefit and food applications the least.

There is one further set of variables in decision making -- the tension between purpose and process. The purpose (or outcome/benefit) is the key positive driver. The process is an important negative driver along with risk. The larger the degree of intrusiveness of the procedure and the greater the extent to which it involves crossing boundaries between plants, animals and humans, the more the resistance that has to be overcome by the putative benefit.

Of the new applications tested, the two that garnered the greatest support involved applications to treat Type One diabetes (despite its invasiveness) and genetic detection technologies like plastic food wrap with antibodies to detect bacteria or toxins in food.

The new applications that garnered the greatest opposition involved cloning animals (like cows) as a source of food and the introduction of GM wheat.

Where Canadians seem willing to assume a generalized benefit from biotechnology applications is in their economic impact. True to their predisposition to approve of high

technologies, Canadians assume biotechnology applications in health, environment and agriculture will yield significant benefits to the Canadian economy. It is just that those benefits are not important enough, in some cases, to overcome the risk/benefit test.

Evaluating Risk

Absent discussion of benefits, statements about the risks inherent in biotechnology are quite compelling. There is a baseline attitude among many people that suggests that the long-term risks of biotechnology are unknowable and cannot be disproved or dismissed. Layered on to that attitude is the presumption that negative impacts, should they occur, are probably "irreversible."

By a wide margin, the evidence shows that risks to human health are the primary driver of concern about biotechnology – more so than concerns about the environment, ethics or moral values.

When statements about risk are balanced with benefit statements or with measures to mitigate risk, support returns. The point is that the benefits of many applications are not "top of mind" but, when entered into discussion, are powerful and desirable outcomes that tilt the risk/benefit equation positively. That underlies the general predisposition to allow the development of biotechnology.

When the consistent use of science in regulation and a commitment to engage in ongoing research into long-term risk are articulated policy elements, large majorities move towards supporting biotechnology. Most people accept that life is replete with risk but they want to know that government is trying to mitigate or reduce those risks as society seeks to gain the benefits.

Most people believe that GM products pose less risk than many other things, including nuclear waste and pesticides. Perhaps surprisingly, most rated the risks as lower than many everyday risks like car accidents and crime. Focus group discussion shows that the relatively low ranking of biotechnology risk helps to explain the predisposition to encourage its development and the willingness to trade benefits against risks in many of the suggested applications.

However, the willingness to accept risk reduces somewhat when the benefits are posited as those deriving from GM foods. Focus group discussion establishes that functional foods and nutriceuticals are relatively unknown, that many doubt whether they will ever exist and even if they did, that many do not understand the need to supplement what already is widely available by other means.

Government Priorities

The top priorities Canadians set for the federal government in dealing with biotechnology have remained quite consistent and include protecting human health and

the environment against risk and conducting long-term research into the impacts of the technology. In general, Canadians have begun to place more emphasis on the importance of stewardship than the importance of encouraging or promoting the development of biotechnology. Though they believe in both, strong stewardship values have become *a sine qua non*. That leads people to placing a higher priority than has been the case on enforcing regulations and working with other countries to develop common standards.

As a general proposition, most people believe the federal government must balance its activities. There is still widespread agreement with the framework that describes the government's primary function as understanding and managing the risks of biotechnology while working to gain its benefits.

The Regulatory System

Canadians have a large amount of confidence in the country's regulatory system although they express very little familiarity with it. Focus group work and previous research have shown that most people *want* to believe that the system is functioning well, in part because they feel unprepared to deal with the consequences if it were not. There is a widespread presumption that somewhere, someone is in charge and that the job is being done well and conscientiously. Large majorities say they are confident about the safety of products that have been approved by the federal government. They also think Canadian practices stack up well against those of other countries.

However, they are also quite convinced regulation should be increased. This runs counter to most Canadians' general view about government regulation and the need to make government less intrusive. Biotechnology, they agree, is a different order of activity that requires a different level of scrutiny because of the risks associated with it. They want strong mandatory regulation by government, utilizing effective technologies. They would also like Canada to work with other countries to develop common standards

Specific Issues – GM Food

These results indicated a moderately higher level of discomfort with GM food than in past waves. That translates into less willingness to buy GM foods and reduced appeal of some GM food applications.

Nevertheless, the discomfort has not translated into increased levels of concern about food safety. Confidence remains high that food is inspected and tested and that if it appears on the shelves, it is safe. Most people are now aware that there are GM ingredients in much of the food they purchase and are correspondingly aware that they have eaten GM foods at some point.

That reality - their presumption that food is safe combined with the fact that they have not heard of any ill effects of eating GM foods - means that the discomfort has not turned into an outright refusal to buy among the vast majority of Canadians.

Specific Issues – Labeling

There was a strong expression of support of mandatory labeling of GM food in the research.

Informed choice is the overriding driver of opinion on this issue. It is not that most people want a way to distinguish GM food so they can stop buying it; it is more that they believe everyone should have that option and that labeling is the only way to ensure that people can choose.

Most insist that labeling must be fully effective in providing choice. That leads them to a preference for mandatory labeling. Most in focus groups could not see the benefits of a voluntary system because the only test they would invoke to assess any labeling system is that it lead to full compliance. That seemed, to most, to be the same outcome as a mandatory system would provide. The added benefit of a mandatory system, in their view, was that it would be easier to enforce by government, and therefore more likely to be complied with.

There were no counter-arguments that changed most people's minds.

Most were not persuaded that segregating food from farm to table would be difficult or inordinately costly. Most people (two thirds) say they would pay 10% more to get labeling. It should be noted that this was not a true consumer market research design and will not accurately predict buying behaviour or price sensitivity. However, these results do show the degree to which the concept of informed consumer choice drives opinion. Few believed, for instance, that labeling would make shoppers more concerned about GM foods and lead to a widespread refusal to buy GM foods.

A discussion in the groups of some of the potential trade implications led to some concern about economic impact and job loss but, on the whole, moved few people.

When it came to the technical issue of whether foods containing traces of GM ingredients could be called GM free, about half insisted on 100% purity. About half would accept a 1% threshold, while only a third would accept a 5% threshold.

Specific Issues – Stem Cell Research

The issue of stem cell research has reached a surprising level of awareness and acceptance among Canadians during the relatively short time it has been topical. More than half have heard of stem cell research with the number rising to about 70% of Involved Canadians.

In focus groups, about a quarter of participants had a real sense of what was involved and why the area had become controversial – again, a surprising level of engagement. It appears, on the basis of the discussions, that most people have internalized that the research will lead to significant health benefits. For instance, about a third believe that stem cell research will be "very beneficial" to them personally. That, in turn, has driven interest in the research and increased awareness of its potential.

Most Canadians (about 70%) say they find stem cell research acceptable with a determined minority (about 1 in 5) finding it totally unacceptable.

The survey questionnaire deliberately posited a complex argument that went to the heart of the current debate in the United States. It set the potential of health breakthroughs alongside the need to use tissues from discarded embryos to see if the benefits trumped potential ethical concerns. They did. Focus group discussion indicated that people tend to assume embryos are aborted fetuses (raising negative views about use of their tissue) unless it is made explicit that they are weeks-old frozen products of in-vitro fertilization that were to be discarded in any case (in which circumstance there is no barrier to their use).

Most respondents want the government involved in supporting stem cell research. In focus groups, government involvement enhanced comfort with the research because it meant to most that government would insist on standards and regulation. Those standards would include ethical guidelines in the minds of most people.

Specific Issues – Information Seeking

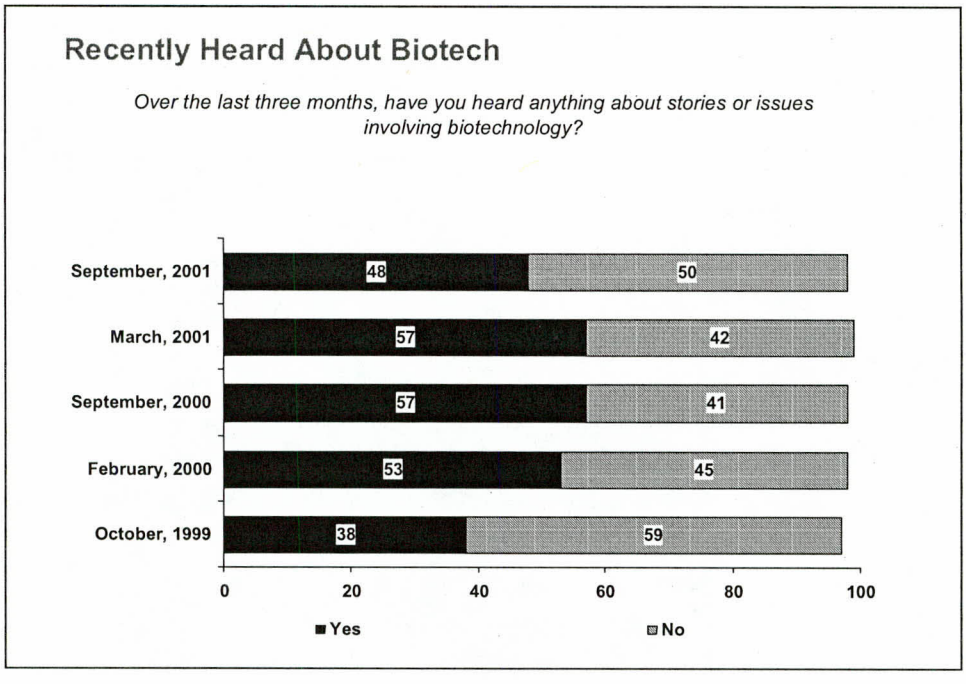
Most people say they are not actively seeking out information on biotechnology. This is thoroughly congruent with the overall findings that most people are neither deeply interested nor engaged in the issues. Almost 7 in 10 respondents said they had never sought information or had done so only one or two times. A further 18% said they had done so a "few" times. And even of those who had sought information at least occasionally, half did so relatively passively through media consumption.

Quantitative Findings

Awareness and Familiarity

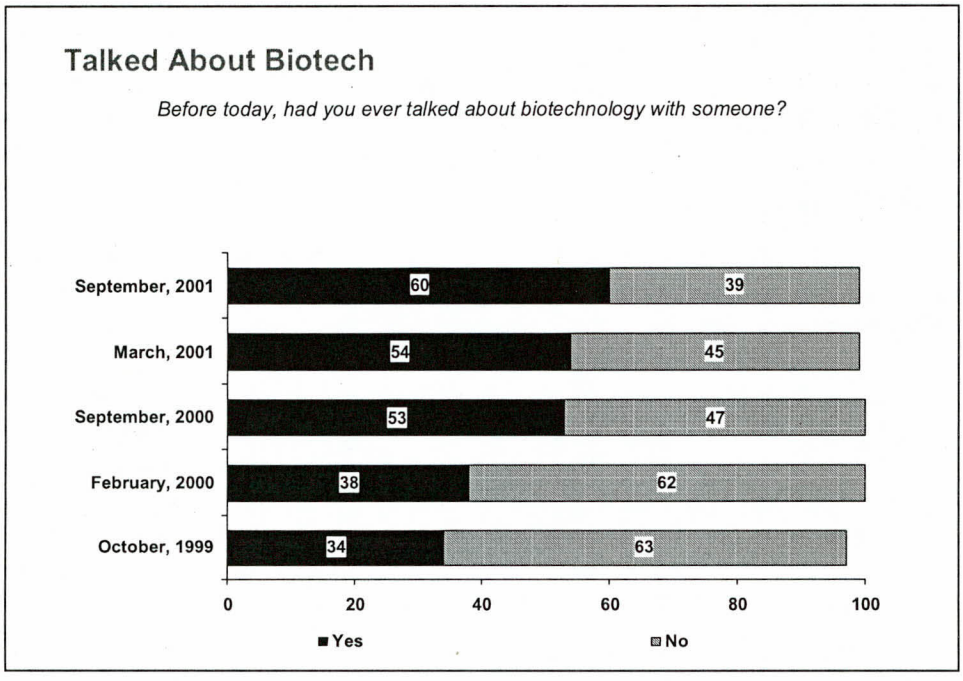
There continues to be a curious blend of high awareness of biotechnology mixed with low levels of interest, engagement and knowledge.

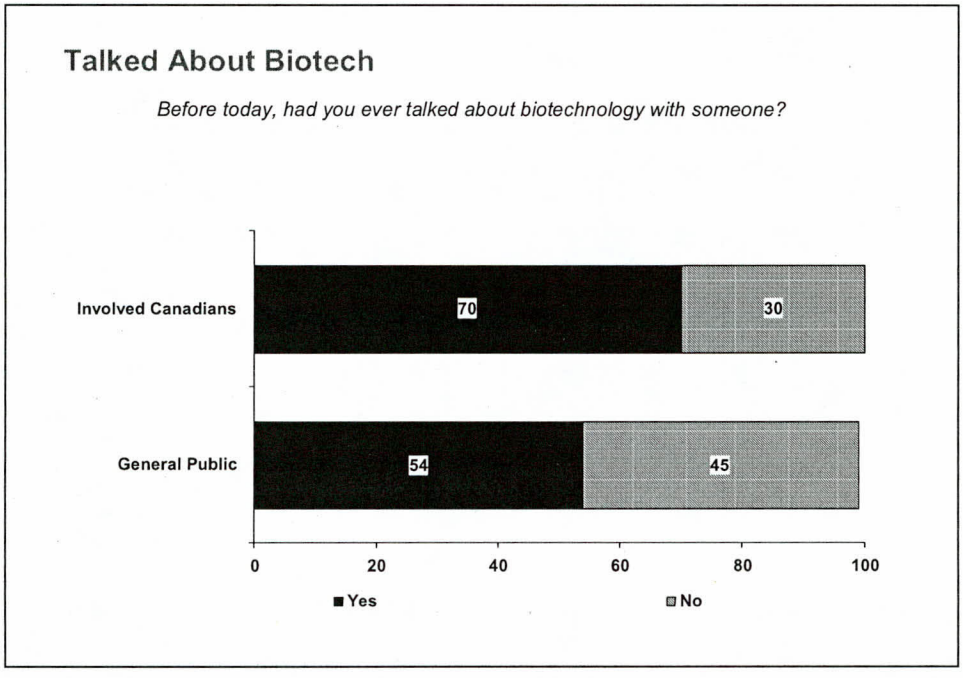
This research was conducted in the aftermath of September 11th . In fact it was delayed by a number of weeks because of the overwhelming preoccupation in the public media with the effects of the attacks. Despite the delay, news coverage remained saturated with those events during the fielding of the survey instrument. As a result, it is not surprising that recall of recent stories was down slightly.



However, there is a different test for awareness that is not time sensitive and that has shown a steady increase over the past two years. This question asks whether people recall talking about biotechnology with someone else. The only time constraint is that the discussion happened some time before the day of the interview. The results show

that a clear majority of Canadians have discussed the issue – even more so among Involved Canadians.



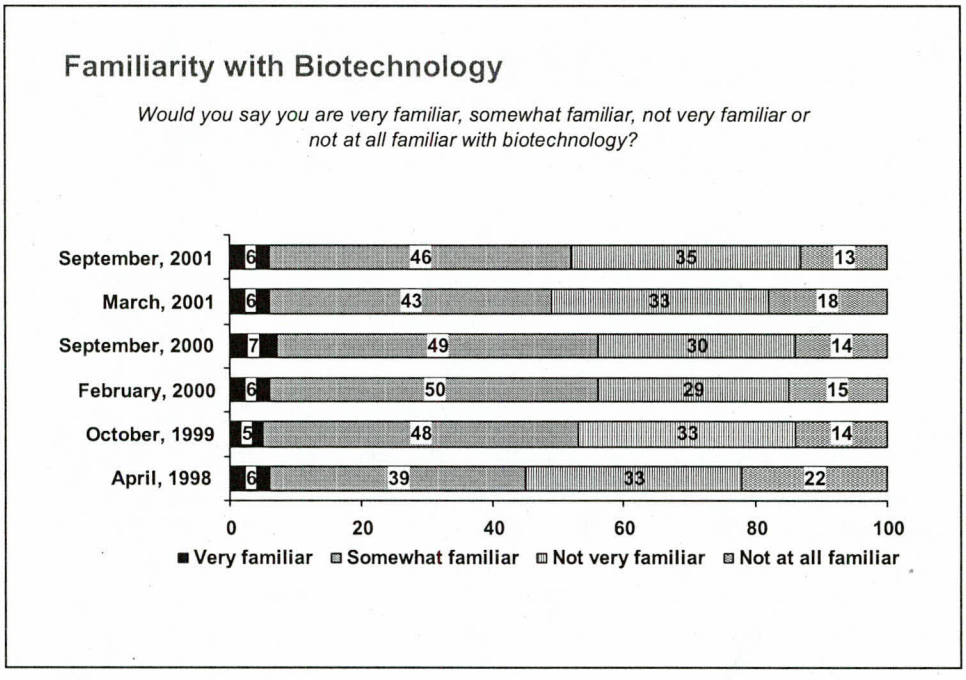


Focus group discussion reveals that most people are aware of the general area and can name a number of applications, usually in health or agriculture. Many seemed to have absorbed information about promising new discoveries or potential cures or heard about controversial applications like cloning.

Nevertheless, there has been very little change in the number of people who say they are very familiar with biotechnology, probably the best indicator of strong interest and engagement. Only six percent of respondents say they are very familiar, a proportion borne out in focus groups. Group discussion also shows that those who say they are somewhat familiar with biotechnology tend to overstate their degree of knowledge.

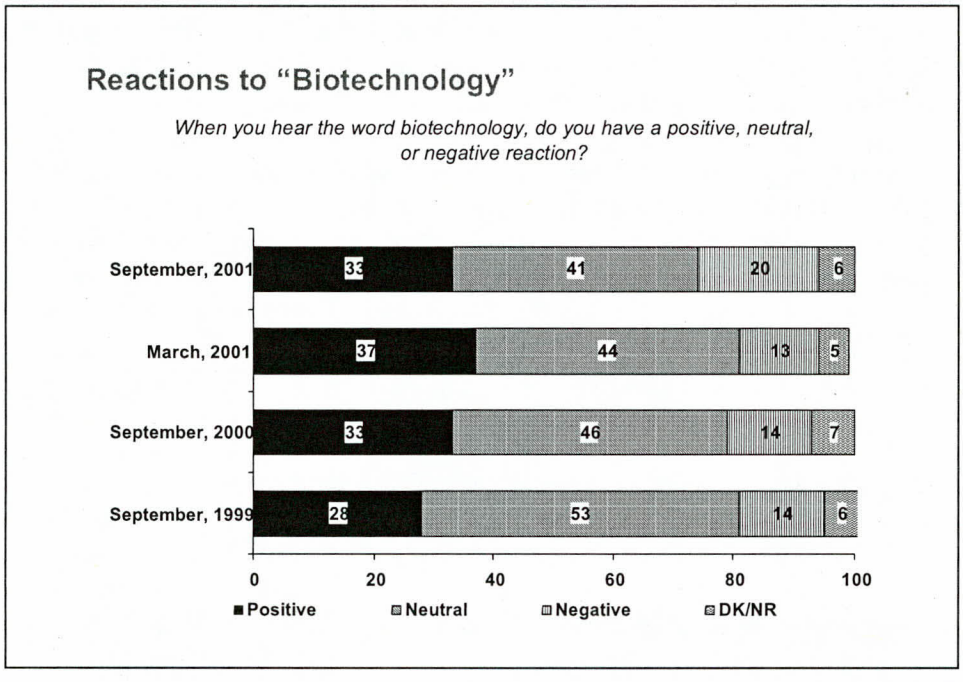
Generally, people don't see the prospect of any immediate personal interaction with biotechnology and, as a result, don't see the point in expending significant time on finding out more. Much of the subject matter seems scientific, dauntingly complex, future-oriented and beyond the scope of their daily lives. That combination tends to convince most that they know all they really need to know from the media they have consumed and the conversations they have had.

This is quite clearly <u>not</u> the case among those with a strong vested interest in biotechnology. They tend to be those who have direct experience with serious illness or genetic disorder that might be affected by new discoveries or those who are implacably hostile to biotechnology, fearing irreversible damage to human health or the environment.



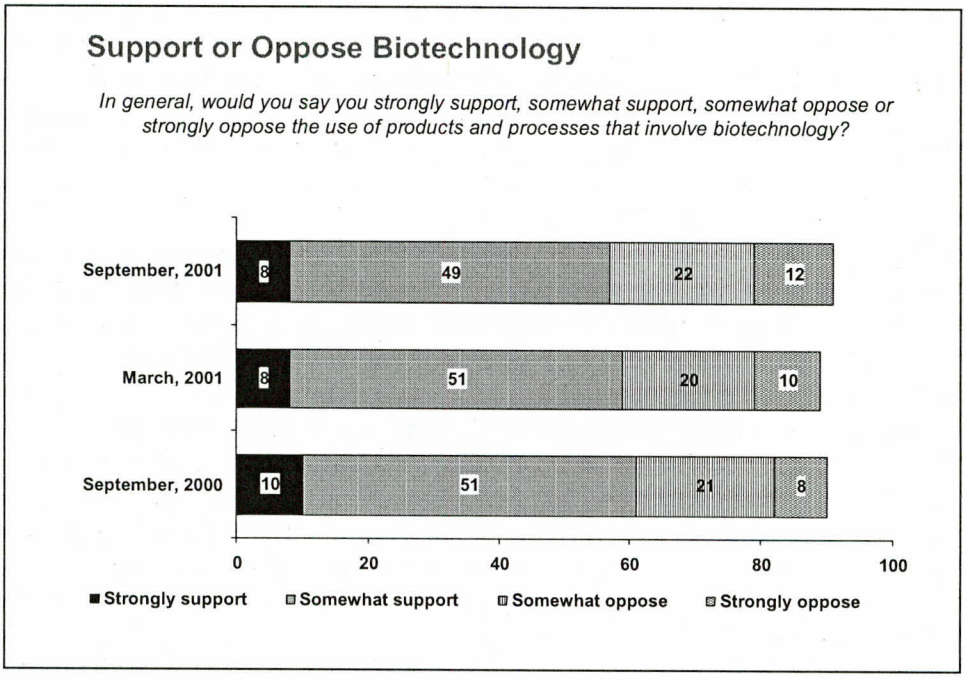
Top-of-Mind Impressions

Most Canadians are positively disposed to biotechnology. As a word, it engenders mostly positive or neutral reactions – a bit of a follow-on halo effect from Canadians' overwhelming presumption that there will be positive impacts from the expanded use of *technology.* Two of three Canadians have a positive reaction to *technology*; only 7% have a negative one. Those numbers narrow considerably when it comes to *biotechnology* but not so much that it raises large negatives. In fact, previous waves and focus group discussion indicate clearly that most people believe that *biotechnology* is a much more appropriate and accurate description of the products and processes than either *genomics* or *life sciences.* They also find the words *genetic modification* to be much more limiting and negative.



Interestingly, when asked specifically whether they support or oppose products and processes involving biotechnology, the third that expressed a positive top-of-mind reaction grows to almost 60%. There has been a small increase in opposition to biotechnology over the past year, with women, older Canadians and people with lower income tending to be more negative than the average. This seems to correlate with somewhat increasing levels of discomfort with and opposition to genetically modified food. It had been a reasonable supposition that the events of September 11th and the discussion of potential bioterrorism, including the anthrax cases, might well cast a negative pall over biotechnology. However, while some people in focus groups raised

bioterrorism as an issue, there was no strong connection made with biotechnology and fears of bioterrorism did not seem to act as a drag on support levels for biotechnology.



Biotechnology Applications

The survey tested 16 current and prospective biotechnology applications to see whether people agreed with their use. Six new ones were added and 10 others tested for tracking purposes. The results continue to be highly consistent and predictable; the survey and focus groups establish the following core propositions:

Canadians insist on evaluating biotechnology applications on a case-by-case basis. They do not and will not express blanket views absent a precise understanding of the individual application.

Each case is approached with a virtually explicit risk/benefit analytical framework. The risk part of the equation is driven by the general presumption that there *is* currently unknowable, long-term potential risk to human health that might well be irreversible.

The arbiter yardstick then applied to the equation is the *marginal personal benefit.* 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?" A hierarchy emerges where health and medical applications demonstrate the greatest marginal personal benefit and food applications the least.

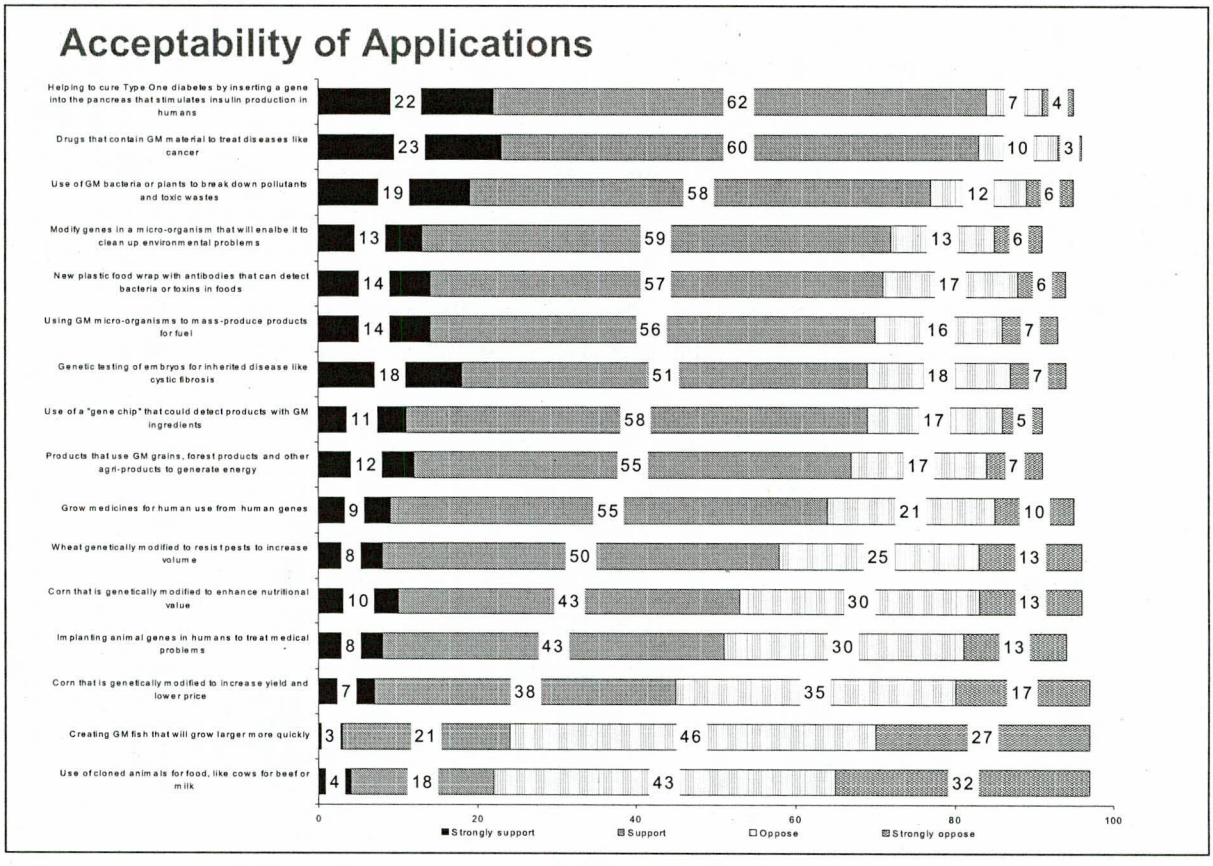
There is one further set of variables in decision making -- the tension between purpose and process. The purpose (or outcome/benefit) is the key positive driver. The process is an important negative driver along with risk. The larger the degree of intrusiveness of the procedure and the greater the extent to which it involves crossing boundaries between plants, animals and humans, the more the resistance that has to be overcome by the putative benefit.

Of the 16 applications, there was more support for than opposition to the wide majority. But certain applications proved much more acceptable than others, following the paradigms set out above. Focus group discussions validated the hierarchy and provided more insight into the decision-making rationales.

Of the new applications tested, the two that garnered the greatest support involved applications to treat Type One diabetes (despite its invasiveness) and genetic detection technologies like plastic food wrap with antibodies to detect bacteria or toxins in food.

The new applications that garnered the greatest opposition involved cloning animals (like cows) as a source of food and the introduction of GM wheat. In the cloning case, virtually no one saw the benefit of replicating a natural process that currently produces all the animals (and meat) anyone wants. In the case of wheat, there was a similar logic chain. Wheat is a major food building block and ingredient; Canada produces an enormous amount of wheat; why tamper with it?

What follows is the list of applications tested – ranked from least to most degree of opposition.

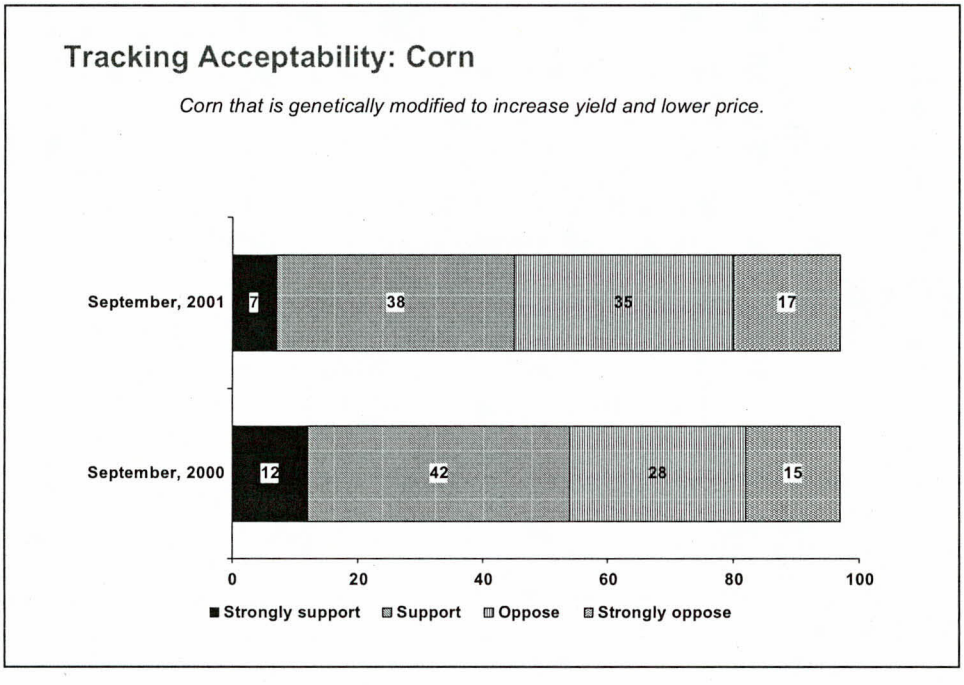


Typography in the Acceptability of Applications graph precludes making it larger. Following is the ranking of applications shown on the left side of the graph from least to most degree of opposition:

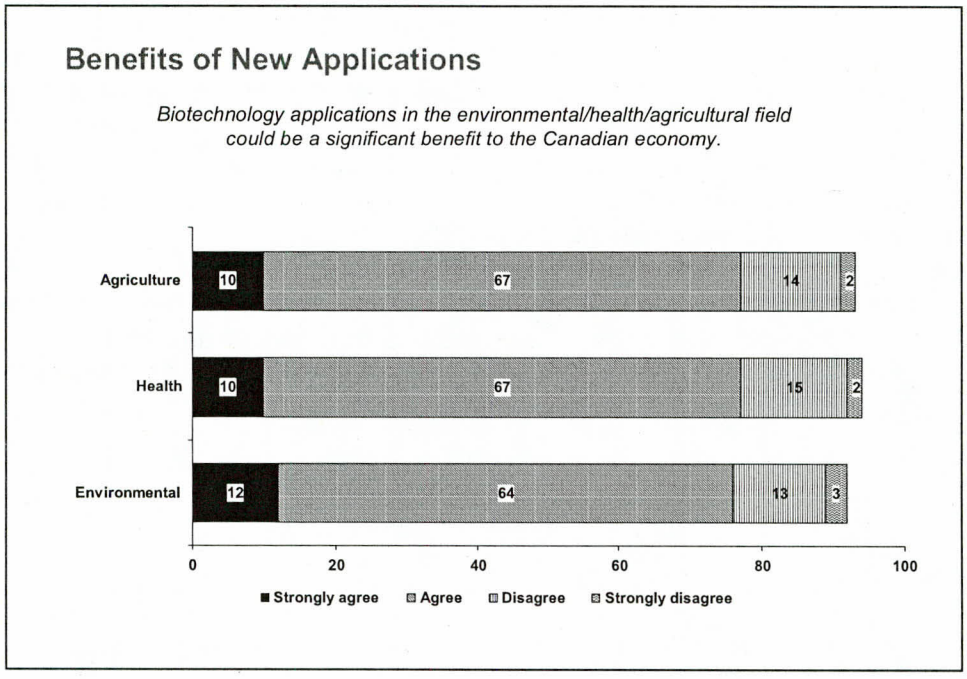
- Helping to cure Type One diabetes by inserting a gene into the pancreas that stimulates insulin production in humans
- Drugs that contain GM material to treat diseases like cancer
- Use of GM bacteria or plants to break down pollutants and toxic wastes
- Modify genes in micro-organisms that will enable it to clean up environmental problems
- New plastic food wrap with antibodies that can detect bacteria or toxins in foods
- Using GM micro-organisms to mass-produce products for fuel
- Genetic testing of embryos for inherited disease like cystic fibrosis
- Use of a “gene chip” that could detect products with GM ingredients
- Products that use GM grains, forest products and other agri-products to generate energy
- Grow medicines for human use from human genes
- Wheat genetically modified to resist pests to increase volume

- Corn that is genetically modified to enhance nutritional value
- Implanting animal genes in humans to treat medical problems
- Corn that is genetically modified to increase yield and lower price
- Creating GM fish that will grow larger more quickly
- Use of cloned animals for food, like cows for beef or milk

Tracking shows that the acceptability of some GM food applications might be declining. Further waves will test whether the trend will continue. For instance, there has been a notable increase in resistance to GM corn. Note, however, that the benefits postulated in the question are not health or medical benefits. In one case the benefit accrues to the producer; in the other, the benefit is an unstipulated lower price. In discussion, focus group participants place a higher premium on potential functional foods or nutriceuticals.



Where Canadians seem willing to assume a generalized benefit from biotechnology applications is in their economic impact. True to their predisposition to approve of high technologies, Canadians assume biotechnology applications in health, environment and agriculture will yield significant benefits to the Canadian economy. It is just that those benefits are not important enough, in some cases, to overcome the risk/benefit test.



Evaluating Risk

Each research wave has focused on issues of risk – identified consistently as the core driver of concern about biotechnology processes and products. This wave added some new questions to further understanding of the perceptions of risk associated with the technology.

Over time, this research has established a number of core propositions.

Absent a discussion of benefits, statements about the risks inherent in biotechnology are quite compelling. When confronted with argumentation about risk, large segments of the population are moved to advocate a slowing down of the development of the technology.

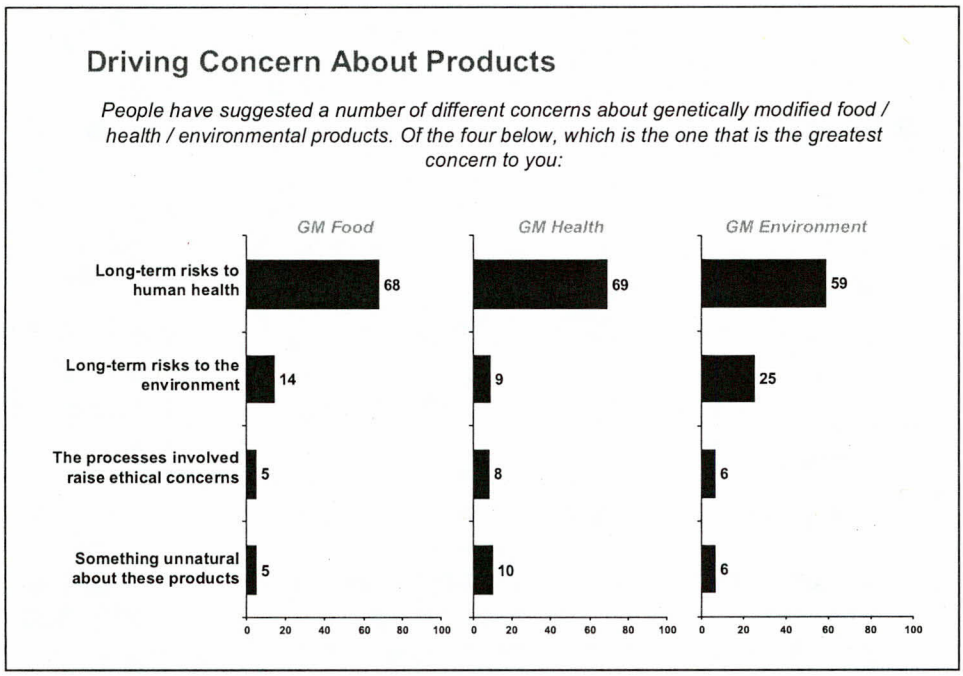
There is a baseline attitude among many people that suggests that the long-term risks of biotechnology are unknowable and cannot be disproved or dismissed. Layered on to that attitude is the presumption that negative impacts, should they occur, are probably "irreversible." In discussion, many worry that the speed at which change is occurring in biotechnology discovery makes irreversibility a key variable.

However, when statements about risk are balanced with benefit statements or with measures to mitigate risk, support returns. The point is that the benefits of

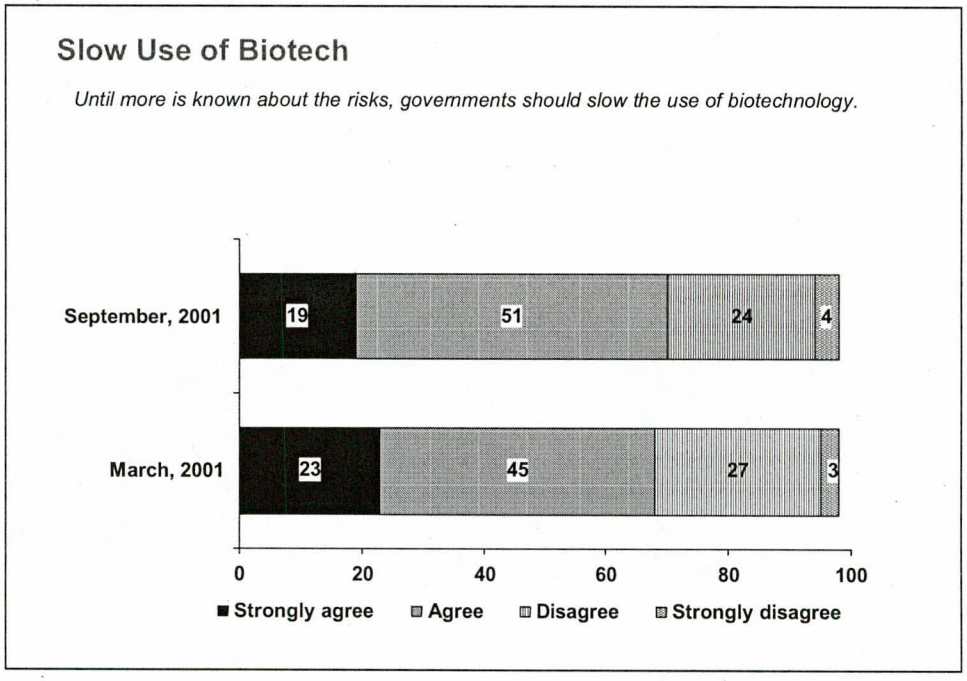
many applications are not "top of mind" but, when entered into discussion, are powerful and desirable outcomes that tilt the risk/benefit equation positively.

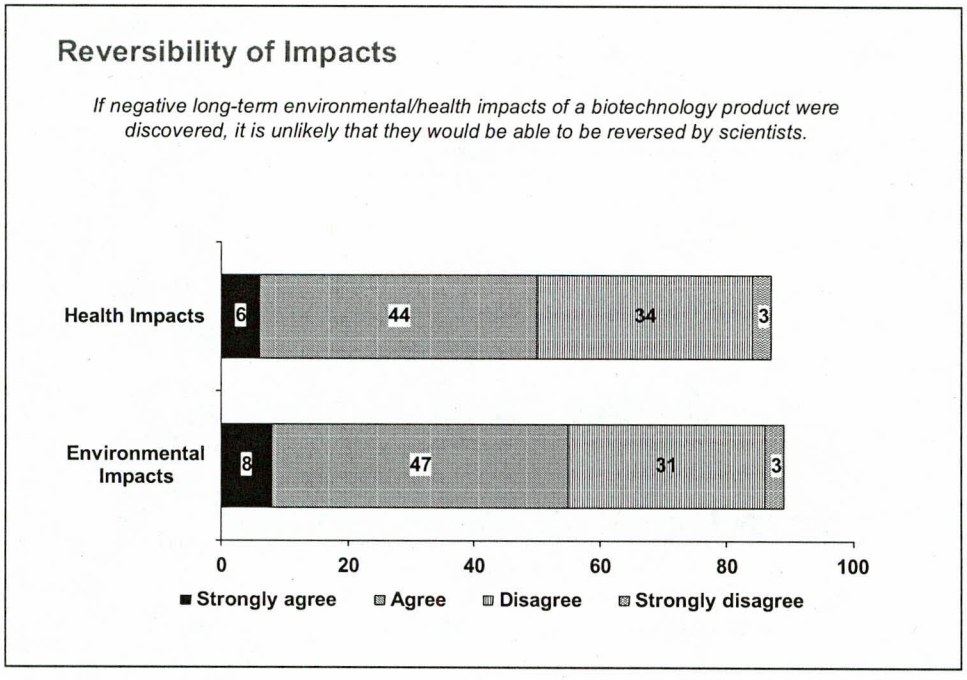
When the consistent use of science in regulation and a commitment to engage in ongoing research into long-term risk are articulated policy elements, large majorities move towards supporting biotechnology. Most people accept that life is replete with risk but they want to know that government is trying to mitigate or reduce those risks as society seeks to gain the benefits.

This wave of research asked respondents to evaluate the causes of concern about biotechnology and to pick, from a list of four, the one that was of greatest concern. By a wide margin, the evidence shows that risks to human health are the primary driver of concern about biotechnology – more so than concerns about the environment, ethics or moral values.

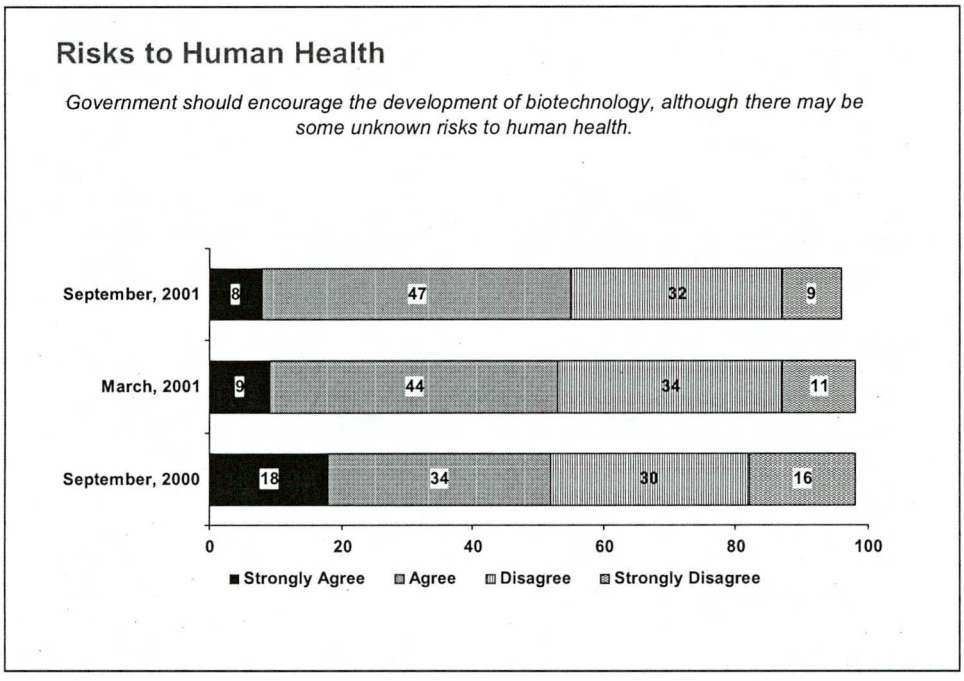


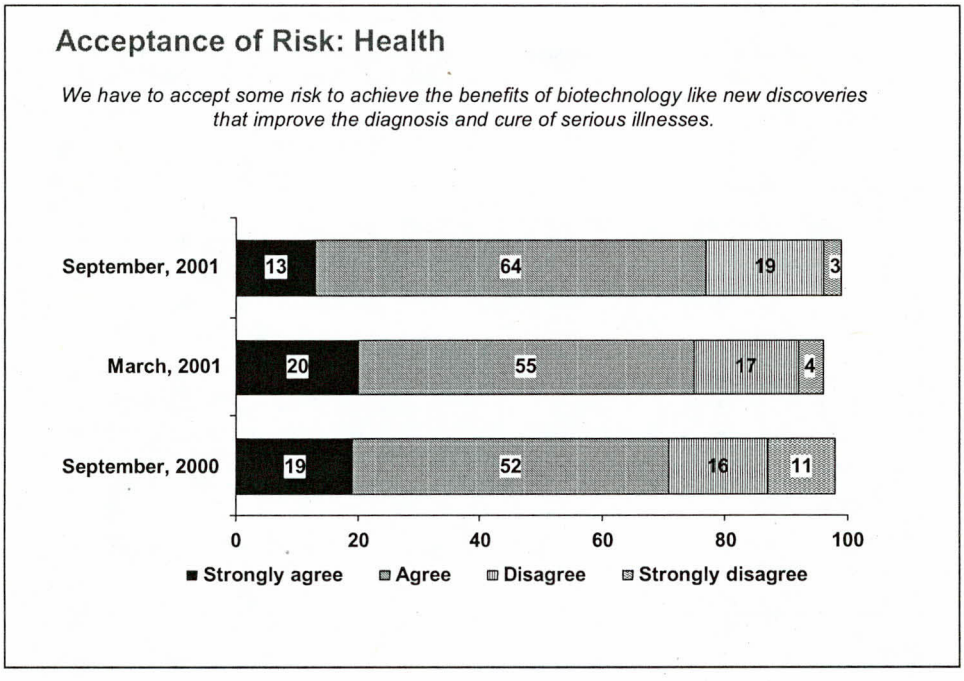
The following sequence of questions clearly demonstrates the impact of a straightforward expression of risk concerning the technology and the underlying fear of "irreversibility."



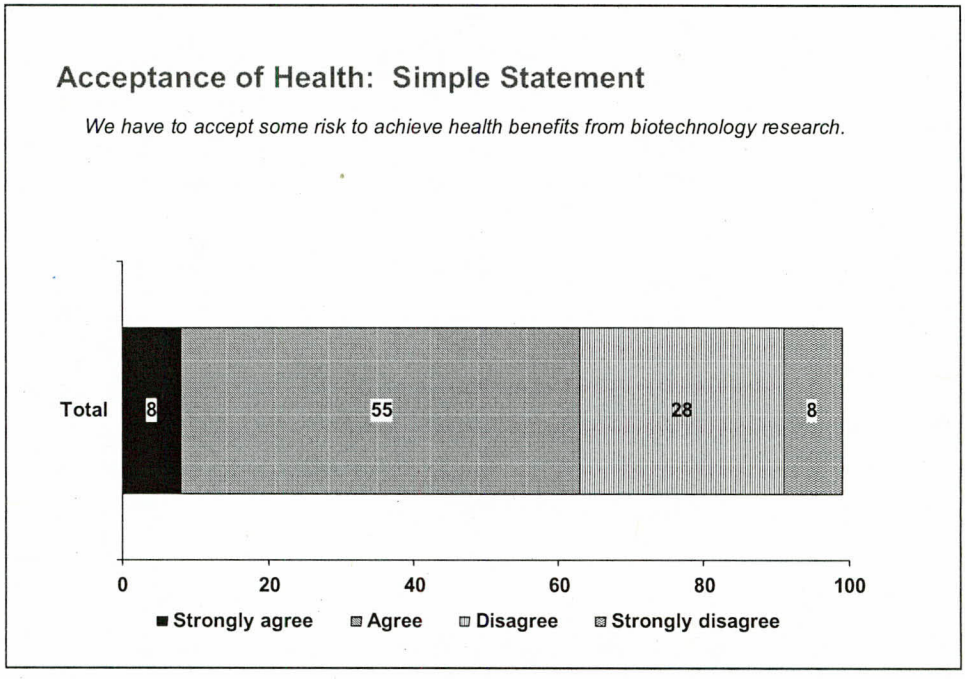


However, there is a predisposition to allow the development of biotechnology. The following results show majority sentiment for government to encourage development despite the risks. A test question that inverted the proposition to screen out wording impacts provided virtually identical results. The second chart shows that when the potential benefits of development are cited, support rises even higher.

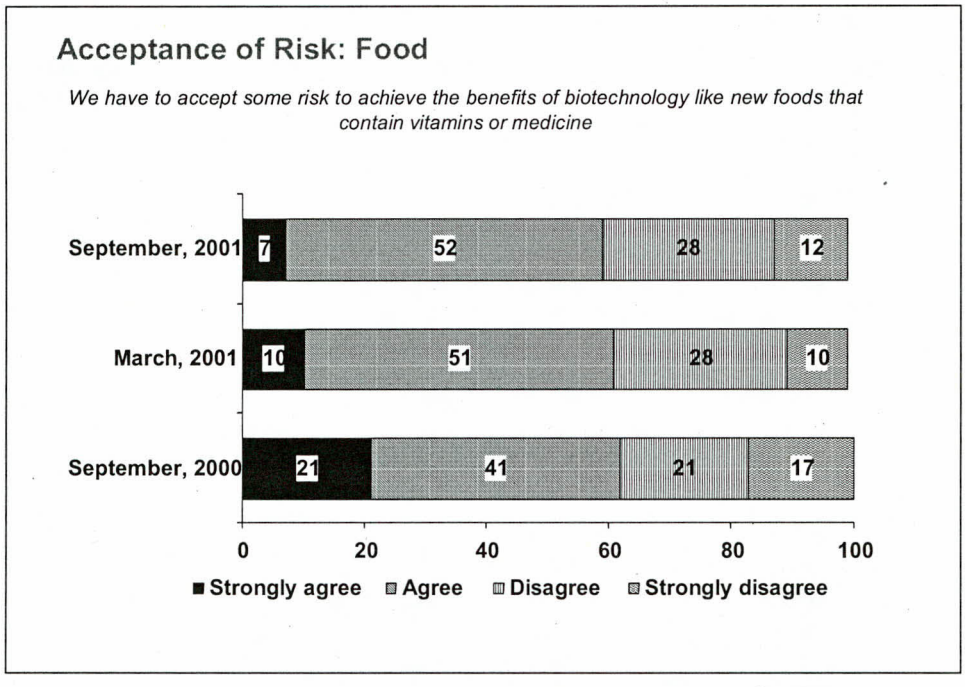


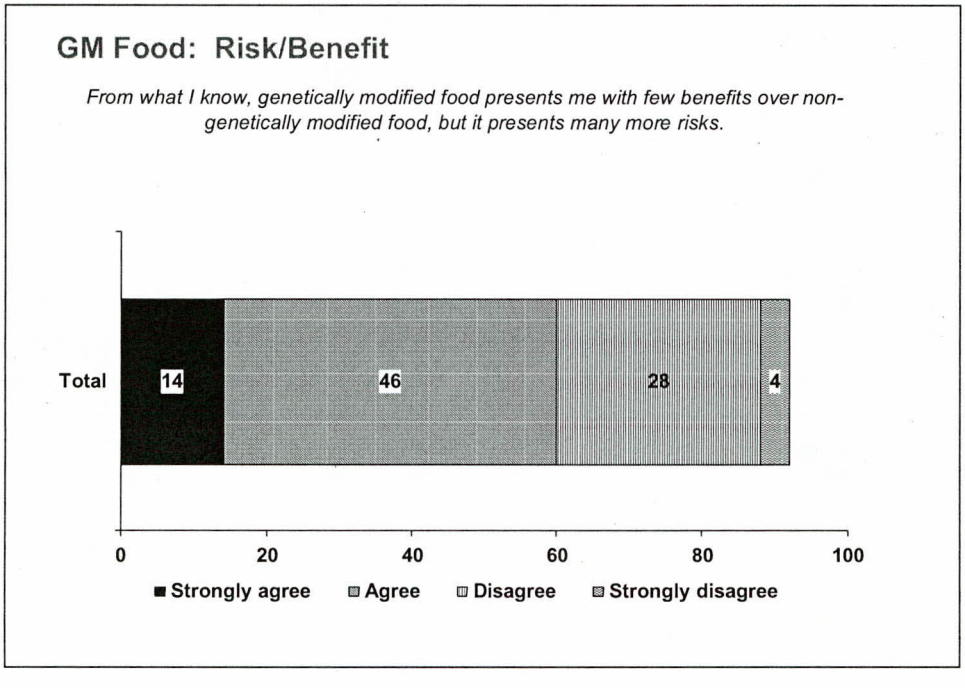


The degree of detail about benefits clearly matters. A variant of the health trade-off was posited but without the detail of improving diagnoses and cures. Though a majority still agrees, note the drop-off in that support.



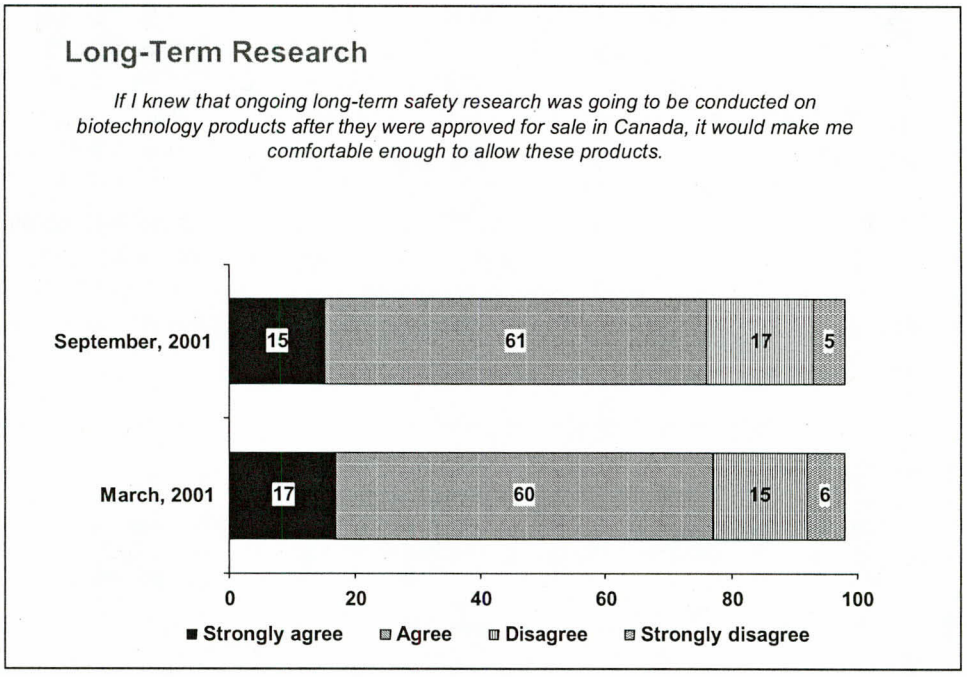
However, as further evidence of the importance of the risk/benefit equation and the influence of the concept of marginal personal benefit, the willingness to accept risk reduces somewhat when the benefits posited are those deriving from GM foods. Focus group discussion establishes that functional foods and nutriceuticals are relatively unknown, that many doubt whether they will ever exist and, even if they did, that many do not understand the need to supplement what already is widely available by other means.

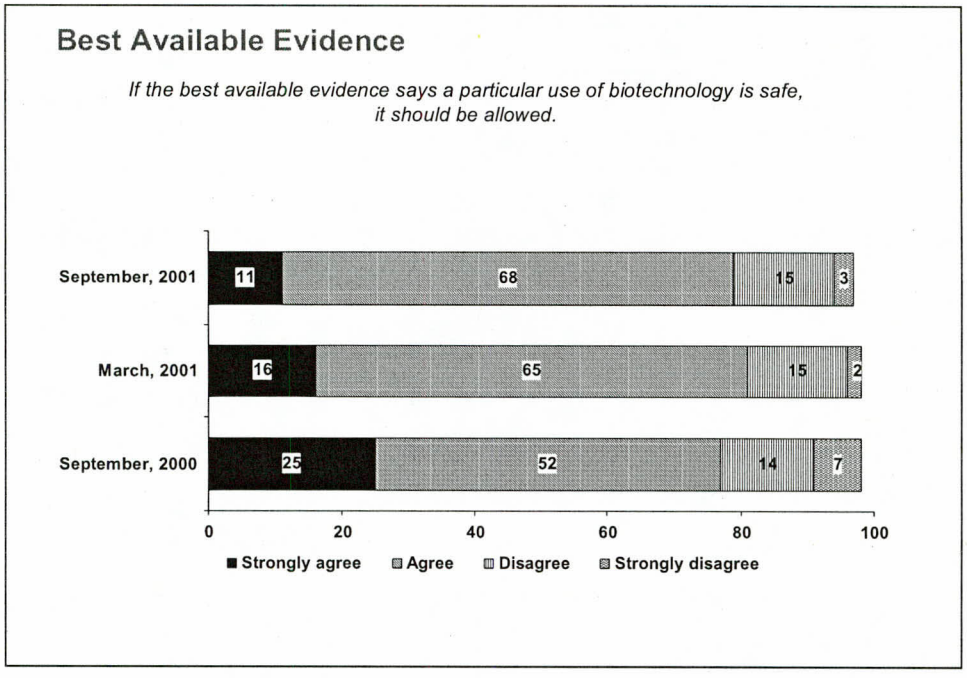




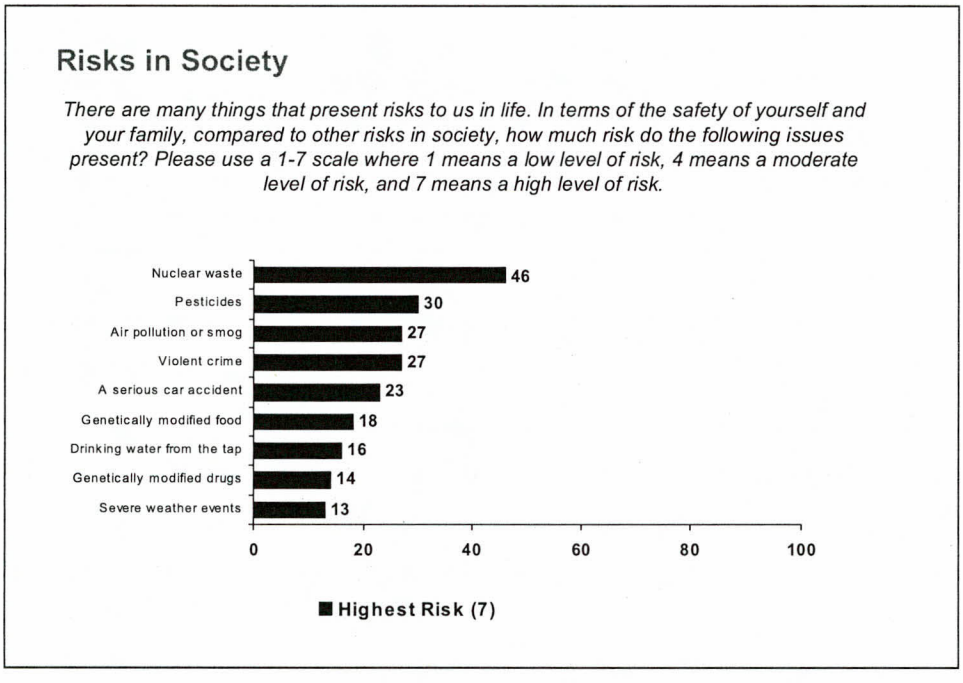
To illustrate the importance of long-term research in decision making about acceptability, the following evidence shows that the vast majority of people say knowing that long-term research was going to be conducted makes them comfortable enough to

allow the sale of GM products. Only 6% express strong disagreement with that proposition. Strong opposition to allowing sale falls even further when the best available evidence says a particular use of biotechnology is safe. The combination strongly suggests that the vast majority of people approach the use of GM products quite pragmatically.



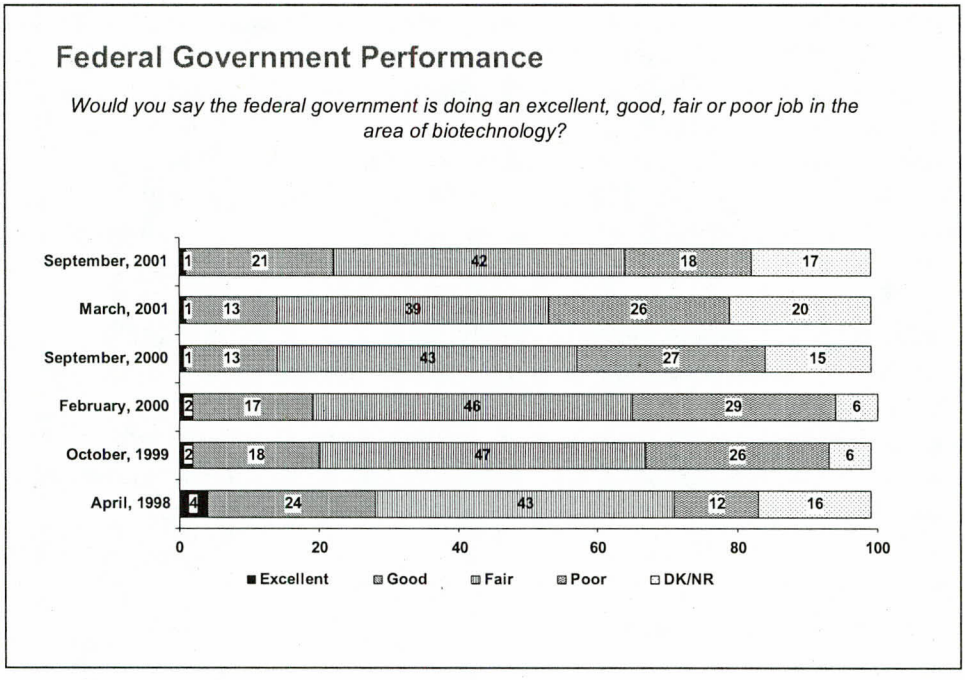


Given the importance of risk assessment to the acceptability of biotechnology products and processes, this research wave tried to put the perceived risks of biotechnology into context. Respondents were asked where biotechnology ranked in relation to other risks in society. The results showed that most people believe that GM products pose less risk than many other things, including nuclear waste and pesticides. Perhaps surprisingly, most rated the risks as lower than many everyday risks like car accidents and crime. Focus group discussion shows that the relatively low ranking of biotechnology risk helps to explain the predisposition to encourage its development and the willingness to trade benefits against risks in many of the suggested applications.
Further, most people suggest they rate the risks as relatively modest because they haven't heard or read much about health consequences associated with GM products and processes. To most, it is a question of long-term unknowable risk, not short-term tangible risk.



Government Performance

The research findings indicate that the federal government's performance rating in biotechnology has improved slightly since the last wave. The number of those rating the government poorly has dropped as well.



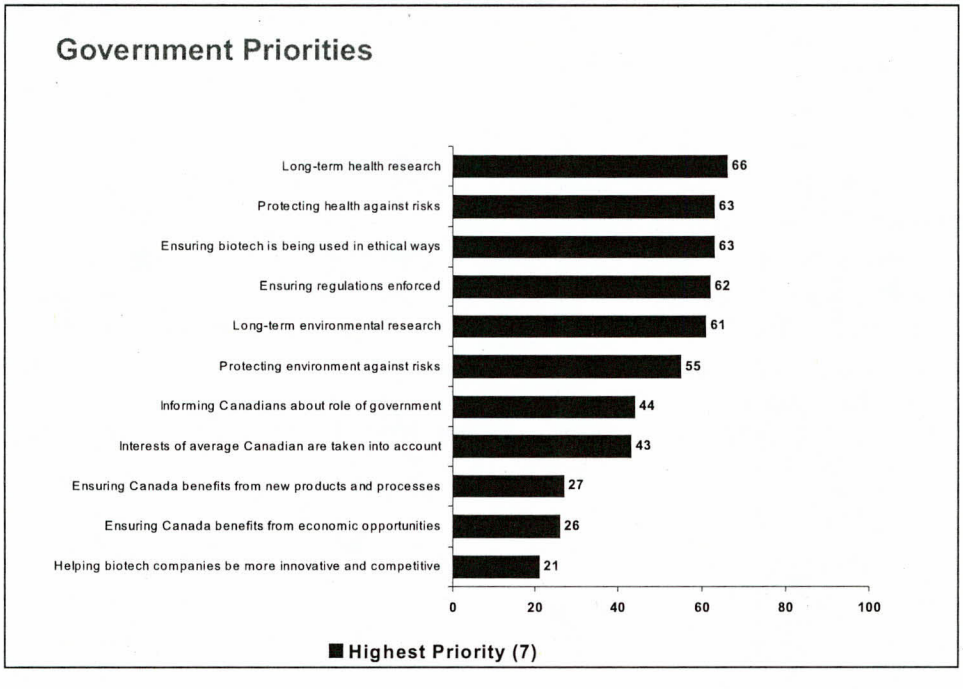
It is more likely, however, that these ratings reflect a generalized positive "halo effect" after September 11 than gauge actual performance in biotechnology. Virtually all public opinion research post-September 11 showed a "rallying" behind the government and an increase in both support and performance assessment. There is further evidence for this phenomenon in the results to the two lead-off questions in the survey. Sixty-one percent of respondents said the country was "generally headed in the right direction" – a level that is as high as any reached over the past eight years – while only 21% were willing to give the government "poor" ratings overall, again a comparatively small number.

Government Priorities

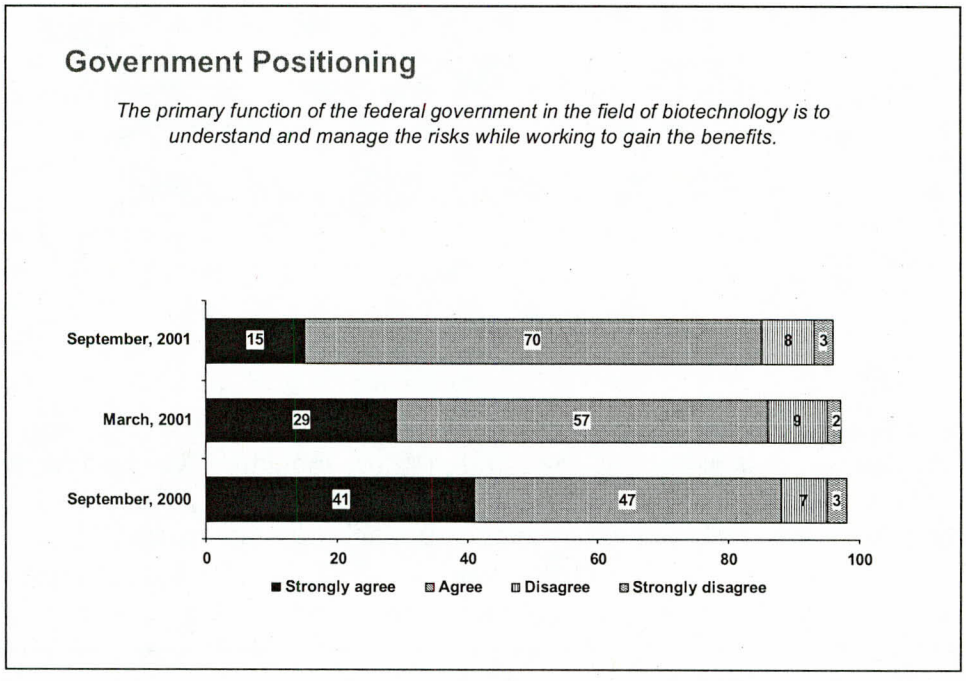
The priorities Canadians set for the federal government in dealing with biotechnology have remained quite consistent over the various research waves. They include protecting human health and the environment against risk and conducting long-term research into the impacts of the technology.

In general, Canadians have begun to place more emphasis on the importance of stewardship than the importance of encouraging or promoting the development of biotechnology. Though they believe in both, strong stewardship values have become a *sine qua non*. That leads people to placing a higher priority than has been the case on enforcing regulations and working with other countries to develop common standards. And though people are still willing to give Canada's regulatory system for biotechnology the benefit of the doubt, they are less strongly convinced about its adequacy. There are no changes in attitudes towards the performance of individual departments.

The rank order of priorities has stayed virtually static. Stewardship functions are the first order of priority, while far fewer assign great importance to economic priorities. Though this wave did not ask people to assess how well the government was carrying out those priority tasks, previous waves have shown an inversion in the hierarchy, a mismatch between expectations and performance. Most people believe the government performs the lower-priority functions better than it does the higher-priority ones.



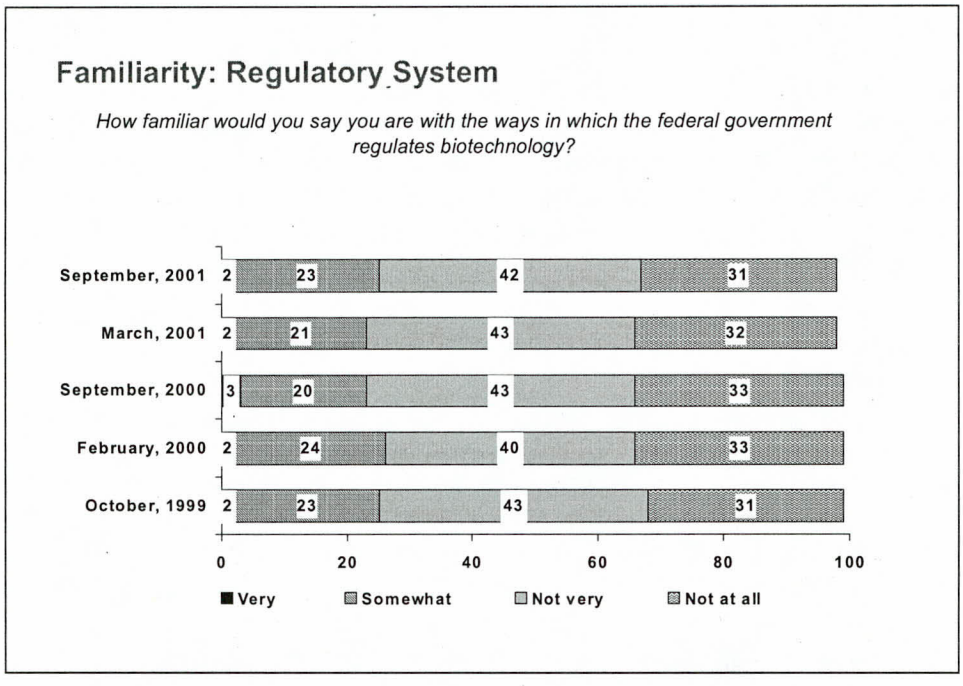
As a general proposition, most people believe the federal government must balance its activities. There is still widespread agreement with the framework that describes the government's primary function as understanding and managing the risks of biotechnology while working to gain its benefits. Interestingly though, the general move towards the "middle," or a move away from strong opinion, is clearly shown in the way agreement levels have evolved towards this framing statement. Though opposition to it has not grown at all, there has been steady erosion in the number of people who strongly agree with it.



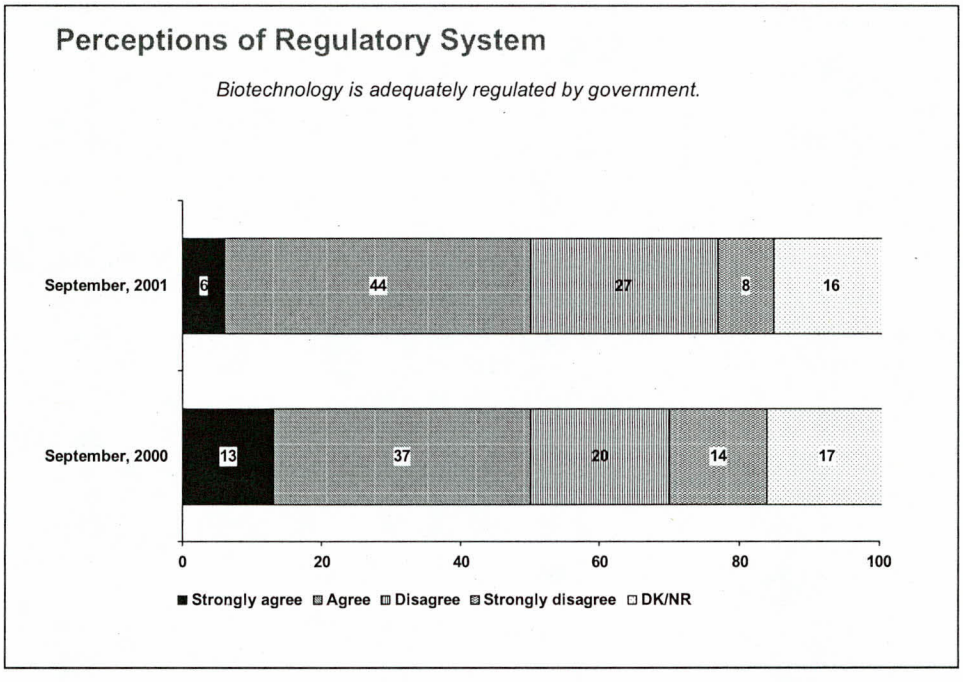
The Regulatory System

The federal government's regulatory system is the frontline player in its stewardship of biotechnology. As has been consistently demonstrated, Canadians have a large amount of confidence in the system although they express very little familiarity with it. Focus group work and previous research have shown that most people *want* to believe that the system is functioning well, in part because they feel unprepared to deal with the consequences if it was not. There is a widespread presumption that somewhere, someone is in charge and that the job is being done well and conscientiously.

Over five survey waves, only very small numbers of people have been willing to say that they are very familiar with the regulatory system.

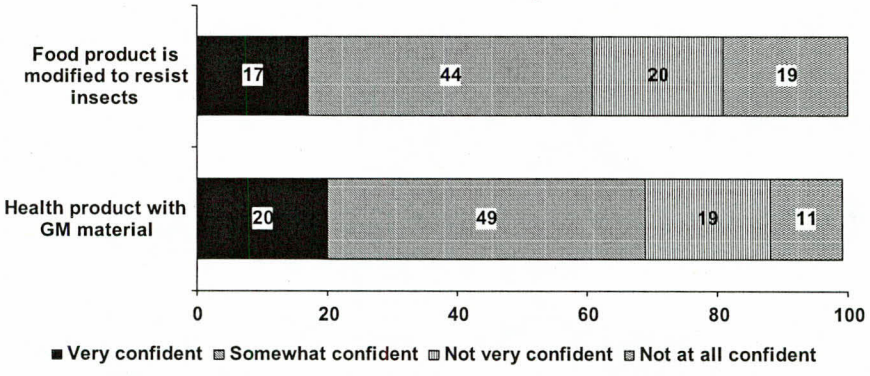


Despite the lack of familiarity, most people are willing to evaluate the regulatory system and a majority agree that biotechnology is adequately regulated. Large majorities say they are confident about the safety of products that have been approved by the federal government. They also think Canadian practices stack up well against those of other countries.



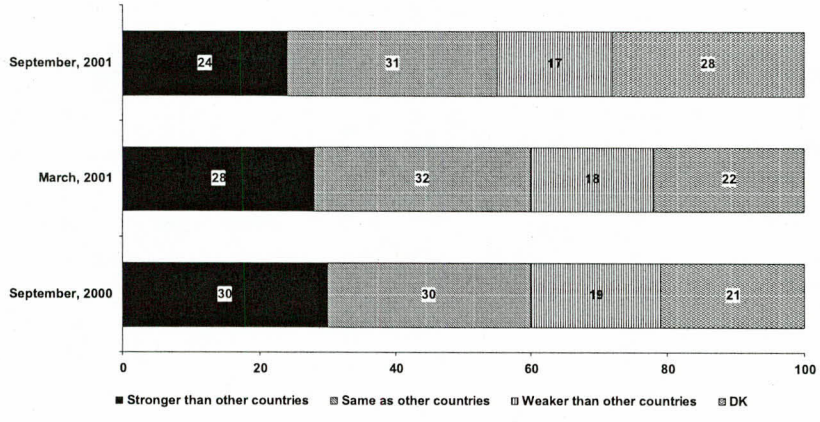
Confidence: Products

Once a food product like corn, which has been genetically modified to resist insects has been evaluated and approved by the federal government, how confident are you about eating that product?/ Once a health product (for example a drug) that contains genetically modified material has been evaluated and approved by the federal government, how confident are you about using that product?

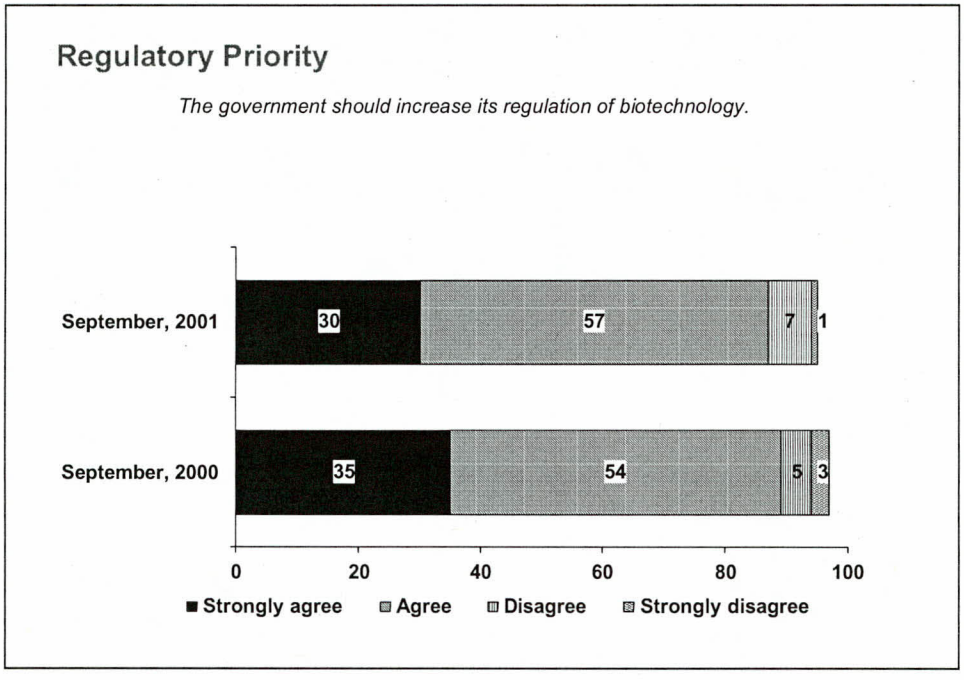


Comparison with Other Nations

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?

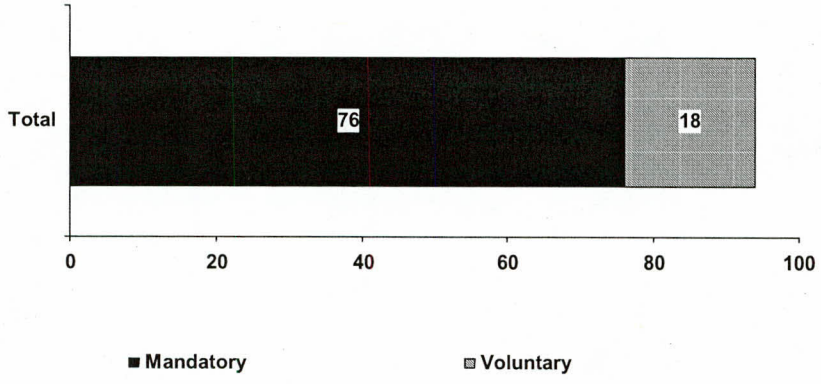


However, they are also quite convinced regulation should be increased. This runs counter to most Canadians' general view about government regulation and the need to make government less intrusive. Biotechnology, they agree, is a different order of activity that requires a different level of scrutiny because of the risks associated with it. They want strong mandatory regulation by government, utilizing effective technologies. They would also like Canada to work with other countries to develop common standards.



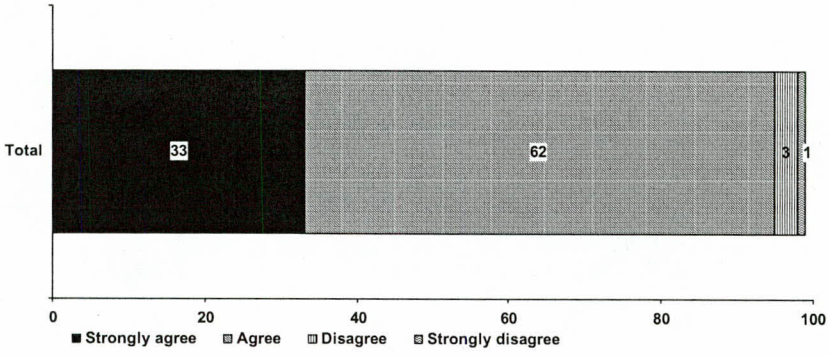
Environmental Issues

When it comes to environmental protection, should biotechnology products be governed by mandatory rules set by government, or by voluntary measures carried out by organizations in the biotechnology sector?



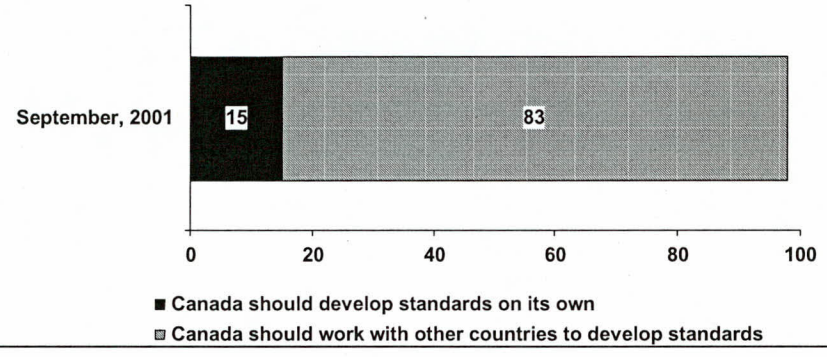
Genetic Monitoring Technologies

If the Government of Canada is going to be involved in supporting the development of new health, environmental and agricultural biotechnology products, it should be just as involved in developing technologies that will be able to monitor and control the impact of these new products.



Regulation – Work Alone or With Others

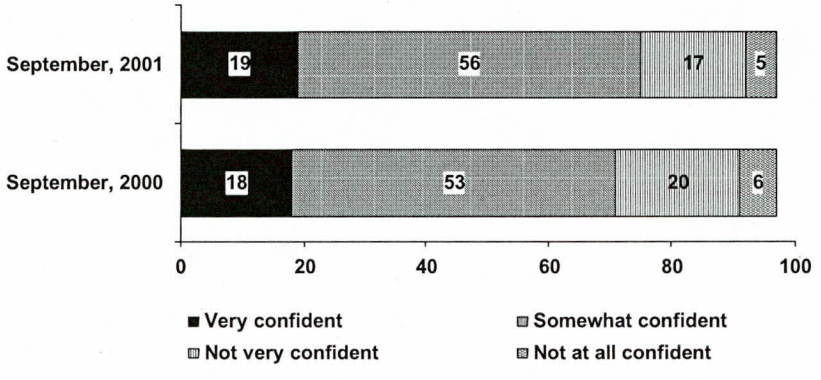
In terms of managing the issues associated with biotechnology, do you think it is better for Canada to develop its own standards and regulations or do you think it is better for Canada to work with other nations to develop standards and regulations?



And while, again, most people don't know in any great detail what government departments do in the regulation of biotechnology products, they give them the strong benefit of the doubt.

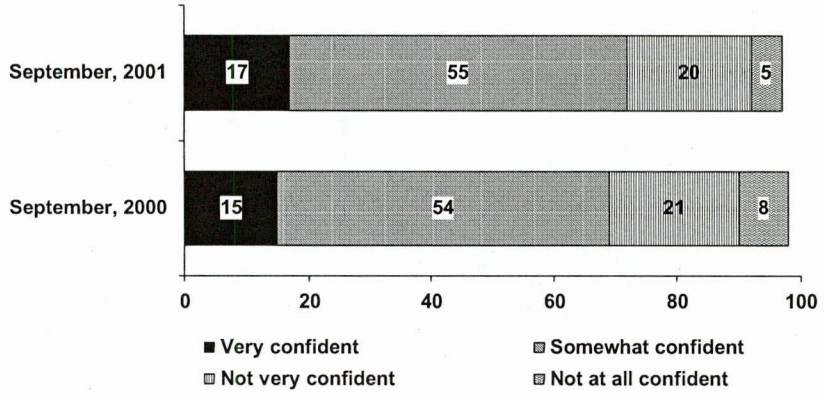
Confidence: Health Canada

How confident would you say you are in the ability of Health Canada to ensure that biotechnology products in its area of responsibility are safe?



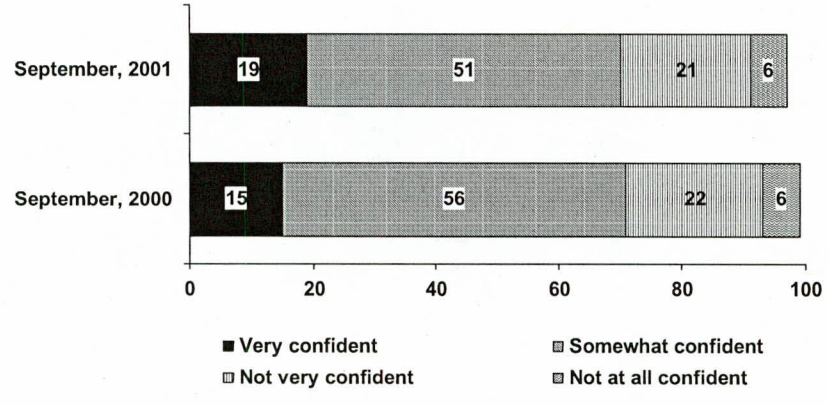
Confidence: Environment Canada

How confident would you say you are in the ability of Environment Canada to ensure that biotechnology products in its area of responsibility are safe?



Confidence: CFIA

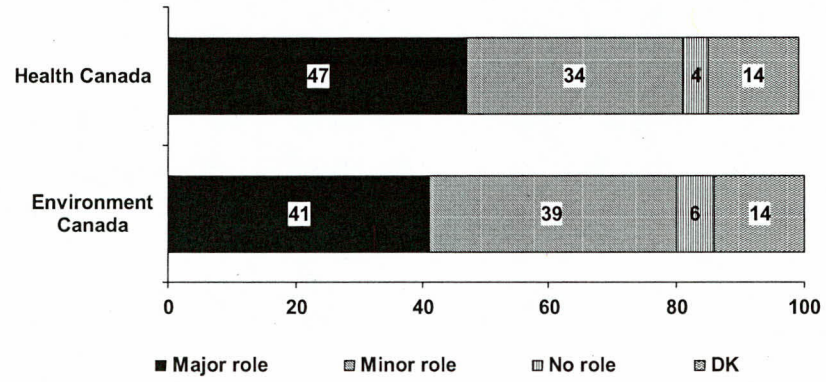
How confident would you say you are in the ability of the Canadian Food Inspection Agency to ensure that biotechnology products in its area of responsibility are safe?



People aren't sure whether these departments play a major or minor role in the regulation of biotechnology products. But there isn't any doubt what they would like – that is, for the departments to play a major role.

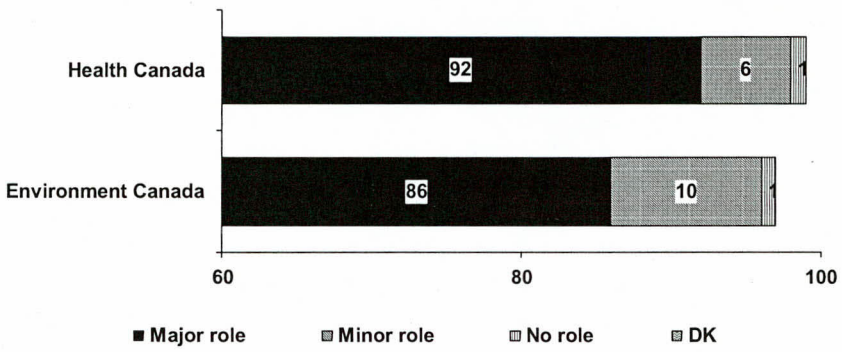
Federal Roles and Responsibilities

Would you say that Environment Canada probably plays a major role, a minor role, or no role in the regulation of biotechnology products in Canada?/ Would you say that Health Canada probably plays a major role, minor role, or no role in the regulation of biotechnology products in Canada?



Federal Roles and Responsibilities

*Would you say that Environment Canada **should play** a major role, a minor role, or no role in the regulation of biotechnology products in Canada?/ Would you say that Health Canada **should play** a major role, minor role, or no role in the regulation of biotechnology products in Canada?*



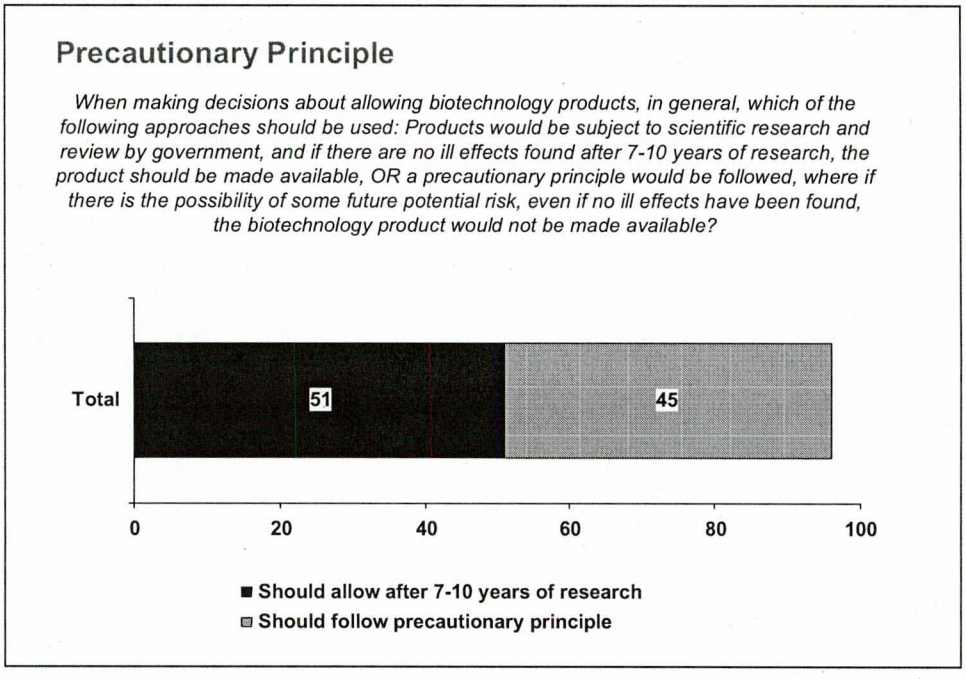
The Precautionary Principle

The research design tried to test how people react to the concept of a "precautionary principle" in the public debate over biotechnology. This was the first attempt to do so and more research will be required to more fully understand its potential impact. Any discussion of the findings must begin with the caveat that almost no one had heard of the concept and most in the focus groups misinterpreted it at first blush. It appears to be quite simple to understand on its surface but rapidly takes on complexity in discussion.

Having said all that, the "precautionary principle" is a powerful communications construct that attracts many people who harbour mixed feelings about biotechnology.

Focus group work reveals that people assume it is a word that combines prevention and caution and suggests moving forward with care. Those who embrace it do not assume there is any trade-off or consequence to applying the principle and have virtually no idea about how applying it might work in practice. It works well for many of them because it seems to provide people with an "out" in terms of decision making by allowing them to put off the choice without any apparent down side.

People who reject it tend to do so because there appears to be little scientific grounding to govern its application. They tended to question who, or what groups, would influence the decision to invoke the principle.



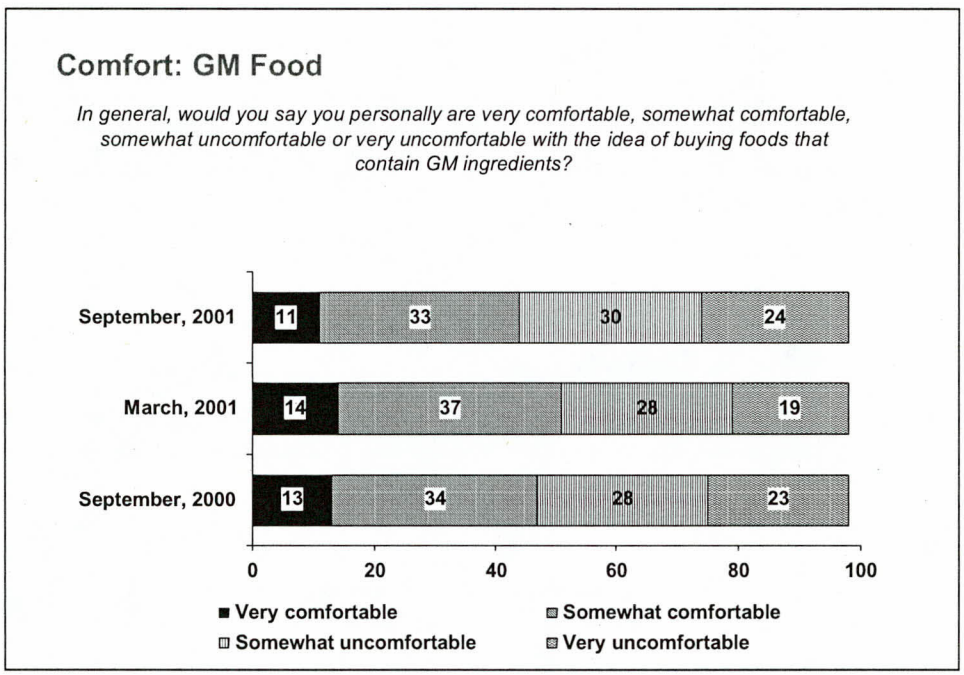
Specific Issues – GM Food

These results indicated a moderately higher level of discomfort with GM food than in past waves. That translates into less willingness to buy GM foods and reduced appeal of some GM food applications. In focus groups, participants displayed higher knowledge levels about GM foods but no clearer understanding of any potential benefits. It is in the discussion of GM foods that the risk/benefit equation and the marginal personal benefit test are most consistently articulated.

Nevertheless, the discomfort has not translated into increased levels of concern about food safety. Confidence remains high that food is inspected and tested and that if it appears on the shelves, it is safe.

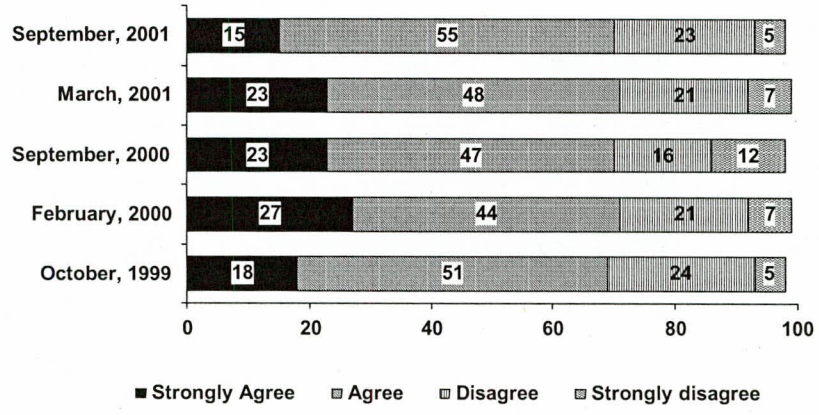
Most people are now aware that there are GM ingredients in much of the food they purchase though they do not really distinguish between the constituent elements of processed food and others. That means most are aware that they have eaten GM foods at some point.

That reality – their presumption that food is safe combined with the fact that they have not heard of any ill effects of eating GM foods - means that the discomfort has not turned into an outright refusal to buy among the vast majority of Canadians. Currently 17% say they would not buy a food with GM ingredients – up 6% from the two previous waves.



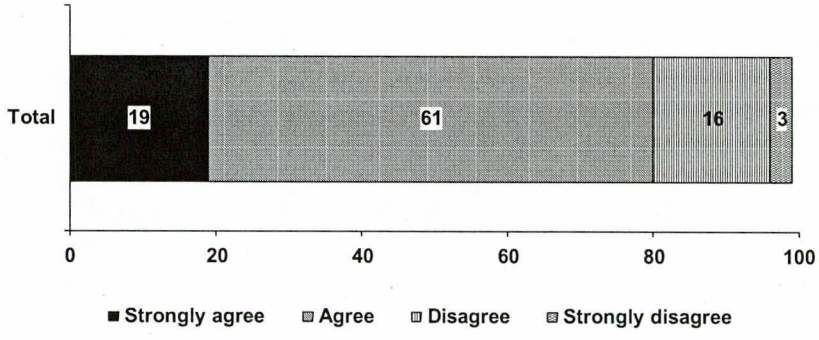
Food Safety

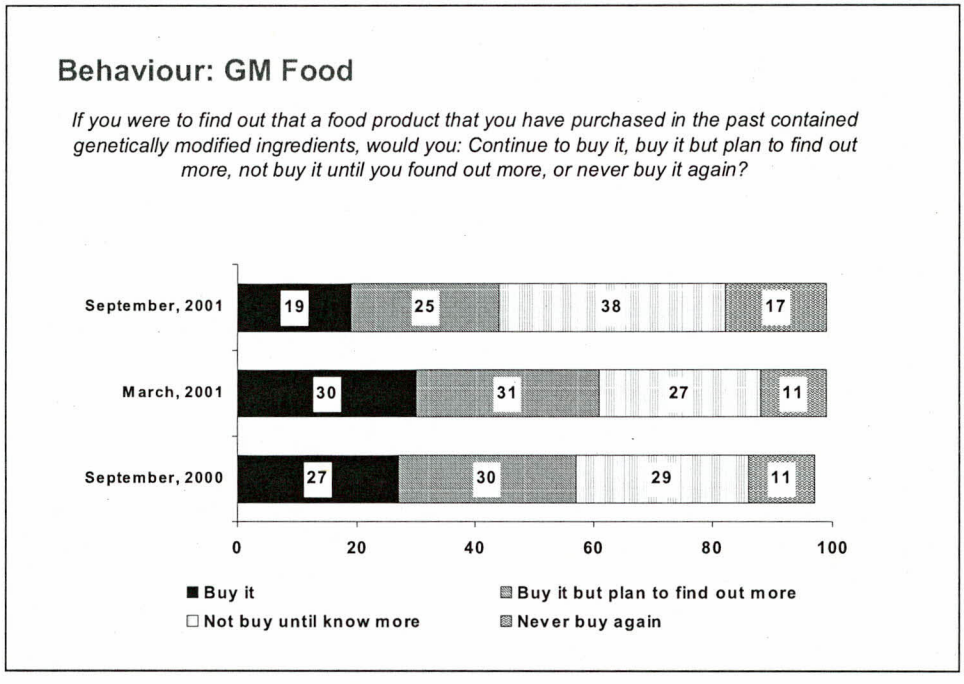
When I see a product on a store shelf, I assume it must be safe.



Food Safety: Government Testing

When I see a product on a store shelf, I assume that it must have been tested for safety by the government .





Specific Issues – Labeling

There was a strong expression of support for mandatory labeling of GM food in the research.

Informed choice is the overriding driver of opinion on this issue. It is not that most people want a way to distinguish GM food so they can stop buying it; it is more that they believe everyone should have that option and that labeling is the only way to ensure that people can choose.

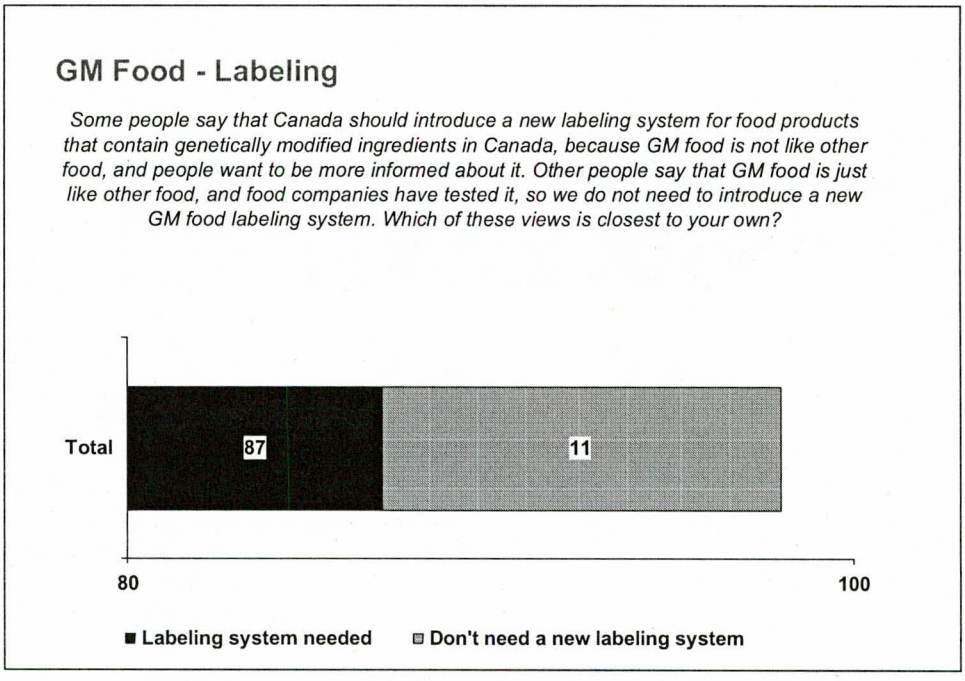
Most insist that labeling must be fully effective in providing choice. That leads them to a preference for mandatory labeling. Most in focus groups could not see the benefits of a voluntary system because the only test they would invoke to assess any system is that it lead to full compliance. That seemed, to most, to be the same outcome as a mandatory system would provide. The added benefit of a mandatory system, in their view, was that it would be easier to enforce by government, and therefore more likely to be complied with.

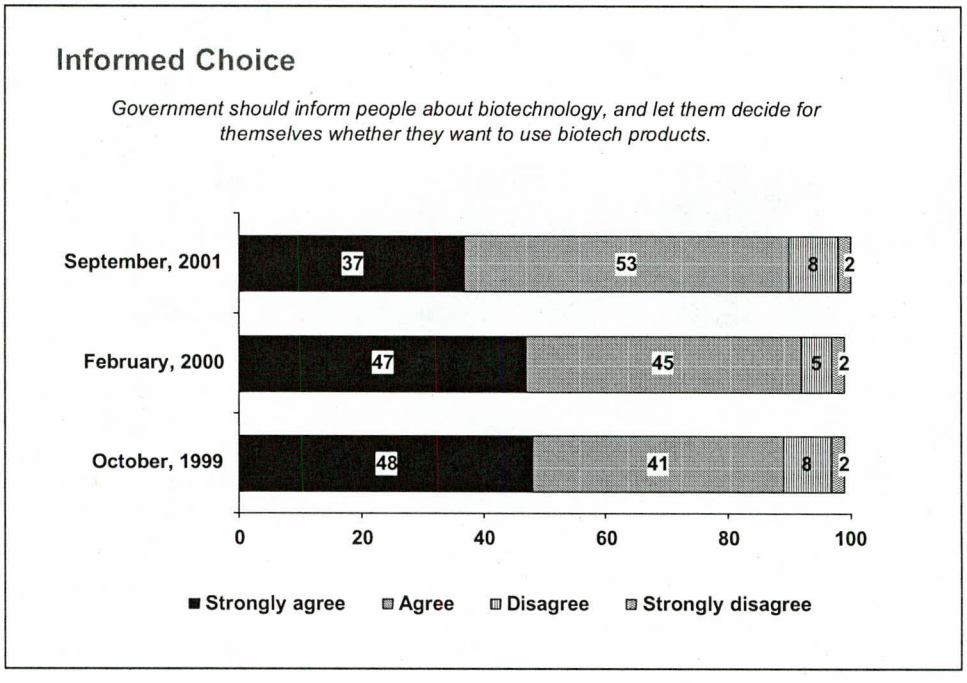
There were no counter-arguments that changed most peoples' minds.

Most were not persuaded that segregating food from farm to table would be difficult or inordinately costly. Most people (two-thirds) say they would pay 10% more to get labeling. It should be noted that this was not a true consumer market research design and will not accurately predict buying behaviour or price sensitivity. However, these results do show the degree to which the concept of informed consumer choice drives

opinion. Few believed, for instance, that labeling would make shoppers more concerned about GM foods and lead to a widespread refusal to buy GM foods.

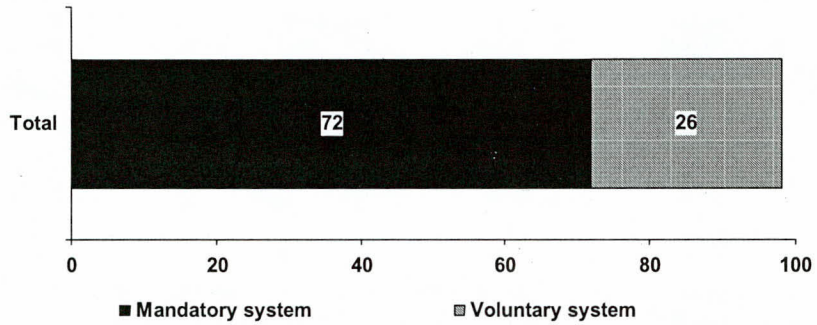
A discussion in the groups of some of the potential trade implications led to some concern about economic impact and job loss but, on the whole, moved few people.





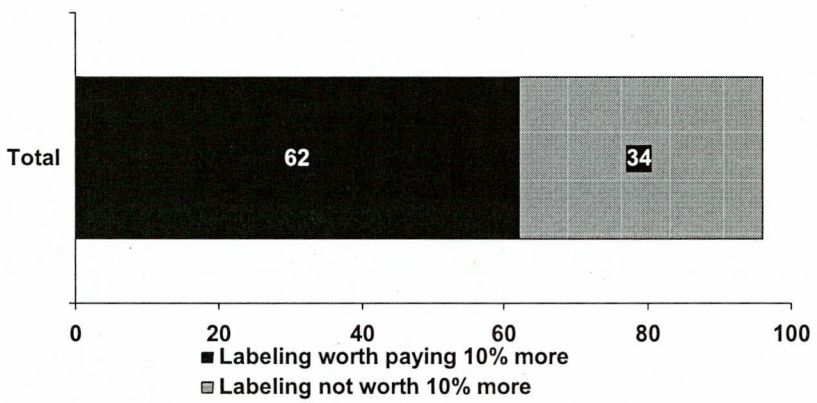
GM Food Labeling

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?



GM Food Labeling

Some people say that it is worth paying 10% more to have a GM food labeling system introduced. Other people say that having a GM food labeling system is not worth a 10% increase in the cost of food. Which of these views is closest to your own?

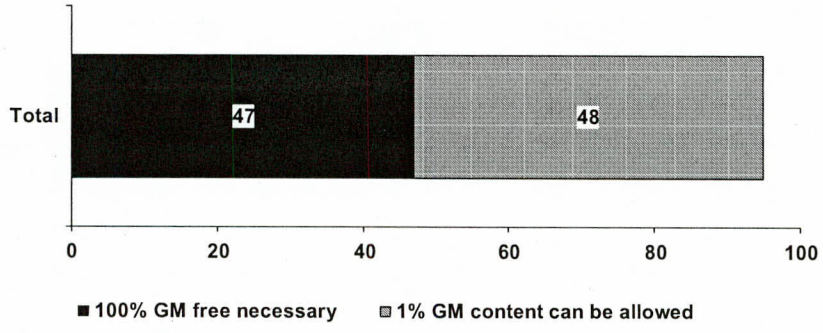


A2

When it came to the technical issue of whether foods containing traces of GM ingredients could be called GM free, about half insisted on 100% purity. About half would accept a 1% threshold, while only a third would accept a 5% threshold.

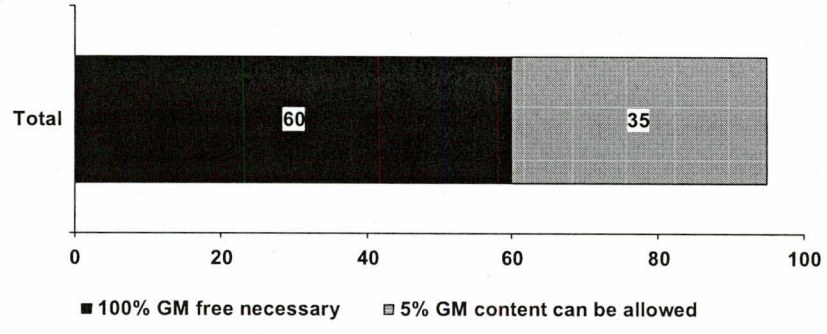
GM Food Labeling (1%)

If Canada introduced mandatory labeling of genetically modified food, standards for GM content would have to be established. Some people say that food should be 100% free of genetically modified ingredients in order for it to get a GM free label. Other people say that it is virtually impossible to ensure that there are no trace amounts of GM ingredients in food and that foods containing trace amounts totaling no more than 1% GM content should be allowed to carry a GM free label. Which of these views is closest to your own?



GM Food Labeling (5%)

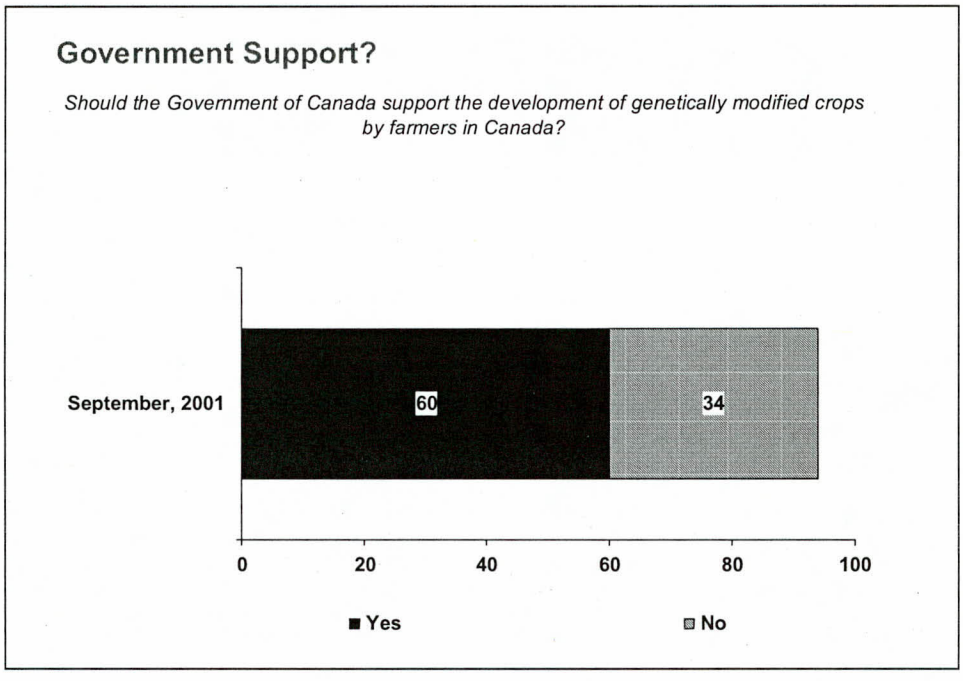
If Canada introduced mandatory labeling of genetically modified food, standards for GM content would have to be established. Some people say that food should be 100% free of genetically modified ingredients in order for it to get a GM free label. Other people say that it is virtually impossible to ensure that there are no trace amounts of GM ingredients in food and that foods containing trace amounts totaling no more than 5% GM content should be allowed to carry a GM free label. Which of these views is closest to your own?



Specific Issues -- Genetically Modified Crops

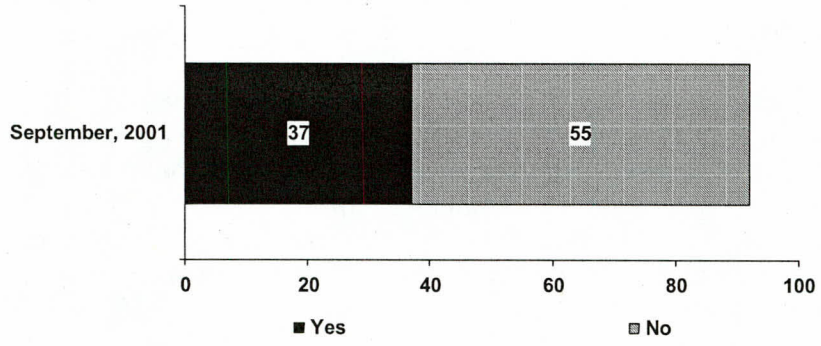
This wave of research asked new questions about farming and GM crops. The results show the mix of opinion and ambivalence surrounding the technology absent strongly articulated personal benefit.

Though a majority believes the government should support the development of genetically modified crops by Canadian farmers, they are more split on how essential GM crops are to ensuring that our farmers are competitive. And the support for a government role begins to dissipate if it means developing products that are banned in some foreign markets.



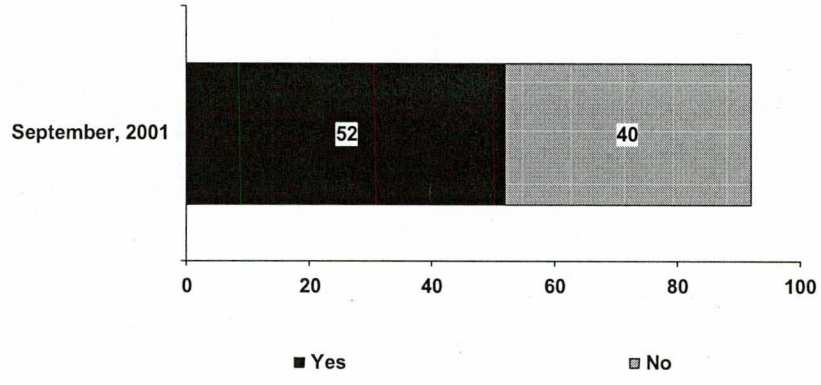
If Banned?

Should the Government of Canada support the development of genetically modified crops by farmers in Canada even if these products might be banned in some countries?



Essential to Compete?

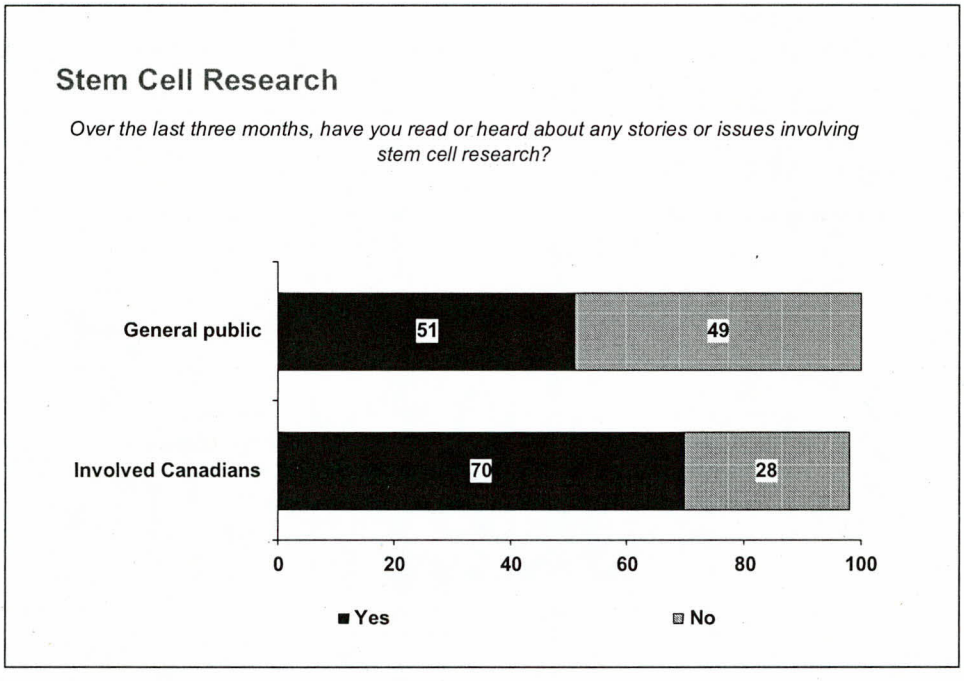
In your view, is allowing the farming of genetically modified crops essential to ensuring that Canadian farmers can compete in the world market?

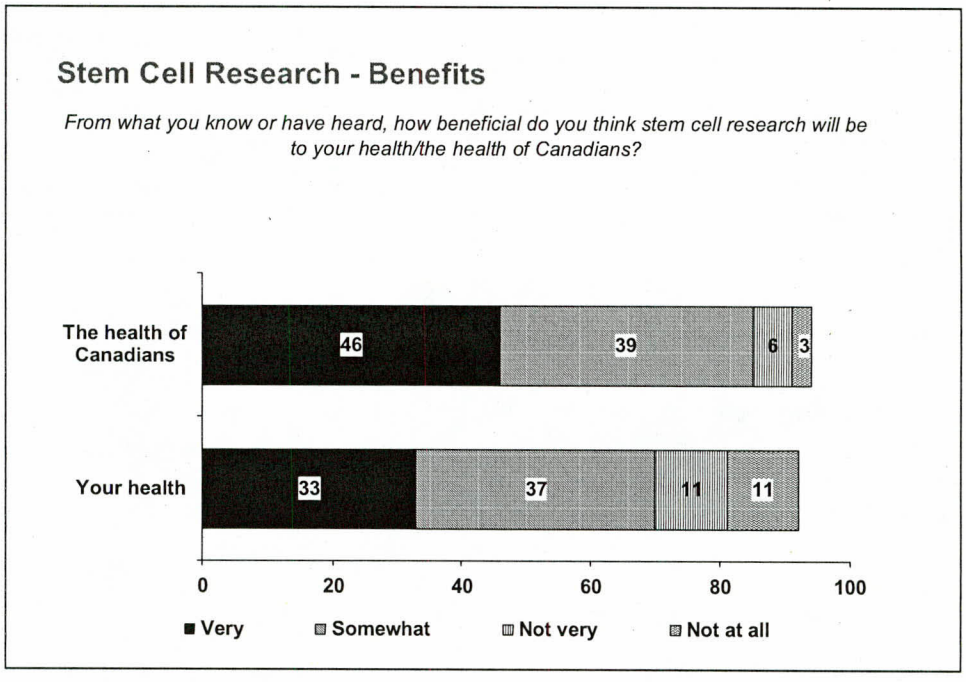


Specific Issues – Stem Cell Research

The issue of stem cell research has reached a surprising level of awareness and acceptance among Canadians during the relatively short time it has been topical. More than half have heard of stem cell research, with the number rising to about 70% of Involved Canadians.

In focus groups, about a quarter of participants had a real sense of what was involved and why the area had become controversial – again, a surprising level of engagement. It appears, on the basis of the discussions, that most people have internalized that the research will lead to significant health benefits. For instance, about a third believe that stem cell research will be "very beneficial" to them personally. That, in turn, has driven interest in the research and increased awareness of its potential.



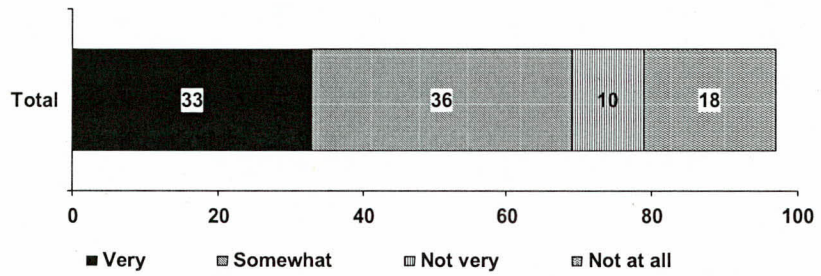


Most Canadians (about 70%) say they find stem cell research acceptable, with a determined minority (about 1 in 5) finding it totally unacceptable.

The survey questionnaire deliberately posited a complex argument that went to the heart of the current debate in the United States. It set the potential of health breakthroughs alongside the need to use tissues from discarded embryos to see if the benefits trumped potential ethical concerns. They did by an overwhelming margin. However, when the benefits argument was removed from the equation, opposition grew, indicating the internal mix of views that people tend to hold about various biotechnology applications. As further evidence, survey respondents split exactly in half in assessing the wisdom of President's Bush's decision to restrict government funding to only research involving existing stem cells gathered from embryos prior to his decision. Focus group discussion indicated that people tend to assume embryos are aborted fetuses (raising negative views about use of their tissue) unless it is made explicit that they are weeks-old frozen products of in-vitro fertilization that were to be discarded in any case (in which circumstance there is no much less concern about their use).

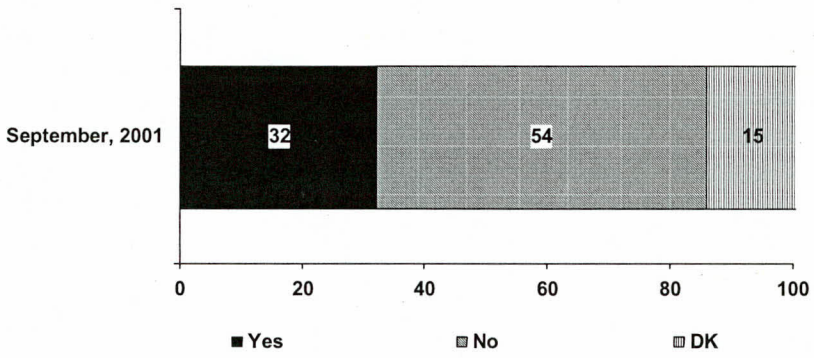
Stem Cell Research Acceptability

Stem cell research involves the use of certain human cells to study diseases and their cures. Unlike other types of human cells, stem cells have the unique ability to reproduce any type of cell in the human body. Many scientists say that research in this field will likely produce the most important healthcare breakthroughs of at least the next decade. However, to conduct this research, scientists have to get stem cells. They have been getting them from embryos that are less than 4 weeks old that have been developed and frozen in fertility clinics, and are going to be discarded because the parents do not need them. How acceptable is it that this type of research be allowed in Canada?

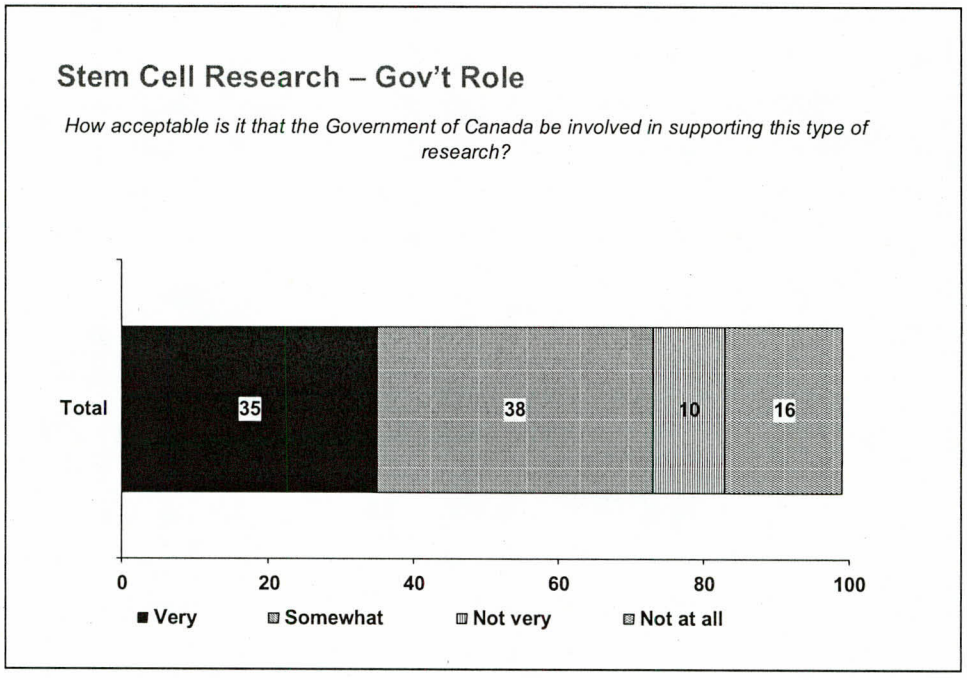


Use of Embryos

On balance, if discarded embryos are the only way to get stem cells, do the potential benefits outweigh the potential drawbacks?



Most respondents want the government involved in supporting stem cell research. In focus groups, government involvement enhanced comfort with the research because it meant to most that government would insist on standards and regulation. Those standards would include ethical guidelines in the minds of most people.



Specific Issues – Information Seeking

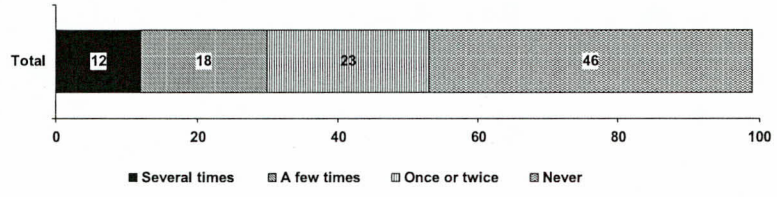
The various research waves have tried, in numerous ways, to provide insights to help inform biotechnology communication strategies in aid of furthering the Canadian Biotechnology Strategy's mandate of citizen engagement. Those results are available in previous reports. This time, the research worked to establish the degree and extent of information-seeking behaviour displayed in connection with information about biotechnology.

The results show that, in the main, most people say they are not actively seeking out this kind of information. This is thoroughly congruent with the overall findings that most people are neither deeply interested nor engaged in the issues. Almost 7 in 10 respondents said they had never sought information or had done so only one or two times. A further 18% said they had done so a "few" times. And even of those who had

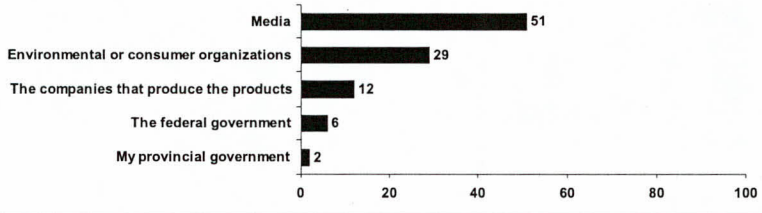
sought information at least occasionally, half did so relatively passively through media consumption.

Information

How often have you actively sought out information about biotechnology products and/or studies that have been carried out to evaluate their safety?

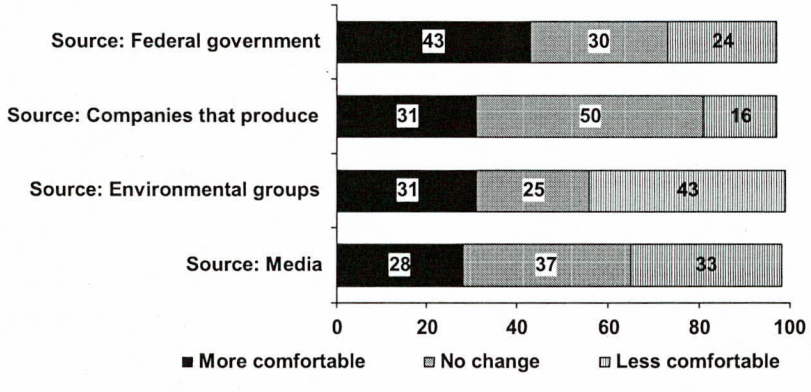


Did you seek that information primarily from:



Information

And did the information you read make you feel more comfortable, less comfortable, or have no impact on your view toward the technology? (asked of those who sought information)



Qualitative Findings

Introduction

In wave 5, a total of 10 focus groups were conducted, in Vancouver, Saskatoon, Toronto, Halifax and Montreal. In each city, one group was conducted with Involved Canadians and one with the general public. Involved Canadians are Canada's opinion leaders; they are more engaged and involved in public affairs issues than most members of the general population. In this wave of research, the main new areas of investigation related to GM food labeling and stem cell research.

Awareness and Familiarity

Top-of-mind awareness of biotechnology continues to grow at a steady pace. At least half of the respondents in these focus groups claimed they had had a conversation about some aspect of biotechnology over the past few months. However, people reported lower recall of media coverage about biotechnology in recent months. Many suggested that they heard more about the issue(s) a year ago than they are hearing today. This is likely due in part to the 9/11 tragedy and the degree to which it dominated the news coverage at the time.

Biotechnology is regarded by most people as both potentially positive and potentially negative, reflecting the continuing "move toward the middle" that comes with higher awareness. Involved Canadians tend to have more positive overall impressions about biotechnology and larger unaided awareness of the benefits it can provide in health and other areas than members of the general public. While most members of the general public are aware of biotechnology, when prompted their reference points tend to involve more controversial applications and associated risks, such as human or animal cloning, and fewer benefits than Involved Canadians cite. This translates into more mixed sentiment among this segment of the populace.

Oftentimes, initial associations tend to be a barometer of prevailing attitudes toward biotechnology. Those who initially cite health or medical benefits tend to lean positively in their outlook toward the technology. Those who tend to initially cite GM food applications tend to lean negatively. Consistent with previous waves, there remains virtually no awareness of forestry applications or environmental applications like bioremediation, biomass energy or new genetic detection technologies. Awareness of

certain breakthrough health technologies, like stem cell research and new applications to treat diseases like diabetes and Alzheimer's garnered surprisingly high levels of recall.

The differences between cross-breeding and directly altering DNA are well understood by Involved Canadians. While some members of the general public continue to have difficulty making this distinction, a majority of general public respondents in the groups were able to do so. Nevertheless, Canadians make clear distinctions between these different "types" of biotechnology, and express a much higher level of concern about modern types of genetic manipulation. These distinctions will be elaborated upon later in this report.

Canadians continue to harbour much deeper concern about "genetic modification" than they do about "biotechnology." In many ways, the two phrases connote two sides of the same coin – biotechnology being the positive side that involves the scientific research and the applications that aid human health, and genetic modification involving human cloning, eugenics and controversial ethical questions. Biotechnology tends to be understood as the "basic science" of how genes work, with applications that "aid" human health as well as other fields. All had heard of biotechnology and of genetic modification.

In contrast, most have no understanding of "genomics" at all, beyond a vague notion that it probably involves genes. However, focus group discussions reveal that underlying connotations of the word tend to lean negatively. The main reason derives from the word itself. The "*omics*" at the back end of the word seems to connote the economic aspect of genetic research, the "profit motive" that underlies some of the work in this field, and this catalyzes fears among some about these technologies being pursued for profit only, to the exclusion of certain groups in society and potentially not for the "right reasons."

Support/Opposition

By and large, the support/opposition balance continues to hover in the range of 2 to 1 support for the technology, with the caveat that most people wish to assess applications of the technology on a case-by-case basis.

As found in previous waves, this balance of opinion did not vary significantly in most regions of the country although, as has been observed in past waves, the depth of negative sentiment was greater in the Vancouver focus groups than in other centres – the balance being more in the range of 3 to 2 support for the technology among respondents in Vancouver. The heightened concern in Vancouver was associated almost exclusively with GM food. On all other applications, the balance of support and opposition was similar everywhere. On the other hand, there was no evidence of higher

levels of support for biotechnology (or GM food in particular) in Saskatoon, where a large cluster of agricultural biotechnology research resides.

Applications

In these focus groups, a number of new applications were tested with respondents to gauge depths of support and opposition toward each. The results suggest a continuing move toward the middle on most applications. In addition, this wave of research provides some evidence of negative attitudinal trends in the food applications of biotechnology. Nevertheless, there is far greater support than opposition for most applications tested in this wave of research.

The overriding principle governing people's attitudes regarding biotechnology applications, irrespective of whether they find them acceptable or not, is "informed choice."

Informed choice is a crucial element of how Canadians believe decision making should proceed in relation to these technologies. It has significant implications for environmental applications in particular. Respondents say that in the case of health applications, they have the choice of whether they want to take them and the risk that goes along with them, something that is not available with food (absence of labeling) or environmental applications (indirect impact). This raises the risk side of the equation for these applications.

Given the events of 9/11, a supposition was made going into the groups that there might be a negative "halo effect" of bioterrorism on sentiments toward biotechnology and its applications. While bioterrorism was certainly a concern to people, it was found to have little connection to the subject of biotechnology, and no discernible negative affect. In fact, some respondents suggested that biotechnology can help to combat bioterrorism through the development of vaccines.

To assess applications, people usually employ the same set of criteria. In general, this list represents the order of importance that people assign to their assessments of each application:

- The potential benefits to them/their family
- The purpose of the research or the application (if the purpose is deemed to be in the public interest, support grows; if not, it recedes)
- Assurances that the application is regulated, and will be studied for long-term impacts
- Assurances that ethical issues are considered (in the case of applications that involve humans, cross orders of organisms, or are highly invasive)

The food applications tested in this wave included GM wheat, cloned animals (like cows) for food or milk, and GM corn. As a whole, GM food applications generated

higher levels of resistance from respondents than observed in the past. While people have heard more about these applications, they have not heard more about benefits to them or their families.

The health applications tested in this wave included an application developed to potentially cure Type One diabetes by inserting GM cells into the pancreas to stimulate insulin production, and the development of "gene chips" to detect genetic modification of cells in an organism, or to detect potential defective genes in human health. Consistent with previous waves of focus groups, the benefits were believed to outstrip the risks of these applications because of their impact on health and safety.

The environmental applications tested in this wave included biofuels, as well as biologically engineered bacteria or enzymes used to clean up toxic waste or oil spills. Consistent with previous waves of focus groups, these applications are generally seen to offer more benefits than risks, although a sizeable number of people express high levels of concern about long-term ecosystem impacts.

Detailed summaries of reaction to the newly tested applications:

- Cloning animals, such as cows for milk/meat to provide better and larger volumes of food was rejected outright by virtually all respondents in all groups. This type of application was not seen as providing a benefit to them - the benefit of this application was seen to accrue to farmers. Moreover, the purpose of the application was not deemed reasonable. The only purpose that people could identify is that this would be more lucrative for people who own the cloned cows. Finally, a few of the most well-informed Involved Canadians raised questions about how genetic diversity would be maintained if such applications were allowed because without genetic diversity the risk of harmful genetic mutations within the cow population would increase substantially, as would the risk of the entire population being at greater risk to certain diseases or viral epidemics.
- GM wheat garnered mixed support from a majority but a sizeable minority of respondents expressed clear reservations about this application, and they tended to feel fairly strong about their position. Like the cloned animals, the benefit to them of this technology was unclear. The benefits were seen to accrue to farmers or seed companies (Monsanto was mentioned several times regarding this application). When asked what is different about GM wheat and GM soy or GM corn, there was a sense that wheat is a more pervasive foodstuff and would be more difficult for people to avoid if they chose to. When the issue of benefit to farmers emerged in discussion, in four of the ten groups it was suggested that a farmers' association had come out against the technology. In each case, the prevailing sentiment quickly became "if farmers didn't want it, why should I"?
- Unlike most other applications that have been tested in the five waves of biotechnology focus groups since 1999, there was an unusually high level of awareness of the diabetes application, particularly in Involved Canadian focus groups. In a few groups it came up unprompted at the outset of the discussion, as one of the benefits of the technology. After further discussion, people expressed a very positive reaction to this application. Although there was

widespread acknowledgement of the risks, the benefits were viewed to be so substantial that there was nearly 100% approval.

- The concept of genetic detection technology initially garnered positive reactions but there was some concern raised, especially in the general public groups, about the active enzymes or ingredients in these technologies. Significant testing and research would be required before this application would be acceptable.

Risk

Following discussion of various applications and their benefits and risks, respondents were asked how risks associated with these technologies rank in relation to other risks that they face, from events such as car accidents and severe weather to substances like pesticides, nuclear waste and pollutants in the air and in tap water.

Respondents ranked the perceived risks of GM food and bio-health applications much lower than virtually all of the others. Risks associated with nuclear waste, pesticides as well air pollution were believed to be much greater than GM food. Bio-health applications were viewed as posing minimal risk in comparison with the others, lower than the perceived risks associated with drinking tap water.

While GM or bio-engineered products were placed in a much lower tier of risk than the other events or products, in several groups people were quick to assert that the decision to expose themselves to the risks tested in the groups was not deliberate because they have no way of identifying them. This often led to a longer discussion about the importance of informed choice. Unlike the other risks, people felt that exposure to the risks of biotechnology can and should be controlled by individuals, that those who are prepared to take the risk should have a choice to use the products or be exposed to them, because they choose to gain their benefits.

The main perceived risk associated with GM or bio-engineered products is risk to human health. Unprompted, most people don't initially consider environmental risks, as they generally haven't thought about environmental applications, but when prompted about environmental risks, people express concern.

Respondents were asked about what connections they make between environmental and health impacts of products like those made through biotechnology. The result was universal - people make close connections between these impacts and all believe that environmental problems eventually affect human health.

One of the new risk-related issues investigated in these focus groups involved the perceived differences between bio-engineering and traditional cross- and selective breeding processes. In previous waves of focus groups and surveys, people have seen these types of applications as being fundamentally different.

All but the most ardent supporters of the technology believe these types of applications are different. When respondents were asked to articulate why, their reasons tended to revolve around two issues – the invasiveness of the process and, more importantly, a sense of greater risk associated with the fact that modern bio-engineering both in terms of the speed at which genetic changes are brought about and the difficulty in monitoring them. To quote one respondent, "cross-breeding is like moving at 30km/hr, but direct genetic splicing moves us to 500km/hr....we are less capable of figuring out how things are affected when we go at such a fast speed than we have been when things have been moving at a slower speed."

How these modern processes significantly raise concerns about risk has to do with the perceived "irreversibility" of the potential negative impacts. Because of the speed of these developments, some people say that even scientists can't know the impacts and, once discovered, they will be very difficult or impossible to reverse. This sense of potential irreversibility, when wedded to concern about long-term impacts, represents the central driver of perceived risk about biotechnology. The only way to mitigate concern about these risks is to dedicate resources to demonstrate strong stewardship of the technology, grounded in long-term research of impacts.

When the issue of long-term risk was raised in focus groups, people were asked what in their view constitutes the "long term," to help define an appropriate length of study of new applications. While opinions varied somewhat, long term is most often defined as two to three generations of the potentially affected organism and its surrounding ecosystem.

Stem Cell Research

Awareness of stem cell research was remarkably high in these focus groups, especially among Involved Canadians. Most people have heard two things about this technology – that it will provide substantial health benefits and that U.S. President George Bush banned certain types of this research.

As found in the survey, stem cell research was found to be strongly acceptable to all but the strongest opposers of biotechnology, in the range of 4-5 to 1 support. While some people raised ethical concerns, these considerations were consistently trumped by the potential health benefits that this technology may provide. As found regarding many

other potentially invasive applications, Canadians are generally resistant to the idea of imposing a set of ethical standards on others unless there is no clear public-purpose rationale behind the application (in which case, people are much more likely to reject applications based on ethical considerations, human cloning being the prime example). Even when the use would involve discarded embryos from fertility clinics, the technology is seen to offer such substantial benefits to society that people accept it. If stem cells could be harvested from umbilical cords, people express complete support for the technology. However, if stem cell research required getting stem cells from aborted fetuses, a sizeable number of people would strongly resist this type of research.

Government Roles and Responsibilities

As found in previous waves of biotechnology research, there is little to no awareness of regulatory systems governing biotechnology in Canada, and only the most general sense of which departments are involved in the stewardship of biotechnology. The "Food and Drug Administration" is the agency most often cited by Canadians when asked who is involved in approving these products. Most don't know that the FDA is a U.S. agency, not a Canadian one. That being said, Canadians continue to express comfort with federal government safety and regulatory systems. The belief that "somebody, somewhere is probably monitoring these technologies" remains pervasive, especially among the general public.

When the responsible departments are mentioned to people, Health Canada, which has a higher profile than the others, gets slightly better marks than Environment Canada or CFIA. However, generally the marks assigned are similar. Most importantly, people generally believe the intentions are right and things are done to the best extent possible. However, there are concerns that government can't keep up with the risks of the technology, which again often leads to support for long-term research and a renewed commitment to government stewardship.

One growing trend which these focus groups pointed towards was a preferred emphasis on international cooperation in the stewardship of these technologies. Canadians see substantial value in establishing rules and regulations to govern biotechnology in concert with other countries.

At the same time, sizeable majorities believe that Canada should work hard to make sure the nation is an international leader in developing these technologies.

Interestingly, they do not see the contradiction between the limits they place on a government role and the likelihood of this international leadership in the development of the technology. There is a sense that these developments will occur in the private sector and that it will choose to do the work in Canada because there are smart people

here and the health care system is good. There is a substantial disconnect between wanting something like this to occur and understanding how it is going to get done.

GM Food Labeling

If these focus groups are an indication, opinions are hardening on GM food labeling in favour of a mandatory labeling system. Consistent with the survey results, a substantial majority of focus group participants, in the range of 80-90%, expressed support for a GM labeling system.

At its core, GM food labeling is fundamentally about one issue: informed choice. Informed choice is the most important and powerful value that governs attitudes about these technologies and nowhere does it play a more important role in decision making than GM food. In addition, Canadians believe that labeling is not and should not be difficult to achieve, and no arguments otherwise will sway opinion. Indeed, the more arguments about the complexity of labeling are raised, the more cynical and suspicious respondents get about the motives of government and/or the pressures that corporations might be exerting on government to resist introducing a labeling system.

Some key arguments against labeling were tested to evaluate the interest of opinion, including a potential increase of 10-15% in the price of food, as well as trade and distribution problems. None of these arguments had any impact on attitudes.

Respondents were also asked about preferences between a voluntary and a mandatory labeling system. The survey findings were confirmed – there was a clear preference for a mandatory system. Most people couldn't figure out why a voluntary system would be better for them or for the companies involved. In the words of one Involved Canadian: "if a voluntary system produces the same result at the same speed, presumably the costs to the companies would be the same, why not just have a mandatory system"?

People were also asked about preferences regarding trace amounts of GM ingredients in food. A significant number of respondents insisted that a GM free label would require no less than a 100% GM free product, while a slight majority expressed a willingness to allow 1% trace ingredients, knowing that there are limitations to the degree to which these products can be separated. However, only a handful were prepared to allow a 5% trace ingredient threshold. Overall, a 1-2% threshold would probably be acceptable to Canadians but acceptability will likely recede significantly for thresholds greater than that.

APPENDIX A

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?

   Canada generally headed in the right direction 61
   Country is headed in the wrong direction..... 32
   Don't know..... 7

2. How would you rate the performance of the federal government overall, on a scale from 1, terrible, to 7, excellent, with 4 being neither good nor bad?

   Good 5-7..... 43
   Neutral 4..... 36
   Bad 1-3..... 21

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

   Positive..... 66
   Neutral..... 24
   Negative 7
   Don't know..... 3

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

   Positive..... 33
   Neutral..... 41
   Negative 20
   Don't know..... 6

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

Yes	48
No	50
Don't know	2

Biotechnology applies science to living things such as plants and animals in order to develop new products and processes. Biotechnology is sometimes referred to as life sciences, genomics **or genetic** modification.

6. Before today, had you ever talked about biotechnology with someone?

Yes	60
No	39
Don't know	0

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

Very familiar	6
Somewhat familiar	46
Not very familiar	35
Not at all familiar	13
Don't know	0

8. 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	8
Somewhat support	49
Somewhat oppose	22
Strongly oppose	12
Don't know	9

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

9. (a) Genetic testing of embryos for inherited diseases such as cystic fibrosis.

9ab

Strongly agree	18
Agree	51
Disagree	18
Strongly disagree	7
Don't know	6

(b) Taking human genes that fight disease and inserting them into plants, to help grow medicines for human consumption.

Strongly agree	9
Agree	55
Disagree	21
Strongly disagree	10
Don't know	6

10ab 10. (a) Corn that has been genetically modified to enhance its nutritional value.

Strongly agree	10
Agree	43
Disagree	30
Strongly disagree	13
Don't know	4

(b) Corn that has been genetically modified to be produced in higher volumes, so it will cost less at the grocery store.

Strongly agree	7
Agree	38
Disagree	35
Strongly disagree	17
Don't know	3

11ab 11. (a) Implanting animal genes in humans to treat medical problems.

Strongly agree	8
Agree	43
Disagree	30
Strongly disagree	13
Don't know	6

(b) Drugs that contain genetically modified material to treat diseases like cancer.

Strongly agree	23
Agree	60
Disagree	10
Strongly disagree	3
Don't know	4

12ab

12. (a) The use of genetically modified bacteria or plants to break down pollutants and toxic wastes.

Strongly agree	19
Agree	58
Disagree	12
Strongly disagree	6
Don't know	6

(b) Using genetically modified micro-organisms to mass-produce products like ethanol, which can be used as a source of fuel.

Strongly agree	14
Agree	56
Disagree	16
Strongly disagree	7
Don't know	7

13ab

13. (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	4
Agree	18
Disagree	43
Strongly disagree	32
Don't know	3

(K)

(b) The use of a "gene chip" that would enable scientists to detect products that contain genetically modified ingredients.

Strongly agree	11
Agree	58
Disagree	17
Strongly disagree	5
Don't know	9

14. (a) Wheat that has been genetically modified to resist certain pests in order to increase the volume of wheat grown.

14ab

Strongly agree	8
Agree	50
Disagree	25
Strongly disagree	13
Don't know	4

(b) Creating genetically modified fish that will grow larger more quickly.

Strongly agree	3
Agree	21
Disagree	46
Strongly disagree	27
Don't know	3

15ab

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

Strongly agree	14
Agree	57
Disagree	17
Strongly disagree	6
Don't know	6

(b) Products that utilize genetically modified grains, forest products and other agricultural products to generate energy, called biomass energy products.

Strongly agree	12
Agree	55
Disagree	17
Strongly disagree	7
Don't know	10

16. (a) Modifying genes in a micro-organism that will enable it to clean up environmental problems (called bioremediation).

Strongly agree	13
Agree	59
Disagree	13
Strongly disagree	6
Don't know	10

(b) Helping to cure Type One diabetes by inserting a gene into the pancreas that stimulates the insulin production process in humans.

Strongly agree	22
Agree	62
Disagree	7
Strongly disagree	4
Don't know	4

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

Excellent	1
Good	21
Fair	42
Poor	18
Don't know	17

18. 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	23
Not very familiar	42
Not at all familiar	30
Don't know	3

How much priority do you feel the federal government should attach to each of the following roles? Please use a scale of 1-7, where 1 is the lowest priority, and 7 is the highest priority.

19. Ensuring that the interests of the average Canadian are taken into account as policies are developed for the use of biotechnology.

7 highest priority	43
5-6 high priority	34
1-4 low priority	20
Don't know	2

20. Ensuring that Canada benefits from the economic opportunities which biotechnology offers.

7 highest priority	26
5-6 high priority	39
1-4 low priority	32
Don't know	3

21. Ensuring that the health of Canadians is protected against risks associated with biotechnology.

7 highest priority	63
5-6 high priority	22
1-4 low priority	13
Don't know	1

22. Ensuring that the environment in Canada is protected against risks associated with biotechnology.

7 highest priority	55
5-6 high priority	26
1-4 low priority	16
Don't know	2

23. Ensuring that Canada benefits from the new products and processes which biotechnology offers.

7 highest priority	27
5-6 high priority	41
1-4 low priority	28
Don't know	3

24. Ensuring that Canadians are informed about the role of government in biotechnology.

7 highest priority	44
5-6 high priority	34
1-4 low priority	21
Don't know	1

25. Making sure that regulations on biotechnology are being enforced.

7 highest priority	62
5-6 high priority	26
1-4 low priority	12
Don't know	1

26. Ensuring that any long-term impacts of biotechnology on the environment are being studied and addressed.

7 highest priority	61
5-6 high priority	24
1-4 low priority	14
Don't know	1

27. Ensuring that any long-term impacts of biotechnology on human health are being studied and addressed.

7 highest priority	66
5-6 high priority	20
1-4 low priority	13
Don't know	1

28. Helping Canadian biotechnology companies become more innovative and competitive.

7 highest priority	21
5-6 high priority	41
1-4 low priority	35
Don't know	3

29. Ensuring that biotechnology is being used in ethical ways.

7 highest priority	63
5-6 high priority	20
1-4 low priority	14
Don't know	3

30. 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	17
About the same	31
Don't know	28

3 labs

31. (a) Once a food product like corn genetically modified to resist insects has been evaluated and approved by the federal government, how confident are you about eating that product?

Very confident	17
Somewhat confident	44
Not very confident	20
Not at all confident	19
Don't know	1

(b) Once a heath product (for example, a drug) that contains genetically modified material has been evaluated and approved by the federal government, how confident are you about using that product?

Very confident	20
Somewhat confident	49
Not very confident	19
Not at all confident	11
Don't know	1

32ab

32. (a) Would you say that Environment Canada probably plays a major role, minor role, or no role in the regulation of biotechnology products in Canada?

Major role	41
Minor role	39
No role	6
Don't know	14

(b) Would you say that Health Canada probably plays a major role, minor role, or no role in the regulation of biotechnology products in Canada?

Major role	47
Minor role	34
No role	4
Don't know	14

33ab

33. (a) Would you say that Environment Canada ***should play*** a major role, minor role, or no role in the regulation of biotechnology products in Canada?

Major role	86
Minor role	10
No role	1
Don't know	2

(b) Would you say that Health Canada ***should play*** a major role, minor role, or no role in the regulation of biotechnology products in Canada?

Major role	92
Minor role	6
No role	1

(L)

Don't know 1

34. How confident would you say you are in the ability of Health Canada to ensure that biotechnology products in its area of responsibility are safe?

Very confident 19
Somewhat confident 56
Not very confident 17
Not at all confident 5
Don't know 3

35. How confident would you say you are in the ability of Environment Canada to ensure that biotechnology products in its area of responsibility are safe?

Very confident 17
Somewhat confident 55
Not very confident 20
Not at all confident 5
Don't know 3

36. How confident would you say you are in the ability of the Canadian Food Inspection Agency to ensure that biotechnology products in its area of responsibility are safe?

Very confident 19
Somewhat confident 51
Not very confident 21
Not at all confident 6
Don't know 2

37. 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?

Canada should develop its own standards 15
Work with others to develop international standards 83
Don't know 2

38. When making decisions about allowing biotechnology products, in general, which of the following approaches should be used: Products would be subject to scientific research and review by government, and if there are no ill effects found after 7-10 years of research, the product should be made available OR A precautionary principle would be followed, where if there is the possibility of some future potential risk, even if no ill effects have been found, the biotechnology product would not be made available?

Make product available after 7-10 years if no ill effects 51
Precautionary principle, don't make available 45
Don't know 4

There are many things that present risks to us in life. In terms of the safety of yourself and your family, compared to other risks in society, how much risk do the following issues present? Please use a 1-7 scale where 1 means a low level of risk, 4 means a moderate level of risk, and 7 means a high level of risk. (ROTATE)

39. Drinking water from the tap.

7 Very high 16
5-6 High 23
1-4 Lower 60
Don't know 1

40. A serious car accident.

7 Very high 23
5-6 High 29
1-4 Lower 46
Don't know 2

41. Air pollution or smog.

7 Very high 27
5-6 High 33
1-4 Lower 39
Don't know 1

42. Pesticides.

7 Very high	30
5-6 High	31
1-4 Lower	38
Don't know	1

43. Violent crime.

7 Very high	27
5-6 High	23
1-4 Lower	49
Don't know	1

44. Genetically modified food.

7 Very high	18
5-6 High	24
1-4 Lower	55
Don't know	2

45. Genetically modified pharmaceutical products (drugs).

7 Very high	14
5-6 High	26
1-4 Lower	57
Don't know	3

46. Severe weather conditions, like hurricanes or floods.

7 Very high	13
5-6 High	17
1-4 Lower	68
Don't know	2

47. Nuclear waste.

7 Very high	46
5-6 High	19
1-4 Lower	34
Don't know	2

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

48. (a) The government should increase its regulation of biotechnology.

Strongly agree	30
Agree	57
Disagree	7
Strongly disagree	1
Don't know	6

(b) Biotechnology is adequately regulated by the government.

Strongly agree	6
Agree	44
Disagree	27
Strongly disagree	8
Don't know	16

49. (a) The government should encourage the development of biotechnology, although there may be some unknown risks to human health.

Strongly agree	8
Agree	47
Disagree	32
Strongly disagree	9
Don't know	3

(b) If I knew that ongoing long-term safety research was going to be conducted on biotechnology products after they were approved for sale in Canada, it would make me feel comfortable enough to accept these products.

Strongly agree	15
Agree	61
Disagree	17
Strongly disagree	5
Don't know	1

50ab

50. (a) We have to accept some risk to achieve the benefits of biotechnology like new discoveries that improve the diagnosis and cure of serious illnesses.

Strongly agree	13
Agree	64
Disagree	19
Strongly disagree	3
Don't know	2

(b) We have to accept some risk to achieve the benefits of biotechnology like new foods that contain vitamins or medicines.

Strongly agree	7
Agree	52
Disagree	28
Strongly disagree	12
Don't know	2

51ab

51. (a) From what I know, genetically modified food presents me with few benefits over non-genetically modified food, but it presents many more risks.

Strongly agree	14
Agree	46
Disagree	28
Strongly disagree	4
Don't know	7

(b) From what I know, genetically modified health products (like drugs) provide me with few benefits over non-genetically modified health products (like drugs), but they provide many more risks.

Strongly agree	10
Agree	42
Disagree	31
Strongly disagree	5
Don't know	12

52ab 52. (a) If the best available evidence says that a particular use of biotechnology is safe, it should be allowed.

Strongly agree	11
Agree	68
Disagree	15
Strongly disagree	3
Don't know	3

(b) We have to accept some risk to achieve health benefits from biotechnology research.

Strongly agree	8
Agree	55
Disagree	28
Strongly disagree	8
Don't know	1

53ab 53. (a) Until more is known about the risks, government should slow the use of biotechnology.

Strongly agree	19
Agree	51
Disagree	24
Strongly disagree	4
Don't know	3

(b) Government should not encourage the development of biotechnology, because there may be some unknown risks.

Strongly agree	7
Agree	32
Disagree	51
Strongly disagree	7
Don't know	3

54. 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	15
Agree	70
Disagree	8
Strongly disagree	3
Don't know	4

55ab 55. (a) Government should inform people about biotechnology, and let them decide for themselves whether they want to use biotechnology products.

Strongly agree	37
Agree	53
Disagree	8
Strongly disagree	2
Don't know	2

(b) Government should use its expertise to make decisions about which products should be available, on behalf of consumers.

Strongly agree	16
Agree	61
Disagree	17
Strongly disagree	4
Don't know	2

5a b

56. (a) If negative long-term environmental impacts of a biotechnology product were discovered, it is unlikely that they would be able to be reversed by scientists.

Strongly agree	8
Agree	47
Disagree	31
Strongly disagree	3
Don't know	12

(b) If negative long-term environmental impacts of a biotechnology product were discovered, it is likely that they would be able to be reversed by scientists.

Strongly agree	4
Agree	41
Disagree	40
Strongly disagree	9
Don't know	7

5 a b

57. (a) If negative long-term health impacts of biotechnology product were discovered, it is unlikely that they would be able to be reversed by scientists.

Strongly agree	6
Agree	44
Disagree	34
Strongly disagree	3
Don't know	12

(b) If negative long-term health impacts of a biotechnology product were discovered, it is likely that they would be able to be reversed by scientists.

Strongly agree	3
Agree	41
Disagree	38
Strongly disagree	9
Don't know	9

58. Any negative long-term effects of a biotechnology product on the environment will have an effect on human health in the long term.

Strongly agree	21
Agree	60
Disagree	12
Strongly disagree	1
Don't know	5

59. (a) Biotechnology applications in the environmental field could be a significant benefit to the Canadian economy.

59a-7c

Strongly agree	12
Agree	64
Disagree	13
Strongly disagree	3
Don't know	8

(b) Biotechnology applications in health could be a significant benefit to the Canadian economy.

Strongly agree	10
Agree	67
Disagree	15
Strongly disagree	2
Don't know	6

(c) Biotechnology applications in agriculture could be a significant benefit to the Canadian economy.

Strongly agree	10
Agree	67
Disagree	14
Strongly disagree	2
Don't know	6

(4)

60. If the Government of Canada is going to be involved in supporting the development of new health, environmental and agricultural biotechnology products, it should be just as involved in developing technologies that will be able to monitor and control the impact of these new products.

Strongly agree	33
Agree	62
Disagree	3
Strongly disagree	1
Don't know	2

61. (a) When I see a product on a store shelf, I assume that it must be safe.

Strongly agree	15
Agree	55
Disagree	23
Strongly disagree	5
Don't know	2

(b) When I see a product on a store shelf, I assume that it must have been tested for safety by the government.

Strongly agree	19
Agree	61
Disagree	16
Strongly disagree	3
Don't know	1

62. Over the last three months, have you read or heard about any stories or issues involving stem cell research?

Yes	57
No	42
Don't know	1

63. (a) From what you know or have heard, how beneficial do you think stem cell research will be to your health?

63abc

Very beneficial	33
Somewhat beneficial	37
Not very beneficial	11
Not at all beneficial	11
Don't know	8

(b) From what you know or have heard, how beneficial do you think stem cell research will be to the health of Canadians?

Very beneficial	46
Somewhat beneficial	39
Not very beneficial	6
Not at all beneficial	3
Don't know	6

Stem cell research involves the use of certain human cells to study diseases and their cures. Unlike other types of human cells, stem cells have the unique ability to reproduce any type of cell in the human body. Many scientists say that research in this field will likely produce the most important healthcare breakthroughs of at least the next decade. However, to conduct this research, scientists have to get stem cells. They have been getting them from embryos that are less than 4 weeks old that have been developed and frozen in fertility clinics, and are going to be discarded because the parents do not need them.

64. How acceptable is it that this type of research be allowed in Canada?

b

Very acceptable	33
Somewhat acceptable	36
Not very acceptable	10
Not at all acceptable	18
Don't know	3

65. How acceptable is it that the Government of Canada be involved in supporting this type of research?

Very acceptable	35
Somewhat acceptable	38
Not very acceptable	10
Not at all acceptable	16
Don't know	2

66. On balance, if discarded embryos are the only way to get stem cells, do the potential benefits outweigh the potential drawbacks?

Yes	32
No	54
Don't know	15

67. Some stem cells are gathered from embryos that are created in laboratories specifically for the purpose of conducting scientific research. Does this make the research more acceptable, less acceptable, or make no difference to your view?

More acceptable	24
Less acceptable	19
Makes no difference	54
Don't know	3

68. U.S. President George Bush recently decided that in the United States, government funding would be restricted to only research involving existing stem cells gathered from embryos prior to his decision. On a scale of 1-7, with 1 being a bad decision and 7 being an excellent decision, how was this decision?

1-3	39
4	19
5-7	39
Don't know	3

69. When it comes to environmental protection, should biotechnology products be governed by mandatory rules set by government, or by voluntary measures carried out by organizations in the biotechnology sector?

Mandatory rules set by government	76
Voluntary measures	18
Don't know	6

70. 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	11
Somewhat comfortable	33
Somewhat uncomfortable	30
Very uncomfortable	24
Don't know	2

71. If you were to find out that a food product that you have purchased in the past contained genetically modified ingredients, 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	19
Buy it but plan to find out more	25
Not buy it until you knew more	38
Never buy it again	17
Don't know	1

72. In your view, is allowing the farming of genetically modified crops essential to ensuring that Canadian farmers can compete in the world market?

Yes	52
No	40
Don't know	8

Bab.

73. (a) Should the Government of Canada support the development of genetically modified crops by farmers in Canada?

Yes	60
No	34
Don't know	6

(b) Should the Government of Canada support the development of genetically modified crops by farmers in Canada even if these products might be banned in some countries?

Yes	37
No	55
Don't know	8

74. 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?

Need a new labeling system	87
Don't need a new labeling system	11
Don't know	2

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.

75. Some people say that it is worth paying 10% more to have a GM food labeling system introduced. Other people say that having a GM food labeling system is not worth a 10% increase in the cost of food. Which of these views is closest to your own?

Labeling system worth 10% increase	62
GM food labeling system is not worth a 10% increase	34
Don't know	4

76. 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?

Need govt regulations for labeling	72
Can create voluntary system for labeling	26
Don't know	2

77. If Canada introduced mandatory labeling of genetically modified food, standards for GM content would have to be established. Some/Other people say that food should be 100% free of genetically modified ingredients in order for it to get a GM free label. Other/Some people say that it is virtually impossible to ensure that there are no trace amounts of GM ingredients in food and that foods containing trace amounts totaling no more than **1%/5%** GM content should be allowed to carry a GM free label. Which of these views is closest to your own?

Need 100% free to get GM free label	47
1% amount ok for GM free label	48
Don't know	5

Need 100% free to get GM free label	60
5% amount ok for GM free label	35
Don't know	5

78. People have suggested a number of different concerns about genetically modified food products. Of the four below, which is the one that is the greatest concern to you? (ROTATE)

The long-term risk they might cause for the environment	14
The long-term risk they might cause for human health	68
That there is something unnatural about these products	5
That the processes involved raise ethical concerns	5
DK	3

79. People have suggested a number of different concerns about genetically modified health products (like drugs that contain GM material). Of the four below, which is the one that is the greatest concern to you? (ROTATE)

The long-term risk they might cause for the environment	9
The long-term risk they might cause for human health	69
That there is something unnatural about these products	8
That the processes involved raise ethical concerns	10
DK	3

80. People have suggested a number of different concerns about genetically modified environmental products (like GM organisms that clean up toxic waste). Of the four below, which is the one that is the greatest concern to you? (ROTATE)

The long-term risk they might cause for the environment	25
The long-term risk they might cause for human health	59
That there is something unnatural about these products	6
That the processes involved raise ethical concerns	6
DK	3

81. How often have you actively sought out information about biotechnology products and/or studies that have been carried out to evaluate their safety?

Several times	12
A few times	18
Once or twice	23
Never	46
DK	1

82. Did you seek out that information primarily from:

The federal government	6
My provincial government	2
The companies that produce the products	12
Environmental or consumer organizations	29
Media	51

83. (If answered yes to question above) - When you read that information, did you feel much more comfortable, more comfortable, less comfortable or much less comfortable about these products, or did it have no impact?

Much more comfortable	4
More comfortable	30
Less comfortable	25
Much less comfortable	9
No impact	32
Don't know	1

(1)

APPENDIX B

Moderator's Guide

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 (10 min)

- 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 (you have not heard of it before).
    - Biotechnology
    - Genetic modification
    - Genomics

Definition: Biotechnology applies science and engineering to living things like plants and animals to create new products and processes. It includes numerous applications, everything from cross-breeding plants to genetic testing to screen for inherited diseases. Aspects of biotechnology include life sciences, genomics, and genetic modification.

Applications (20 min)

- Biotechnology has applications in a number of fields. Can you recall any that you have heard of?
- Are you interested in this subject? Is this a subject you follow closely in the news, or not? Compared to other issues, how closely do you follow issues related to biotechnology?

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

(DISCUSS 3, ROTATED FOR EACH GROUP, INCLUDING AT LEAST ONE HEALTH, AG, AND ENVIRONMENTAL APPLICATION)

- Implanting plant genes in other plants (like corn that has a gene from another plant inserted into it to resist certain kinds of insects), to help improve the quality/quantity/price of food

- Using genes from one organism to change another organism in order to help clean up environmental problems (bioremediation)
- Helping to cure Type One diabetes by inserting a gene into the pancreas that stimulates the insulin production process, enabling people to produce their necessary level of insulin on their own
- The use of cloned animals as a source of food, such as using cloned cows as a source of beef or milk
- The use of a "gene chip" that would enable scientists to detect products that contain genetically modified ingredients
- Wheat that has been genetically modified to resist certain pests in order to increase the volume of wheat grown/reduce cost to consumers
- A new type of plastic food wrap that contains antibodies that can automatically detect bacteria or toxins in food
- Products that utilize genetically modified grains, forest products and other agricultural products to generate energy, called biomass energy products
- IF BIOTERRORISM RAISED IN DISCUSSION, Bio-engineered vaccines to combat viruses that could be released by terrorists, like smallpox or anthrax
- Do the benefits of biotechnology outweigh the risks, or vice versa? Over time, will that change – will it reverse?
- There are many things that present risks to us in life. In terms of the safety of yourself and your family, where do GM food, bio-health, and bio-environmental products rank? Have you thought about these risks before? Compared to things like a serious car accident, drinking water from the tap, pesticides, where do these products fit? Air pollution? Climate change?
- If negative health or environmental impacts of a biotech product (for example a GM bacteria used to clean up toxic waste, or a drug that contains GM material) were to be found, do you think it could be reversed and/or fixed by scientists?

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 ACTIVITIES 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 government departments might be responsible?
- How effective do you think these systems are?
- What departments are involved? (probe Health, Environment, Industry, Agriculture, CFIA, Fisheries and Oceans)
- From what you know, how effective would you say the government is at carrying out each of these roles? Do you differentiate among departments in your assessments of effectiveness?
- There are two basic theories about how to go about making decisions about allowing these products. Some say products would be subject to scientific research and review by government, and if there are no ill effects found after 7-10 years of research, the product

should be made available. Other say a precautionary principle would be followed, where if there is the possibility of some future potential risk, even if no ill effects have been found, the biotechnology product would not be made available? What is the approach that you think should be pursued? Why?

- What kind of balance should the government strike between stewardship and support to the industry?
- Can government regulate industry and support industries like this at the same time? If yes, how?
- Should Canada work mostly on its own to develop regulations and safety measures in this area, or work with other countries to this end? Why?

Environmental Issues/Impacts (30 min)

I'd like to discuss a few issues specifically associated with the environment and biotechnology for a few minutes.

- There has been a fair amount of discussion of long-term impacts of these technologies. What are "long-term impacts"? How long is long term? How do they pertain to the environment and biotech - Is "long term" defined differently regarding the environment than it is for human health?
- From what you know, is there a relationship between environmental impacts and health impacts of these technologies? How does that relationship work?
- Who is best positioned to study the impacts of these technologies on the environment? PROBE university environmental scientists/scientists who work at Environment Canada/other federal departments/scientists who work for your provincial government?
- What are your expectations of Environment Canada with regard to managing the near- and long-term impacts of these technologies? What if there was a need to reverse some negative impact of a biotechnology application on the environment? From what you know, are they up to the job? If not, who would be best placed to do this?
- When we talked about environmental applications earlier, the general view was that XXXX. Is there a way that you can think of that the risks that were discussed can be reduced?
- Using the example of the bacteria modified to eat toxic waste, if there were a way to contain the material, say in specially constructed pools, how does that impact your view about the benefits versus the risks? Why? Are there any other things that could be done with these technologies to reduce your concern about their risks?
- Using the example of GM trees modified to resist disease, if there were a way to isolate them on an island or in some other area, would that reduce your concern about their risks?
- Is there a useful role that Environment Canada can play in helping to reap the benefits of some of these technologies? What should it do? (PROBE: DO RESEARCH/WORK WITH UNIVERSITIES TO DO RESEARCH/
- Can Environment Canada be a promoter as well as a regulator of these technologies?
- Are there particular types of GM technologies that Environment Canada should be more/less involved in supporting?
  - Biomass energy
  - Bioremediation
  - Genetic detection technologies
  - GM forestry
- Environment Canada is involved in a number of areas, including monitoring weather, air pollution, climate change, water treatment technologies, protection of wildlife, as well as protection of the environment. Re biotechnology: What level of priority should its work in the

field of biotechnology take? Is it more important/less important than some of these other areas?

- Have you heard anything from Environment Canada with regard to biotechnology? If you were to hear something, would it be credible to you? Why/Why not?
- What are the kinds of things you would like to hear from Environment Canada on biotechnology? Understanding that there isn't an unlimited budget to do TV advertising, how should this information be delivered to you?

Stem Cell Research (15 min)

- Have you heard about stem cell research? What is it? What does it involve?
- From what you know or have heard, how beneficial do you think stem cell research will be?
- Should the Government of Canada help support this type of research?
- Have you heard about any controversy involving stem cell research?

Stem cell research involves the use of certain human cells to study diseases and their cures. Unlike other types of human cells, stem cells have the unique ability to reproduce any type of cell in the human body. Many scientists say that research in this field will likely produce the most important healthcare breakthroughs of at least the next decade. However, to conduct this research, scientists have to get stem cells. They have been getting them from embryos that are less than 4 weeks old that have been developed and frozen in fertility clinics, and are going to be discarded because the parents do not need them.

- Were you aware of this? Does it change your views about its acceptability? How about with regard to the government role?
- Scientists are looking at other ways of getting stem cells, such as from umbilical cords. However, if discarded embryos turned out to be the only way to get stem cells, should we reconsider whether this technology should be pursued?

GM Foods and Labeling (20 min)

- From what you know, is all the food that gets to the grocery store tested for safety? How, when, by whom? From what you know, is the system effective?
- How do you generally feel about GM foods? Do you have strong views one way or the other?
- Have you eaten GM food before?
- Did you know that new technologies are being developed that will produce food with additional nutritional/medicinal benefits (enhanced levels of vitamins and minerals)? How does knowing that make you feel about these products?
- (IF NOT ALREADY ADDRESSED EARLIER IN DISCUSSION) Do you feel that governments are doing enough to ensure your safety when it comes to GM foods? What could they do to reassure you?

Labeling food in relation to genetic modification is something that is currently being considered by governments as well as some of the companies that produce these products. As you may realize, labeling is not quite as straightforward as one might think.

First of all, I want to give you some of the arguments for and against labeling genetically modified foods and see what you think.

First, it is important to understand that right now in Canada all foods MUST be labeled to address aspects of food safety. For instance, nutritional changes, compositional changes and the presence of allergens must be labeled.

The reason foods with genetically modified ingredients are not labeled now is that they have been approved for sale because the government says they are safe and equivalent to similar foods without genetically modified ingredients. For instance, a bag of corn tortilla chips might include GM corn or corn that has not been modified. The tortilla chips look and taste the same in either case.

Some people want systematic labeling of GM foods. Some do not.

Everybody agreeing to do so means substantial changes in our food production system. For instance, for the labels to be meaningful, what they claim must be capable of being verified. That means products like grain would have to be segregated into GM grain and non-GM grain right at the farm level. They would have to be harvested, stored and transported separately. Companies that produce processed foods would need separate lines for GM and non-GM or get out of one of the products altogether.

People who want systematic GM labeling say that current labeling for safety does not take into account social or ethical concerns or production methods. They say if GM products were labeled systematically, they would have the choice to consume GM foods, organic foods or others, whatever the reason for their choices. They say they should have the option of non-GM products in case GM foods turn out to be more dangerous than governments say they are now.

Those opposed say it would make food production significantly more expensive. They also say if you label the foods, people will automatically think they are unsafe and get upset. That would mean grocery stores would be frightened into not stocking GM foods and those who want them for their benefits would lose the opportunity to buy them.

There are also implications for world trade in food. Currently, some countries insist on labeling, others do not. Canada's products, for instance, cannot be sold in some countries because they are genetically modified or because we cannot certify that they are not. In this case, segregating our products and labeling them would allow us to sell in these countries. However, because there are no international rules about this, if we insist on mandatory labeling, we might be breaking our existing trade agreements with countries that do not label, like the U.S. Lastly, to insist on systematic labeling, segregating and tracking products is to impose significant costs on developing countries who are using biotechnology to grow more and hardier crops. They may lose their opportunity to sell agricultural products.

As I said, this is complicated. After hearing all that – what do you think about labeling GM foods? Are you in favour or opposed or don't really care?

If systematic labeling increased the cost of processed food by 10%, as some studies have suggested, does that alter your view in any way?

Let's assume the government goes ahead with labeling for GM foods. There are many ways to label these kinds of foods. I'm going to provide you with some options for labeling of these products, and for each, I'd like you to write down what the benefits and drawbacks are that you

would see, whether the information that would be provided might be helpful and then which of the three you as a consumer would prefer.

Voluntary versus Mandatory

There are a few different ways of establishing a labeling system for GM food.

One way is for the government to work with the food industry to create a voluntary system for labeling of these products.

51 What do you think of this approach? What are its strengths and weaknesses?

Another way is to make it mandatory for companies to label food products that contain genetically modified ingredients.

52 What do you think of this approach? What are its strengths and weaknesses?

Labeling the Process

Genetic modification includes processes like cross-breeding flowers or trying to reproduce mutations that have occurred in plants and animals. It also involves processes like trying to create beneficial mutations through things like radiation. The newest technique is to modify actual genetic structures.

The label could be used quite broadly. In other words, any food created using any of those processes would be identified as having been produced using GM techniques.

Or

The label could be used very narrowly. GM labeling would not be used to identify anything but the newest technique, that is using modern technology to alter DNA in genes.

53 Which do you think might be more appropriate?

Labeling the Ingredients

A food could be non-GM even if there was a very small agreed-upon amount of GM ingredients (1%/5%). Allowing trace amounts would make segregation of products much easier, and it may not even be feasible to guarantee 100% GM free content.

Or

A food could be non-GM only if there were absolutely no GM ingredients in it.

54 Which do you think might be more appropriate?