EARNSCLIFFE POLLARA W6

2020601

BL

15
2fg > 3 codages
1 classical
1 biotech story test

Wave 6

PUBLIC OPINION RESEARCH INTO BIOTECHNOLOGY ISSUES

SIXTH WAVE

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

June 2002

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

Pollara and Earnscliffe Research and Communications is pleased to present this report on a public opinion research program conducted in the early Spring of 2002 for the Biotechnology Assistant Deputy Minister Coordinating Committee (BACC). This was the sixth wave of a series begun in the fall of 1999. During that time, the BACC has commissioned seven public opinion surveys and more than 60 focus groups. In all, there are more than 10,000 data points available in what is North America's largest and most comprehensive investigation into attitudes about biotechnology and the public policy that surrounds it. The program is designed to produce two waves of research each year with a large tracking component and chapters of more intensive inquiry into specific issues like genetic privacy, GM food and stem cell research.

The sixth wave was comprised of three separate instruments:

- a telephone survey of 1200 Canadians;
- three sets of focus groups (a total of 6 groups) to support the survey; and
- two additional sets of focus groups (a total of 4 groups) to permit further probing on a detailed economic component in aid of communications for BIO 2002 in Toronto, the U.S.-based Biotechnology Industry Organization's annual conference and exhibition.

The research was designed to accomplish three major objectives:

- to track sentiment on a range of biotechnology issues, using a baseline of data developed in previous waves of research;
- to assess opinion more comprehensively in discrete areas, including stem cell research, GM food labeling and the risk/benefit equation of biotechnology; and
- to develop a significant line of inquiry into attitudes towards the biotechnology industry, its economic benefits, and government promotion of the industry and the technology.

The telephone work began on March 19, 2002, and ended on March 30, 2002. The survey reports on the views of a random sample of 1200 Canadians and carries a margin of error for the national sample of +/- 2.8%, nineteen times out of twenty.

Five nights of focus groups (10 groups in all) were conducted in Vancouver, Toronto (four groups), Ottawa and Quebec City between March 25, 2002 and April 9, 2002.

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

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

Further information can be obtained from Pollara or Jeff Walker at 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)
Don Guy (dguy@pollara.ca)

Trend Lines

Canada provides a relatively benign and in some ways quite positive environment for biotechnology development. Overall opinion towards biotechnology – its processes, products and applications – has remained fairly stable over the past three years. Canadians express about two to one support for the technology, with a small segment, in the range of 10%, who are strongly opposed. Most Canadians believe it is a leading-edge technology that will be critical to the country's future economic success -- a large majority want the country to be a world leader in biotechnology so that they can gain its benefits – particularly in the areas of health and medicine.

Canadians exhibit a blend of high awareness of biotechnology mixed with low levels of engagement and knowledge. Polling data shows that a clear majority of Canadians have read about, and even discussed, the issue of biotechnology. Nevertheless, the number of people who say they are very familiar with biotechnology remains below 10%. Most find the area too complex and technical to follow closely.

Although there remain low levels of familiarity and interest among the general population, the increase in awareness, coupled with extensive media coverage, has had an impact on the depth of knowledge among interested people about these technologies. Heightened awareness is driving the growth of more complex, nuanced and moderate views toward biotechnology.

There is a widely held sense, particularly among interested Canadians, that biotechnology advances are inextricably linked to societal progress, that its development is bound to modernity, and that its expansion in Canada and worldwide is inevitable. Even among those who tend to be opposed to these technologies, this sense is clearly evident, and presents itself as resigned acceptance. And although there is clear trepidation about some of the more invasive technologies (cloning, using animal genes in humans), for the most part there is hope that these advances will improve people's lives.

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

People come to views about applications using an implicit risk/benefit calculation, with their conclusion driven by an assessment of the marginal personal benefit conveyed by the application. In other words: "do the potential benefits of the application (compared to non-GM products already available) outweigh the potential risks to myself or my family?" In simple terms, the larger and more personal the anticipated benefit, the more acceptable the risk and the higher the level of support for a given application.

More than 40 current and prospective biotechnology applications in health, environment and agriculture have been tested in the research. What has emerged is a clear hierarchy of support that finds health applications at the top of the hierarchy, environmental applications in the middle range, and agricultural and food applications with decidedly lower levels of support.

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

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

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

Overall, most Canadians express a sense of inevitability about biotechnology, coupled with a strong sense that risk is pervasive in modern society and that managing risk in biotech, as in other fields, is about as much as can be expected. Though most Canadians express concern about potential risk, they are both resigned to its inevitability and confident that somewhere, someone is in charge of trying to mitigate that risk. In a world replete with threats and risks, the risks of biotechnology seem to many to be less urgent and commanding of immediate attention. The research shows that Canadians place the risks from biotechnology on a decidedly lower tier of concern than many other risks. In general, Canadians seem to have assumed a casually watchful and mostly neutral stance, relying on science to sort things out.

The case for biotechnology applications is most widely compelling to Canadians when it is built on science. The wide majority tends to be reluctant to accept arguments based on fear or emotion. Ultimately, if an application is deemed safe by the "best available" scientific research, and is monitored over time through diligent government surveillance and ongoing research, the test for acceptability has been met.

Canadians resist the idea that because of the potential risks, these technologies should be stopped or that governments should ban their use. It appears that these technologies are closely linked to people's conceptions about human progress and the benefits that

progress brings. The idea of banning a technology altogether strikes many as an unreasonably radical measure. Beyond ensuring basic safety, Canadians resist the idea of "banning" any product. They want the marketplace to determine whether an application is viable. While very few are willing to ban these products, virtually all believe they have a right to know the contents of the products they purchase and consume.

This issue of informed choice plays an important role in how Canadians wish ethical considerations to be addressed in the context of biotechnology. The research shows that Canadians expect that ethical considerations will guide the development of these technologies, but they are loath to allow the ethical standards of one person or group to determine whether a product should be allowed or not allowed for all. The preference of the vast majority is for individuals to make their own choices, based on their own ethical standards. The only situation where ethics trumps other considerations, and where Canadians are prepared to accept a ban of an application on ethical grounds, is in the case of cloning human beings which, in their view, virtually everyone would agree upon, so they see no infringement on others' rights. Beyond this example, ethical considerations are a much less powerful reason for opposing biotechnology applications than are long-term health risks.

That is most obvious in Canadians' attitudes towards stem cell research. Few issues of public policy have gained public attention at such a rapid rate. The vast majority of Canadians support the research because of what they believe to be the very large potential health and medical benefits that will accrue from the research. Almost a third of Canadians believe stem cell research will lead to very important benefits to them personally. The one caveat that tends to be expressed is the possibility that stem cell research will enhance the possibility of human cloning. As a result, most people want the government involved in fostering and regulating the research. Its involvement raises their comfort level that there will be consistent standards and regulatory enforcement.

There is virtually no detailed understanding or knowledge of the federal government's regulatory practices and imperatives but there is a general sense that the systems are sound. Most Canadians believe that products on store shelves have been tested and are safe. Once Canadians are provided with information about the government's stewardship roles and systems, large majorities move towards supporting most applications. Most people want to know that government is trying to mitigate or reduce risks as society seeks to gain the benefits. They want biotechnology activity to proceed as long as government seems to be managing risk intelligently. There is, however, a preference that the government increase its emphasis on stewardship, with particular emphasis on studying the long-term impacts of these technologies.

The current government policy approach to biotechnology continues to be accepted by a wide majority of Canadians. There is continuing broad support for a two-track policy approach which includes a strong regulatory and scientific oversight system for long-term surveillance and research, in concert with measures designed to foster the development of the technology and the industry. Almost 9 in 10 agree that "the primary

role of government in this field is to gain the benefits while managing the risks," suggesting that gaining the benefits is an acceptable and appropriate objective to strive for, as long as stewardship is diligently pursued. People don't see stewardship and promotion as a "zero-sum" game. Both can and should be pursued, but primacy is assigned to the stewardship function because the technology is seen to have the potential to affect people's lives negatively.

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

Executive Summary

Main Findings of Wave 6

The general results were quite consistent with previous waves of research. In wave 5 there was evidence of a slight shift towards greater public concern about biotechnology. It was unclear at the time whether this was the beginning of a significant trend, an artifact of a particular (and unidentified) series of circumstances or a result at the outer end of the range of the margin of error. Wave 6 data is much more consistent with other waves of research, and public concern levels are lower than those found in Wave 5. This seems to indicate that Wave 5 concern levels likely represent a one-time event.

The growth in awareness of biotechnology seems to be slowing down with continuing low levels of familiarity. Nevertheless, there is growing support for the technology with levels now at two to one over opposition. On many of its issues, attitudes continue to move "towards the middle", reflecting more nuanced understanding and more considered views.

There is a growing divergence of views between members of the general public and *Involved Canadians* – the 30% of the population that displays information-seeking and opinion-influencing behaviour. The latter are more supportive of biotechnology because they are increasingly of the view that this is a leading-edge technology of the future. Members of the general public seem to be tempering their views as they become more aware that biotechnology involves some very fundamental issues of life.

On most biotechnology applications, the "marginal benefit" test continues to apply – the larger the potential personal benefit, the more that trumps concern about long-term risk. However, there is a specific group of applications that are assessed differently and almost universally negatively – those involving the cloning of an entire human being or animal.

Most Canadians want the government involved in the regulation of biotechnology. Stewardship remains their preferred focus for the government. And though few have detailed knowledge about regulatory practices, they believe our systems to be sound.

Most people believe Canada has the skill set to become a world leader in biotechnology and they would like it to do so.

Awareness and Familiarity

Canadians are paying more selective attention to biotechnology. Awareness and recall levels have begun to stabilize and decline somewhat. Through the various measures employed, somewhere between 50 and 60% of Canadians have talked about or recently heard about stories concerning biotechnology. The increasing gap in interest

and engagement between the general public and *Involved Canadians* is evident here. Significantly more *Involved Canadians* (seven in ten) report talking to someone else about issues involving biotechnology.

Not surprisingly, given the lack of deep interest or engagement, reported familiarity with biotechnology remains quite low. It has not increased in the four years of testing. The number of people reporting that they are very familiar with biotechnology has hovered around 6% every time it has been tested.

Top-of-Mind Impressions

Top-of-mind impressions of biotechnology continue to be largely neutral to positive. A majority (52%) of Canadians express neutrality, while those saying they are positively inclined outnumber those who are opposed by about two and a half to one. When asked whether they support the technology, Canadians respond they do by a margin of two to one. That ratio has not changed significantly in four waves of research.

Biotechnology Applications

Wave 6 revisited four biotechnology applications and found the normal pattern of acceptability – the more personal the benefits, the higher the level of agreement with their use. The test people employ is a "marginal personal benefit" test, which is best illustrated by the following question:

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

Decisions on the acceptability are made on a case-by-case basis. Few people come to a systematic view about applications in general.

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

Of the four applications tested, the potential cure for Type 1 diabetes and the use of GM bacteria to break down pollutants received levels of acceptance surpassing 80%. Strong disagreement with their use was less than 5%. In the two agricultural applications, there was bare majority support and significant levels of opposition – largely because the benefits posited were purely economic.

As people think through applications and evaluate potential benefits, they tend to believe that on balance, the technology will provide more benefits than drawbacks. About 7 in 10 believe that is true whether the benefits are to health or to the economy.

Evaluating Risk

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

However, the risks of genetic modification are assessed to be decidedly lower than those of many other risks. Further, there is generally a resigned acceptance that modern life is replete with risks and technological change is inevitable. That, combined with the fact that the risks of GM products stand on a lower tier of risks, helps to explain the trend towards supporting the applications of biotechnology and the relatively muted deep-seated opposition to most of them. It may also explain the relative lack of concerted organized opposition to biotechnology in Canada.

The power of the benefit side of the risk/benefit equation can be seen when benefits are posited as the outcome of assuming some risk. There is four-to-one agreement to assuming risk in order to gain substantial medical benefit, two-to-one agreement to gain food benefits. The promise to mitigate long-term risk by performing long-term research into the safety of GM products substantially raises the comfort level with the products.

Similarly, the risk side of the equation drives concern absent strong statements about benefits. Where the benefits are not posed, or where they are only raised in the abstract, there is a hesitancy to proceed full bore with biotechnology. The default proposition is to assume that risks outweigh benefits – more so for the less attractive applications like GM food.

Government Roles and Regulation

In general, Canadians expect their government to provide active oversight and promotion of biotechnology and to balance its various roles in the public interest. Most believe there is a public interest in regulating biotechnology stringently and in holding it to higher safety standards than other products.

However, they also believe there is an important public interest in gaining the benefits of biotechnology. As a result, Canadians overwhelmingly endorse the current positioning that the primary function of the federal government in the field of biotechnology is to understand and manage the risks while working to gain the benefits.

Canadians continue to assume that the regulatory system is working well. Most believe that products on the shelves must be safe and that they have been tested for safety by the government.

A plurality of Canadians (41%) believes that the government currently places equal emphasis on regulation and economic development but, of the rest, the perception is that it tilts towards economic benefits rather than stewardship. Going forward, the preferred tilt goes the other way -- a desire for emphasis on regulation for safety. In reality, most people do not want to make that choice and would prefer a balanced approach; that emerges clearly in focus group discussion. And, as has been consistently true, people find no contradiction between strong regulation and policies supportive of industrial development. Most people think the government can and should play both roles. In discussion, the consensus moves towards separating the functions between departments.

As further evidence of the support for government involvement, most people say the government should spend the same amount or more on biotechnology research. Only 13% say it should spend less.

Specific Issues – Biotechnology and the Economy

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

Most Canadians don't know or don't believe that Canada is among the world's biotechnology leaders though they very much want it to be so. Eight in ten agree that is a goal they would support. Focus group discussion shows that people are quite surprised to hear about Canada's relative standing. They tend to presume that the U.S. and some European countries would be further ahead. That is largely based on the fact that few had heard much about a Canadian biotechnology industry or its achievements.

Although Canadians believe that the private sector will and should drive investment and growth, most people believe government involvement and support will shorten the time required for the biotechnology industry to reach critical mass and success. In many ways, Canadians see a parallel to the way information and communications technology grew and drove the economy before recent difficulties. And they believe that government assistance would help the biotechnology industry grow in the same way. They believe Canada has the skill set to compete globally in high technologies and be among the world's leaders.

When presented with a "Biotechnology Economic Storyline" (see Appendix D), most participants were pleasantly surprised with Canada's international ranking and quite astonished to learn that Canadian scientists had produced so many important breakthroughs. All of that reinforced their belief that Canada should do what was required to maintain itself among the world's leadership in biotechnology.

Finally, the research tested a series of arguments in favour of, and opposed to, government support for the biotechnology industry. The arguments in favour of a government role proved to be much stronger than those against. About three times as many people found the pro arguments very persuasive as found the anti arguments very persuasive. When forced to choose between the two sets of arguments, the pro-to-anti ratio was even higher.

Specific Issues – GM Food and Food Labeling

The results indicate – as they did in the first five waves – a relatively even split between the number of Canadians who feel comfortable with GM foods and those who do not. Though somewhat more people feel comfortable, the number who feel otherwise is very substantial (47%), with 18% saying that they are very uncomfortable. Somewhat fewer (12%) say they would never again buy a food product if they found out that it contained GM ingredients. There is little question that GM food is the least acceptable of all biotechnology applications. This probably reflects, in part, wider concerns about food ingredients. Focus group discussion indicates that many people are quite concerned about chemical additives, pesticides and other potential dangers in the food they eat.

Focus group discussion also indicates that Canadians have become more aware of the likelihood that there are GM ingredients in their foods. That, coupled with the lack of news about direct health consequences of eating GM food, has rendered many people more sanguine about consuming GM foods. Though many are not comfortable, few say they take special precautions to ensure they are not exposed to GM ingredients.

There continues to be widespread confusion about just how GM ingredients show up in food. Most people tend to think they are ingredients that are added discretely like vitamins are. They also tend to believe they show up in fresh produce and meat.

Labeling. In the groups, a sizeable number of people indicated that they currently read food labels, though they do so primarily for nutritional content. Some said they wanted to see whether there were ingredients or additives like preservatives or artificial colouring. Almost no one said they read labels to determine whether there were GM ingredients. When asked what further information they would like to see on labels, one or two people in each group mentioned GM ingredients. And as soon as discussion was joined, a substantial majority expressed a preference for GM food labeling.

There were virtually no arguments that would move people away from endorsing GM labeling. People tended to dismiss arguments about the difficulty and cost of segregating food all along the production chain. Those with lower income did express a fair level of concern about having to pay as much as 10% for their food to pay for labeling, but ultimately that moved few people to change their minds. Few people believed that there would be substantially increased cost to taxpayers of monitoring the system nor were they moved by arguments that international trade difficulties may arise from different labeling regimes.

Lastly, few people in focus groups saw much point in voluntary systems of labeling rather than mandatory systems. It was the final outcome of full compliance that most people wanted.

The underlying issue that strongly emerges in focus group discussion of labeling is not the long-term risk of GM foods but the principle of informed consumer choice. Even those people who are comfortable with GM foods generally believe that everyone has the right to know whether there are GM ingredients in their food. The strong, un-nuanced views that emerged reflect the core strength of the principle of the consumer's right to know and choose.

The survey results were entirely consistent with the focus group discussions.

Specific Issues – Stem Cell Research

Awareness and recall of stem cell research hovers over 60% with the vast majority of Canadians being at least somewhat supportive of the research. The number of people adamantly opposed has dropped five points to 13% of the population. Further, a vast majority of Canadians believe it is very or somewhat acceptable for the Government of Canada to be involved in supporting this type of research.

The main reason for the high levels of support for stem cell research is the promise of what people believe to be unparalleled health benefits. A remarkable number of people believe that the research will not only be a general benefit but that it will benefit them personally. Focus group discussion shows that most people associated stem cell research with health benefits, while a sizeable number associated it with the controversy surrounding President Bush's view on the research.

Specific Issues – Decision Making

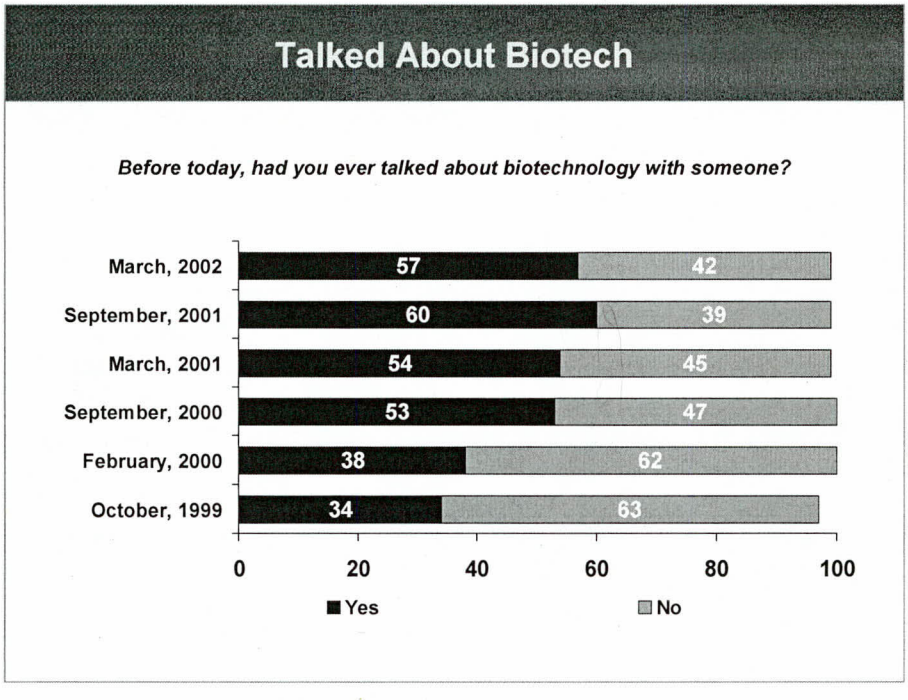
Informed choice is a powerful concept in the context of GM applications. Most people believe it is their choice whether or not to use any particular GM product and few would wish to impose their preferences on others. That, of course, is conditioned by the presumption that the product has been found safe for use. If the best available evidence suggests that a particular use is safe, most say it should be allowed. That issue for most people is a science-based question, not an ethical or moral one. On ethical and moral issues, the public asserts its exclusive right to make choices.

When it comes to safety, most do not want public opinion or individual preference to prevail. They want the government and experts to make the decisions. Focus group discussions indicate that Canadians want high safety standards and sanctions imposed on those who might get involved in unacceptable cloning. However, for a majority of applications, most people would want expert decision making confined to safety.

Quantitative Findings

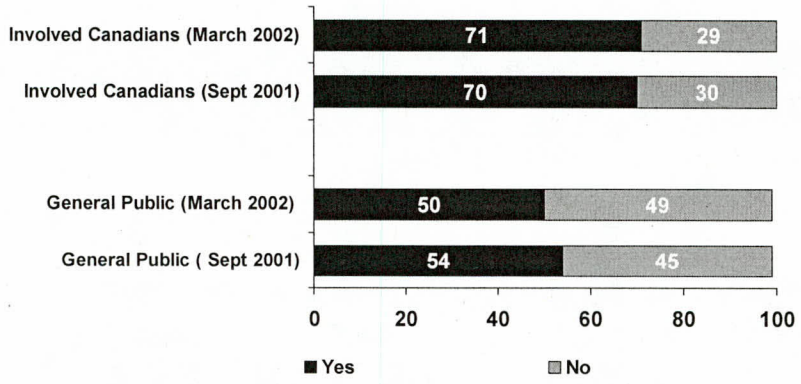
Awareness and Familiarity

Canadians are paying more selective attention to biotechnology. Awareness and recall levels have begun to stabilize and decline somewhat as people find information about the technology less routinely surprising and a more normal item in the news. Through the various measures employed, somewhere between 50 and 60% of Canadians have talked about or recently heard about stories concerning biotechnology. The increasing gap in interest and engagement between the general public and *Involved Canadians* is evident here. Significantly more Involved Canadians (7 in 10) report talking to someone else about issues involving biotechnology.



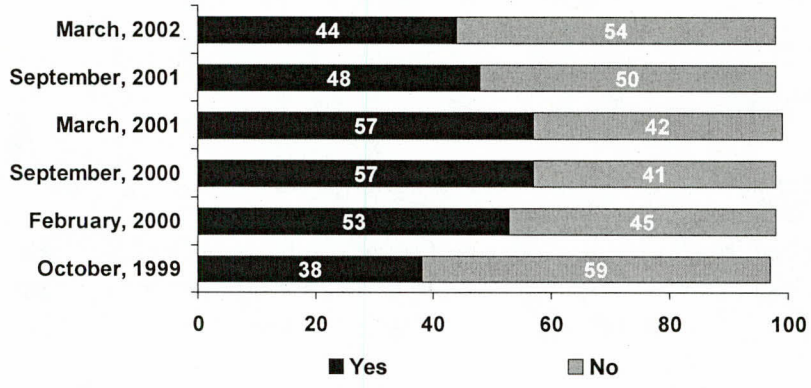
Talked About Biotech

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



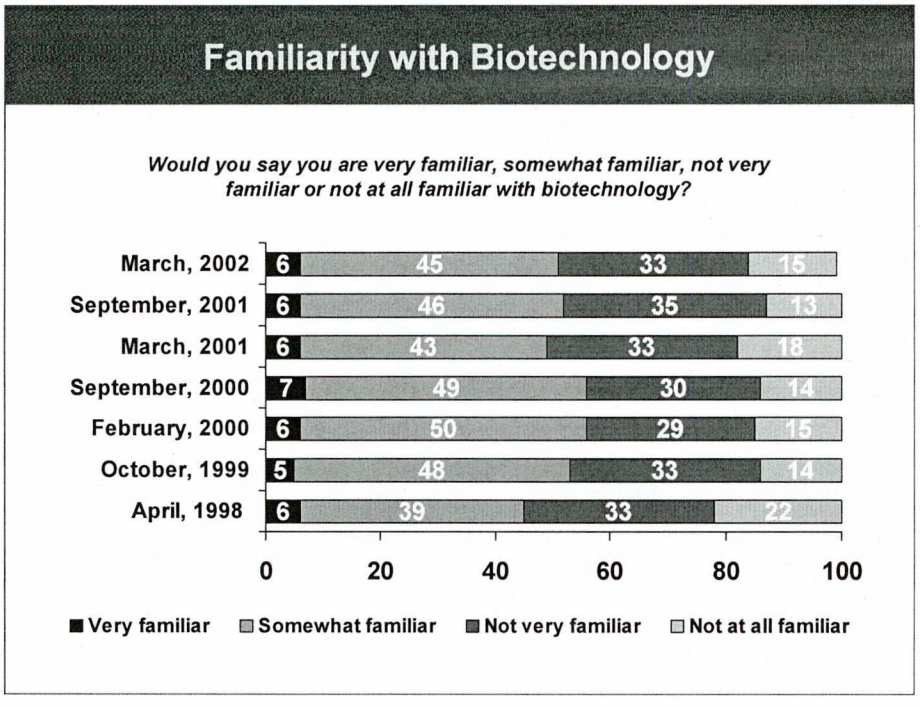
Recently Heard About Biotech

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



Not surprisingly, given the lack of deep interest or engagement, reported familiarity with biotechnology remains quite low. It has not increased in four years of testing. The number of people reporting that they are very familiar with biotechnology has hovered around 6% every time it has been tested.

In focus groups, discussion reveals that a significant number of people, primarily the Involved, actually know the subject area quite well and are quite comfortable with it. Members of the general public are less aware of its scope and how pervasive some of the applications are. Many have thought very little about it. When the subject matter is introduced, some exhibit a fair amount of concern.



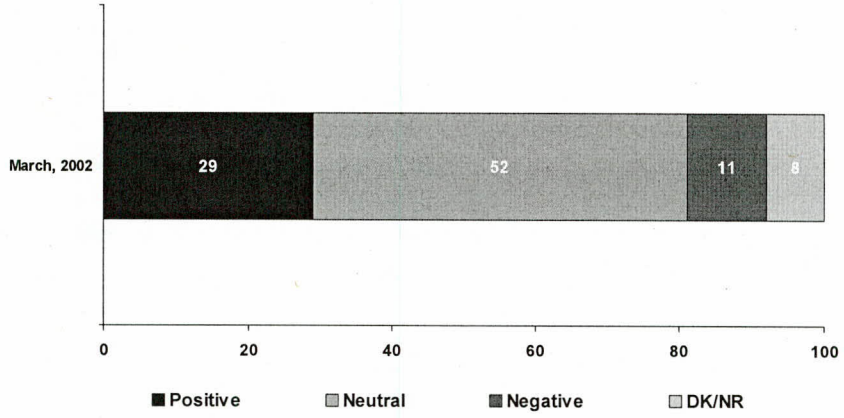
Top-of-Mind Impressions

Top-of-mind impressions of biotechnology continue to be largely neutral to positive. A majority (52%) of Canadians express neutrality while those saying they are positively inclined outnumber those who are opposed by about two and a half to one. When asked whether they support the technology, Canadians respond they do by a margin of two to one. That ratio has not changed significantly in six waves of research.

It should be noted that the word *biotechnology* is better received than the word *genomics*. Biotechnology is much more widely known and much better understood. Most people believe it to be a word that properly captures the current range of activity. Genomics is a word that is unfamiliar to most and seems to connote more invasive applications.

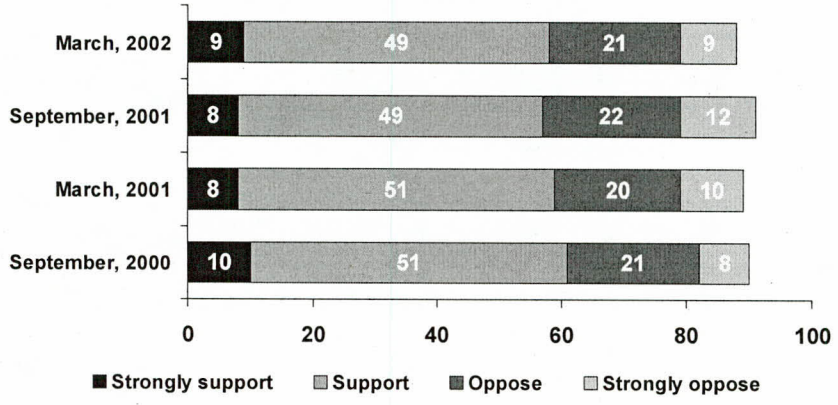
Biotechnology Recognition

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



Support or Oppose Biotechnology

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



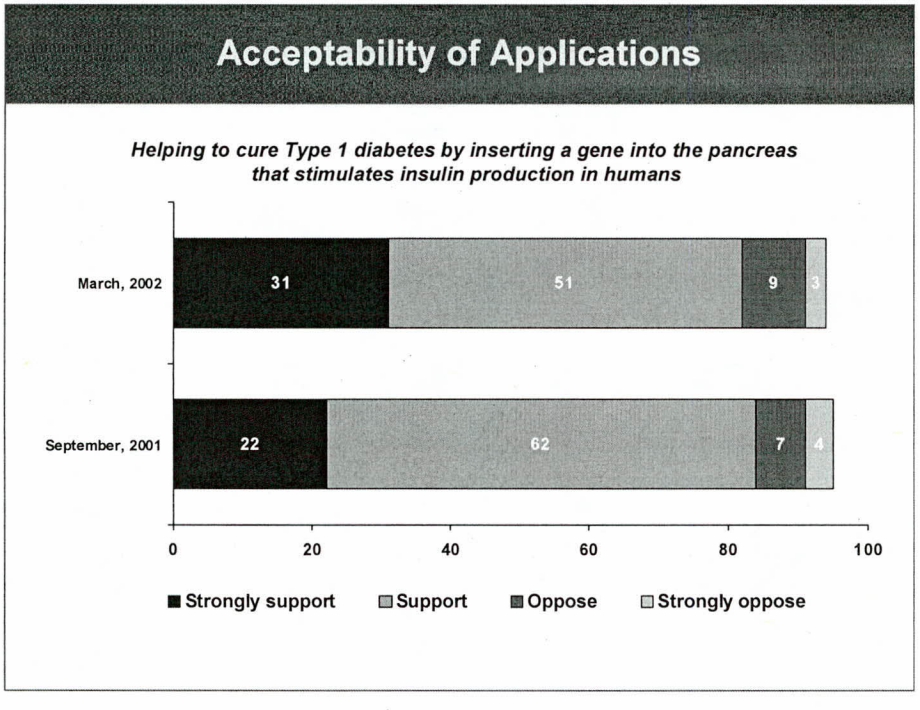
Biotechnology Applications

Wave 6 revisited four biotechnology applications and found the normal pattern of acceptability: the more personal the benefits, the higher the level of agreement with their use. The test people employ is a "marginal personal benefit" test, which is best illustrated by the following question:

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

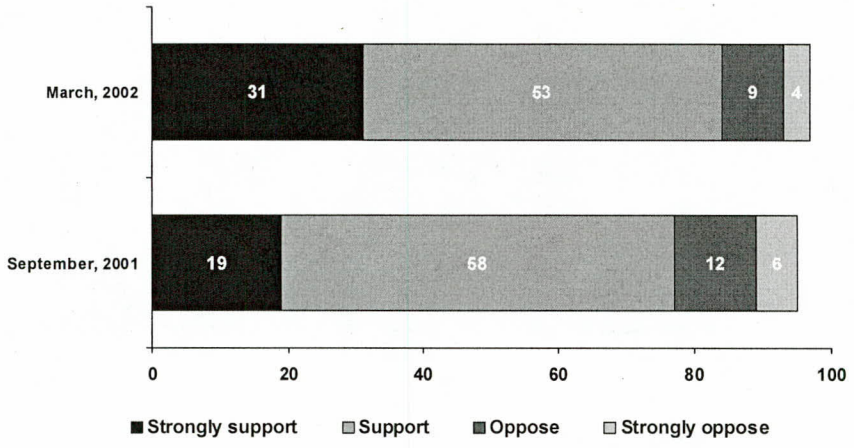
Over the six waves of research, a clear hierarchy of acceptability has emerged. Applications promising health and medical benefits rank highest in acceptability, followed by those with environmental benefits. Applications involving the genetic modification of food or agricultural products receive the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

Of the four applications tested, the potential cure for Type 1 diabetes and the use of GM bacteria to break down pollutants received levels of acceptance surpassing 80%. Strong disagreement with their use was less than 5%. In the two agricultural applications, there was bare majority support and significant levels of opposition – largely because the benefits posited were economic.



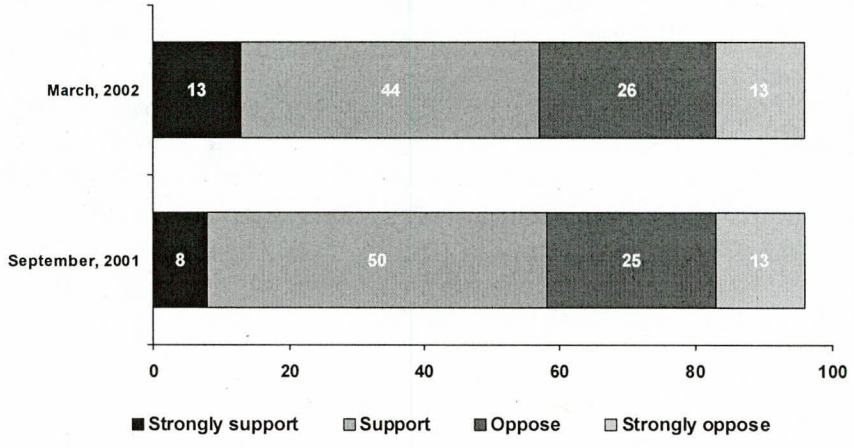
Acceptability of Applications

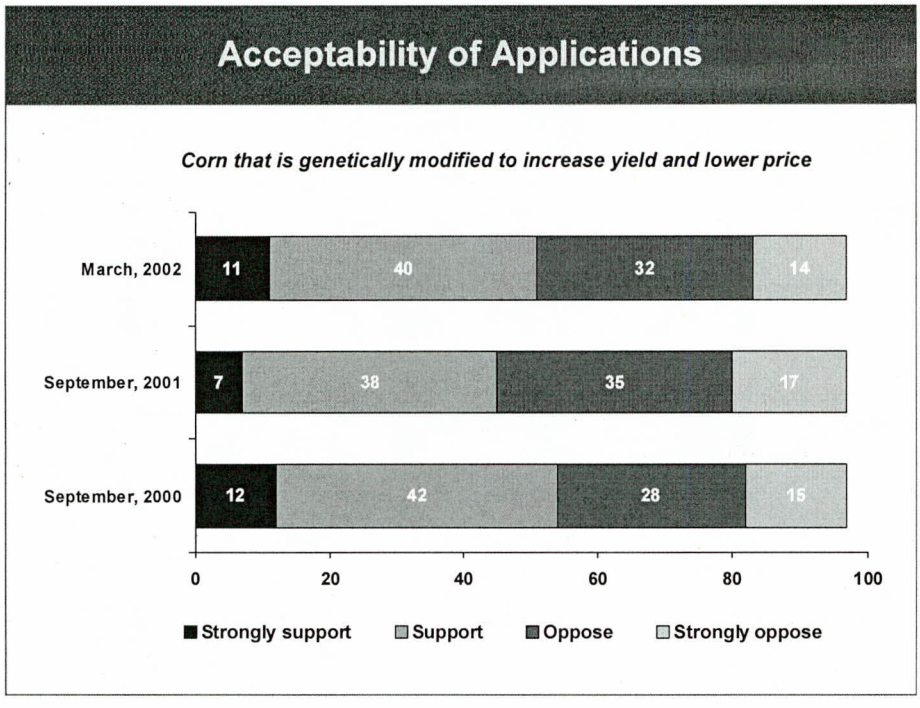
Use of genetically modified bacteria or plants to break down pollutants and toxic wastes



Acceptability of Applications

Wheat genetically modified to resist pests to increase volume

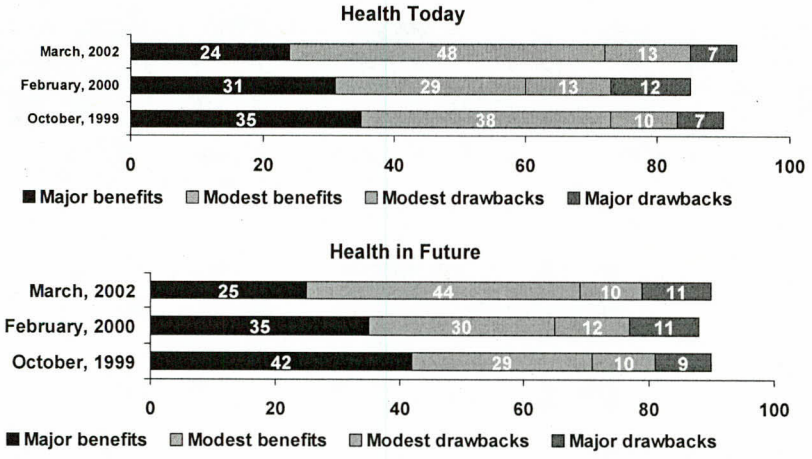




As people think through applications and evaluate potential benefits, they tend to believe that on balance, the technology will provide more benefits than drawbacks. About 7 in 10 believe that to be true whether the benefits are to health or to the economy. Similar proportions believe that is the case today and will continue to be so going forward. But the "movement toward the middle" is clearly evident. Fewer people are inclined to believe that there will be major benefits to health than were inclined that way almost four years ago. Partly that is a reflection of a broader understanding that some of the benefits continue to be more promise than reality and partly the result of continuing worry that not enough is known about the long-term risks associated with genetic modification.

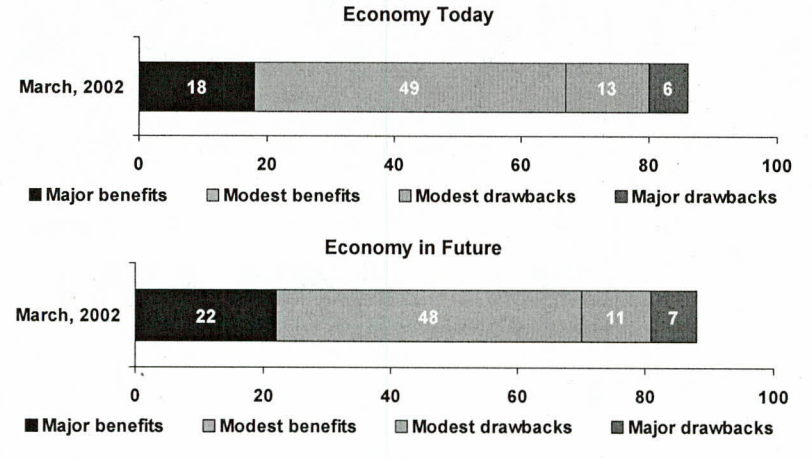
Benefits and Drawbacks: Health

In your opinion, does biotechnology bring major benefits, modest benefits, modest drawbacks, or major drawbacks in the following areas (HEALTH)



Benefits and Drawbacks: Economy

In your opinion, does biotechnology bring major benefits, modest benefits, modest drawbacks, or major drawbacks in the following areas (ECONOMY)



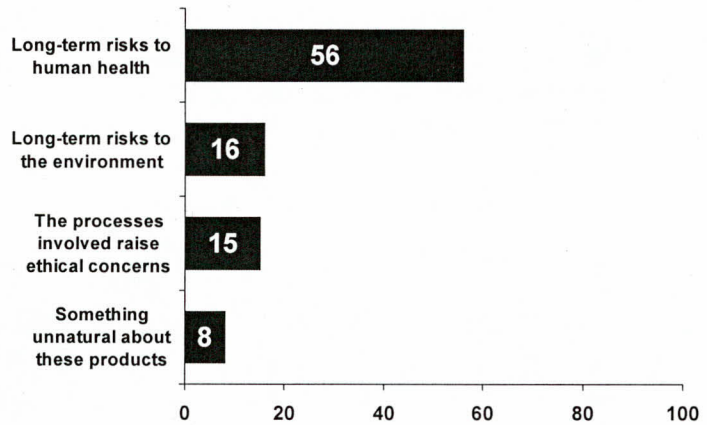
Evaluating Risk

The long-term risks of biotechnology are the largest drivers of concern about the technology centering around unknowable outcomes and the perceived irreversibility of impacts. As people evaluate the potential risk, it is long-term health risks that are seen

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

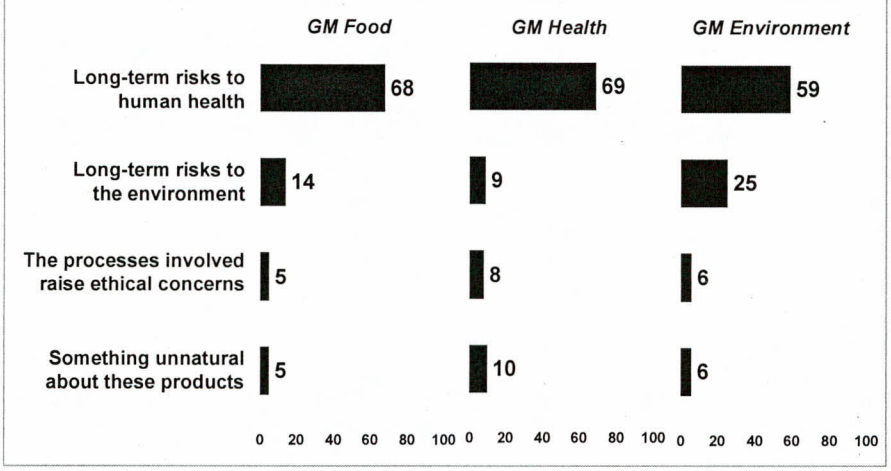
Driving Concern About Products

People have suggested a number of different concerns about products and processes involving genetic modification. Of the four below, which is the one that is the greatest concern to you?

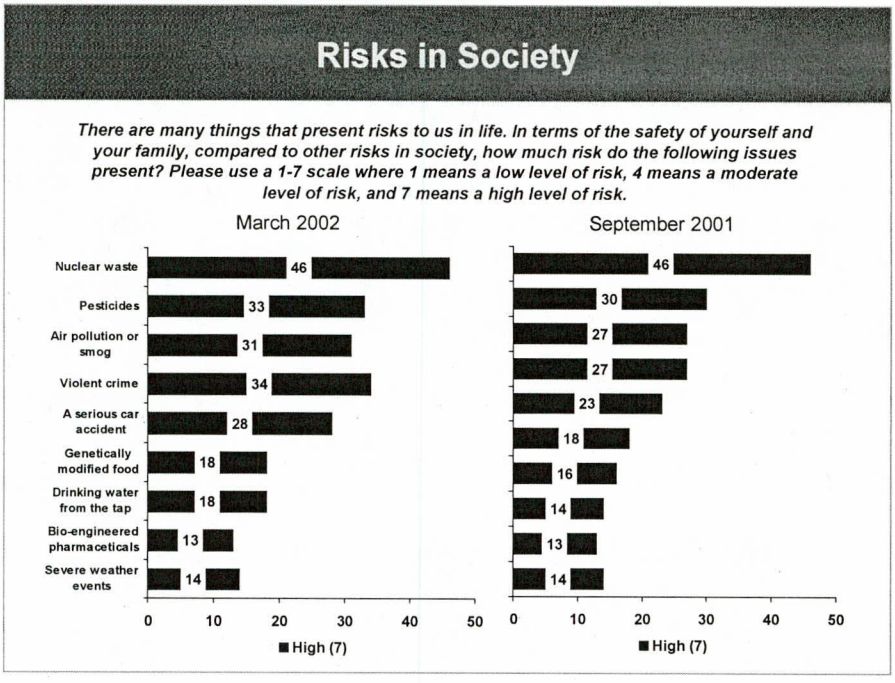


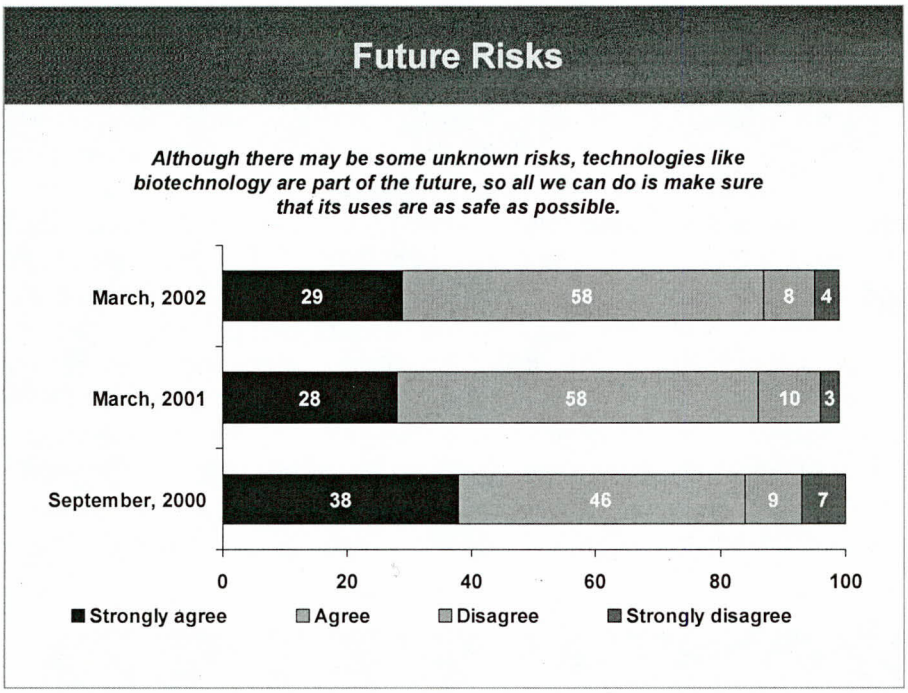
Tracking: Driving Concern

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



To provide a context and to assess the power of the risk side of the risk/benefit equation, the research has been designed to situate the risks of biotechnology against other risks in society. That was first done in September 2001 and repeated in wave six. The results are highly consistent and show that the risks of genetic modification are assessed to be decidedly lower than those of many other risks. In focus groups, participants did not raise the risks of biotechnology in top-of-mind responses to probes about what risks people perceive to them and their families. Further, there is generally a resigned acceptance that modern life is replete with risks and technological change is inevitable. That, combined with the fact that the risks of GM products stand on a lower tier of risks, helps to explain the trend towards supporting the applications of biotechnology and the relatively muted deep-seated opposition to most of them. It may also explain the relative lack of concerted organized opposition to biotechnology in Canada. The perception that GM technologies are inevitable and can only be managed is widely held among Involved Canadians. The general public expresses more hesitation about this premise.

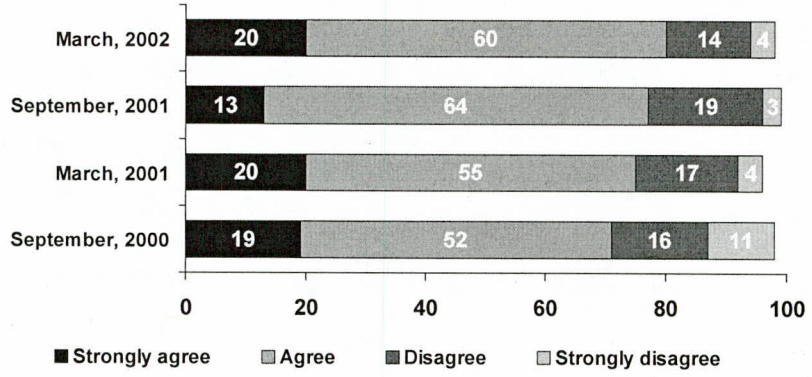




The power of the benefit side of the risk/benefit equation can be seen when benefits are posited as the outcome of assuming some risk. There is four-to-one agreement to assuming risk in order to gain substantial medical benefit, two-to-one agreement to gain food benefits. The promise to mitigate long-term risk by performing long-term research into the safety of GM products substantially raises the comfort level with the products.

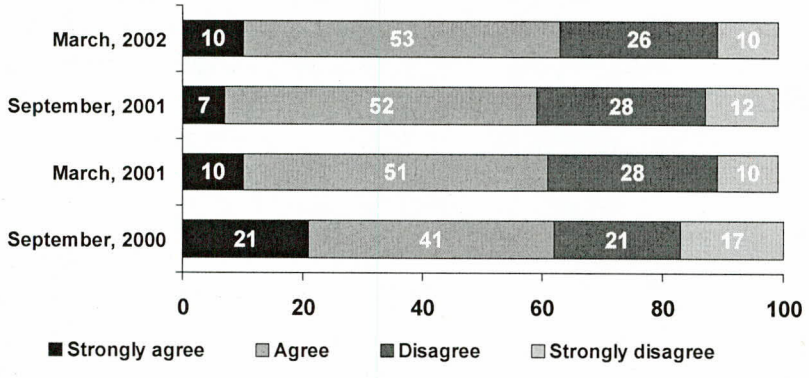
Acceptance of Risk: Health

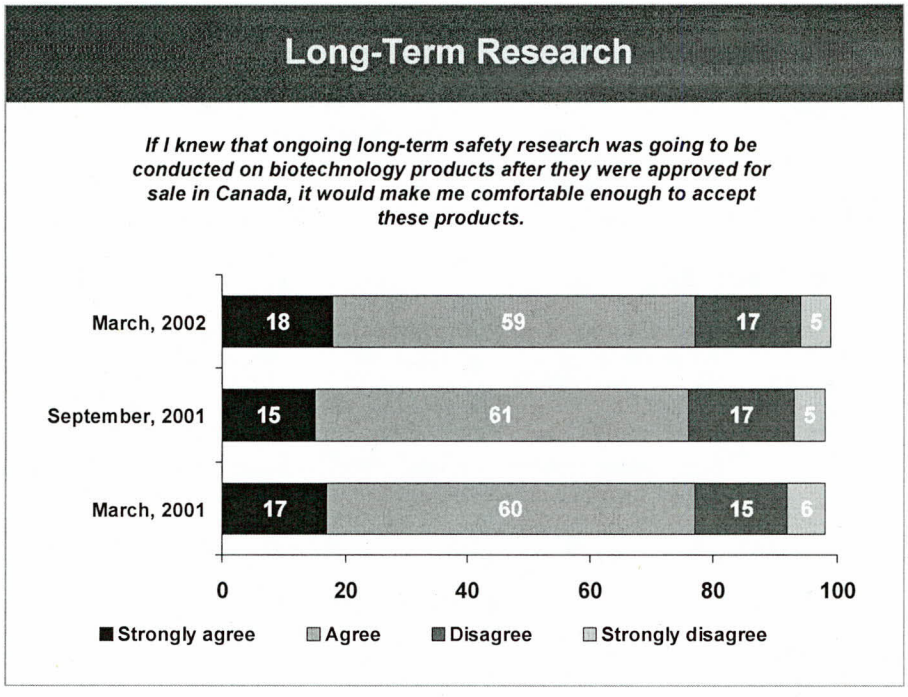
We have to accept some risk to achieve the benefits of biotechnology like new discoveries that improve the diagnosis and cure of serious illnesses.



Acceptance of Risk: Food

We have to accept some risk to achieve the benefits of biotechnology like new foods that contain vitamins or medicine.

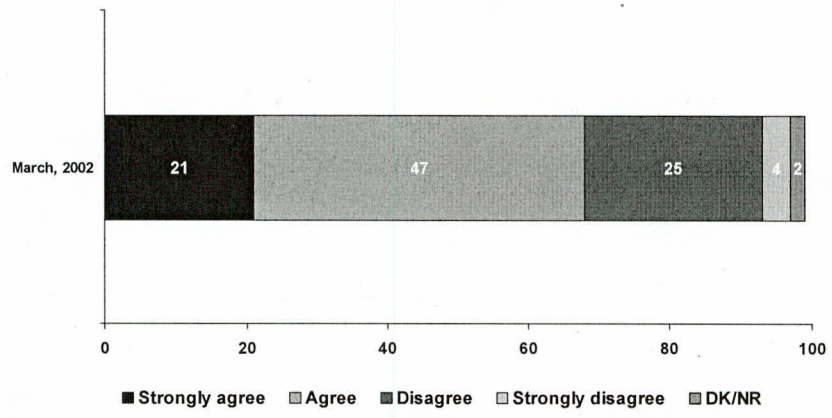




Similarly, the risk side of the equation drives concern absent strong statements about benefits. Where the benefits are not posed, or where they are only raised in the abstract, there is a hesitancy to proceed full bore. When the benefits are not spelled out, the default proposition is to assume that risks outweigh benefits – more so for the less attractive applications like GM food.

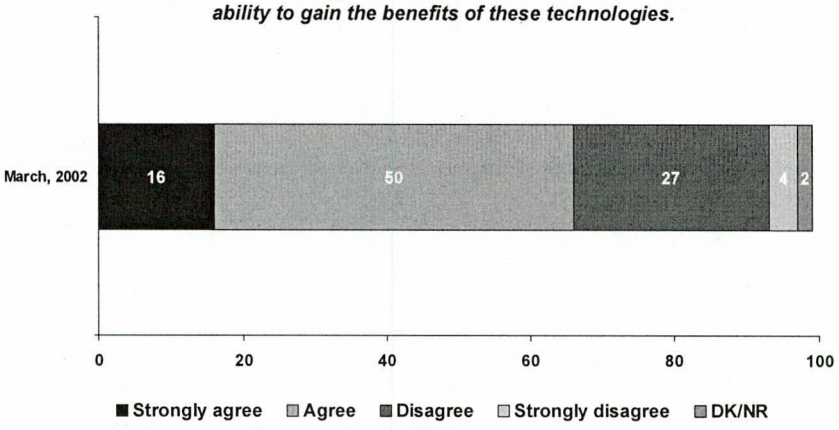
Risks

Until more is known about the risks, government should slow the use of biotechnology.



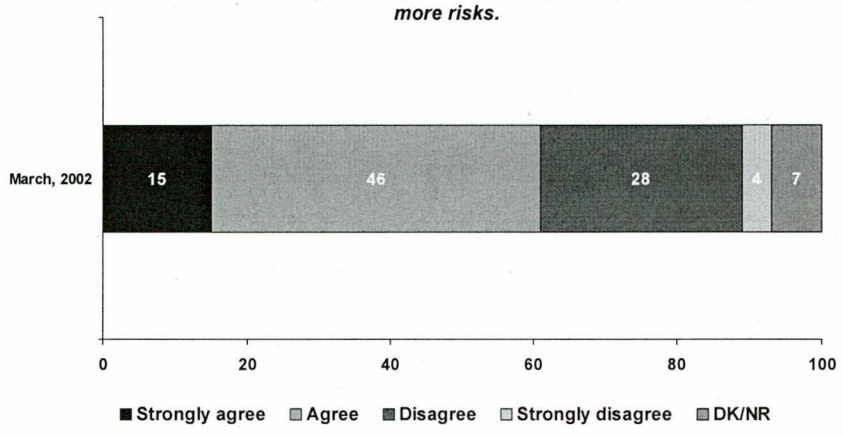
Risks

Until more is known about the risks, government should slow the use of biotechnology, even if it means that it would reduce our ability to gain the benefits of these technologies.



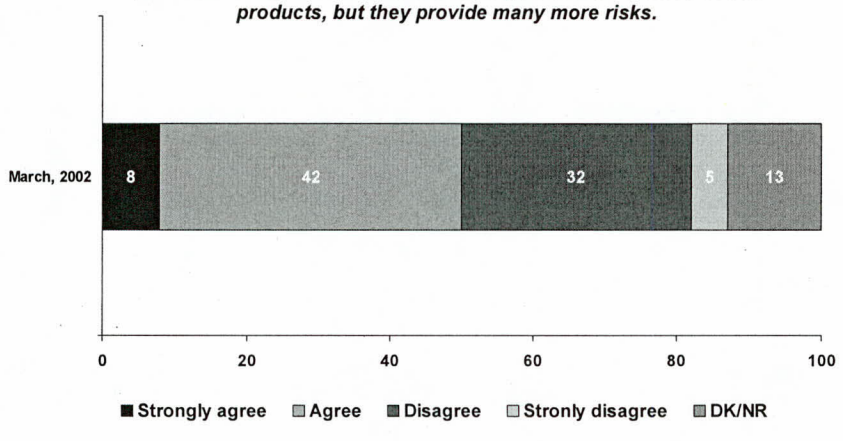
Genetically Modified Food Benefits

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



Genetically Modified Health Products Benefits

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



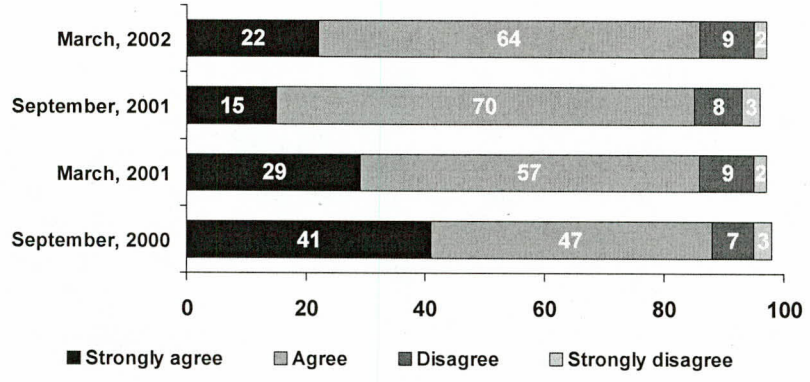
Government Roles and Regulations

In general, Canadians expect their government to provide active oversight and promotion of biotechnology and to balance its various roles in the public interest. Most believe there is a public interest in regulating biotechnology stringently and in holding it to higher safety standards than other products.

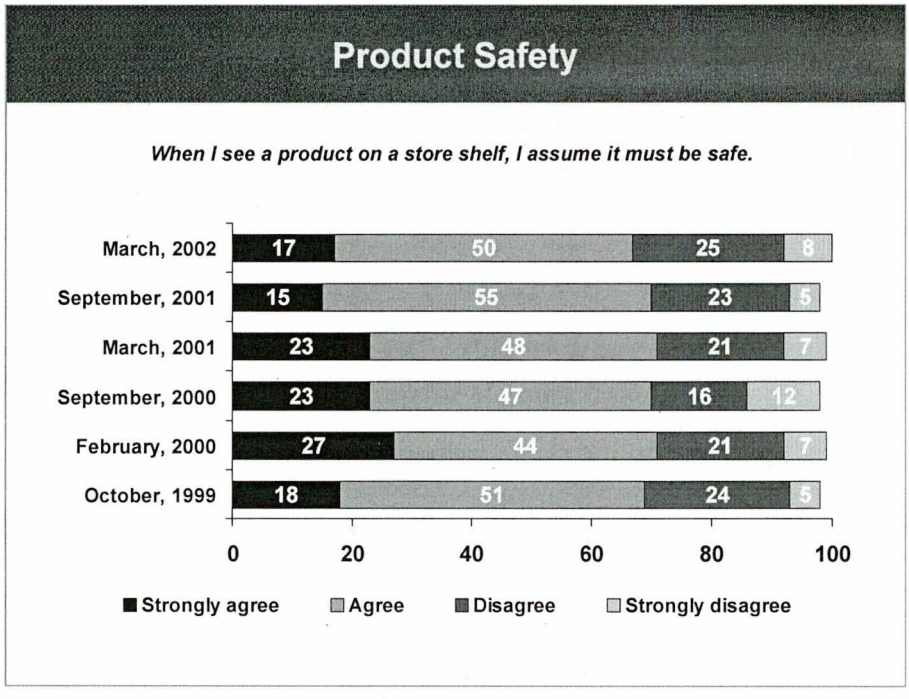
Most Canadians also believe there is an important public interest in gaining the benefits of biotechnology. As a result, Canadians overwhelmingly endorse the current positioning that the primary function of the federal government in the field of biotechnology is to understand and manage the risks while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

Government Positioning

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.



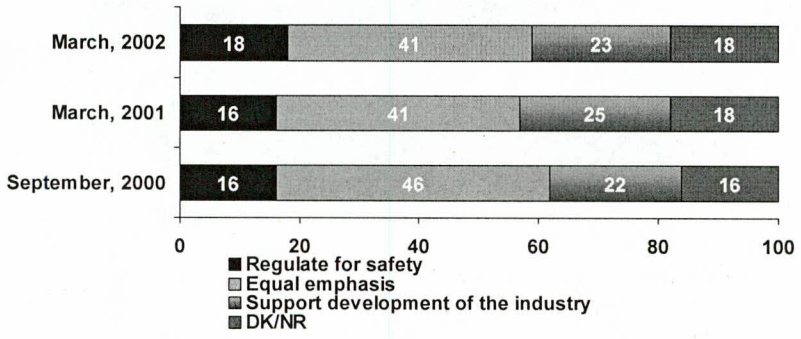
In general, Canadians assume that the regulatory system is working. They assume that products on the shelves must be safe and that they have been tested for safety by the government. Earlier waves have consistently reproduced these results despite establishing, equally consistently, that the vast majority of Canadians know very little about how the regulatory system performs its work. Focus group discussions have established that people do not want to have doubts about safety and tend to believe that somewhere, someone is in charge and doing their job properly.



A plurality of Canadians (41%) believes that the government currently places equal emphasis on stewardship and economic development but, of the rest, the perception is that it tilts towards economic benefits rather than stewardship. Going forward, the preferred tilt goes the other way -- a desire for emphasis on regulation for safety. In reality, most people do not want to make that choice and would prefer a balanced approach. This emerges clearly in focus group discussion. And, as has been consistently true, people find no contradiction between strong regulation and policies supportive of industrial development. Most people think the government can and should play both roles. In discussion, the consensus moves towards separating the functions between departments.

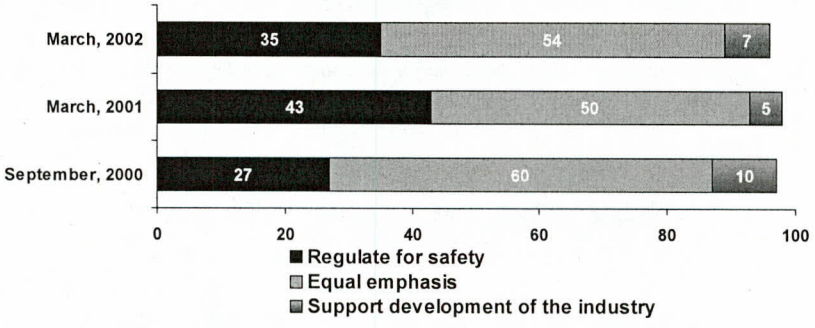
Stewardship Versus Promotion: Current

In the field of biotechnology, one role for the federal government is to regulate the products that are being developed, to ensure that they are safe for our health and environment; another role is to support the development of the industry, which helps create investment and jobs. With respect to biotechnology, which role do you think the federal government is <u>putting more emphasis on today</u>, or is it putting equal emphasis on both?



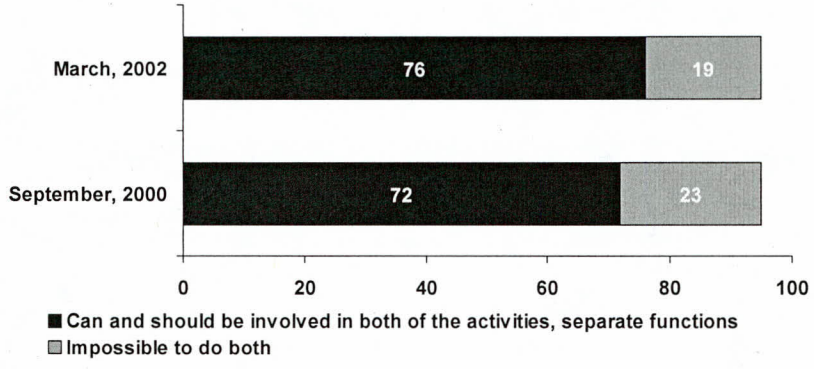
Stewardship Versus Promotion: Future

In the field of biotechnology, one role for the federal government is to regulate the products that are being developed, to ensure that they are safe for our health and environment; another role is to support the development of the industry, which helps create investment and jobs. With respect to biotechnology, which role do you think the federal government <u>should emphasize in future</u>, or should it put equal emphasis on both?



Balanced Role

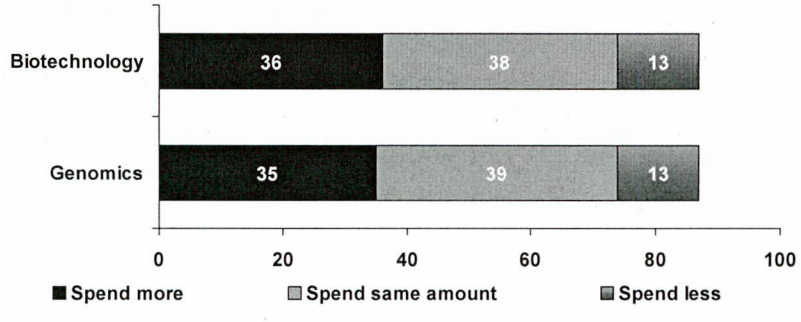
Some people say that it is impossible for the federal government to regulate industry and to support industry at the same time. Other people say that government can and should be involved in both of these activities, as long as the two functions are separated (between departments). Which of these two views is closest to your own?



As further evidence of the support for government involvement, most people say the government should spend the same amount or more on biotechnology research. Only 13% say it should spend less.

Government Spending

Knowing that there are many things that government could dedicate resources to, do you think that government should spend more, less, or about the same amount as it currently spends on supporting biotechnology/genomics research in future?

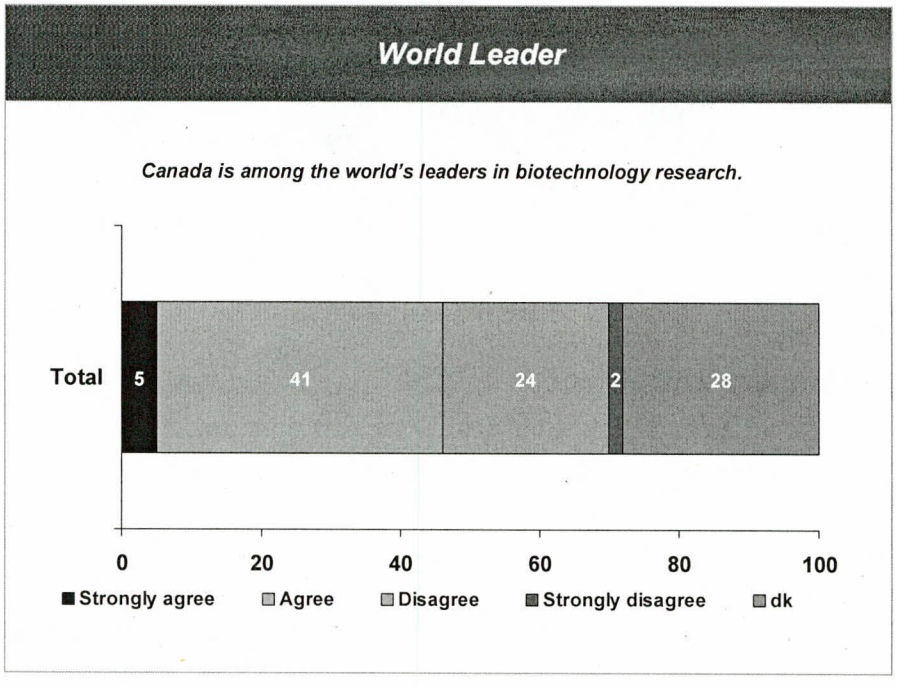


Specific Issues – Biotechnology and the Economy

Wave 6 tested a battery of questions relating to biotechnology and the economy, including the role of government in supporting the biotechnology industry. Previous waves of research have established that Canadians view the economic benefits to be derived from biotechnology as secondary to health, medical and environmental benefits. Nevertheless economic benefits are seen to be quite important in their own right.

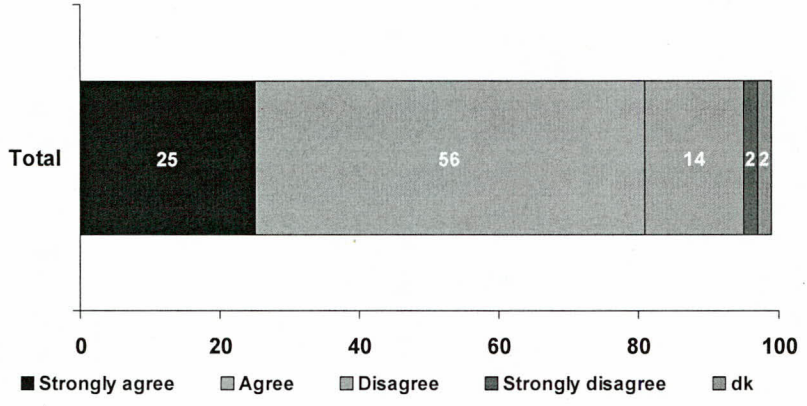
Most people readily agree that biotechnology is a leading-edge technology that will be critical to the future success of the Canadian economy. That is even more pronounced among Involved Canadians. Canadians tend to see it as a source of discovery, innovation, jobs and economic growth.

Most Canadians don't know or don't believe that Canada is among the world's biotechnology leaders though they very much want it to be so – 8 in 10 agree that is a goal they would support. By a two-to-one margin Canadians say they want leadership because they want to realize the promise of health and economic benefits. Focus group discussion shows that people are quite surprised to hear about Canada's relative standing. They tend to presume that the U.S. and some European countries would be further ahead. That is largely based on the fact that few had heard much about a Canadian biotechnology industry or its achievements.



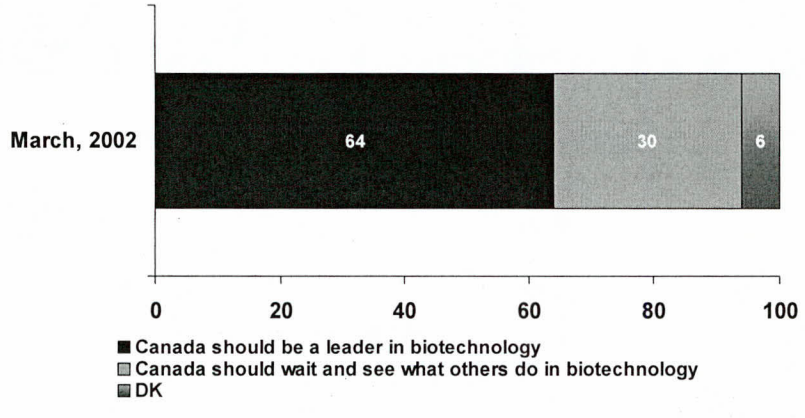
Should Be World Leader

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



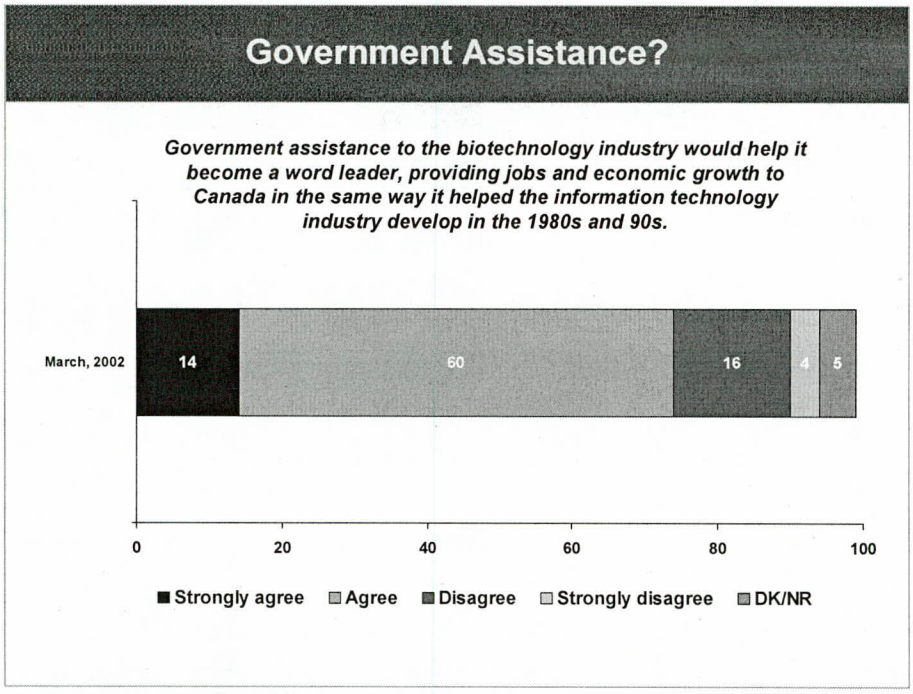
Support for Leadership

Which is closest to your own view? Biotechnology is a field of endeavour that I think Canada and Canadians should be leaders in, because it promises health and economic benefits OR Biotechnology is an area that Canada and Canadians should wait to see what others do, because it involves dealing with an issue that makes me uncomfortable.



Previous research has shown that most believe the government has a role to play in fostering the industry. Although they believe that the private sector will and should drive investment and growth, most people believe government involvement and support wil shorten the time required for the industry to reach critical mass and success. In many

ways, Canadians see a parallel to the way information and communications technology grew and drove the economy before recent difficulties. And they believe that government assistance would help the biotechnology industry grow in the same way.



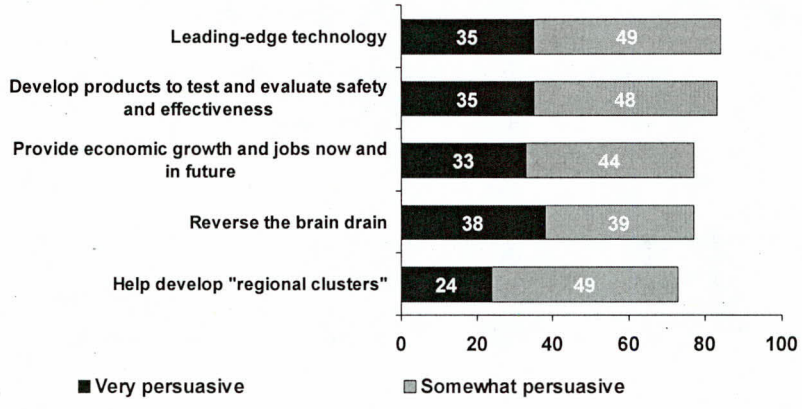
Focus group discussion revealed that Canadians continue to invest much of their hope for the success of their children and the country's economic future in high technologies. They believe Canada has the skill set to compete globally in high technologies and be among the world's leaders.

When presented with a "Biotechnology Economic Storyline" (see Appendix D), most participants were pleasantly surprised with Canada's international ranking and quite astonished to learn that Canadian scientists had produced so many important breakthroughs. All of that reinforced their belief that Canada should do what was required to maintain itself among the world's leadership in biotechnology.

Finally, the research tested a series of arguments in favour of, and opposed to, government support for the biotechnology industry. The arguments in favour of a government role proved to be much stronger than those against. About three times as many people found the pro arguments very persuasive as found the anti arguments very persuasive. When forced to choose between the two sets of arguments, the pro-to-anti ratio was even higher. The following graphs summarize the findings. The full text of the questions can be found in Appendix A.

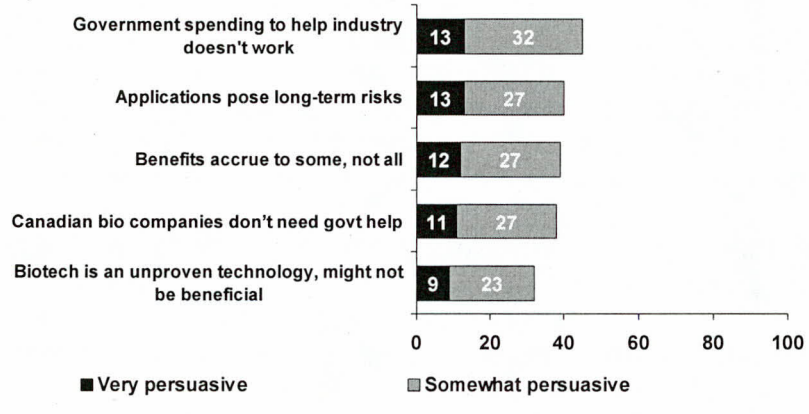
Economic Arguments in Favour

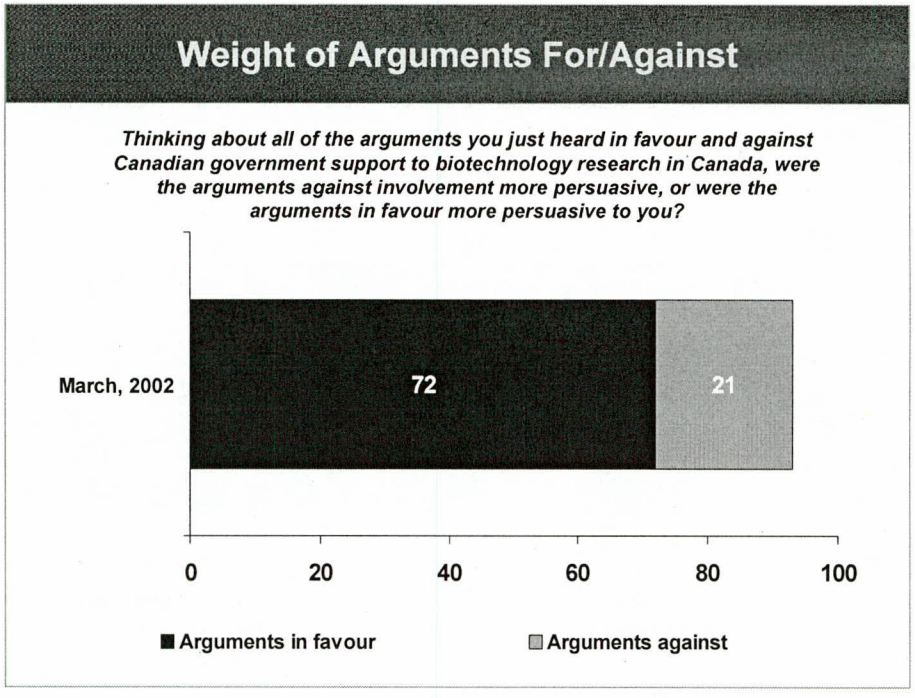
I'd like to read you a list of arguments in favour of government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive each is:



Arguments Against

I'd like to read you a list of arguments against government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive each is:



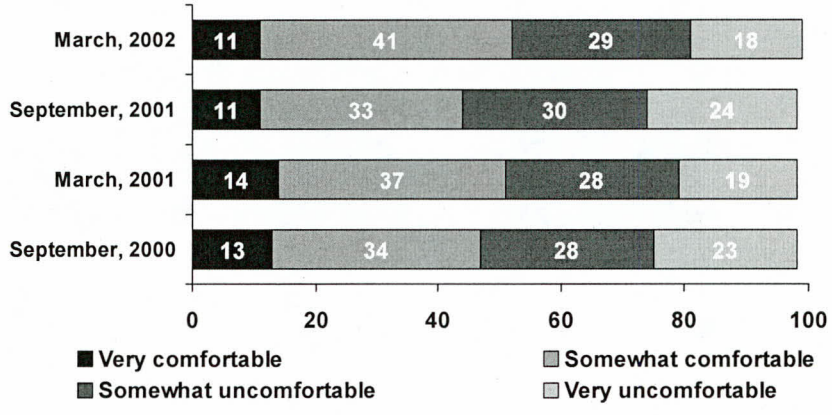


Specific Issues – GM Food and Food Labeling

This research wave tracked several questions involving genetically modified food and food labeling. The results indicate – as they did in the first five waves – a relatively even split between the number of Canadians who feel comfortable with GM foods and those who do not. Though somewhat more people feel comfortable, the number of who feel otherwise is very substantial (47%), with 18% saying that they are very uncomfortable. Somewhat fewer (12%) say they would never again buy a food product if they found out that it contained GM ingredients. There is little question that GM food is the least acceptable of all biotechnology applications. This probably reflects, in part, wider concerns about food ingredients. Focus group discussion indicates that many people are quite concerned about chemical additives, pesticides and other potential dangers in the food they eat.

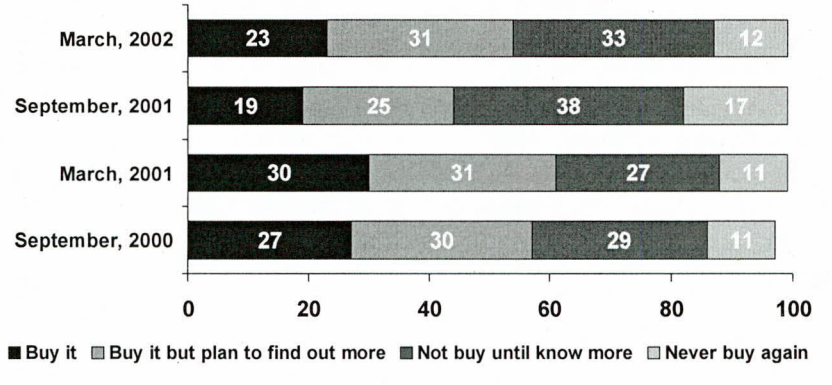
Comfort: GM Food

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 GM ingredients?



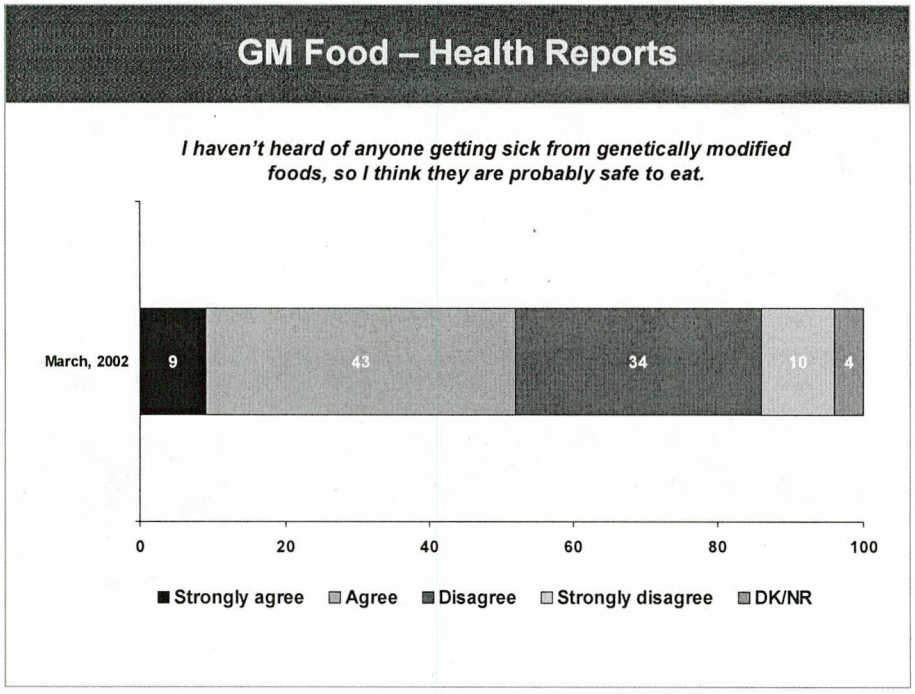
Behaviour: GM Food

If you were to find out that a food product that you have bought 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?



Focus group discussion also indicates that Canadians have become more aware of the likelihood that there are GM ingredients in their foods. There is little surprise when they are told that more than 60% of processed foods contain GM ingredients. That level of awareness, coupled with the lack of news about direct health consequences of eating

GM food, has rendered many people more sanguine about consuming GM foods. Though many are not comfortable, few say they take special precautions to ensure they are not exposed to GM ingredients. And focus group discussion indicates that there is some increasing price sensitivity in the issue. There are more people now who say they would not pay a large price increment to obtain GM-free foods.



There continues to be widespread confusion about just how GM ingredients show up in food. Most people tend to think they are ingredients that are added discretely like vitamins are. They also tend to believe they show up in fresh produce and meat. Most people are surprised to hear how few GM foods have been approved for sale.

Labeling. Wave 6 probed the question of GM food labeling in both the survey and focus groups. In the groups, a sizeable number of people indicated that they currently read food labels, though they do so primarily for nutritional content. Most people said they were interested in things like fat, sugar and carbohydrate levels. Some said they wanted to see whether there were ingredients or additives like preservatives or artificial colouring. Almost no one said they read labels to determine whether there were GM ingredients. When asked what further information they would like to see on labels, one or two people in each group mentioned GM ingredients. And as soon as discussion was joined, a substantial majority expressed a preference for GM food labeling.

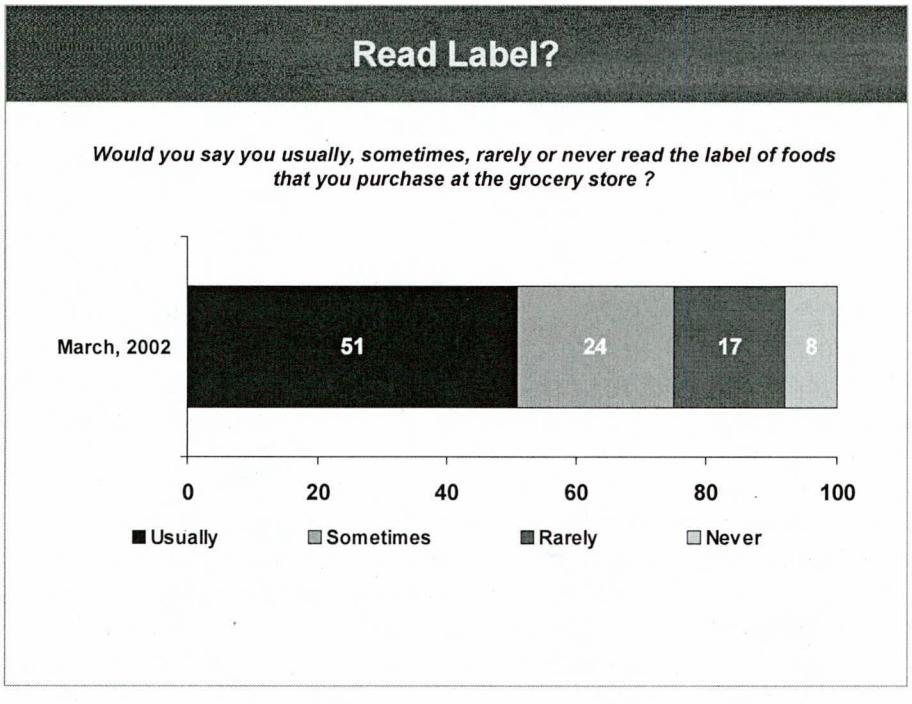
There were virtually no arguments that would move people away from endorsing GM labeling. People tended to dismiss arguments about the difficulty and cost of segregating food all along the production chain. Those with lower income did express a fair level of concern about having to pay as much as 10%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

labeling but ultimately that moved few people to change their minds. Few people believed that there would be substantially increased cost to taxpayers of monitoring the system nor were they moved by arguments that international trade difficulties may arise from different labeling regimes.

Lastly, few people in focus groups saw much point in voluntary systems of labeling rather than mandatory systems. It was the final outcome of full compliance that most people wanted.

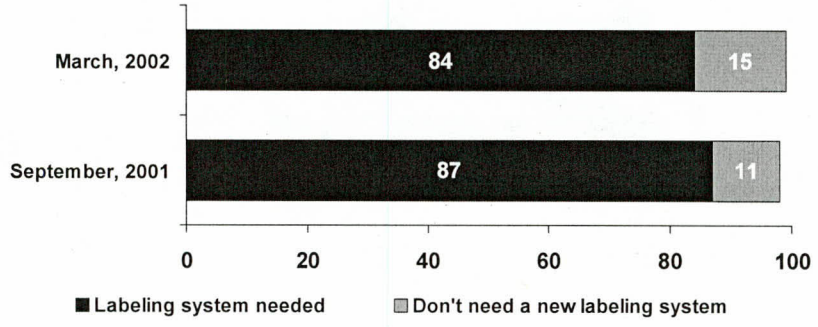
The underlying issue that strongly emerges in focus group discussion of labeling is not the long-term risk of GM foods but the principle of informed consumer choice. Even those people who are comfortable with GM foods generally believe that everyone has the right to know whether there are GM ingredients in their food. The strong, un-nuanced views that emerged reflect the core strength of the principle of the consumer's right to know and choose.

The survey results were entirely consistent with the focus group discussions.



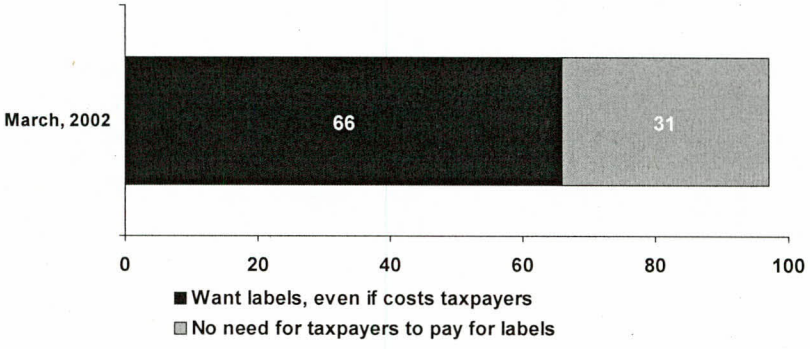
GM Food - Labeling

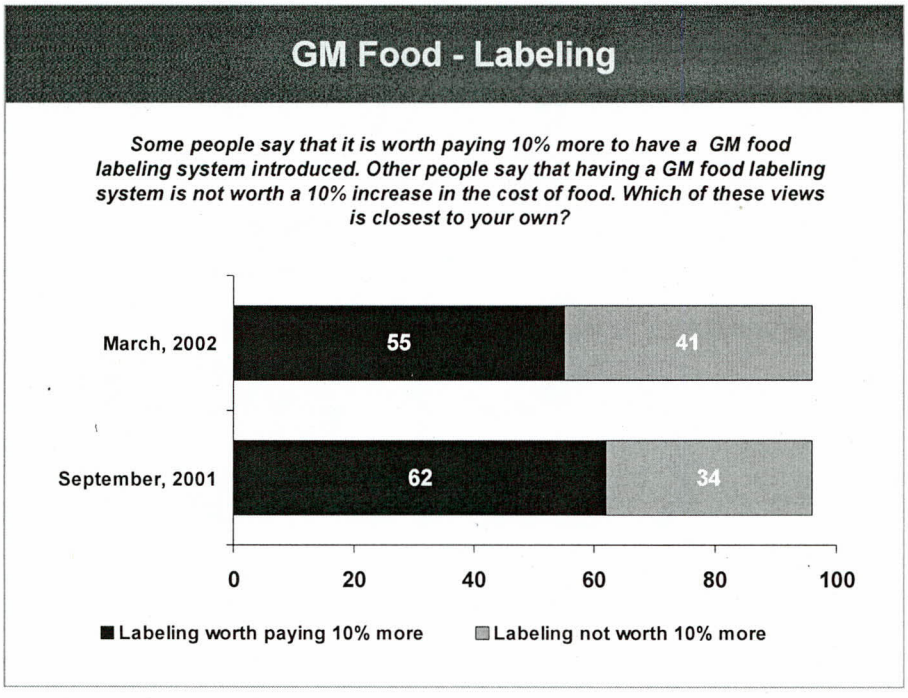
Some people say that Canada should introduce a new labeling system for food products that contain genetically modified ingredients in Canada, because GM food is not like other food, and people want to be more informed about it. Other people say that GM food is just like other food, and food companies 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?



GM Food - Labeling

Some people say that there is no need for taxpayers to pay for a system to create and monitor the labeling of genetically modified food, since these products are approved for safety by government. Other people say that they want labels to inform them about whether the food they buy contains genetically modified ingredients, even if it might cost the taxpayers some money to monitor the system. Which of these two views is closest to your own?





Specific Issues – Stem Cell Research

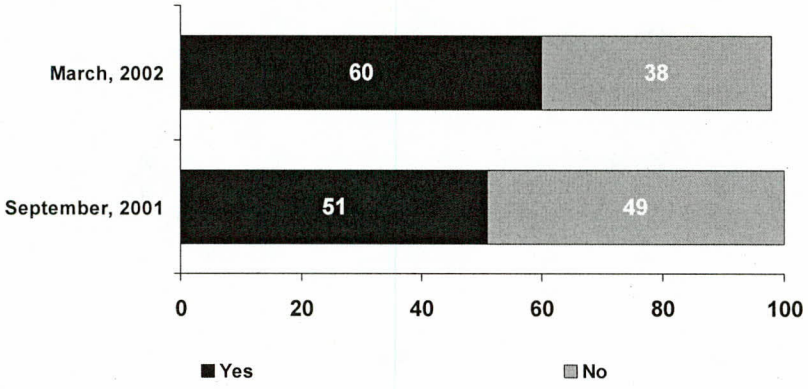
It has been more than a year since stem cell research broke onto the front pages and became a controversial subject. Few issues have gained such high levels of public attention in such a short period of time.

Awareness and recall of stem cell research hovers over 60% with the vast majority of Canadians being at least somewhat supportive of the research. The number of people adamantly opposed has dropped five points to 13% of the population. Those numbers come after a quite tendentious description of the issue to test discomfort over embryos being the source of stem cell tissue.

As a corollary, a vast majority of Canadians believe it is very or somewhat acceptable for the Government of Canada to be involved in supporting this type of research.

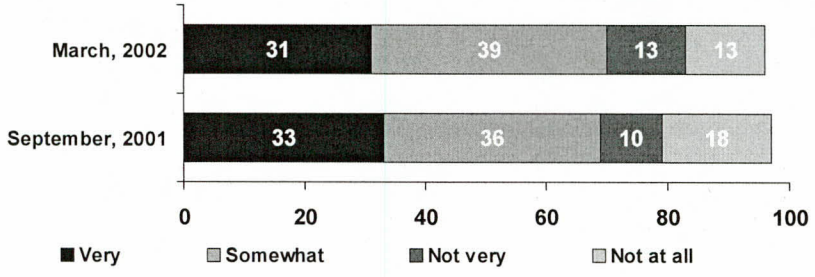
Stem Cell Research

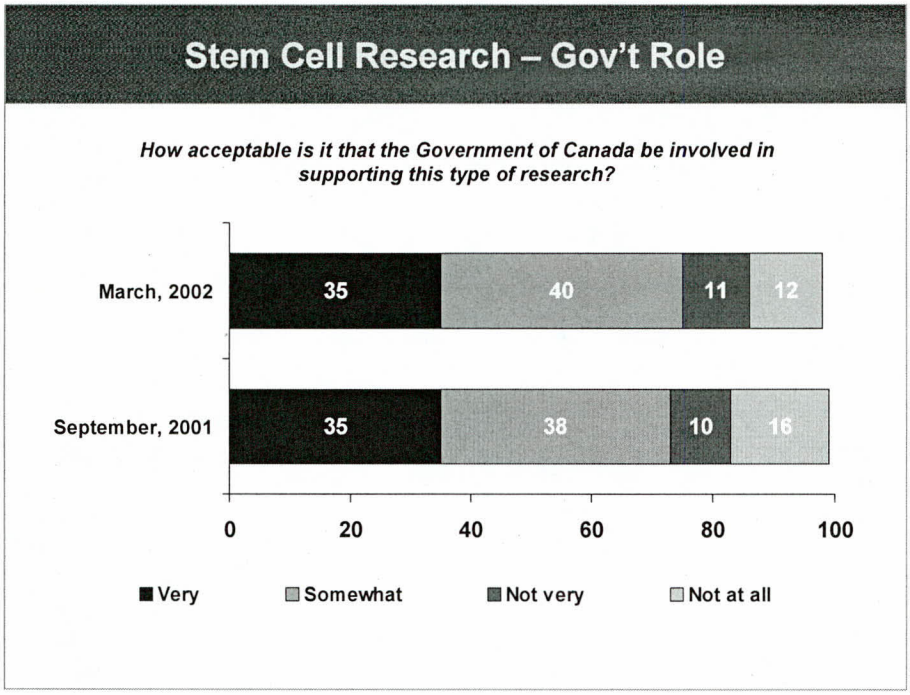
Over the last three months, have you heard about any stories or issues involving STEM CELL RESEARCH?



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 14 days old that have been developed and frozen in fertility clinics, which 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?

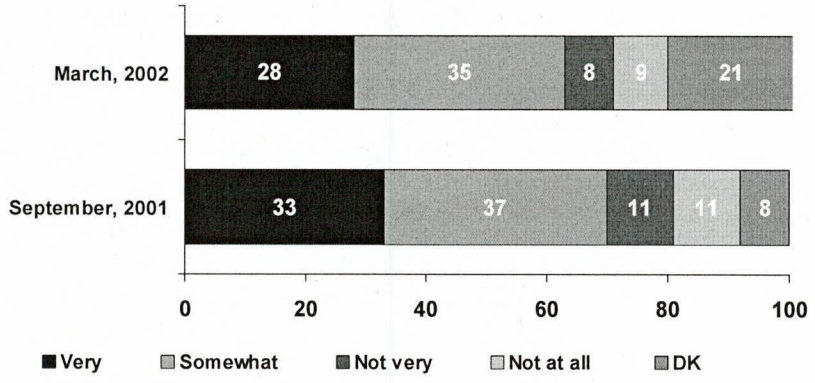




The main reason for the high levels of support for stem cell research is the promise of what people believe to be unparalleled health benefits. A remarkable number of people believe that the research will not only be a general benefit but that it will benefit them personally. However, with greater awareness comes greater uncertainty. More than twice as many people in wave 6 (21%) as in wave five (7-8%) said they "don't know" whether the technology will provide benefits. Focus group discussion shows that most people associated stem cell research with health benefits while a sizeable number associated it with the controversy surrounding President Bush's view on the research.

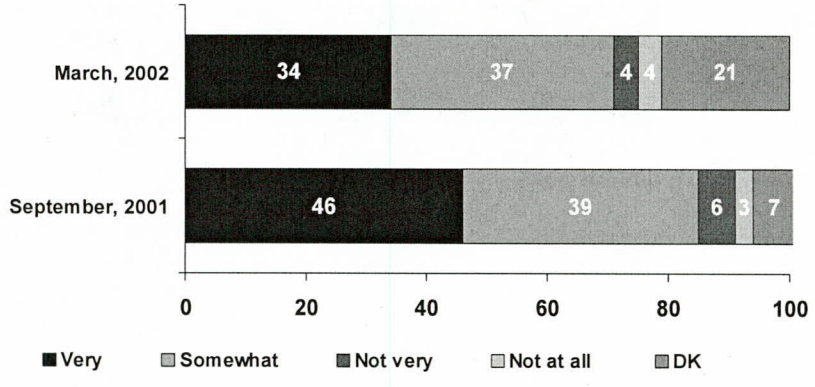
Stem Cell Research - Benefits

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



Stem Cell Research - Benefits

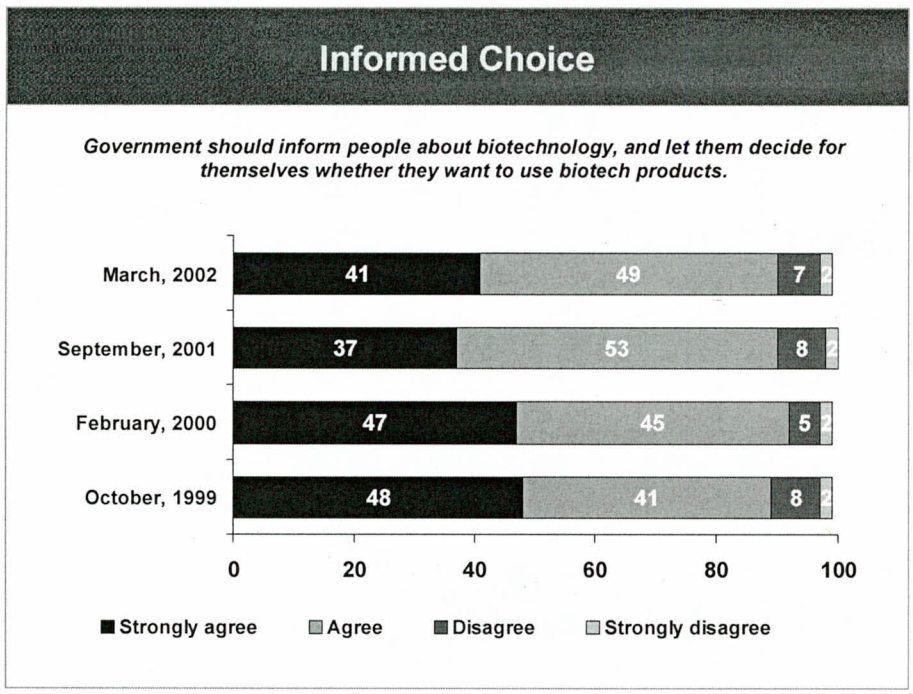
From what you know or have heard, how beneficial do you think stem cell research will be to the health of Canadians?



Specific Issues – Decision Making

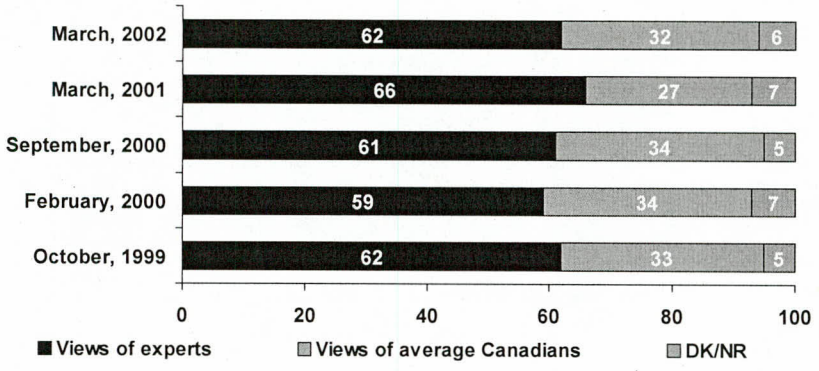
As it is in labeling, informed choice is a powerful concept in the context of GM applications. Most people believe it is their choice whether or not to use any particular GM product and few would wish to impose their preferences on others. That, of course, is conditioned by the presumption that the product has been found safe for use. If the best available evidence suggests that a particular use is safe, most say it should be allowed. The issue for most people is a science-based question, not an ethical or moral one. It is at that point that the public asserts its exclusive right to make choices.

When it comes to safety, most do not want public opinion or individual preference to prevail. They want the government and experts to make the decisions. Focus group discussions indicate that Canadians want high safety standards and sanctions imposed on those who might get involved in unacceptable cloning. However, for a majority of applications, most people would want expert decision making confined to safety.



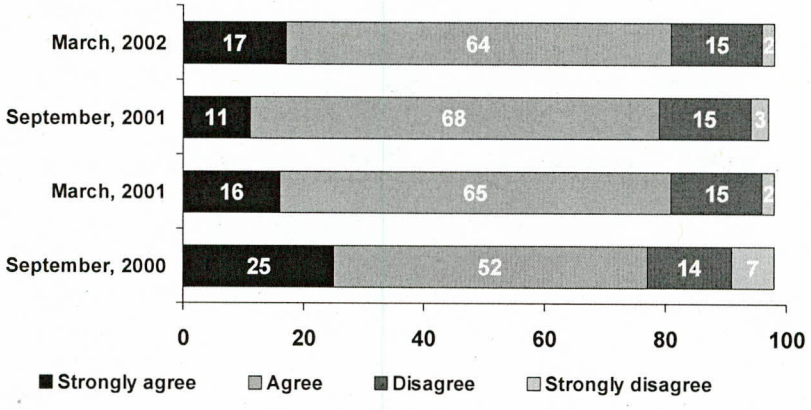
Experts Versus Average Canadians

Which of the following views is closest to your own? Decisions about biotechnology should be based mainly on the views and advice of experts and scientists OR Decisions about biotechnology should be based primarily on the views of average Canadians.



Best Available Evidence

If the best available evidence says a particular use of biotechnology is safe, it should be allowed.



Appendix A

Biotechnology Wave 6 Survey
Interview Schedule

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

Positive reaction	29
Neutral reaction	52
Negative reaction	11
Don't know/refused	8

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

Yes	44
No	54
Don't know/Refused	2

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

Yes	57
No	42
Don't know/Refused	0

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

Very familiar	6
Somewhat familiar	45
Not very familiar	33
Not at all familiar	15
Don't know/refused	0

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

Strongly support	9
Somewhat support	49
Somewhat oppose	21
Strongly oppose	9
Don't know/refused	11

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

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

Strongly agree	11
Agree	40
Disagree	32
Strongly disagree	14
Don't know/refused	3

7. The use of genetically modified bacteria or plants to break down pollutants like oil spills and toxic wastes.

Strongly agree	31
Agree	53
Disagree	9
Strongly disagree	4
Don't know/refused	3

8. Wheat that has been genetically modified to resist certain pests in order to increase the volume of wheat grown.

Strongly agree	13
Agree	44
Disagree	26
Strongly disagree	13
Don't know/refused	4

9. Helping to cure Type 1 diabetes by inserting a gene into the pancreas that stimulates the insulin production process in humans.

Strongly agree	31
Agree	51
Disagree	9
Strongly disagree	3
Don't know/refused	5

In your opinion, does biotechnology bring major benefits, modest benefits, modest drawbacks, or major drawbacks in each of the following areas. How about:

10. a) The health of Canadians today.

Major benefits	24
Modest benefits	48
Modest drawbacks	13
Major drawbacks	7
Don't know/refused	8

10 b) The health of Canadians over the longer term.

Major benefits	25
Modest benefits	44
Modest drawbacks	10
Major drawbacks	11
Don't know/refused	11

11. a) Canada's economy today

Major benefits	18
Modest benefits	49
Modest drawbacks	13
Major drawbacks	6
Don't know/refused	14

11 b) Canada's economy over the long term

Major benefits	22
Modest benefits	48
Modest drawbacks	11
Major drawbacks	7
Don't know/refused	12

12 In the field of biotechnology, one role for the federal government is to regulate the products that are being developed, to ensure that they are safe for our health and environment; another role is to support the development of the industry, which helps create investment and jobs. With respect to biotechnology, which role do you think the federal government is putting more emphasis on today, or is it putting equal emphasis on both?

Emphasis on regulating	18
Emphasis on supporting development	23
Equal Emphasis on regulating/supporting	41
Don't know/refused	19

13 Which role do you think the federal government *should emphasize in future,* or should it put equal emphasis on both?

Emphasis on regulating	35
Emphasis on supporting development	7
Equal Emphasis on regulating/supporting	54
Don't know/refused	4

14 Some people say that it is impossible for the federal government to regulate industry and to support industry at the same time. Other people say that government can and should be involved in both of these activities, as long as the two functions are separated (between departments). Which of these two views is closest to your own?

Impossible to do both	19
Govt. can and should be involved in both	76
Don't know/refused	4

15ab

15 a) Which view is closest to your own? Biotechnology is a field of endeavour that I think Canada and Canadians should be leaders in, because it promises health and economic benefits.

Canada should be a leader in biotechnology	64
Canada should wait and see what others do	30
Don't know/refused	6

15 b) Biotechnology is an area that Canada and Canadians should wait to see what others do, because it involves dealing with an issue that makes me uncomfortable.

Canada should be a leader in biotechnology	65
Canada should wait and see what others do	30
Don't know/refused	5

16ab

16 a) Knowing that there are many things that government could dedicate resources to, do you think that government should spend more, less or about the same amount as it currently spends on supporting genomics research in future?

Spend more	35
Spend less	13
Spend about the same amount	39
Don't know/refused	13

16 b) Knowing that there are many things that government could dedicate resources to, do you think that government should spend more, less or about the same amount as it currently spends on supporting biotechnology research in future?

Spend more	36
Spend less	13
Spend about the same amount	38
Don't know/refused	13

17 Which of the following views is closest to your own? Decisions about biotechnology should be based mainly on the views and advice of experts and scientists OR Decisions about biotechnology should be based primarily on the views of average Canadians.

Decisions based on views of experts	62
Decisions based on views of Canadians	32
Don't know/refused	6

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.

18 Drinking water from the tap

Low level of risk	18
2	11
3	10
Moderate level of risk	23
5	11
6	8
High level of risk	18
Don't know/refused	1

19 A serious car accident

Low level of risk	7
2	7
3	8
Moderate level of risk	25
5	13
6	11
High level of risk	28
Don't know/refused	1

20 Air pollution or smog

Low level of risk	5
2	4
3	6
Moderate level of risk	18
5	17
6	17
High level of risk	31
Don't know/refused	1

21 Pesticides

Low level of risk	4
2	4
3	6
Moderate level of risk	21
5	15
6	15
High level of risk	33
Don't know/refused	1

22 Violent crime

Low level of risk	9
2	8
3	8
Moderate level of risk	18
5	12
6	11
High level of risk	34
Don't know/refused	1

23 Genetically modified food

Low level of risk	9
2	8
3	11
Moderate level of risk	28
5	14
6	8
High level of risk	18
Don't know/refused	3

24 Genetically modified pharmaceutical products (drugs)

Low level of risk	11
2	8
3	11
Moderate level of risk	31
5	14
6	8
High level of risk	13
Don't know/refused	5

25 Severe weather events, like hurricanes or floods

Low level of risk	23
2	13
3	10
Moderate level of risk	22
5	11
6	6
High level of risk	14
Don't know/refused	1

26 Nuclear waste

Low level of risk	10
2	7
3	5
Moderate level of risk	12
5	8
6	10
High level of risk	46
Don't know/refused	2

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

27 Canada is among the world's leaders in the field of biotechnology research.

Strongly agree	5
Agree	41
Disagree	24
Strongly disagree	2
Don't know/refused	28

28 Canada should be among the world's leaders in the field of biotechnology research.

Strongly agree	25
Agree	56
Disagree	14
Strongly disagree	2
Don't know/refused	2

29 Until more is known about the risks, government should slow the use of biotechnology.

Strongly agree	21
Agree	47
Disagree	25
Strongly disagree	4
Don't know/refused	2

30 Until more is known about the risks, government should slow the use of biotechnology, even if it means that it would reduce our ability to gain the benefits of these technologies.

Strongly agree	16
Agree	50
Disagree	27
Strongly disagree	4
Don't know/Refused	2

3/a&b

31 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	15
Agree	46
Disagree	28
Strongly disagree	4
Don't know/refused	7

31b) From what I know, genetically modified health products (like drugs) provide me with few benefits over non-genetically modified health products, but they provide many more risks.

Strongly agree	8
Agree	42
Disagree	32
Strongly disagree	5
Don't know/refused	13

32 Government should inform people about biotechnology, and let them decide for themselves whether they want to use biotechnology products.

Strongly agree	41
Agree	49
Disagree	7
Strongly disagree	2
Don't know/refused	1

5

33 Government assistance to the biotechnology industry would help it become a world leader, providing jobs and economic growth to Canada in the same way it helped the information technology industry develop in the 1980s and 90s.

Strongly agree	14
Agree	60
Disagree	16
Strongly disagree	4
Don't know/refused	5

34 a) 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	18
Agree	59
Disagree	17
Strongly disagree	5
Don't know/refused	1

34 b) Although there may be some unknown risks, technologies like biotechnology are part of the future, so all we can do is make sure that its uses are as safe as possible.

Strongly agree	29
Agree	58
Disagree	8
Strongly disagree	4
Don't know/refused	1

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

Strongly agree	17
Agree	50
Disagree	25
Strongly disagree	8
Don't know/refused	0

35 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	25
Agree	50
Disagree	19
Strongly disagree	6
Don't know/Refused	0

36 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	20
Agree	60
Disagree	14
Strongly disagree	4
Don't know/refused	2

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

Strongly agree	10
Agree	53
Disagree	26
Strongly disagree	10
Don't know/refused	2

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

Strongly agree	17
Agree	64
Disagree	15
Strongly disagree	2
Don't know/refused	2

38 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	22
Agree	64
Disagree	9
Strongly disagree	2
Don't know/refused	3

39 I haven't heard about anyone getting sick from genetically modified foods, so I think they are probably safe to eat.

Strongly agree	9
Agree	43
Disagree	34
Strongly disagree	10
Don't know/refused	4

40 Would you say you usually, sometimes, rarely or never read the label of foods that you purchase at the grocery store?

Usually	51
Sometimes	24
Rarely	17
Never	8
Don't know/refused	0

41 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	41
Somewhat uncomfortable	29
Very uncomfortable	18
Don't know/refused	2

42 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	23
Buy it but plan to find out more	31
Not buy until you found out more	33
Never buy it again	12
Don't know/refused	1

43a Some people say that Canada should introduce a new labeling system for food products that contain genetically modified ingredients in Canada, because GM food is not like other food, and people want to be more informed about it./Other people say that GM food is just like other food, and food companies have tested it, so we do not need to introduce a new GM food labeling system. Which of these views is closest to your own?

Canada introduce new labeling system	84
No need to introduce labeling system	15
Don't know/refused	1

A3b

A3b

Some people say that there is no need for taxpayers to pay for a system to create and monitor the labeling of genetically modified food, since these products are approved for safety by government./ Other people say that they want labels to inform them about whether the food they buy contains genetically modified ingredients, even if it might cost the taxpayers some money to monitor the system. Which of these two views is closest to your own?

No need for taxpayers to pay for labeling	31
Want labels even if might cost taxpayers	66
Don't know/refused	3

44 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. 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?

Worth paying 10% more	55
Not worth paying 10% more	41
Don't know/refused	4

45 Over the last three months, have you heard about any stories or issues involving STEM CELL RESEARCH?

Yes	60
No	38
Don't know/refused	1

46ab

46 A) From what you know or have heard, how beneficial do you think stem cell research will be to your health? (very, somewhat, not very, not at all)

Very beneficial	28
Somewhat beneficial	35
Not very beneficial	8
Not at all beneficial	9
Don't know/refused	21

46 B) From what you know or have heard, how beneficial do you think stem cell research will be to the health of Canadians? (very, somewhat, not very, not at all)

Very beneficial	34
Somewhat beneficial	37
Not very beneficial	4
Not at all beneficial	4
Don't know/refused	21

47a

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 14 days old that have been developed and frozen in fertility clinics, which are going to be discarded because the parents do not need them.

47b

47 How acceptable is it that this type of research be allowed in Canada? (very, somewhat, not very, not at all)

Very acceptable	31
Somewhat acceptable	39
Not very acceptable	13
Not at all acceptable	13
Don't know/refused	3

48 How acceptable is it that the Government of Canada be involved in supporting this type of research? (very, somewhat, not very, not at all)

Very acceptable	35
Somewhat acceptable	40
Not very acceptable	11
Not at all acceptable	12
Don't know/refused	3

I'd like to read you a list of arguments in favour of government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive each is – very, somewhat, not very, not at all.

49 Biotechnology is a leading-edge technology that is producing breakthroughs in health and medicine that will benefit our health as well as the health of future generations.

Very persuasive	35
Somewhat persuasive	49
Not very persuasive	10
Not at all persuasive	5
Don't know/refused	2

50 If we invest in Canadian biotechnology research, it can help to reverse the "brain drain" by enabling Canadian biotechnology researchers to remain in Canada to do their scientific work, rather than moving to the United States or other countries.

Very persuasive	38
Somewhat persuasive	39
Not very persuasive	15
Not at all persuasive	6
Don't know/refused	2

51 Having a vibrant biotechnology industry will help ensure that Canada's economy is prosperous both now and for future generations, providing high-paying, skilled jobs.

Very persuasive	33
Somewhat persuasive	44
Not very persuasive	16
Not at all persuasive	5
Don't know/refused	2

52 Government support can help the development of regional industry groupings or "clusters" for biotechnology in cities across Canada, which create spin-off benefits for those industry groupings and the people who live in those communities.

Very persuasive	24
Somewhat persuasive	49
Not very persuasive	18
Not at all persuasive	6
Don't know/refused	2

53 An important aspect of biotechnology involves the development of applications to evaluate the safety and effectiveness of biotechnology products, and an investment by government can help those who work at universities and hospitals be world leaders in this area.

Very persuasive	35
Somewhat persuasive	48
Not very persuasive	12
Not at all persuasive	3
Don't know/refused	1

Now I'd like to read you a list of arguments against government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive they are.

54 Biotechnology is an unproven technology which may not produce significant benefits in the future, so it is probably not worth the investment.

Very persuasive	9
Somewhat persuasive	23
Not very persuasive	40
Not at all persuasive	26
Don't know/refused	2

55 Canadian researchers and companies that work in the field of biotechnology don't need any support from government in order for them to become world leaders in this field.

Very persuasive	11
Somewhat persuasive	27
Not very persuasive	38
Not at all persuasive	20
Don't know/refused	3

56 The benefits of biotechnology will only be gained by a small group of Canadians, not all Canadians.

Very persuasive	12
Somewhat persuasive	27
Not very persuasive	35
Not at all persuasive	23
Don't know/refused	3

57 Biotechnology applications could pose long-term risks, so Canada should resist getting involved in this area.

Very persuasive	13
Somewhat persuasive	27
Not very persuasive	35
Not at all persuasive	23
Don't know/refused	2

58 Government spending to help industries in general is fraught with problems, so government should not get involved in supporting this industry

Very persuasive	13
Somewhat persuasive	32
Not very persuasive	32
Not at all persuasive	18
Don't know/refused	5

59 Thinking about all of the arguments you just heard in favour of and against Canadian government support to biotechnology research in Canada, were the arguments against involvement more persuasive, or were the arguments in favour more persuasive to you?

Arguments against involvement	21
Arguments in favour of involvement	72
Don't know/refused	7

60 People have suggested a number of different concerns about products and processes involving genetic modification. Of the four below, which is the one that is the greatest concern to you?

Long-term risks to environment	16
Long-term risks to human health	56
There is something unnatural about these products	8
Processes involved raise ethical concerns	15
Don't know/refused	6

Appendix B

Biotechnology Wave 6 Focus Groups
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
    - 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, AGRICULTURAL, 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
- Biomass energy

- Helping to cure Type 1 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
- Using genetic technology to identify predisposition to disease, and studying ways of adjusting those genes so people do not get those diseases
- The use of cloned animals as a source of food, such as using cloned cows as a source of beef or milk
- Wheat that has been genetically modified to resist certain pests in order to increase the volume of wheat grown/reduce cost to consumers
- Do the benefits of biotechnology applications outweigh the risks, or vice versa? Over time, will that change – will it reverse?

Comparative Risk (10 min)

- 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, 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?

Perceptions - Roles and Responsibilities of the Federal Government (15 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?

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?

Importance/Future of Biotechnology Industry (20 min)

- When you think about the future world economy, and what sectors are going to be leaders, which ones come to mind? What about the Canadian economy? Will it be same/different?
- Where do you think biotechnology will be? Is it a leading-edge technology like information technology?
- How extensive is the Canadian biotech industry? Are we world leaders in this area? What countries are world leaders in this area?
- Should we in Canada try and be world leaders in this area? Do we have the capacity (skills, knowledge, infrastructure) to do it? If no, what do we need to work on?
- What role can government play in helping to ensure that biotechnology is a leading industry in Canada's future? What are some of the arguments for and against government playing this kind of role?
- I'm going to give you a series of reasons why government should play a role in this area, and then I'm going to give you a series of reasons why government should not. Please think about these, as well as others that were raised, and discuss
- Which arguments are strongest in favour?
- Which arguments are strongest in opposition?
- Overall, do the arguments against outweigh the arguments in favour, or vice versa?

HAND OUT (ROTATE LISTS OF ARGUMENTS)

POSITIVE

1. Biotechnology is a leading-edge technology that is producing breakthroughs in health and medicine that will benefit our health as well as the health of future generations
2. If we invest in Canadian biotechnology research, it can help to reverse the "brain drain" by enabling Canadian biotechnology researchers to remain in Canada to do their scientific work, rather than moving to the United States or other countries
3. Having a vibrant biotechnology industry will help ensure that Canada's economy is prosperous both now and for future generations, providing high-paying, skilled jobs
4. Government support can help the development of regional industry groupings or "clusters" for biotechnology in cities across Canada, which create spin-off benefits for those industry groupings and the people who live in those communities
5. An important aspect of biotechnology involves the development of applications to evaluate the safety and effectiveness of biotechnology products, and an investment by government can help those who work at universities and hospitals be world leaders in this area

NEGATIVE

6. Biotechnology is an unproven technology which may not produce significant benefits in future, so it is probably not worth the investment
7. Canadian researchers and companies that work in the field of biotechnology don't need any support from government in order for them to become world leaders in this field
8. The benefits of biotechnology will only be gained by a small group of Canadians, not all Canadians
9. Biotechnology applications could pose long-term risks, so Canada should resist getting involved in this area

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 14 days old that have been developed and frozen in fertility clinics, which 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. If they were to get them from this source, would this affect your view?

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?

Do you read the label on products you buy in detail? What do you look for when you read the label?

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 agrees 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 would have to 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. They also say that it would cost more money for government inspectors to monitor such a system.

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, while 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 of 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?

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

Bioterrorism (15 min)

33 Do you make any linkages between biotechnology as we have been discussing here tonight and bioterrorism?

34 How much risk do you believe there is to you/Canada of a bioterrorist attack?

35 What do Canadians percieve to be at greatest peril from bioterrorism (i.e., their food supply, water, health products, the environment)?

36 How prepared are we for such an attack?

37ab Should the Government of Canada dedicate resources to preparations for defending ourselves from such attacks? (e.g. new vaccines, therapeutics, etc.)? 37a Should the government provide incentives to businesses that demonstrate promising uses of biotechnology for biodefence? 37b

38ab Should we take steps to build elements into our public health system to help defend against a bioterrorist attack? (well equipped hospitals, etc.)? Should the government invest more in biotechnological defence technologies that also promote public health (e.g. disease detection, vaccines)? 38a 38b

Appendix C
BIO 2002 Focus Groups
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.

Topline Views: Labeling and Risk (10 min)

There are many things that present risks to us in life. In your view, what are some of the most significant risks that face you and your family?

How often do you read the label on food products you buy? What do you look for when you read the label?

General Impressions of Biotechnology (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
    - 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, AGRICULTURAL, 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
- Biomass energy products, like ethanol, which is a car fuel produced using corn
- Helping to cure Type 1 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
- Wheat that has been genetically modified to grow better in dryer climates, to enable it to grow during long periods of drought
- Do the benefits of biotechnology applications outweigh the risks, or vice versa? Over time, will that change – will it reverse?

Comparative Risk (10 min)

- 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, 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?

Perceptions - Roles and Responsibilities of the Federal Government (15 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?
- 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?

Importance/Future of Biotechnology Industry (25 min)

- When you think about the future world economy, and what sectors are going to be leaders, which ones come to mind? What about the Canadian economy? Will it be same/different?
- Where do you think biotechnology will be?
  - Will it contribute to the economy?
  - Will it create jobs?
  - Will it create jobs in future?
  - Is it a leading-edge technology like information technology?
- How extensive is the Canadian biotech industry? Are we world leaders in this area? What countries are world leaders in this area?
- Should we in Canada try and be world leaders in this area? Do we have the capacity (skills, knowledge, infrastructure) to do it? If no, what do we need to work on?
- What role can government play in helping to ensure that biotechnology is a leading industry in Canada's future? What are some of the arguments for and against government playing this kind of role?

- I'm going to give you a series of reasons why government should play a role in this area, and then I'm going to give you a series of reasons why government should not. Please think about these, as well as others that were raised, and discuss
- Which arguments are strongest in favour?
- Which arguments are strongest in opposition?
- Overall, do the arguments against outweigh the arguments in favour, or vice versa?

HAND OUT (ROTATE LISTS OF ARGUMENTS)

POSITIVE

10. Biotechnology is a leading-edge technology that is producing breakthroughs in health and medicine that will benefit our health as well as the health of future generations
11. If we invest in Canadian biotechnology research, it can help to reverse the "brain drain" by enabling Canadian biotechnology researchers to remain in Canada to do their scientific work, rather than moving to the United States or other countries
12. Having a vibrant biotechnology industry will help ensure that Canada's economy is prosperous both now and for future generations, providing high-paying, skilled jobs
13. Government support can help the development of regional industry groupings or "clusters" for biotechnology in cities across Canada, which create spin-off benefits for those industry groupings and the people who live in those communities
14. An important aspect of biotechnology involves the development of applications to evaluate the safety and effectiveness of biotechnology products, and an investment by government can help those who work at universities and hospitals be world leaders in this area

NEGATIVE

15. Biotechnology is an unproven technology which may not produce significant benefits in future, so it is probably not worth the investment
16. Canadian researchers and companies that work in the field of biotechnology don't need any support from government in order for them to become world leaders in this field
17. The benefits of biotechnology will only be gained by a small group of Canadians, not all Canadians
18. Biotechnology applications could pose long-term risks, so Canada should resist getting involved in this area
19. Government spending to support industries often does not pay off in the long run

Communications Material Testing (45 min)

MATERIALS – TWO-PAGE "NARRATIVE" FOR BIO 2002

I am going to provide you with a document that outlines "Canada's story" on biotechnology. What I would like you to do is read it, and discuss.

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

1. What are the one or two main messages that it delivers?
2. What specific pieces of information or messages stood out for you as particularly interesting?
3. Is the information contained in this document credible (or believable) to you, or not?
4. Does it provide you with information that you have/have not heard about this subject?
5. Overall, does it represent good reasons for Canada to move ahead in the area of biotechnology, or not?
6. And does it represent good reasons why government should make efforts to support the development of this industry?

Appendix D

Biotechnology Economic Storyline

- A number of experts in Canada believe that biotechnology will have an impact on this century as dramatic and far-reaching as that of computers and telecommunications on the last. New technologies and approaches are increasing the frontiers of our knowledge and new discoveries, cures and breakthroughs are emerging at an unprecedented historical pace.

- Biotechnology is being targeted by most industrialized countries as one of the most important sources of jobs and economic growth in the 21st century. The global market for biotechnology products is expanding at an unprecedented rate. There are estimates that world trade in biotechnology will be about $50 billion within four years, growing fully 10% a year.

- As home to the second largest number of biotechnology companies in the world, Canada's position as a leader in the field of biotechnology is already well established:
  - Canada ranks first in terms of private sector research and development spending per employee and first in cost-competitiveness for biomedical R&D. Canada has also established the fastest rate of growth among G-7 countries in the number of workers devoted to research and development, in external applications for patents, and in business expenditures on R&D.
  - Canada has world-renowned clusters of biotechnology excellence where knowledge-intensive industry develops around universities, research and government institutions: Montreal is home to the largest biotechnology specialized research center in the world; Toronto's medical research community ranks among the top four in North America, Saskatoon is one of the world's leading centers for bio-agriculture.
  - Canadian universities and research hospitals are generating significant commercial activity. Three out of every 10 companies in Canada's rapidly expanding biotechnology sector in 1999 were spin-off companies. These firms accounted for more than one-quarter of total revenues and 29% of total employees with biotechnology-related responsibilities.
  - Specialized institutes have been established to direct funding and to attract the world's most competitive researchers in emerging fields through the Canadian Institutes of Health Research, Genome Canada and the National Institute for Nanotechnology.

- With a commitment to innovation and excellence, Canada is building on these advantages with the following actions:
  - The establishment of the Canada Foundation for Innovation (CFI) to refurbish and update the research tools and infrastructure at our universities, hospitals and laboratories – by 2005 the CFI's total investment will exceed $5.5 billion.
  - Substantial new investments in our universities, including the creation of 2000 new Research Chairs to foster new discoveries and learning.
  - Roughly 5% of federal government budget dedicated to funding initiatives for science and technology.

- The G-7's most attractive R&D tax incentives – with immediate and full write-off for all expenditures in R&D capital and the Scientific Research and Experimental Development Investment tax credit, which encourages capital to new areas of scientific discovery.
- A 21st century infrastructure with the highest per capita on-line penetration (after Denmark and Norway), every school and library linked through the Internet and the highest per-capita ownership of home computers.
- A highly trained, well-schooled labour pool – with the world's highest rate of post-secondary enrolment and schools that have been independently ranked among the world's elite.

➢ To maintain focus and spur continued excellence the Canadian government has set bold objectives to be met by 2010, including: doubling the amount invested in R&D by the federal government, developing at least 10 internationally competitive clusters, and increasing the number of post-graduate and doctoral candidates at our universities by 5% per year.

➢ The Canadian public is open-minded and supportive of the potential benefits associated with biotechnology, particularly those related to medical discovery, improved quality of life and new jobs. Fully two-thirds of the public describe themselves as supportive of Canada's focus on biotechnology for the future.

➢ At the same time, this is a newly emerging technology that involves the very core of life itself. The Canadian government understands that the pace of change in this field – fuelled by new technologies and new discoveries – demands an increased responsibility to anticipate and manage risks. Open discussion and public dialogue will become increasingly important as our society works its way through the associated social and ethical issues.

- The Government of Canada is wholly committed to ensuring that it continues to have an efficient, effective regulatory system and the scientific capacity to protect health and the environment. Nearly $100 million has been committed in the past two years toward modernization of food safety and the management/control of toxic substances in our environment, food and drinking water.

- Canada has established CBAC (the Canadian Biotechnology Advisory Committee), an independent expert committee of leading scientists, academics, ethicists, environmentalists, members of the public and industry to consult with Canadians and to advise the government on how to reap the benefits of biotechnology while managing the risks that it presents.

~~20020301~~

1

EARNSCLIFFE

Presentation to:

Biotechnology Communications Working Group

Biotechnology Wave 6 POR Results

Research Findings

Powerpoint of wave 6

March 2002

20020601

EARNSCLIFFE

Methodology

- **National Survey of 1200 respondents**
  - Margin of error 2.8%
- **6 Focus groups**
  - Vancouver, Toronto, Quebec City
- **4 Additional groups conducted for bio 2002**
  - With detailed economic component, separate from CBS tracking
- **Content:**
  - Largely tracking, but one new element
    - An economic module
      - Testing a storyline about economic benefits
      - Testing rationales for its importance
      - Testing arguments for/against government support to biotech industry

EARNSCLIFFE

Summary (1)

- **Results highly consistent with previous waves**
  - In wave 5, there was some evidence of a slight shift toward greater concern about biotech
  - At the time we suggested that this wave would indicate whether this was a significant trend
  - That evidence has not borne out in wave 6
- **Main Findings**
  - Growth in awareness slowing, familiarity low
  - Continuing two to one support for the technology overall
  - A return to growing support for the technology
  - A continuing movement "toward the middle" on many issues
    - More nuanced understanding, more considered views
  - A growing divergence between involved, general public
    - In groups, Involved more supportive than in past, gp less so
      - Involved increasingly of the view that this is a leading edge technology of the future
      - Gp beginning to absorb that biotech involves some fundamental issues, which is tempering their attitudes

EARNSCLIFFE

Summary (2)

- **On most applications, marginal benefit test continues to apply**
  - Canadians continue to express concern about risks, but as long as an application provides significant potential benefits to them, most are acceptable
  - Without those benefits, resistance grows
  - The purpose of the application is central to the marginal benefit test
- **There is a specific group of applications that are viewed and assessed differently**
  - Cloning/genetic reproduction of an entire human or animal
  - These applications are universally unacceptable, for any purpose
  - It is on these applications where moral/ethical dimensions are at play
    - On the vast majority of applications, moral/ethical dimensions not the main concern

EARNSCLIFFE

Summary (3)

- **People indicate that while GM products do pose risks, they pose much less risk than other things**
  - Like pesticides, nuclear waste
- **Government approval, regulatory systems generally believed to be sound, although few have any specific knowledge**
  - Stewardship remains the preferred focus going forward
- **Most believe Canada has the skill set to take leadership in biotech research**
  - Optimism about Canadians' ability to compete in high technologies
  - Particularly among involved Canadians, who have increasingly heard about clusters, scientific breakthroughs
- **Economic "storyline" tests very well in groups**
  - Most surprised that Canada near the top internationally

EARNSCLIFFE

Summary (4)

- **Results on GM food comfort level similar to first four waves, relatively even split**
  - More are comfortable than uncomfortable
  - But the number of uncomfortable is substantial, about four in ten
- **In groups, a sizeable number indicate they read food labels now**
  - Primarily for nutritional content
- **On an unaided basis in groups, minimal demand for GM labeling**
  - At most, one or two people in a group will suggest
- **But when raised, a decided preference for GM food labeling**
  - Even if it costs taxpayers, consumers
  - Driven by principle of "Informed choice"
  - Once raised in a group, the rest virtually always concur
- **Stem cell research still broadly acceptable**
  - But support equivocal
  - General public in particular exhibiting greater concern than last fall
  - Movement toward the middle, rather than outright opposition

EARNSCLIFFE

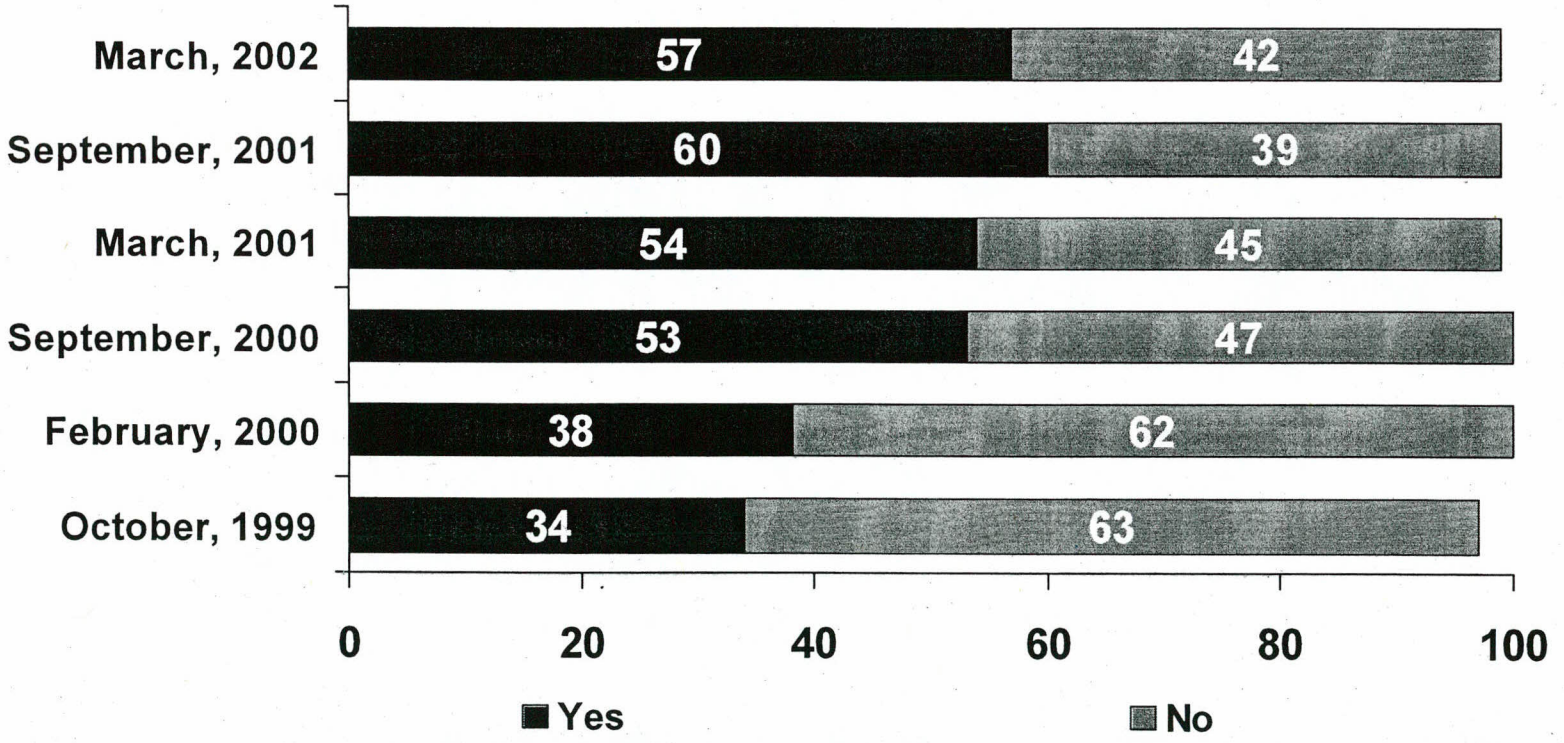
Awareness and Familiarity

- **People paying more selective attention to biotech**
  - Awareness levels have stabilized
  - Recall of stories down slightly
- **Reported familiarity remains low**
  - Has not increased in four years
- **In focus groups, discussions reveal that a significant number of people know the subject fairly well**
  - A growing divergence between involved Canadians and general public
  - Involved more aware, more likely to have discussed, more comfortable
  - General public less aware of the scope of the technology
    - And how pervasive these applications are
    - Have thought very little about it
      - Once introduced, some exhibit a fair amount of concern

EARNSCLIFFE

Talked About Biotech

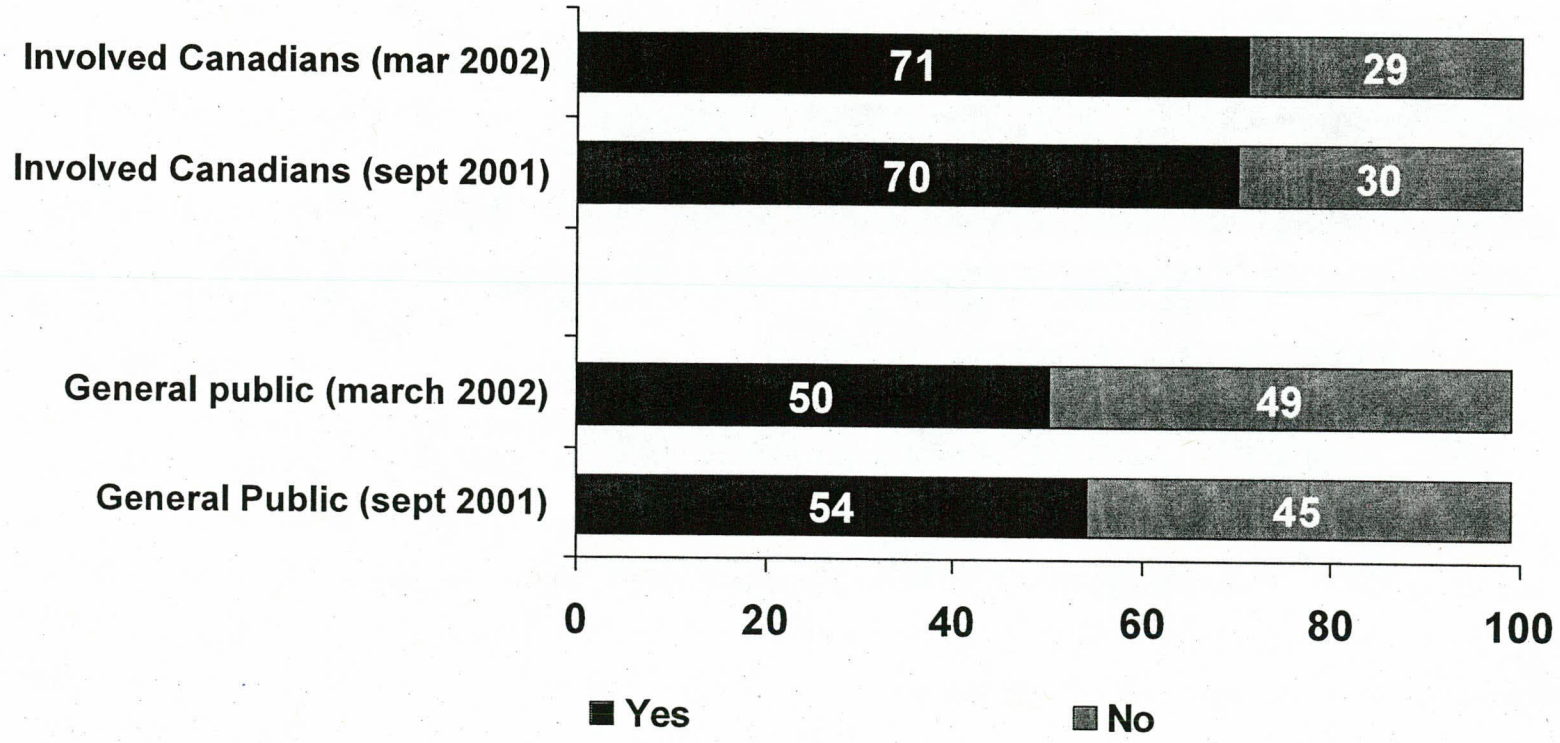
Before today, had you talked about biotechnology with someone?



EARNSCLIFFE

Talked About Biotech

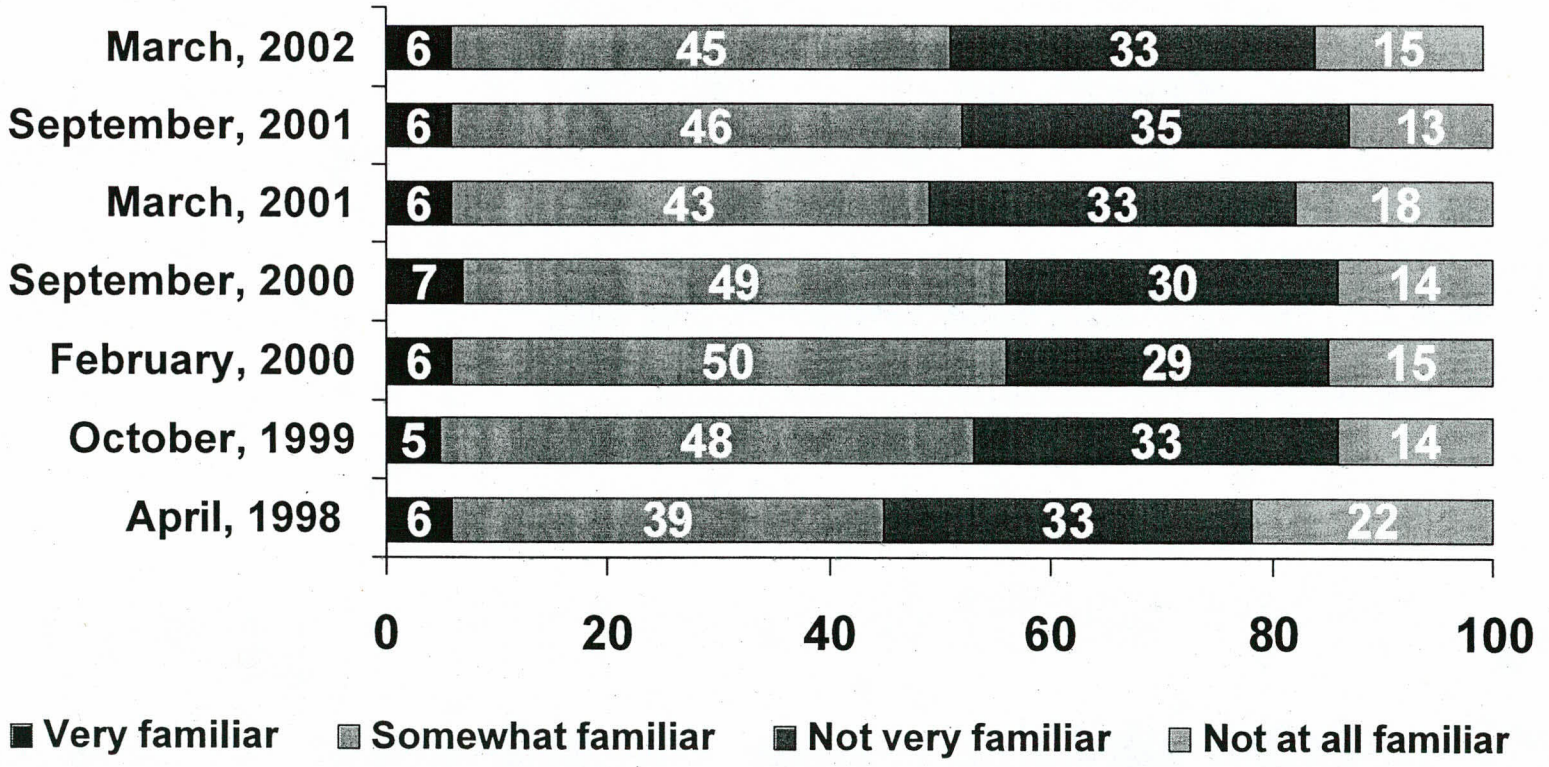
Before today, had you talked about biotechnology with someone?



EARNSCLIFFE

Familiarity with Biotechnology

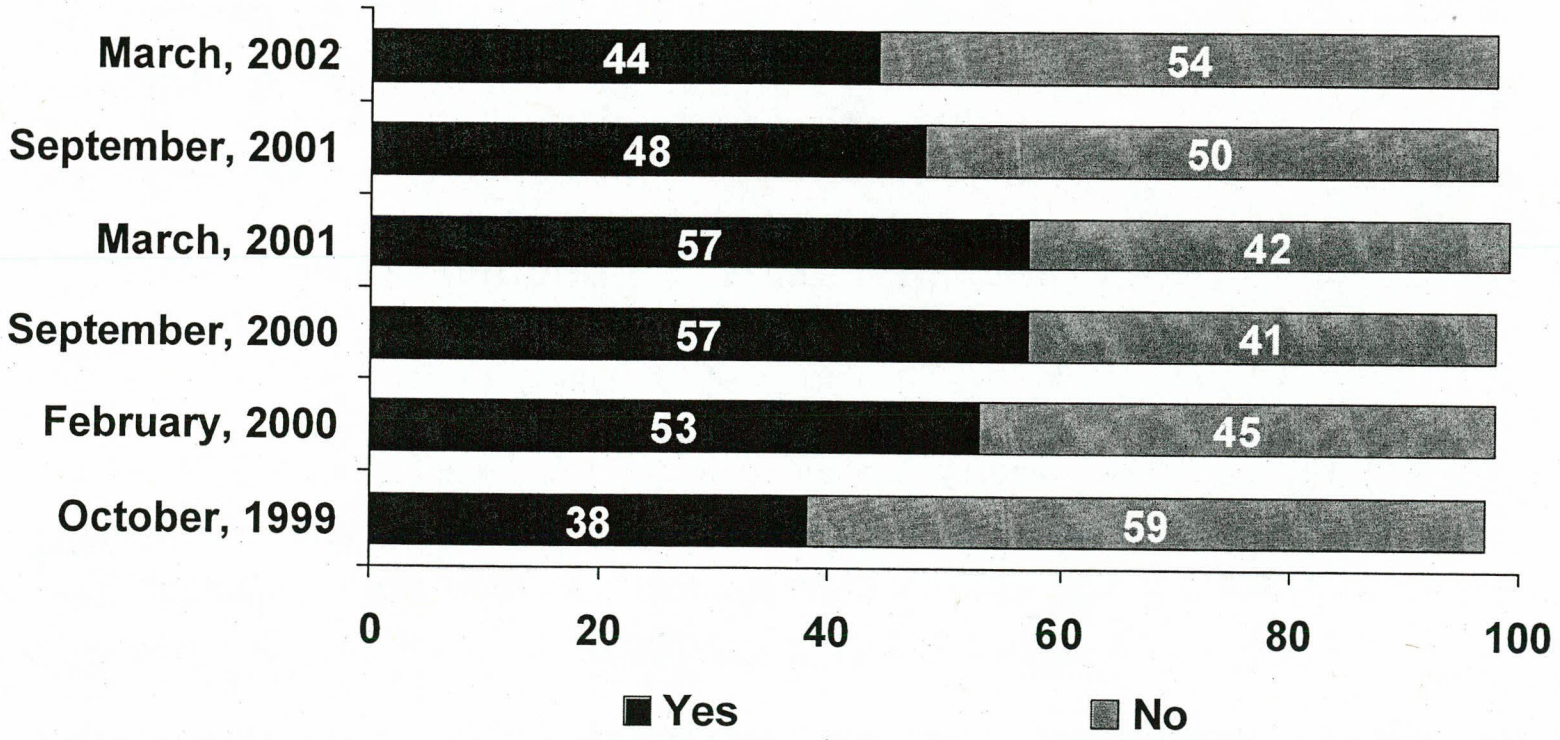
Would you say you are very familiar, somewhat familiar, not very familiar or not at all familiar with biotechnology?



EARNSCLIFFE

Recently Heard About Biotech

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



EARNSCLIFFE

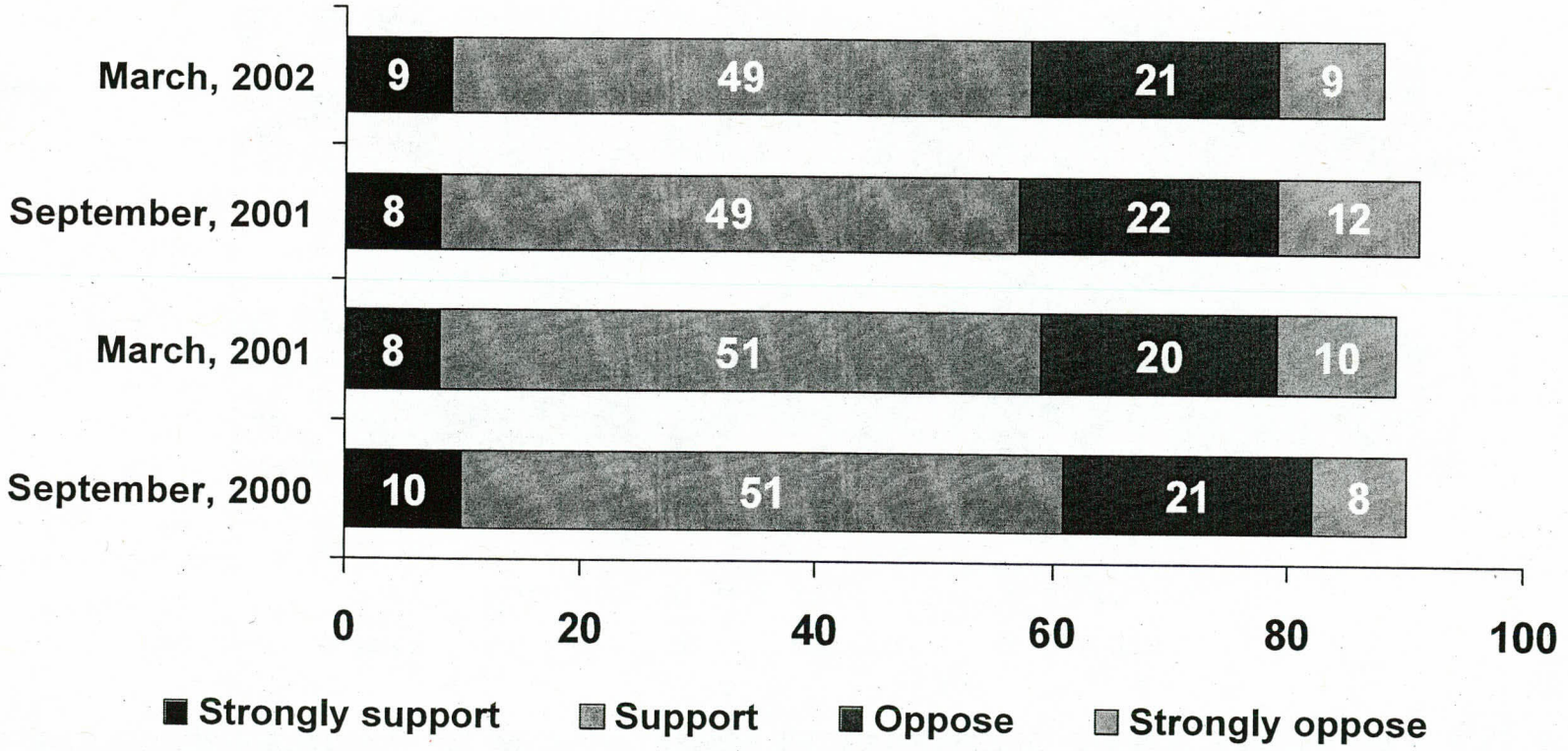
Prevailing Sentiments

- **Continuing two to one support for the technology**
  - Unchanged from previous wave of research
- **Biotechnology and Genomics receive different reactions**
  - Biotechnology is much more widely known, understood
    - It is the phrase that encapsulates the field as a whole
  - Genomics not known by most, a number believe it involves more invasive applications
- **On applications tested in this wave, still majority support**
  - Slim majority on the two GM food applications, corn and wheat
  - While there is majority support, there remains a significant opposition
    - In part because the benefits posited are simply economic
- **Seven in ten believe the technology will provide more benefits than drawbacks in long run**
  - To health as well as to the economy
  - But "movement toward the middle" clearly in evidence
    - Especially over longer term, where people suggest that there are are many potential factors affecting the risk/benefit equation over time

EARNSCLIFFE

Support or Oppose Biotechnology

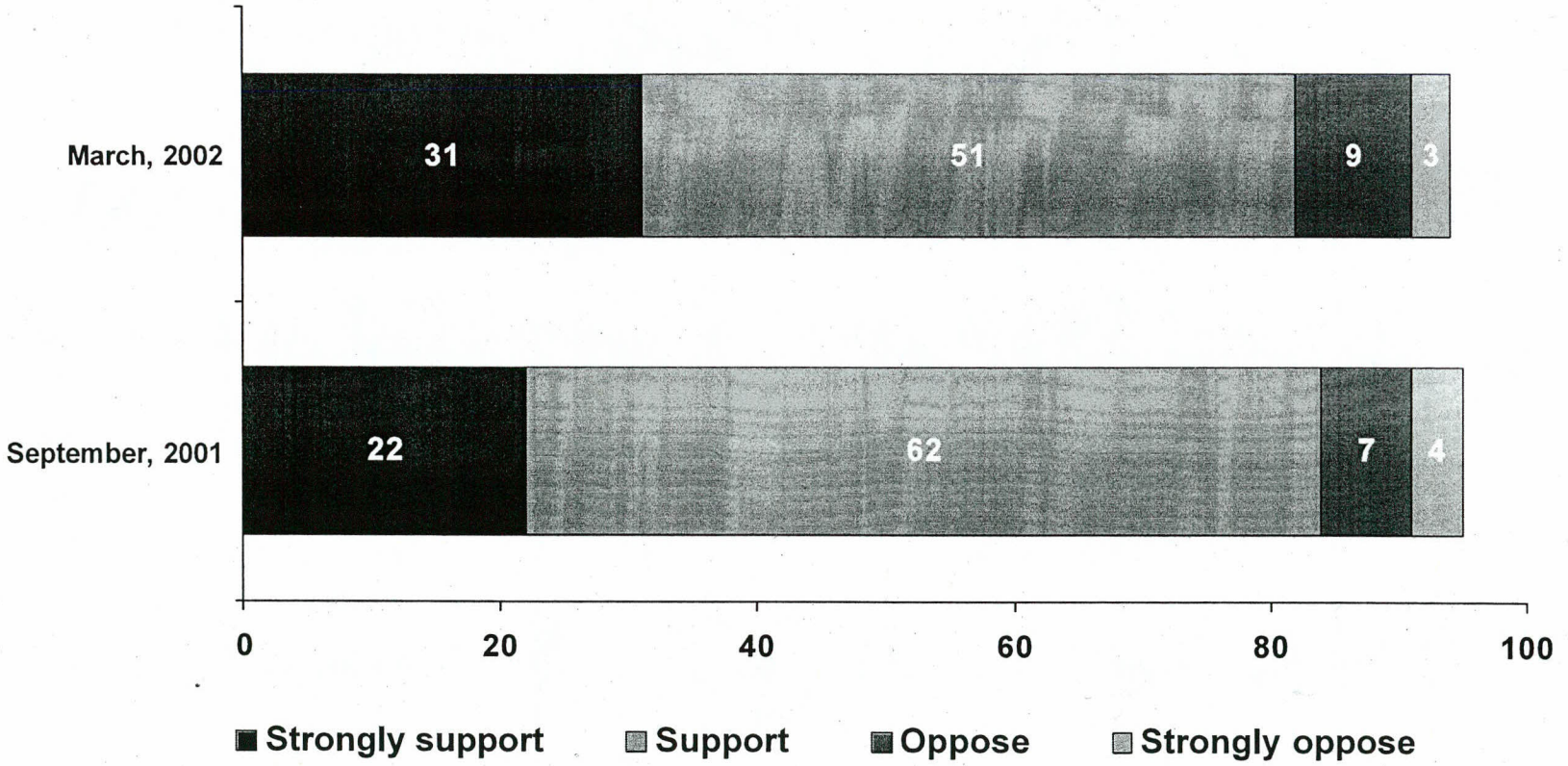
In general, would you say you strongly support, somewhat support, somewhat oppose or strongly oppose the use of products and processes that involve biotechnology?



EARNSCLIFFE

Acceptability of Applications

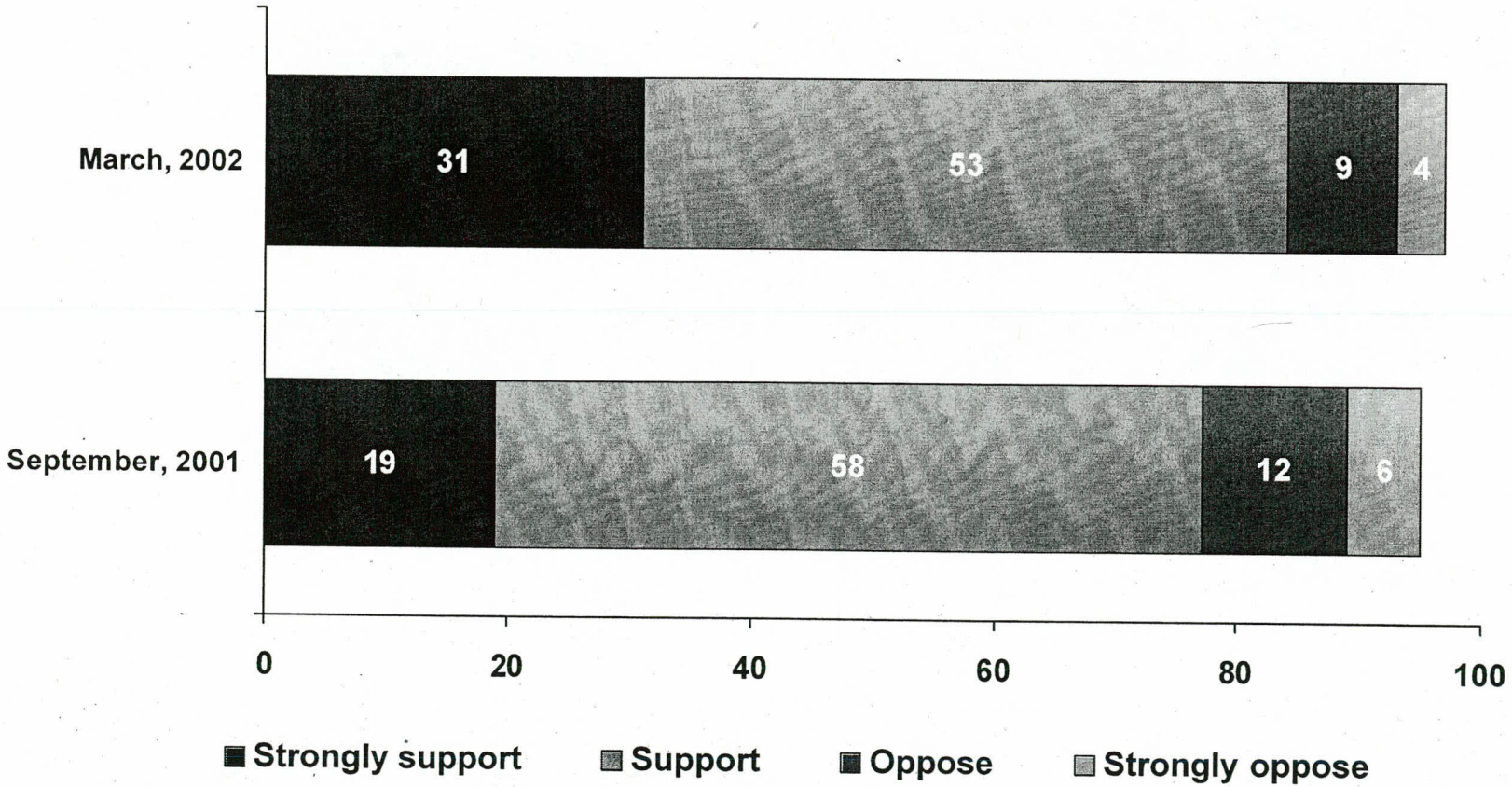
Helping to cure Type 1 diabetes by inserting a gene into the pancreas that stimulates insulin production in humans



EARNSCLIFFE

Acceptability of Applications

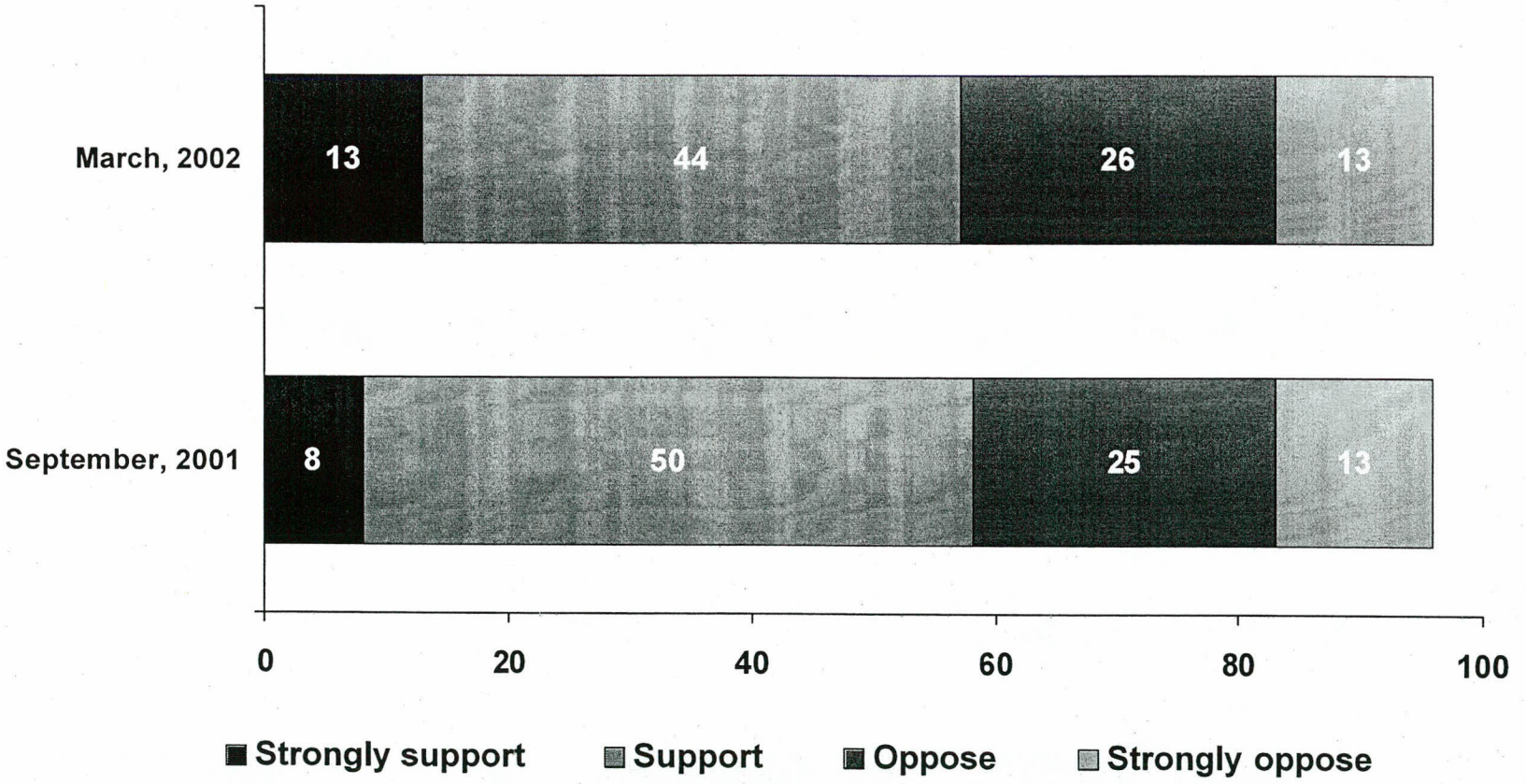
Use of genetically modified bacteria or plants to break down pollutants and toxic wastes



EARNSCLIFFE

Acceptability of Applications

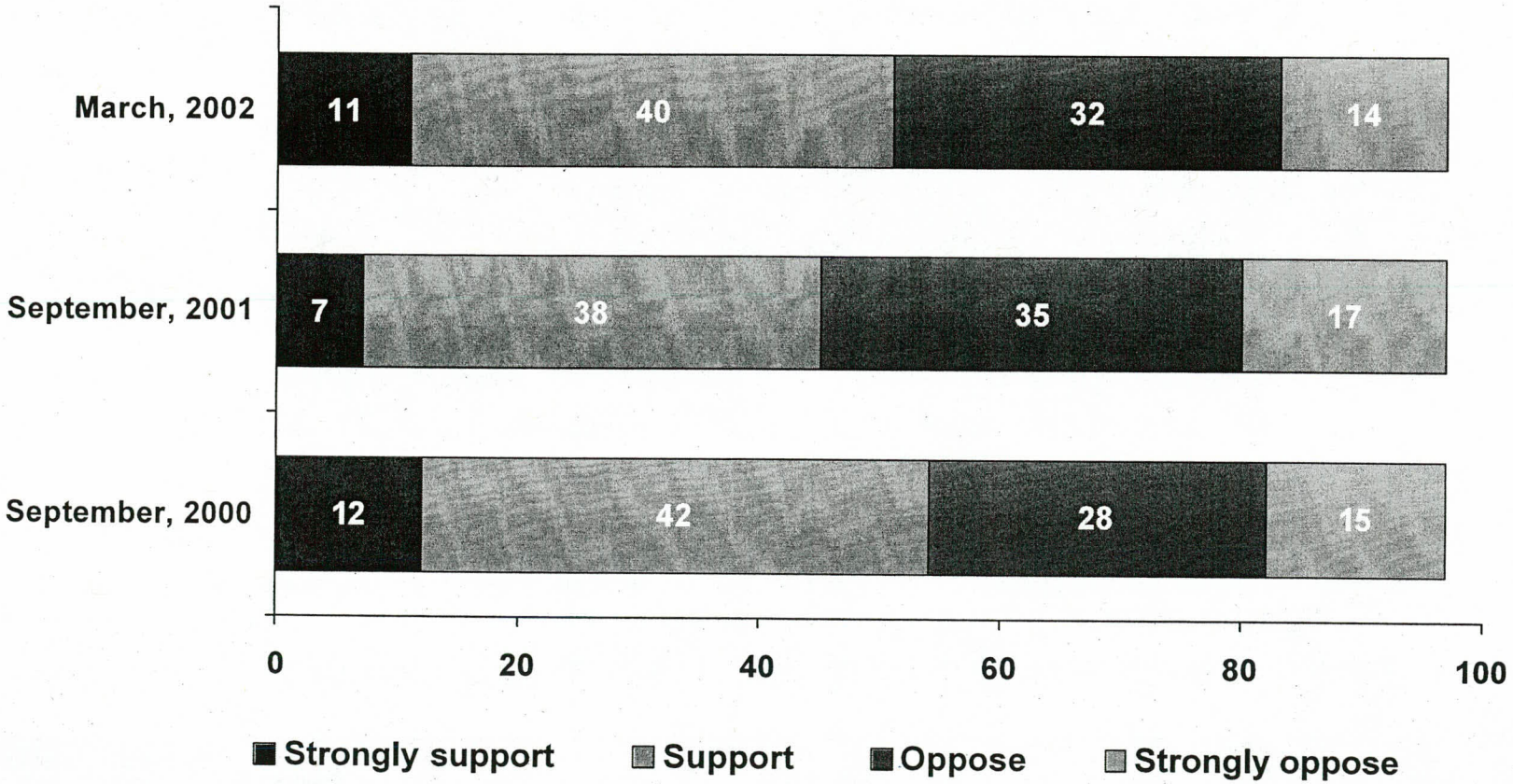
Wheat genetically modified to resist pests to increase volume



EARNSCLIFFE

Acceptability of Applications

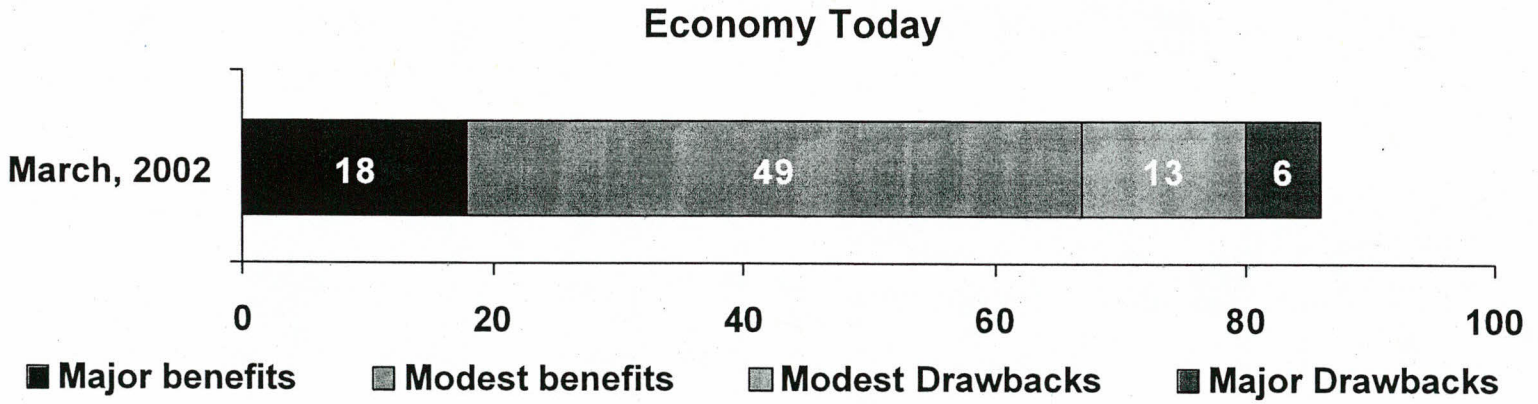
Corn that is genetically modified to increase yield and lower price

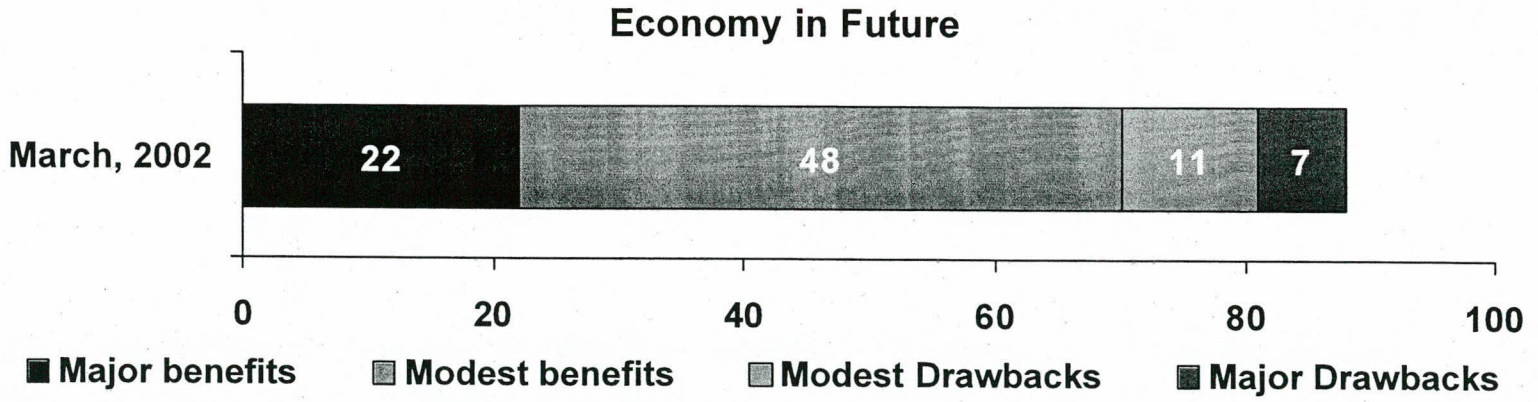


EARNSCLIFFE

Benefits and Drawbacks - Economy

In your opinion, does biotechnology bring major benefits, modest benefits, modest drawbacks, or major drawbacks in the following areas (ECONOMY)

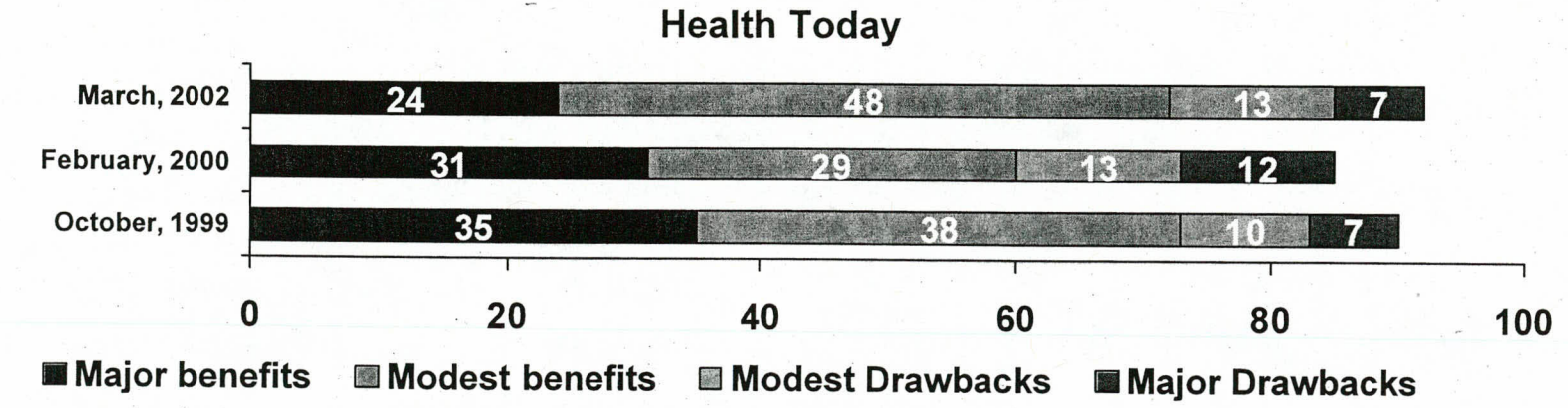


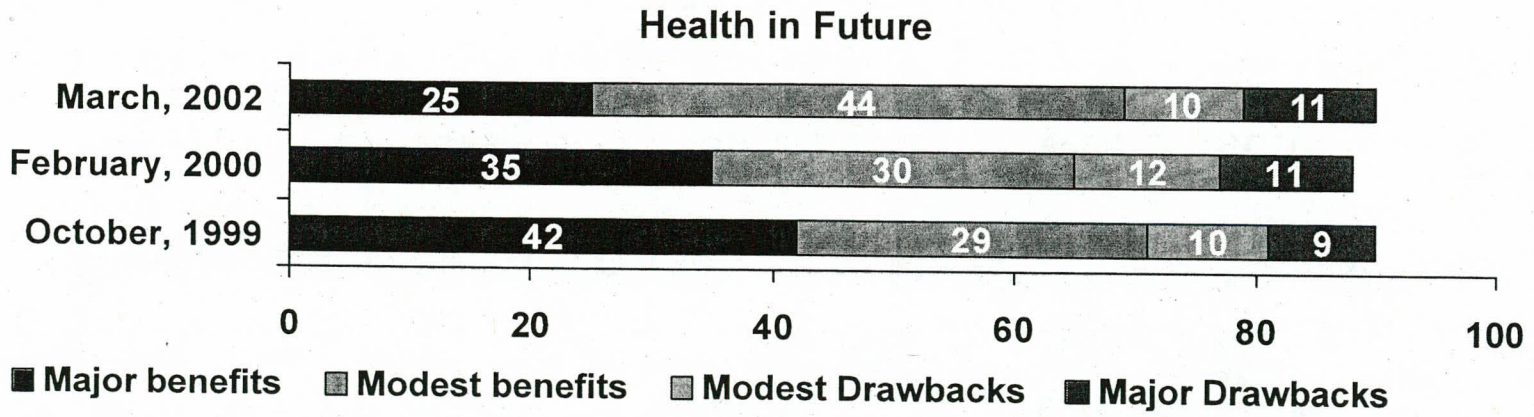


EARNSCLIFFE

Benefits and Drawbacks - Health

In your opinion, does biotechnology bring major benefits, modest benefits, modest drawbacks, or major drawbacks in the following areas (HEALTH)



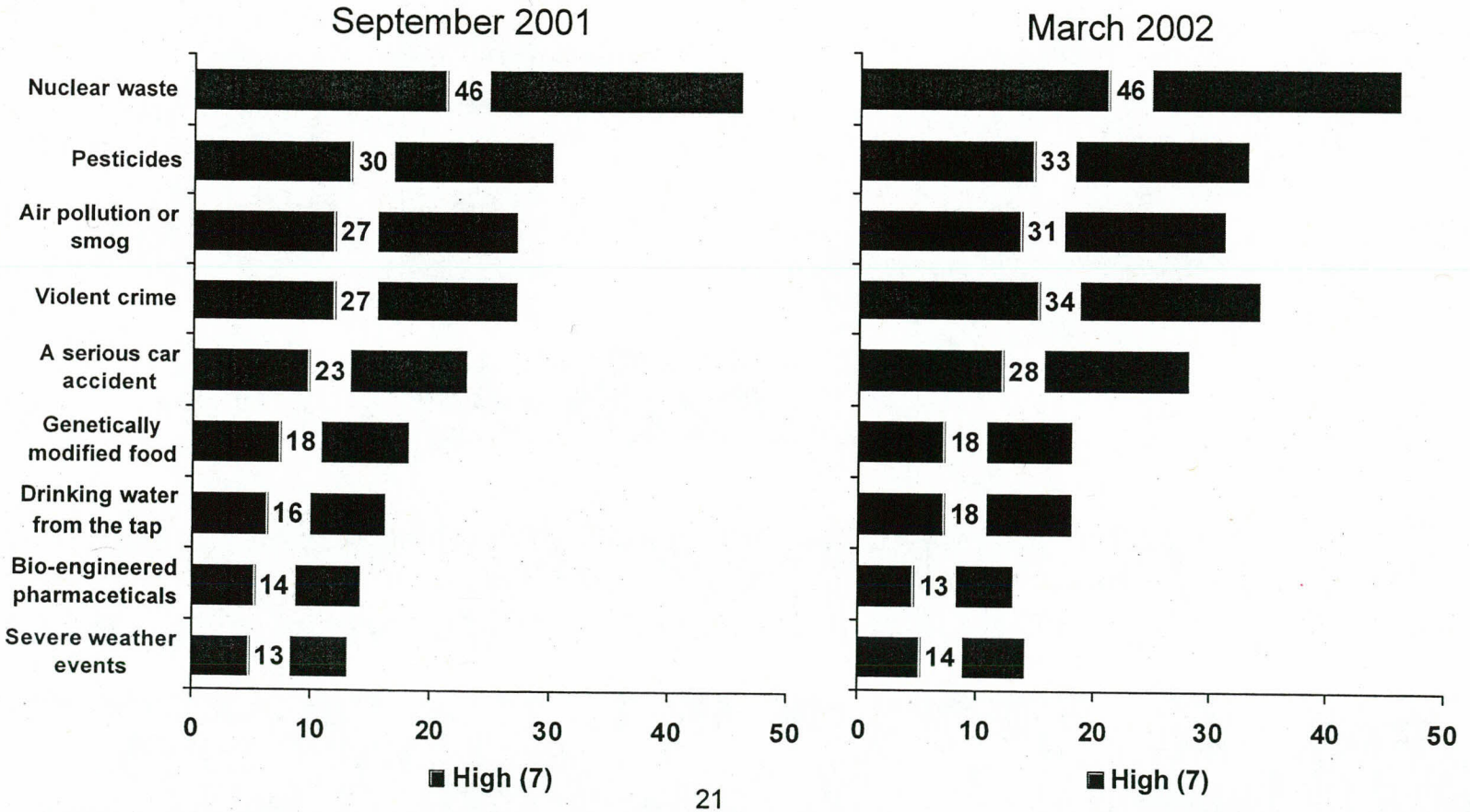


- **The prevailing opinion climate on GM risks is highly consistent with previous waves**
- **To provide context, this research situated risk of biotech with other risks in society**
  - And tracked it from last September
  - Result in survey, and in groups suggest that GM in lower tier of risks
    - Does not come up as a "top of mind" risk in focus groups
- **When asked what is of greatest concern about biotech, health risks are the primary driver**
  - Much more so than environmental risks, ethical concerns
    - With the exception of cloning entire human/animal, where ethical concerns paramount
- **A key element of how many view the risks of GM technology is a perception that these technologies are "inevitable"**
  - They are part of human progress which can't be stopped; can only be managed
  - Involved widely accept this premise, general public express more hesitation
- **When risks balanced with benefit statements, or measures to mitigate, support 4:1 on health apps, 2:1 on food**
  - When science, long term research built into the risk-benefit equation, large majorities move toward support

EARNSCLIFFE

Risks in Society

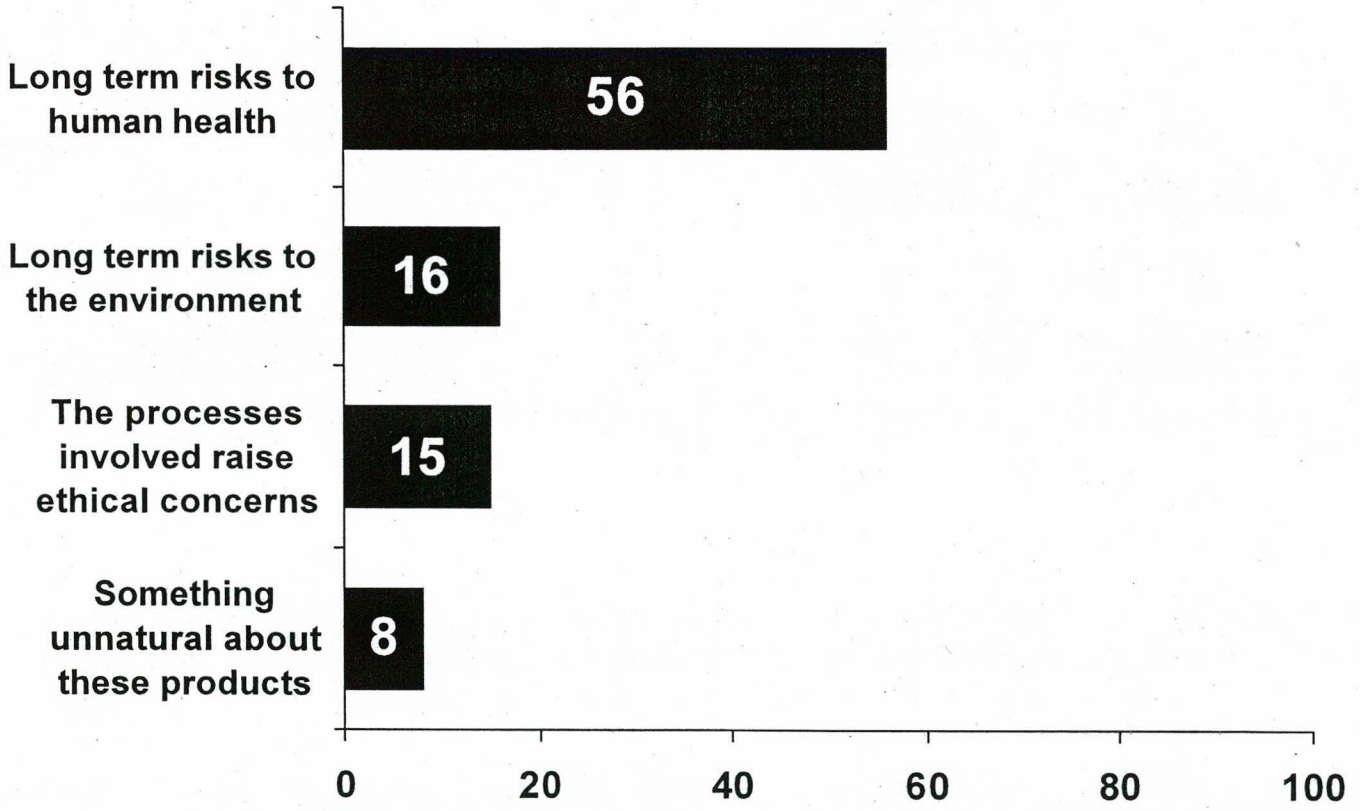
There are many things that present risks to us in life. In terms of the safety of yourself and your family, compared to other risks in society, how much risk do the following issues present? Please use a 1-7 scale where 1 means a low level of risk, 4 means a moderate level of risk, and 7 means a high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



EARNSCLIFFE

Driving Concern About Products

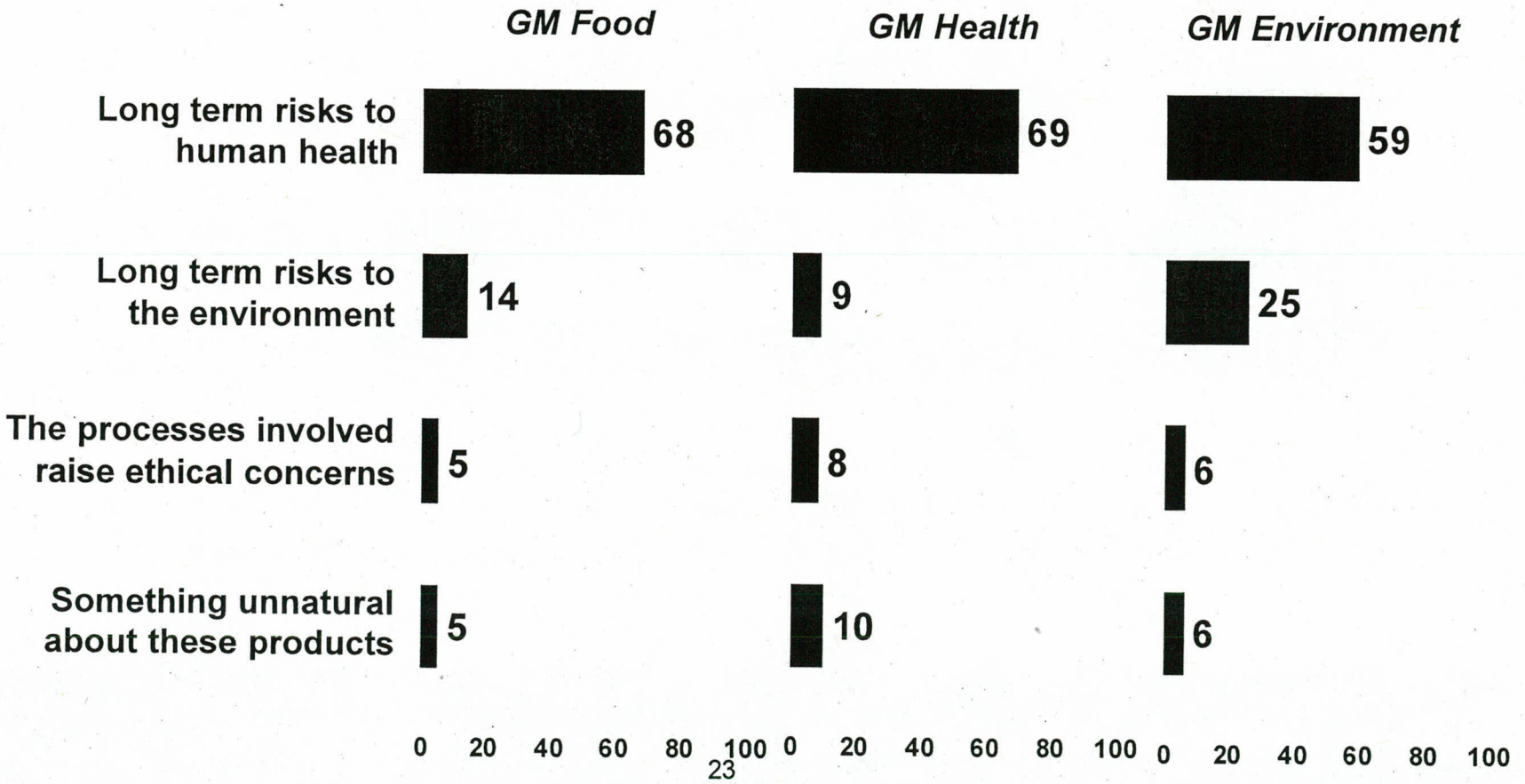
People have suggested a number of different concerns about products and processes involving genetic modification. Of the four below, which is the one that is the greatest concern to you:



EARNSCLIFFE

Tracking: Driving Concern

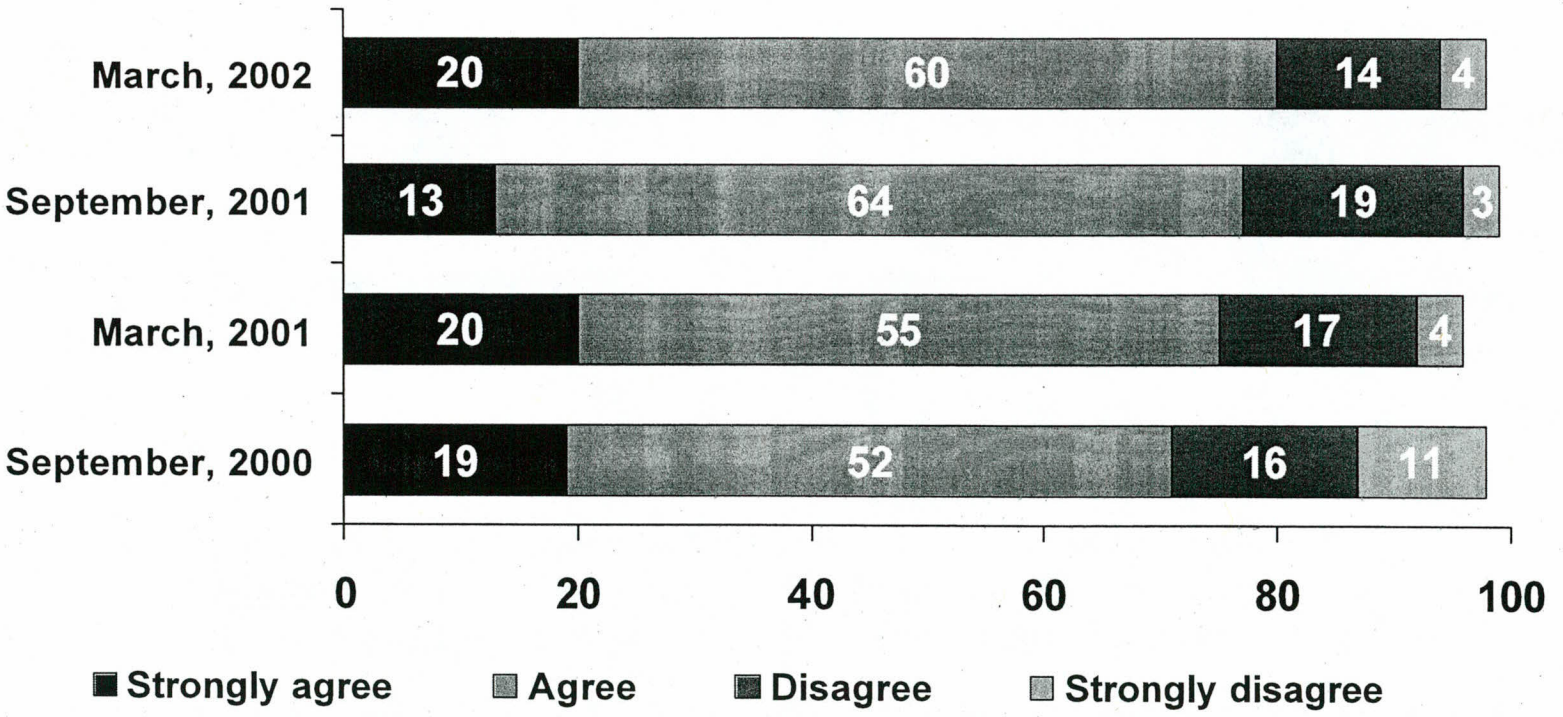
People have suggested a number of different concerns about genetically modified food/health/environmental products. Of the four below, which is the one that is the greatest concern to you:



EARNSCLIFFE

Acceptance of Risk: Health

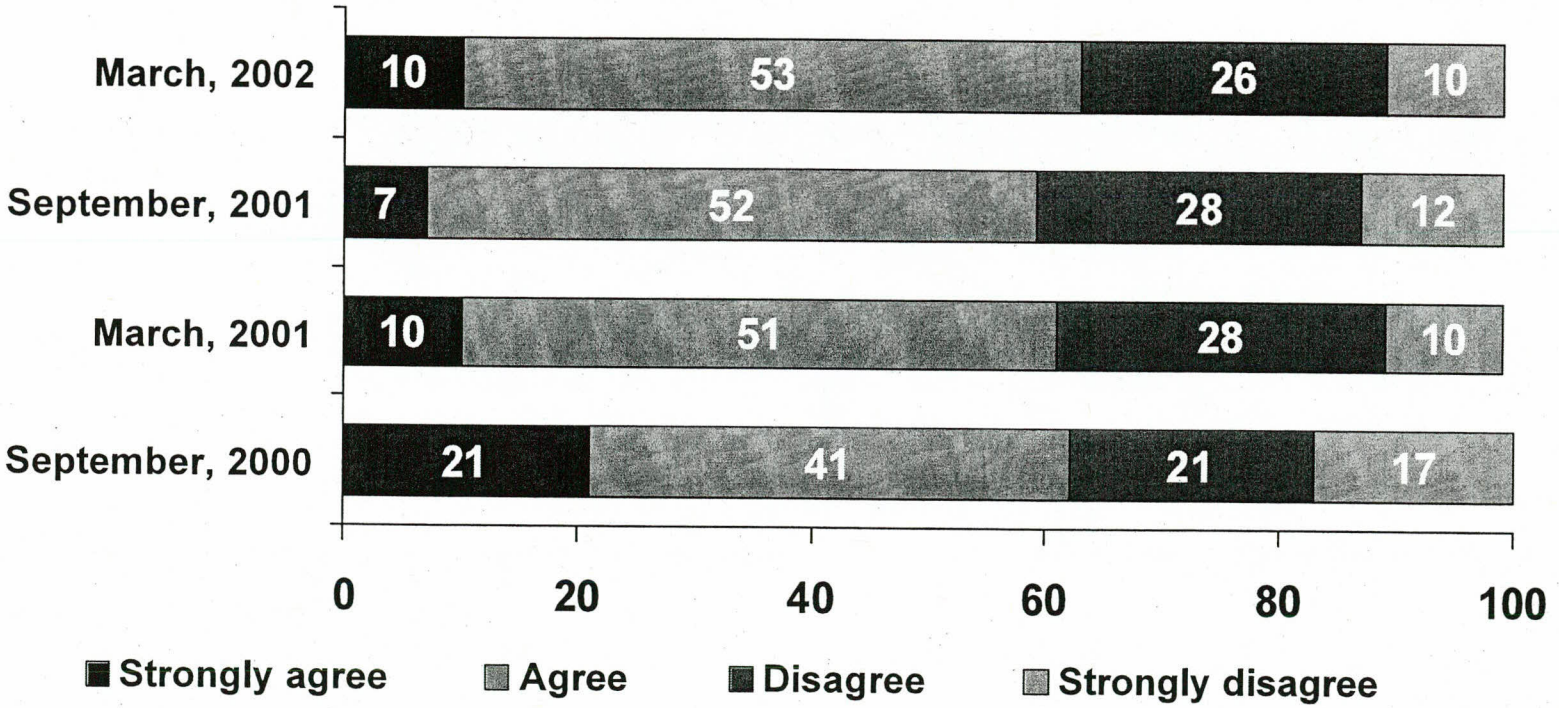
We have to accept some risk to achieve the benefits of biotechnology like new discoveries that improve the diagnosis and cure of serious illnesses



EARNSCLIFFE

Acceptance of Risk: Food

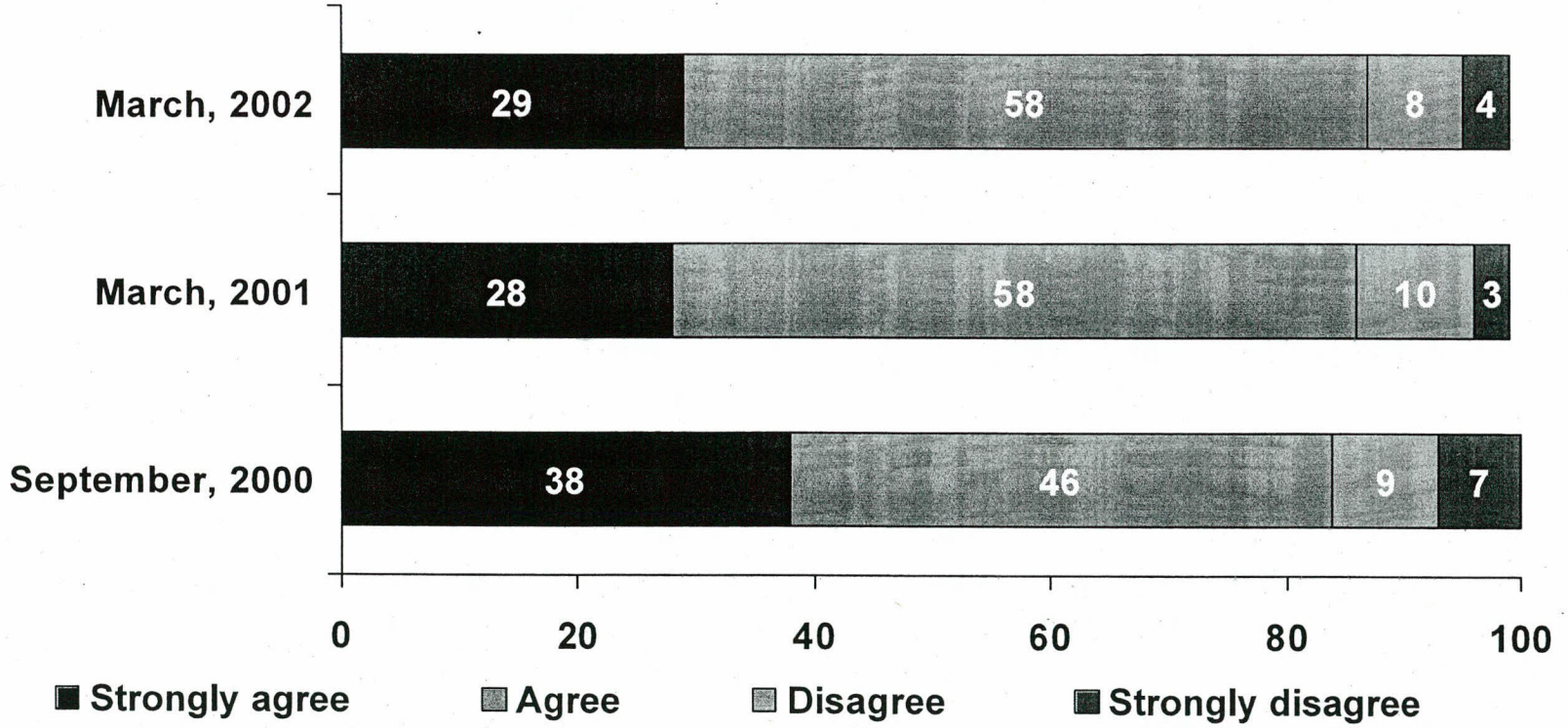
We have to accept some risk to achieve the benefits of biotechnology like new discoveries like new foods that contain vitamins or medicine



EARNSCLIFFE

Future Risks

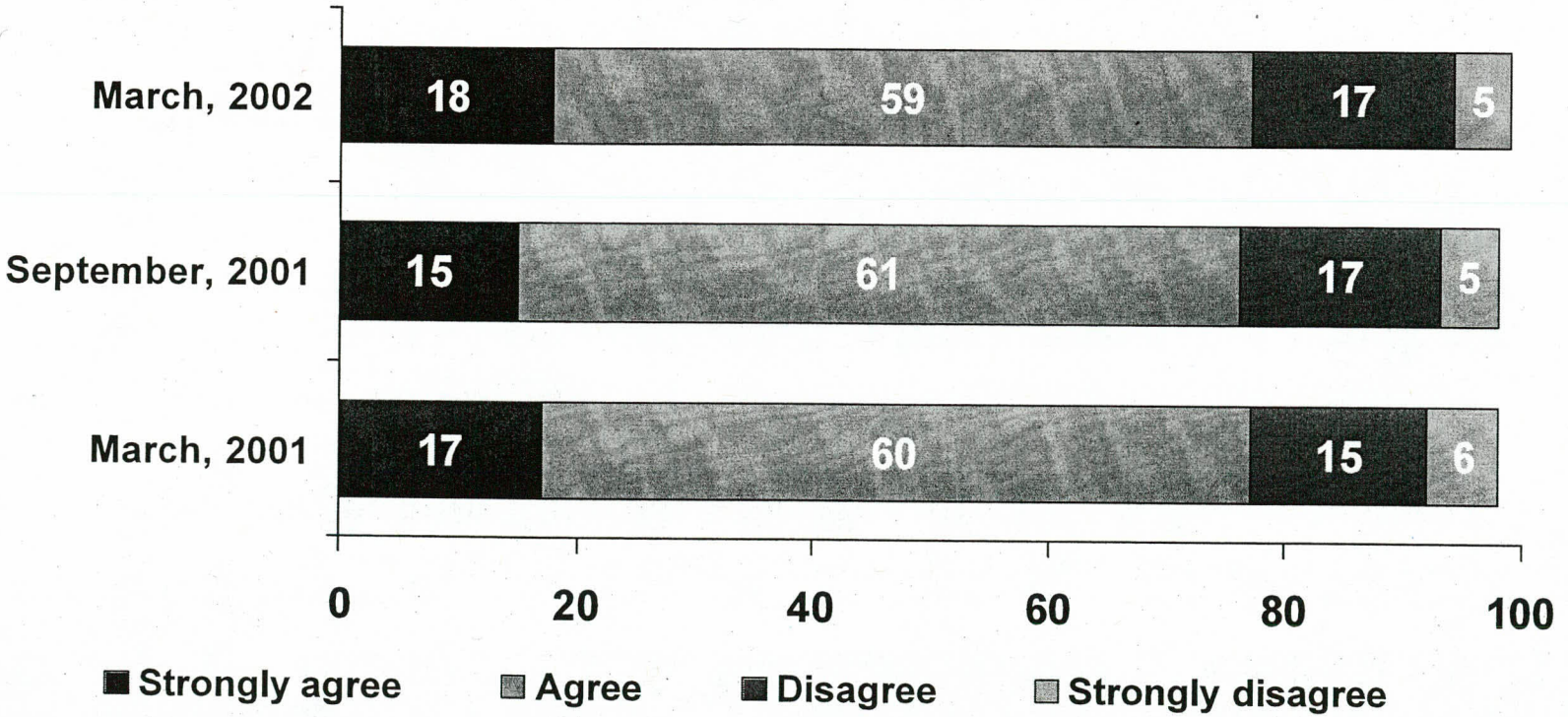
Although there may be some unknown risks, technologies like biotechnology are part of the future, so all we can do is make sure that its uses are as safe as possible



EARNSCLIFFE

Long Term Research

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 comfortable enough to allow these products



EARNSCLIFFE

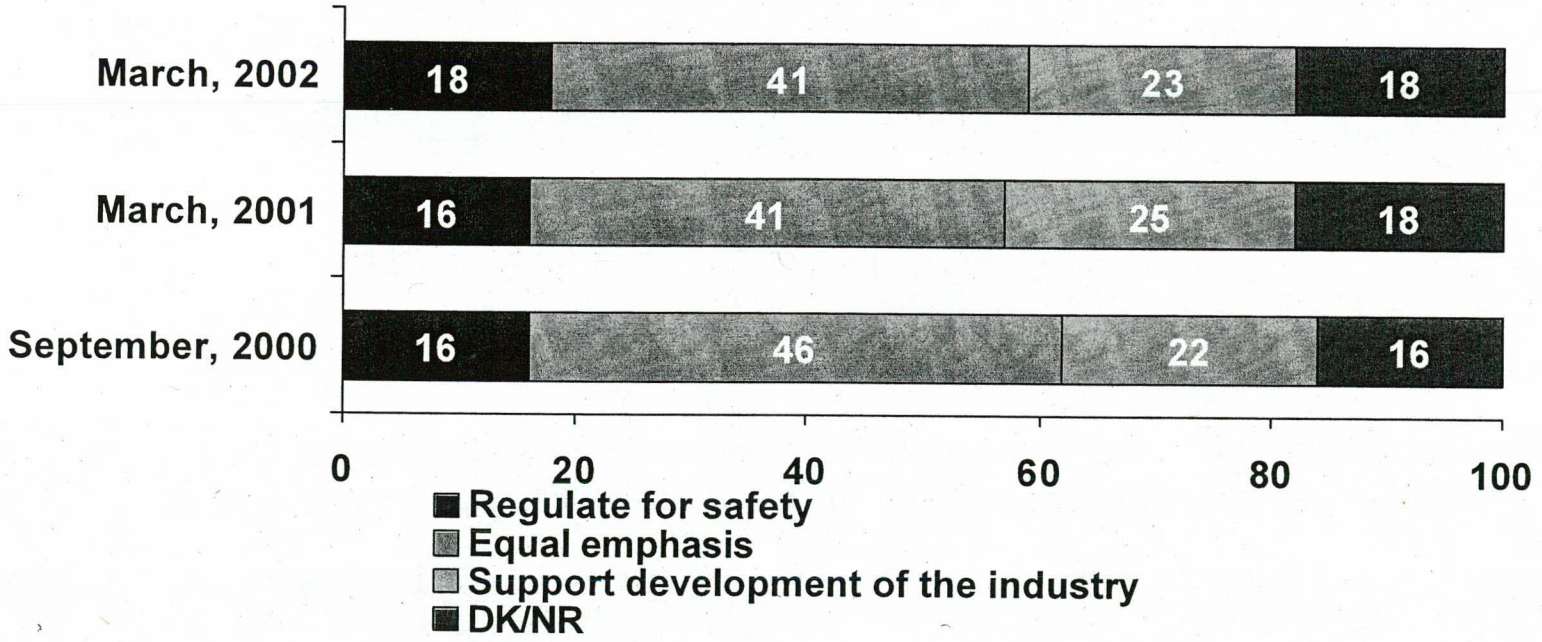
Government Roles

- **The perception remains that government focuses slightly more on economic benefits than stewardship**
  - While majority want an equal emphasis in future, the rest would like government to lean toward stewardship
- **There continues to be a preference for government to dedicate resources to stewardship in future**
  - But in groups, it is believed that it is worth making an investment to gain economic benefits
- **Consistent with past, no contradiction between support and regulatory roles**
  - Groups reveal that most think government SHOULD play both roles
  - But different departments should probably carry out those roles
- **Most say government should spend same amount or more on biotech in future**
  - Only 13% say government should spend less

EARNSCLIFFE

Stewardship Versus Promotion - Current

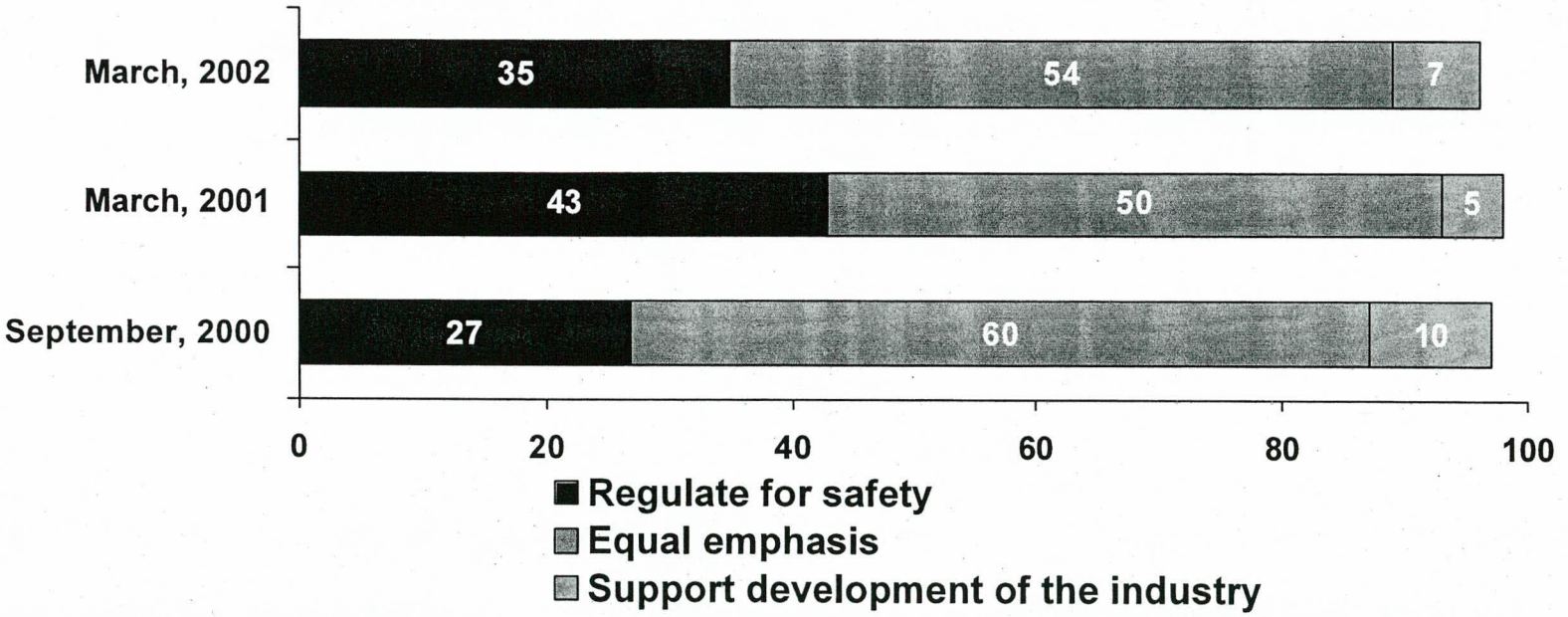
In the field of biotechnology, one role for the federal government is to regulate the products that are being developed, to ensure that they are safe for our health and environment; another role is to support the development of the industry, which helps create investment and jobs. With respect to biotechnology, which role do you think the federal government is putting emphasis on today, or emphasis on both?



EARNSCLIFFE

Stewardship Versus Promotion - Future

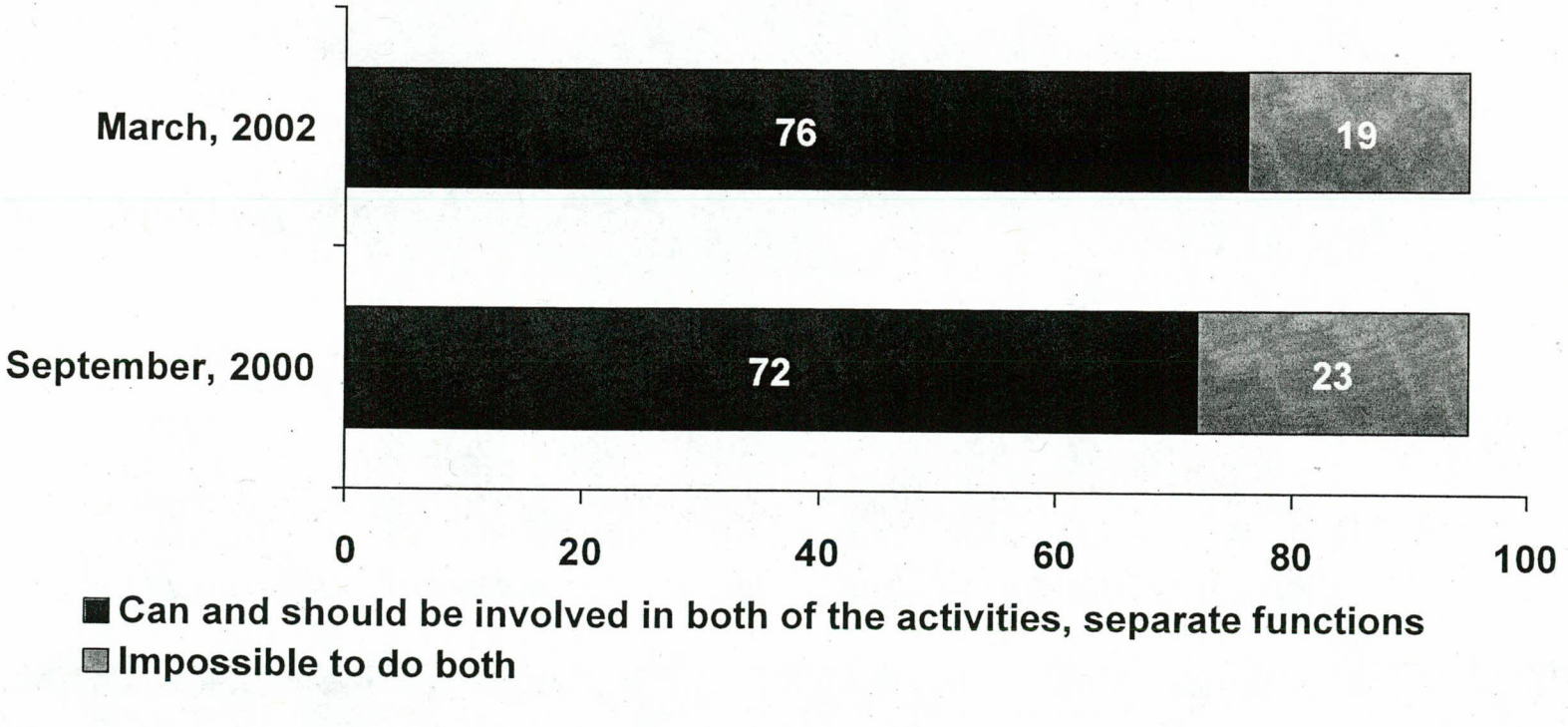
In the field of biotechnology, one role for the federal government is to regulate the products that are being developed, to ensure that they are safe for our health and environment; another role is to support the development of the industry, which helps create investment and jobs. With respect to biotechnology, which role do you think the federal government <u>should emphasize in future</u>, or equal emphasis on both?



EARNSCLIFFE

Balanced Role?

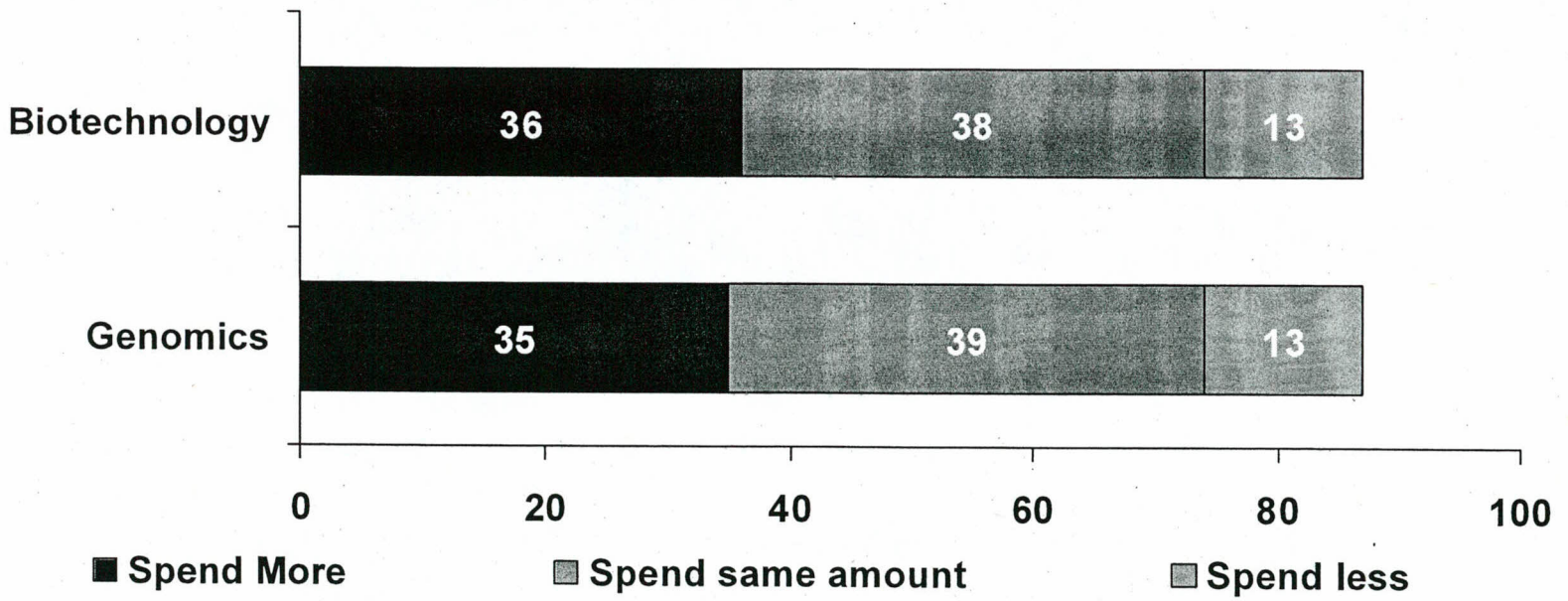
Some people say that it is impossible for the federal government to regulate industry and to support industry at the same time. Other people say that government can and should be involved in both of these activities, as long as the two functions are separated (between departments). Which of these two views is closest to your own?



EARNSCLIFFE

Government Spending ?

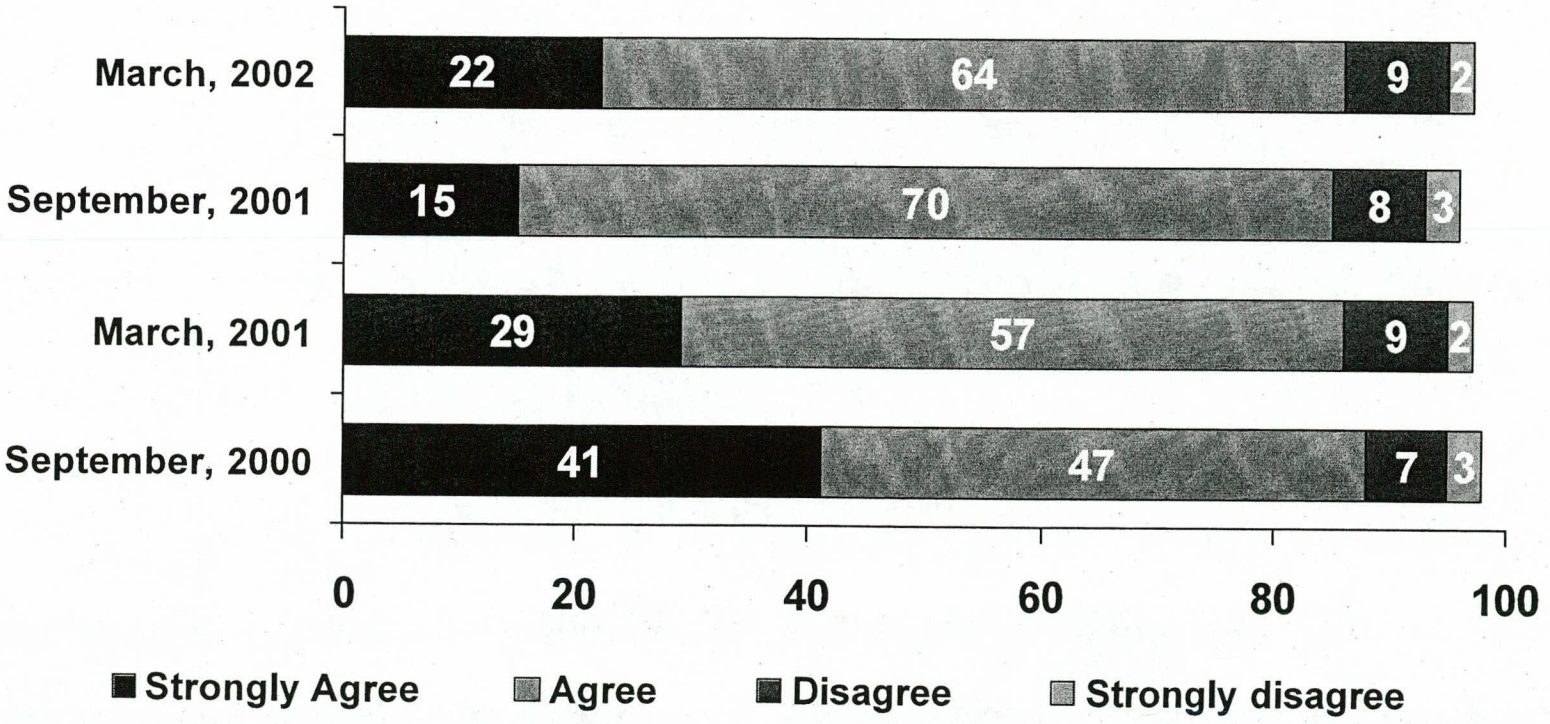
Knowing that there are many things that government could dedicate resources to, do you think that government should spend more, less, or about the same amount as it currently spends on supporting biotechnology/genomics research in future?



EARNSCLIFFE

Government Positioning

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



EARNSCLIFFE

The Economics of Biotechnology

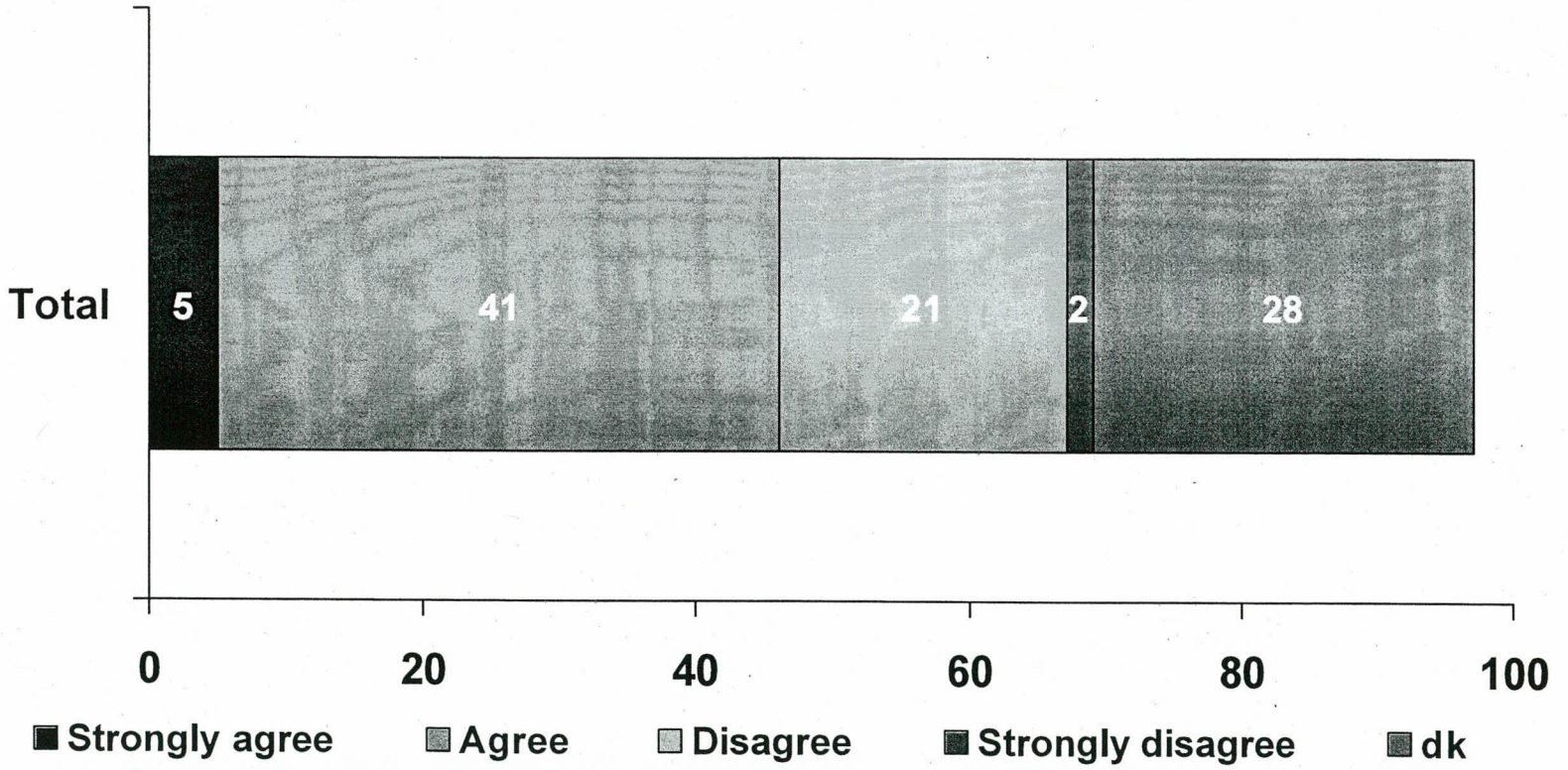
- **Wave 6 probed attitudes on the economic benefits of biotechnology**
  - And on the role of government in fostering the industry
- **Economic benefits continue to be secondary to health, medical and environmental benefits**
  - But they are seen to be quite important in their own right
- **Most people readily agree that biotechnology is a leading edge technology that will be critical to the Canadian economy**
  - Evaluate it like they do information and communications technology
  - Seen as a source of discovery, innovation, jobs, economic growth
- **Majority don't know or don't believe Canada is a leader now**
  - In groups there was a presumption that the U.S. and some European countries would be further ahead
  - Largely based on the fact that few had heard much about a Canadian biotech industry or its achievements
- **But eight in ten would like Canada to be a leader in this field in future**
  - See substantial "pay-off" for leadership

EARNSCLIFFE

Canadian Leadership in Biotech

- **Most believe Canada has the skill set to take leadership**
  - Optimism about Canadians' ability to compete in high technologies
- **Economic "storyline" tests very well in groups**
  - Most surprised that Canada near the top internationally
  - And that Canadian scientists have produced so many important breakthroughs
  - Reinforces the belief that Canada should take steps toward leadership

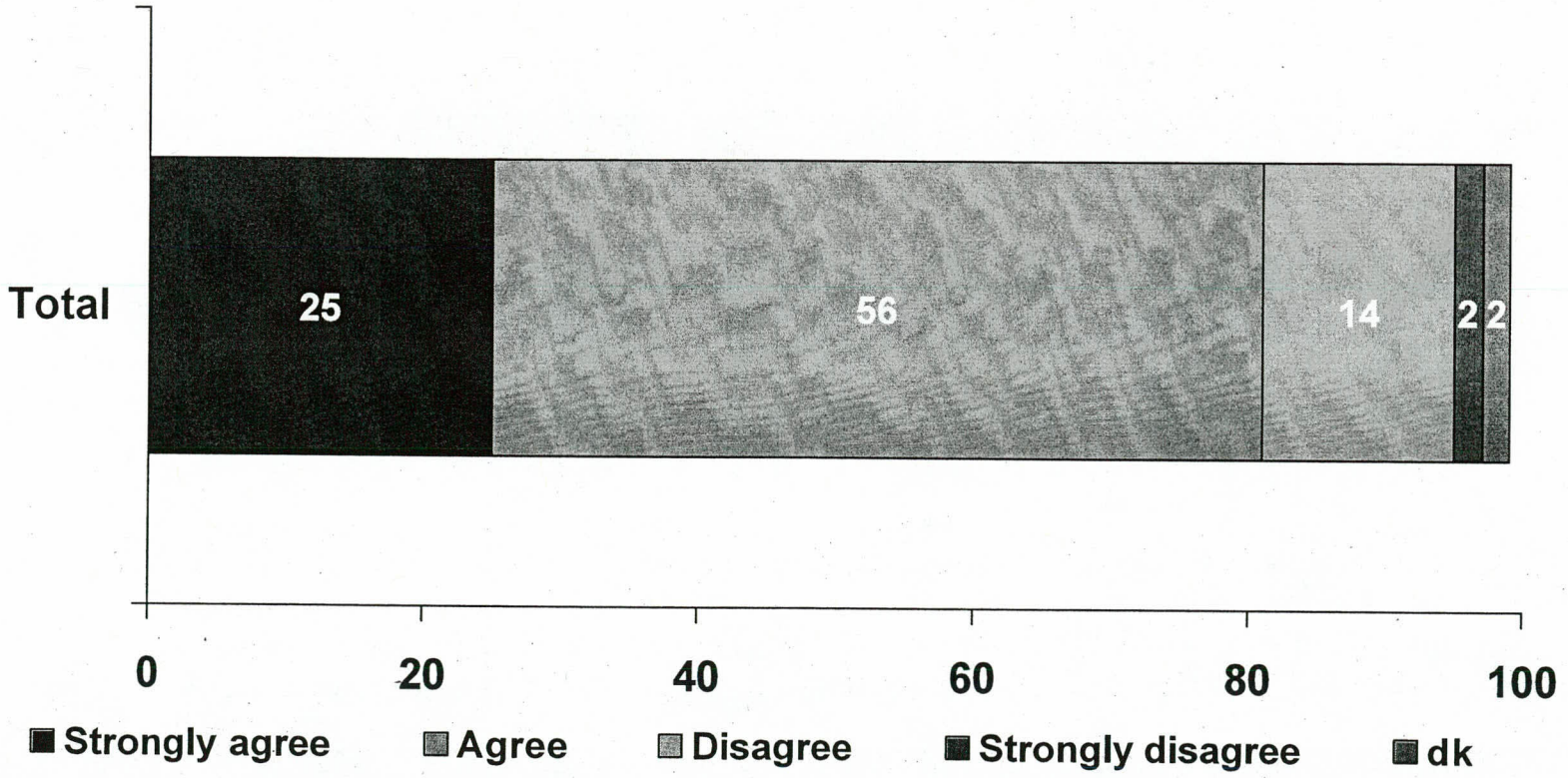
Canada is among the world leaders in biotechnology research



EARNSCLIFFE

Should be World Leader?

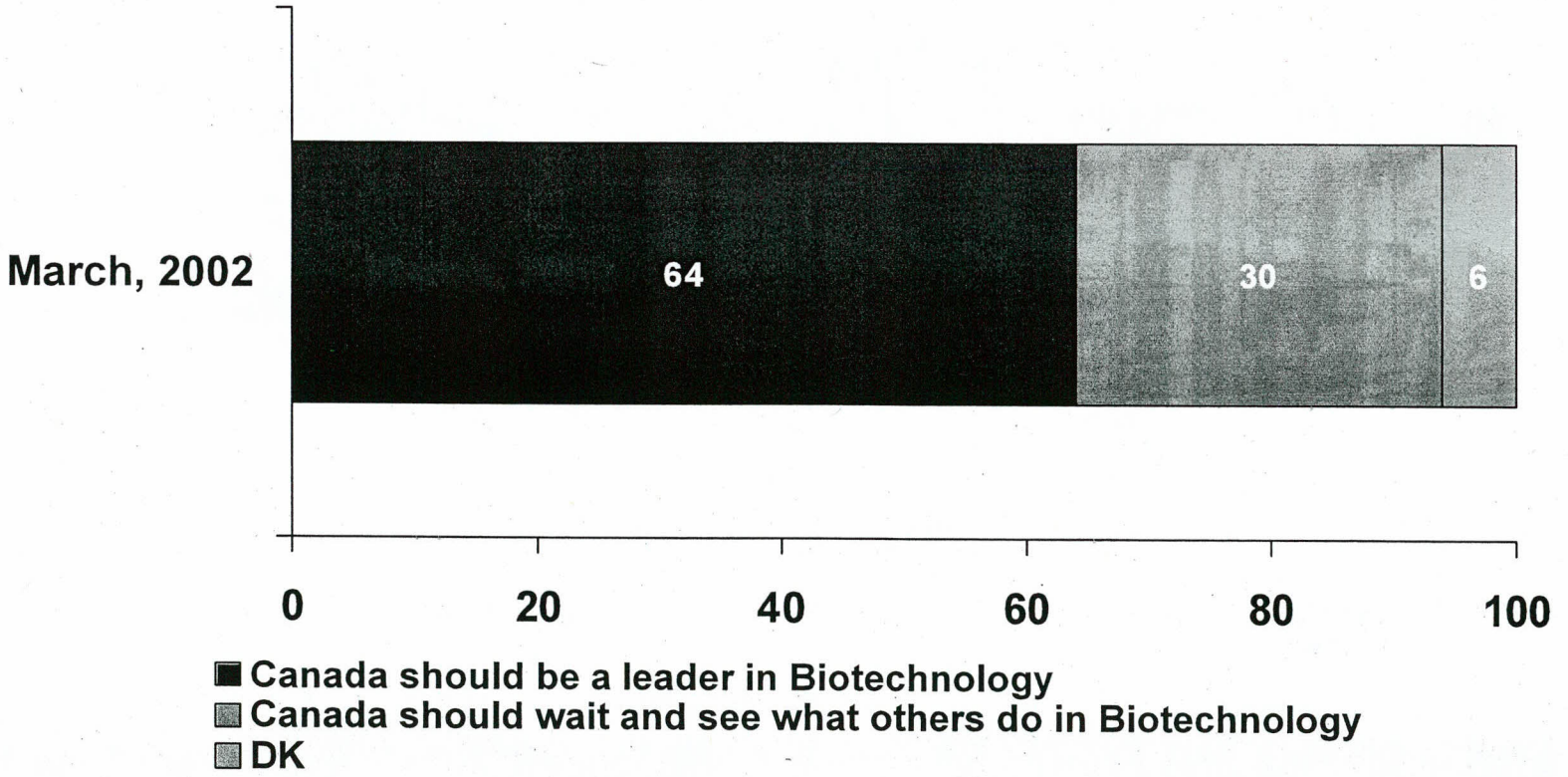
Canada SHOULD BE among the world leaders in the field of biotechnology research



EARNSCLIFFE

Support for Leadership

Which is closest to your own view? Biotechnology is a field of endeavour that I think Canada and Canadians should be leaders in, because it promises health and economic benefits OR Biotechnology is an area that Canada and Canadians should wait to see what others do, because it involves dealing with an issue that makes me uncomfortable



EARNSCLIFFE

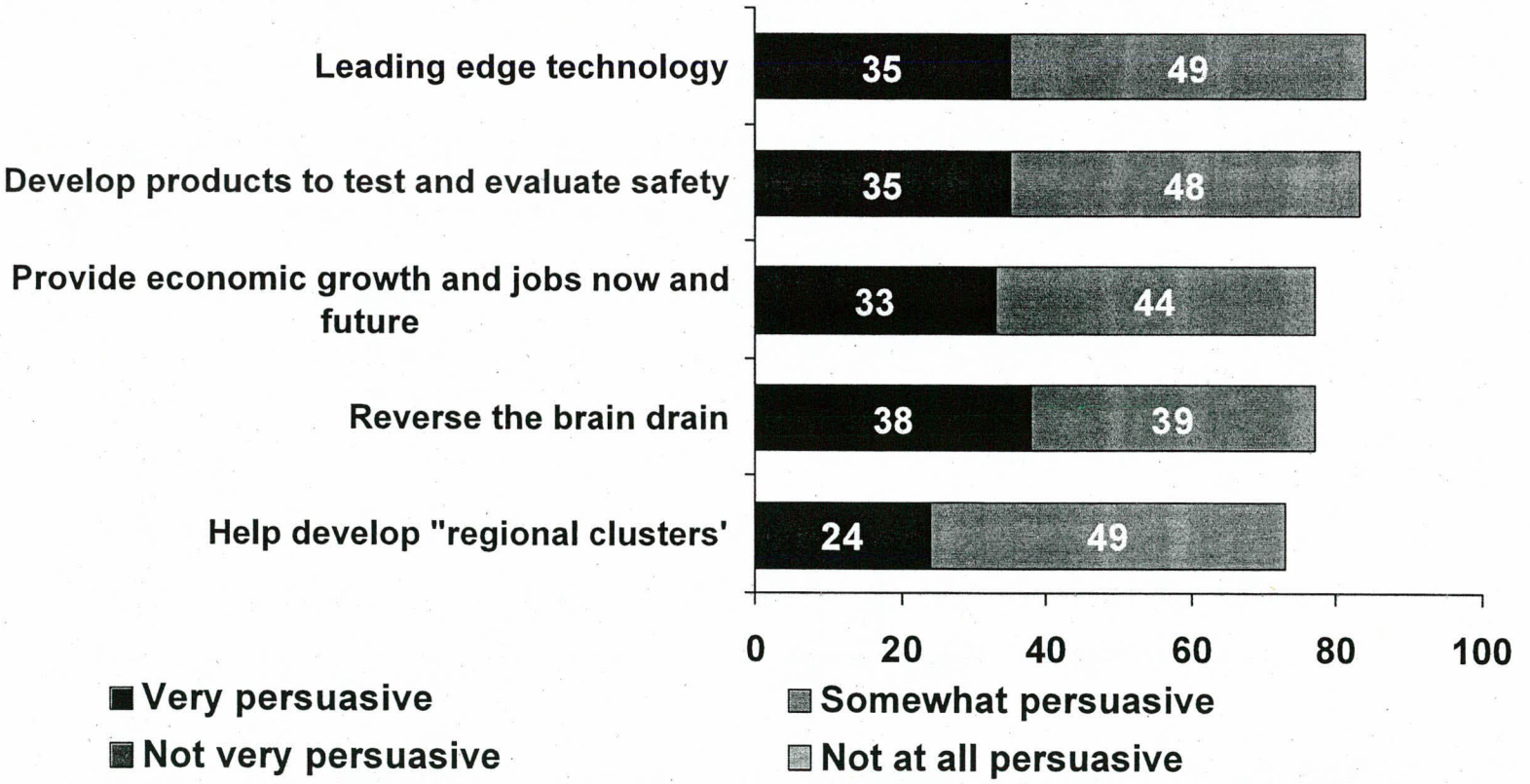
Canadian Leadership in Biotech

- **Previous research and focus group discussion indicate that most believe government has a role to play in fostering the industry**
  - Most would say the private sector will drive growth and investment
  - But most also believe government involvement and support will shorten the time required to reach critical mass and success
    - Most agree that happened with ICT and should be replicated in biotech
- **Arguments in favour of a government role proved to be much stronger than those against**
  - About three times as many find arguments for government involvement very persuasive as feel that way about arguments against
  - In forced choice, ratio even higher

EARNSCLIFFE

Economic Arguments In Favour

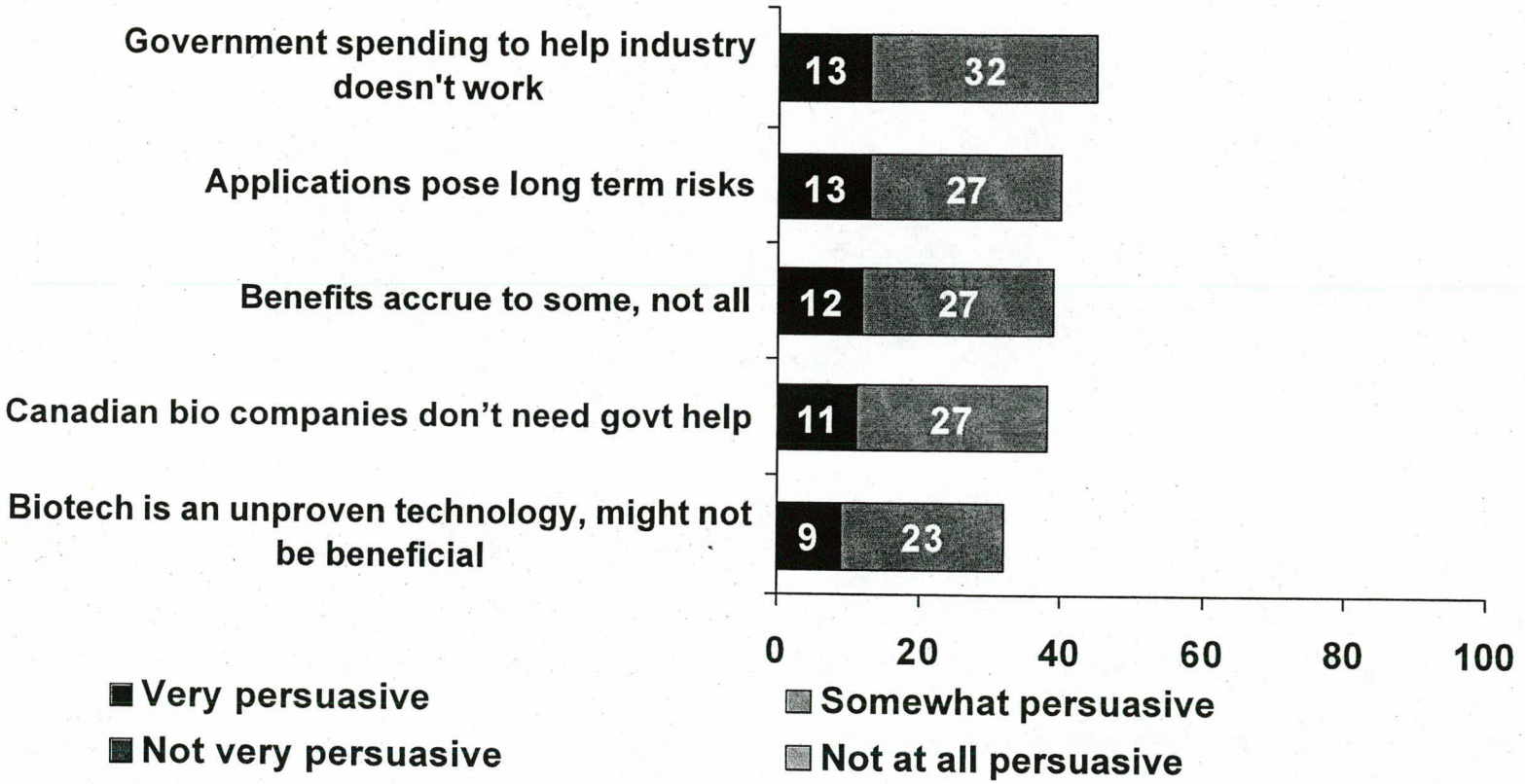
I'd like to read you a list of arguments in favour of government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive each are:



EARNSCLIFFE

Arguments Against

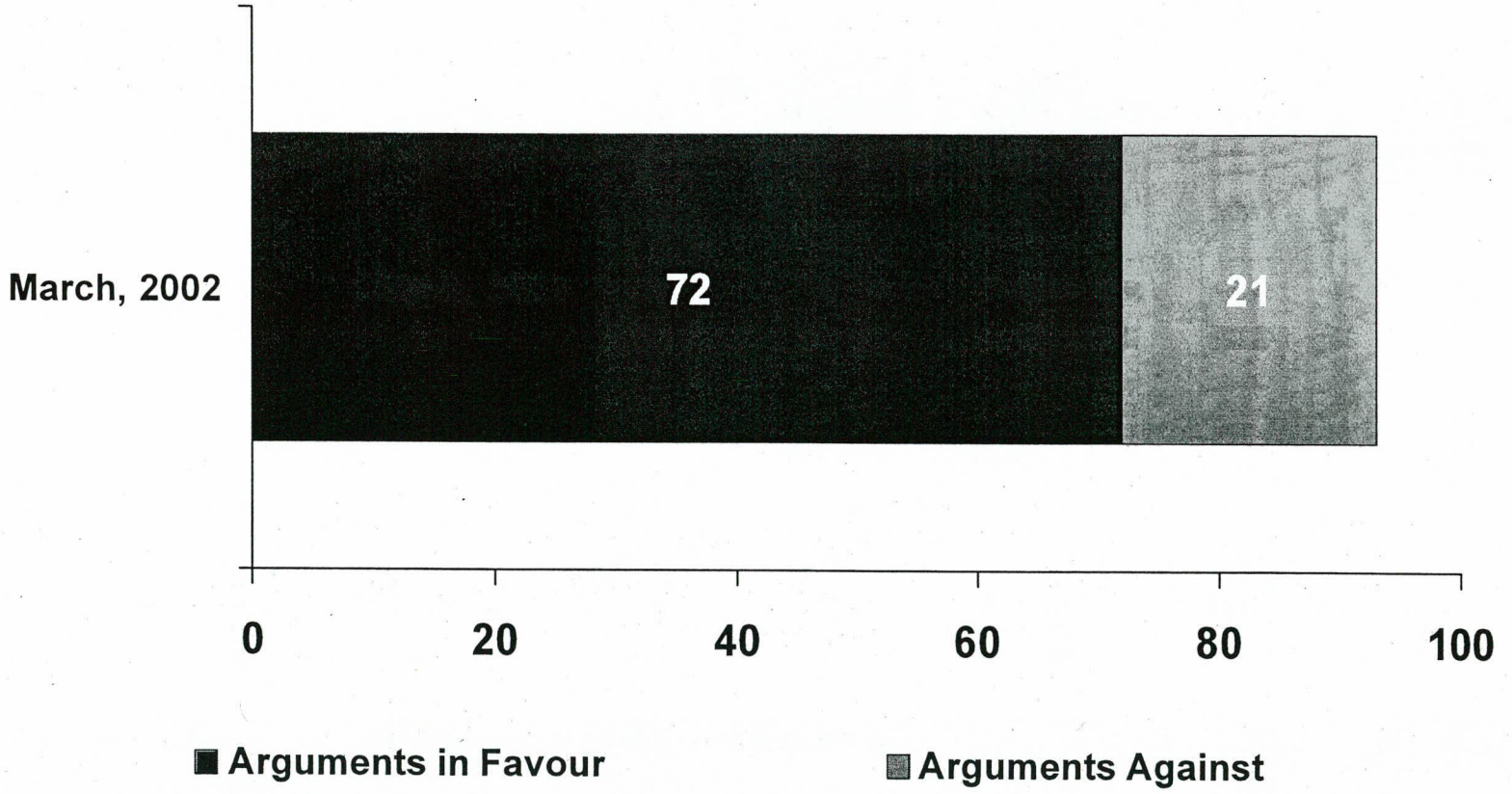
I'd like to read you a list of arguments AGAINST government support to the development of biotechnology in Canada, and I'd like you to tell me how persuasive each are:



EARNSCLIFFE

Weight of Arguments For/Against

Thinking about all of the arguments you just heard in favour and against Canadian government support to biotechnology research in Canada, were the arguments against involvement more persuasive, or were the arguments in favour more persuasive to you



EARNSCLIFFE

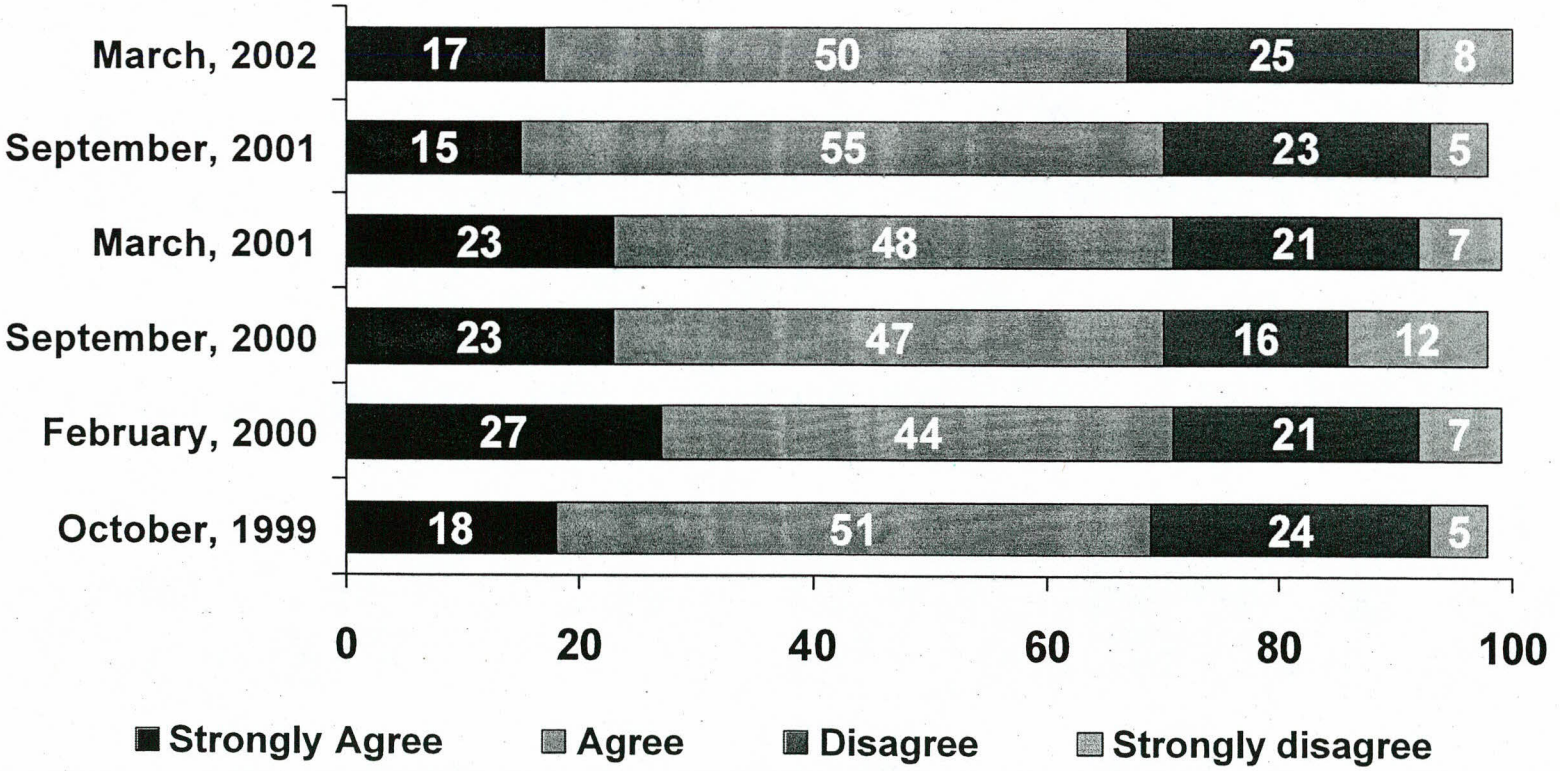
Food Safety and GM Food

- **Two thirds believe food on store shelves is safe**
  - Although a slight increase in number who do not believe it is safe
  - No evidence of increased concern in groups, but a trend worth watching carefully in the next wave
- **Results on GM food comfort level similar to first four waves, relatively even split**
  - More are comfortable than uncomfortable
  - But the number of uncomfortable is substantial, about four in ten
- **On behaviour, number who say "never buy again" down from 17% to 12%**
  - Again, a trend worth watching, will draw conclusions if it reveals itself in next wave

EARNSCLIFFE

Food Safety

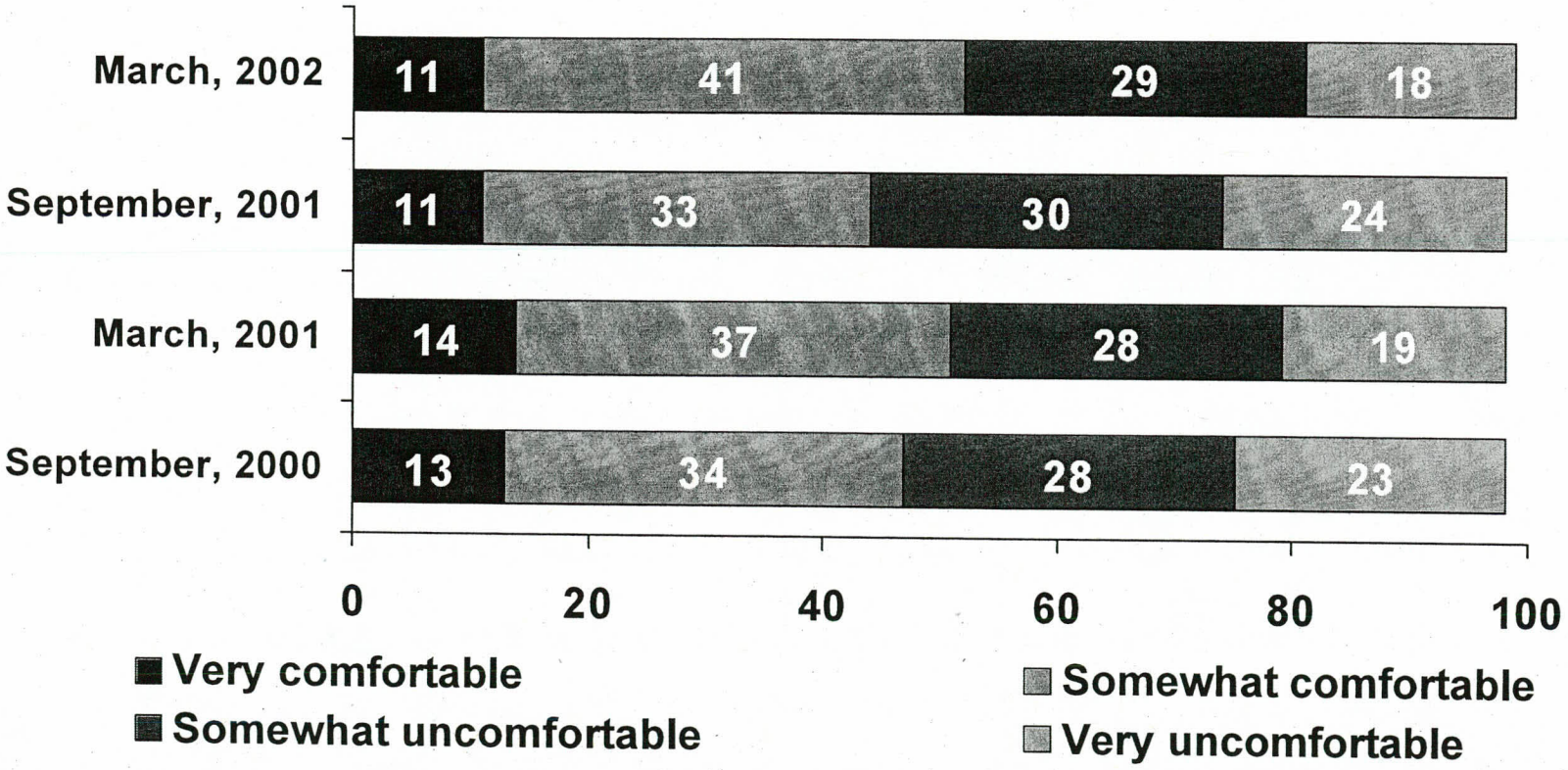
When I see a product on a store shelf, I assume it must be safe



EARNSCLIFFE

Comfort: GM Food

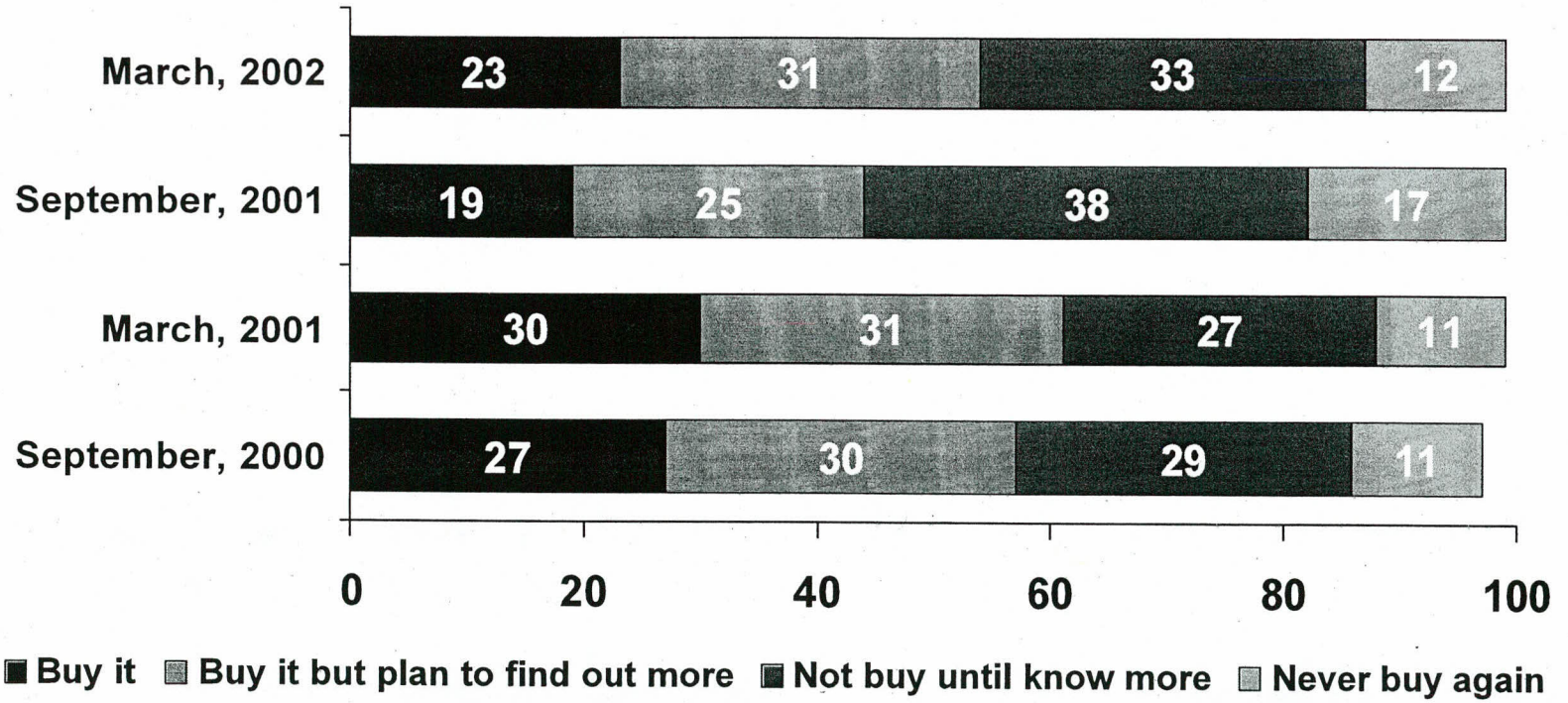
In general, would you say you personally are very comfortable, somewhat comfortable, somewhat uncomfortable or very uncomfortable with the idea of buying foods that contain GM ingredients?



EARNSCLIFFE

Behaviour: GM Food

If you were to find out that a food product that you have bought 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?



EARNSCLIFFE

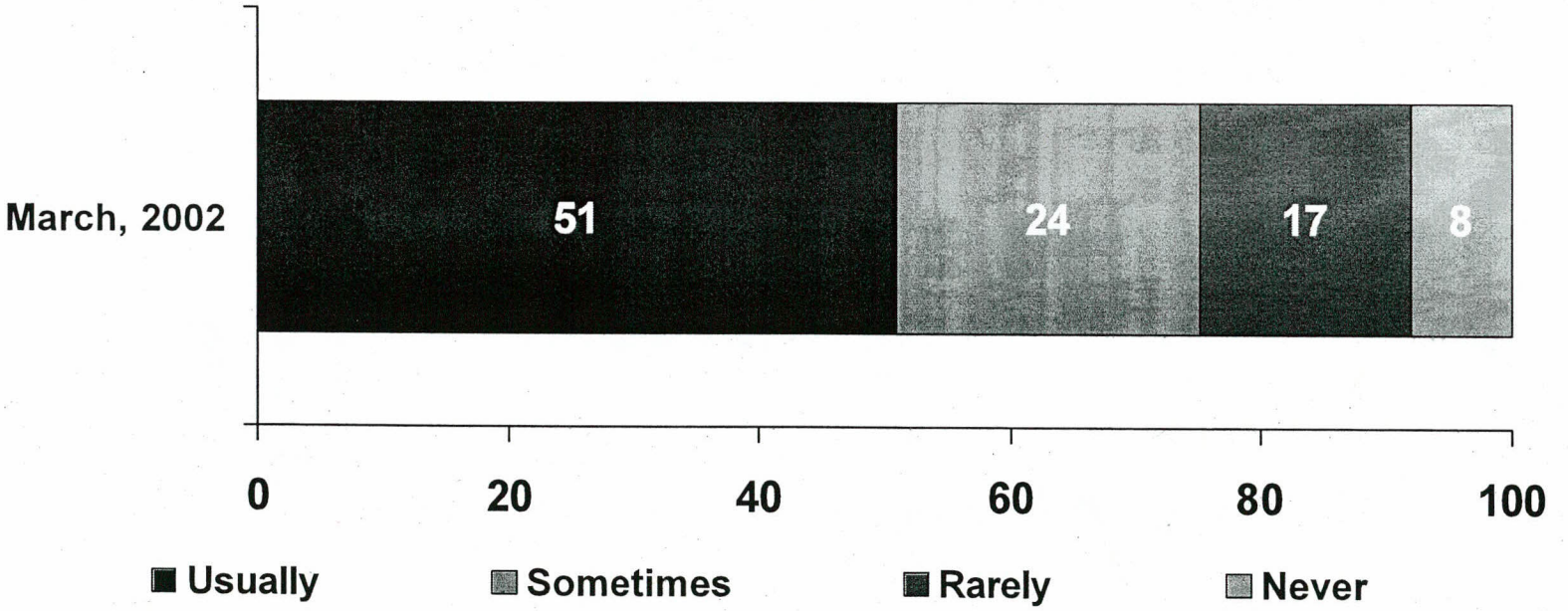
Labeling

- **In groups, a sizeable number indicate they read food labels now**
  - Primarily for nutritional content
- **On an unaided basis, minimal demand for GM labeling**
  - At most, one or two people in a group will suggest
  - Once raised, the rest virtually always initially concur
- **Upon discussion, a substantial majority express a preference for GM food labeling**
  - Even if it costs taxpayers, consumers
  - Driven by principle of "Informed choice"
  - More resistance than in past to idea of paying 10% more
    - Those in lower SES categories express a fair level of concern about potential cost increase, although this argument ultimately moves few away from labeling
  - However, the "cost to taxpayers to monitor" argument does not resonate
    - In groups, people say they don't believe that monitoring such a system would significantly increase cost

EARNSCLIFFE

Read Label ?

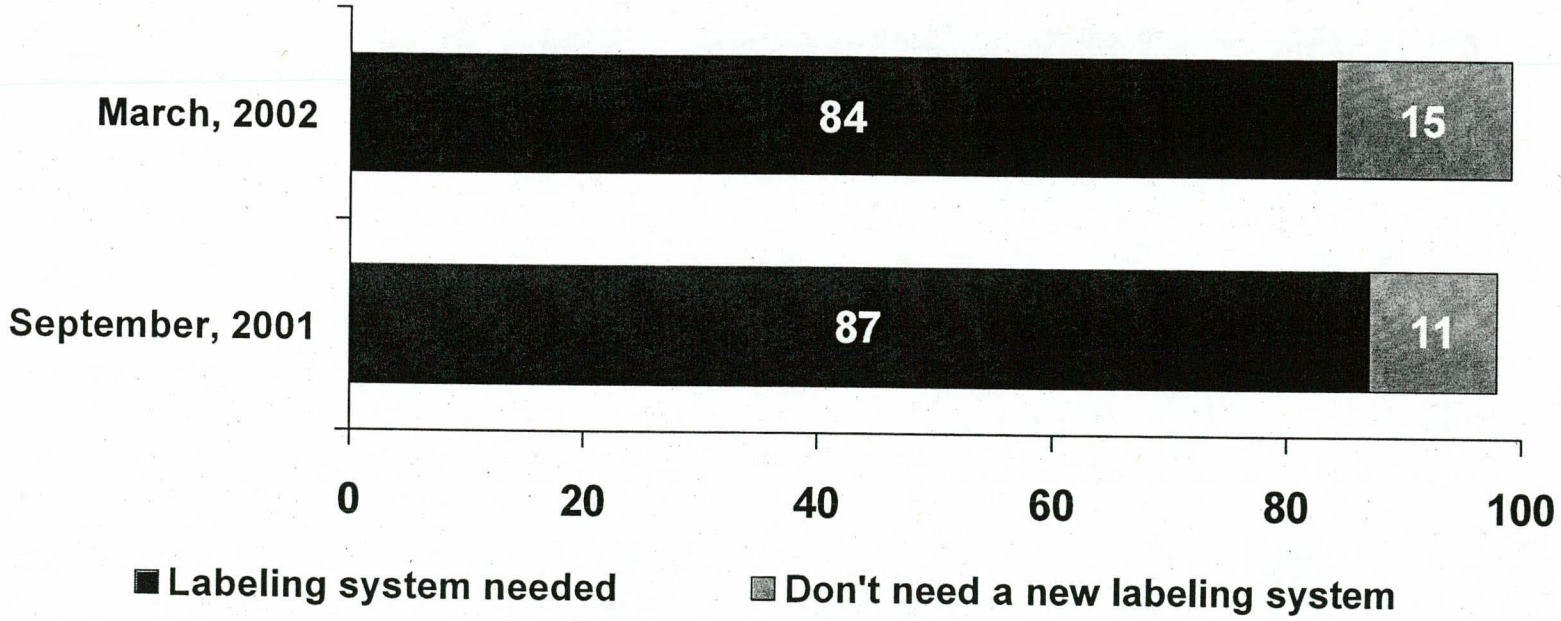
Would you say you usually, sometimes, rarely or never read the label of foods that you purchase at the grocery store ?



EARNSCLIFFE

GM Food - Labeling

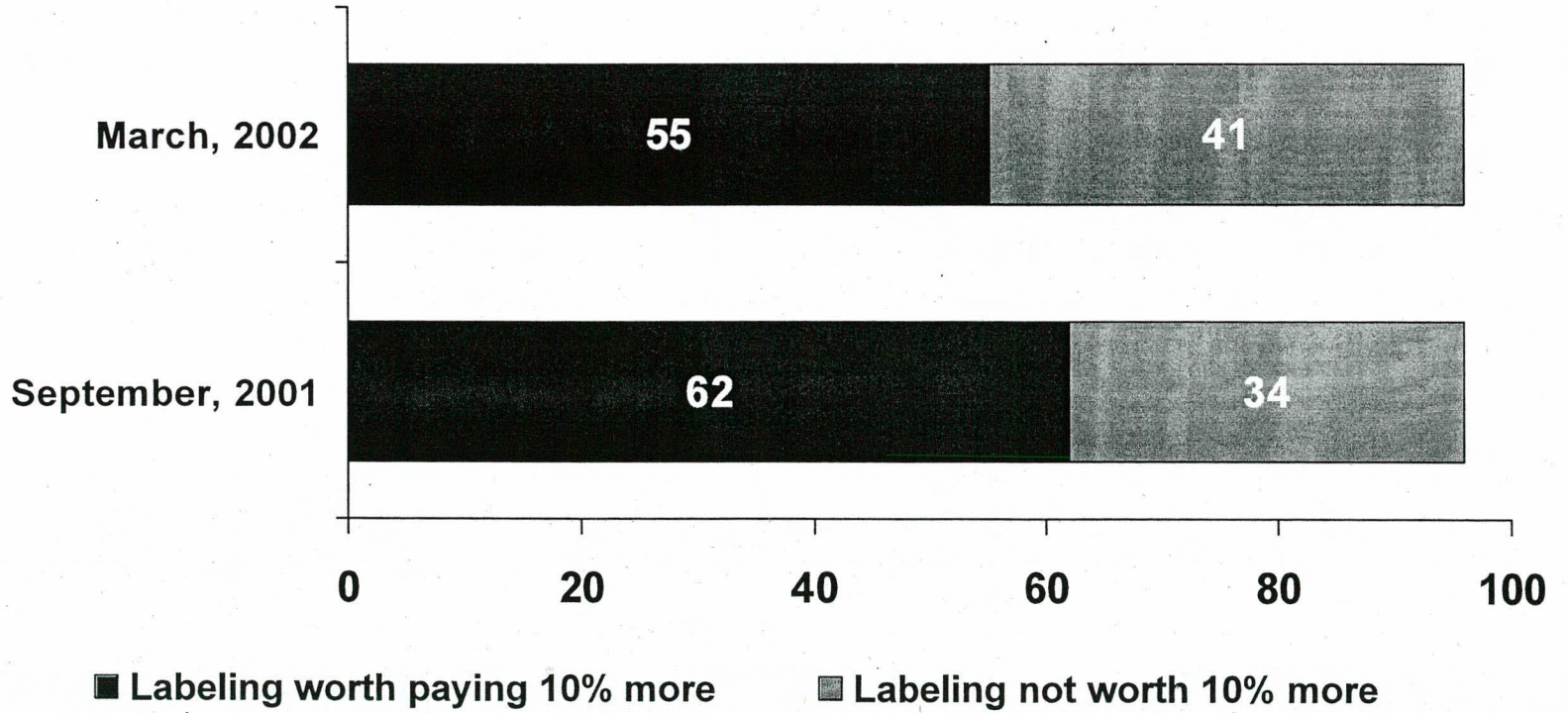
Some people say that Canada should introduce a new labeling system for food products that contain genetically modified ingredients in Canada, because GM food is not like other food, and people want to be more informed about it. Other people say that GM food is just like other food, and food companies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



EARNSCLIFFE

GM Food - Labeling

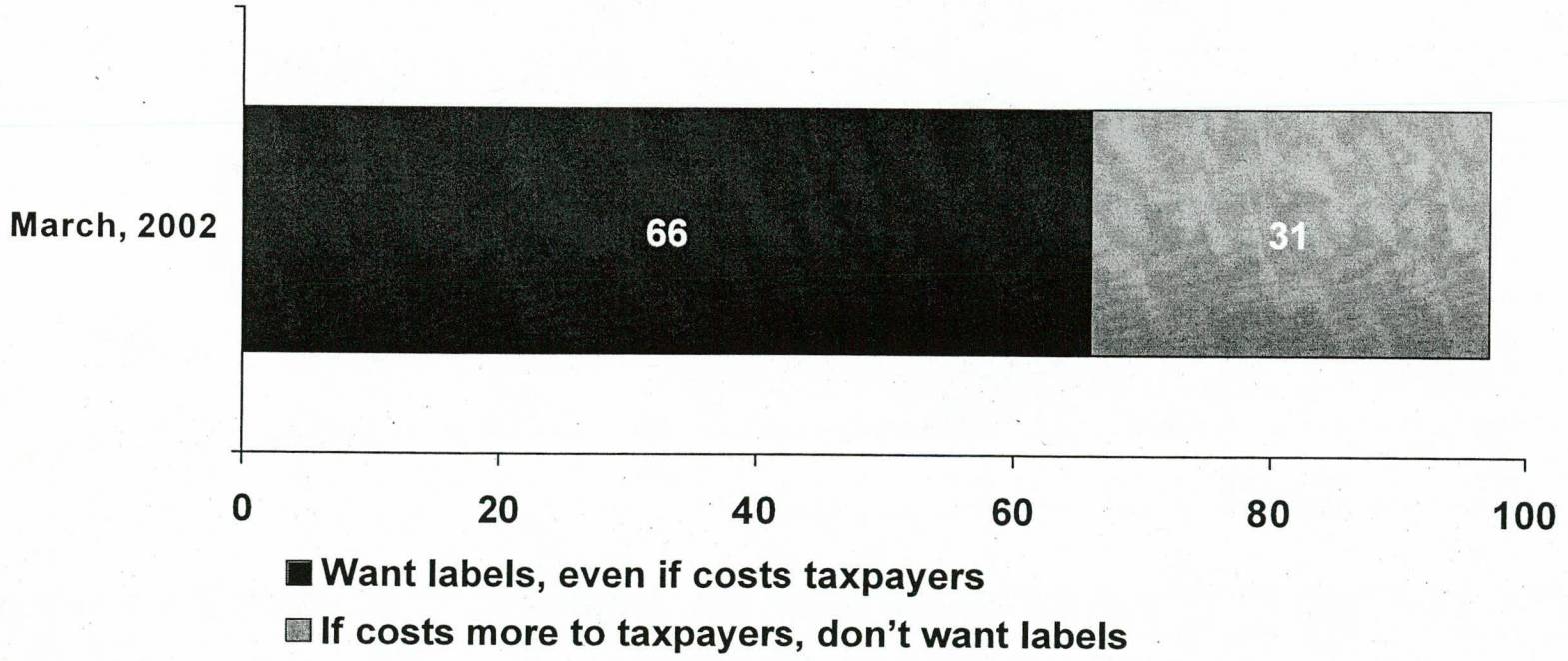
Some people say that it is worth paying 10% more to have a GM food labeling system introduced. Other people say that having a GM food labeling system is not worth a 10% increase in the cost of food. Which of these views is closest to your own?



EARNSCLIFFE

GM Food - Labeling

Some people say that there is no need for taxpayers to pay for a system to create and monitor the labeling of genetically modified food, since these products are approved for safety by government. Other people say that they want labels to inform them about whether the food they buy contains genetically modified ingredients, even if it might cost the taxpayers some money to monitor the system. Which of these two views is closest to your own?



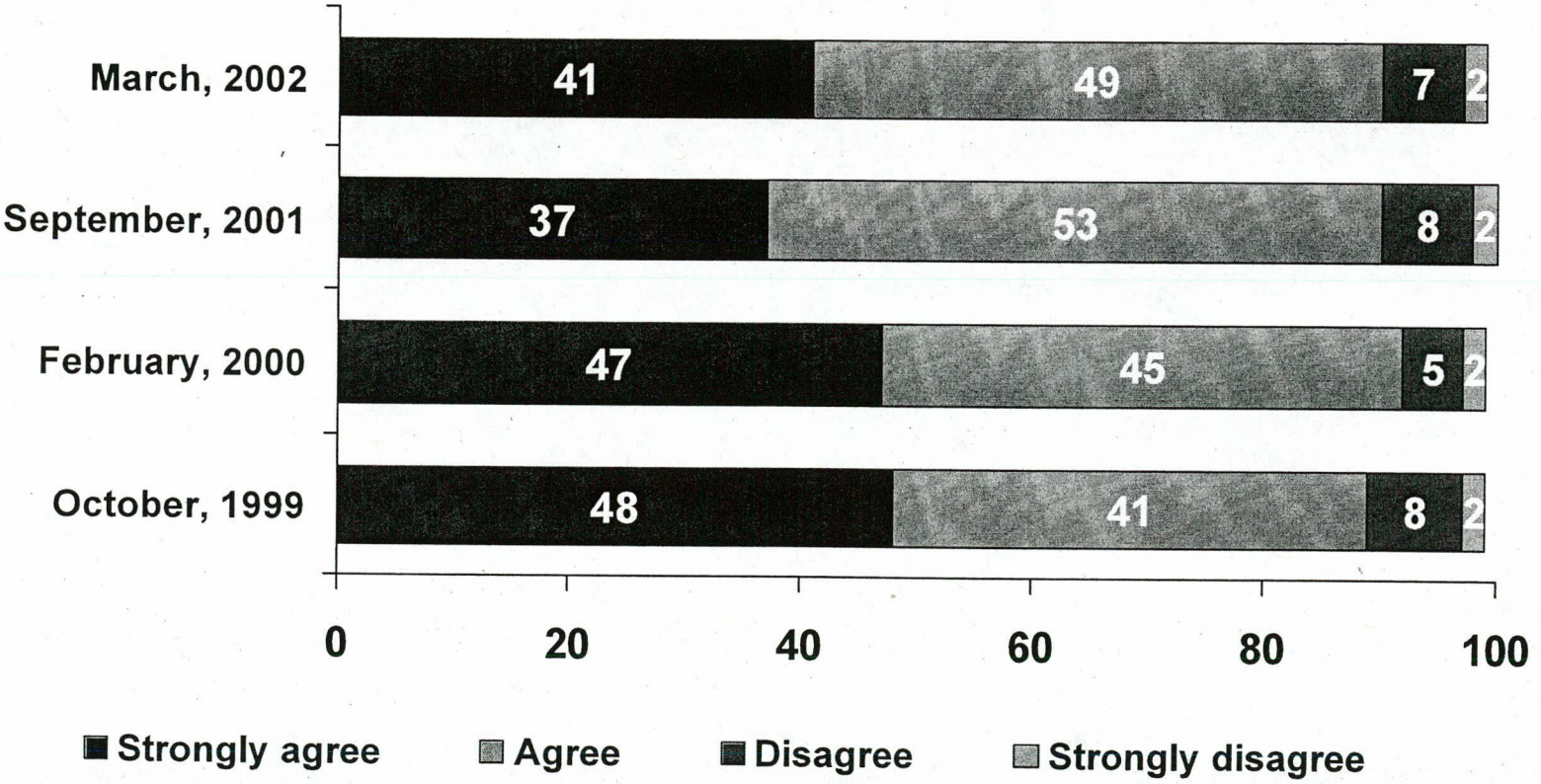
Decision Making

- **Informed choice is a powerful concept in the context of GM applications, and continues to be**
- **But people do want science, experts involved**
  - Groups clarify preferred roles:
    - For the majority of applications, they want the expert decision making role to be largely confined to safety
    - They want government/experts to regulate for safety, and to impose sanctions against those who might get involved in cloning
    - But beyond these roles, the public want the right to make choices

EARNSCLIFFE

Informed Choice

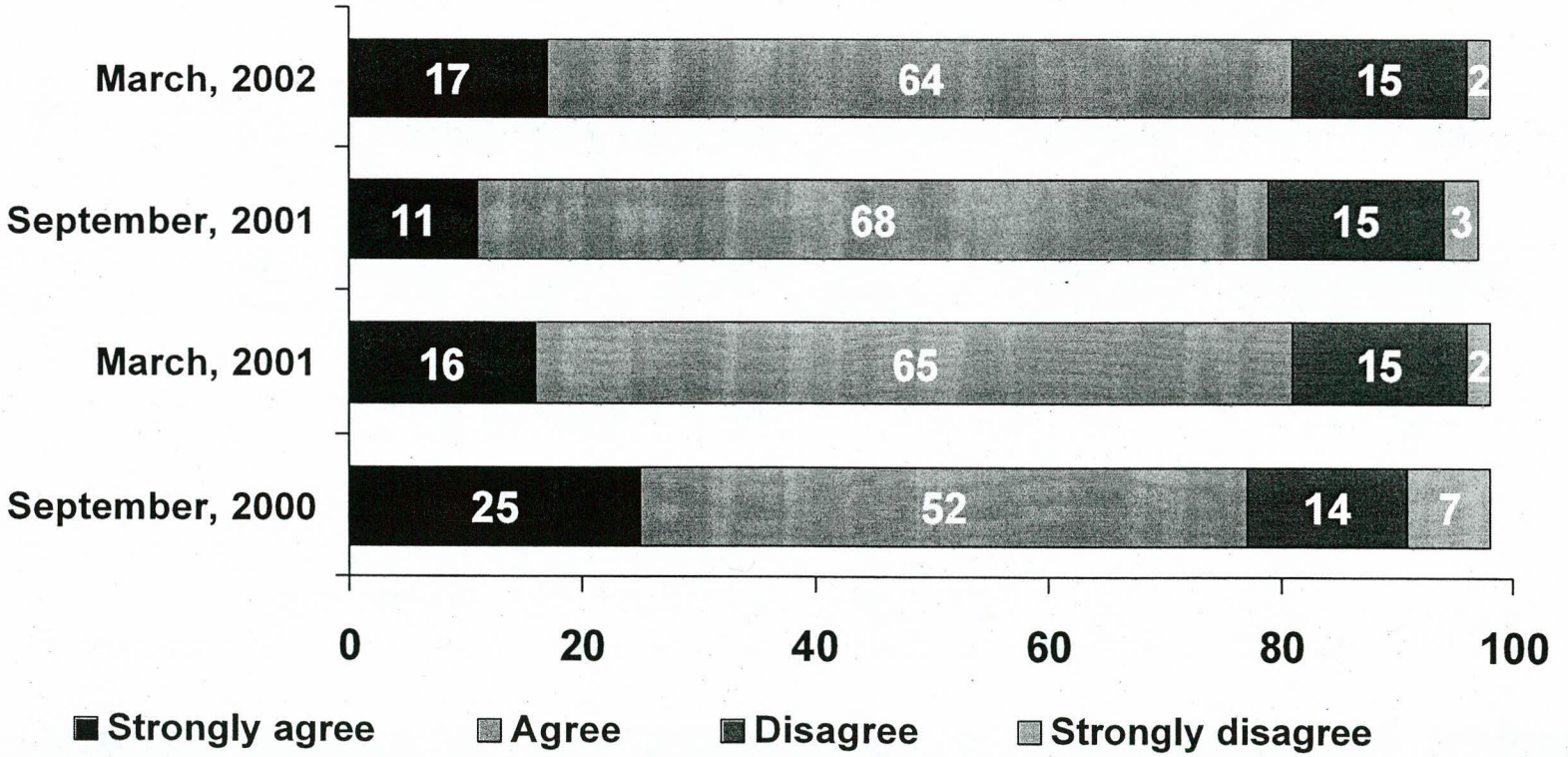
Government should inform people about biotechnology, and let them decide for themselves whether they want to use biotech products



EARNSCLIFFE

Best Available Evidence

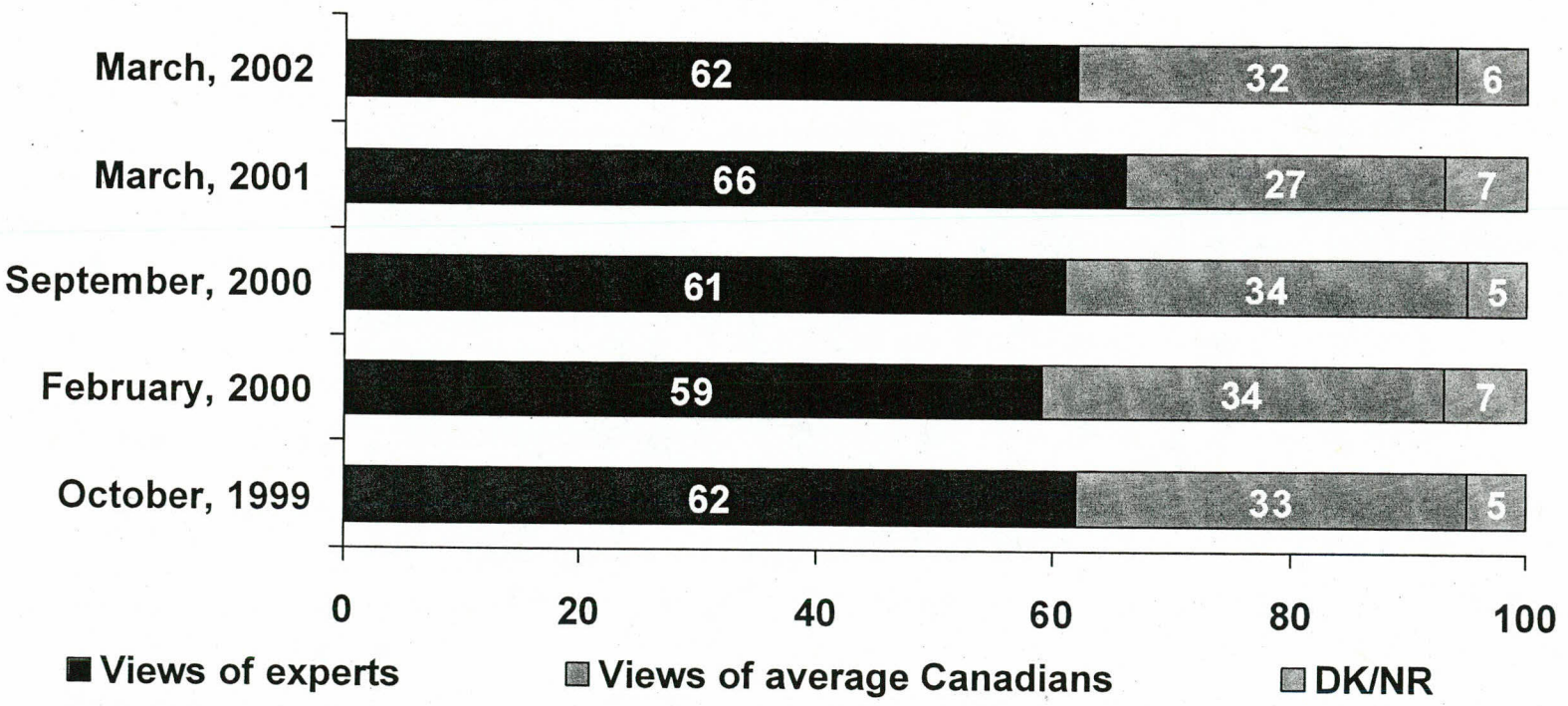
If the best available evidence says a particular use of biotechnology is safe, it should be allowed.



EARNSCLIFFE

Experts versus Average Canadians

Which of the following views is closest to your own: Decisions about biotechnology should be based mainly on the views of experts and scientists OR Decisions about biotechnology should be based primarily on the views of average Canadians.



EARNSCLIFFE

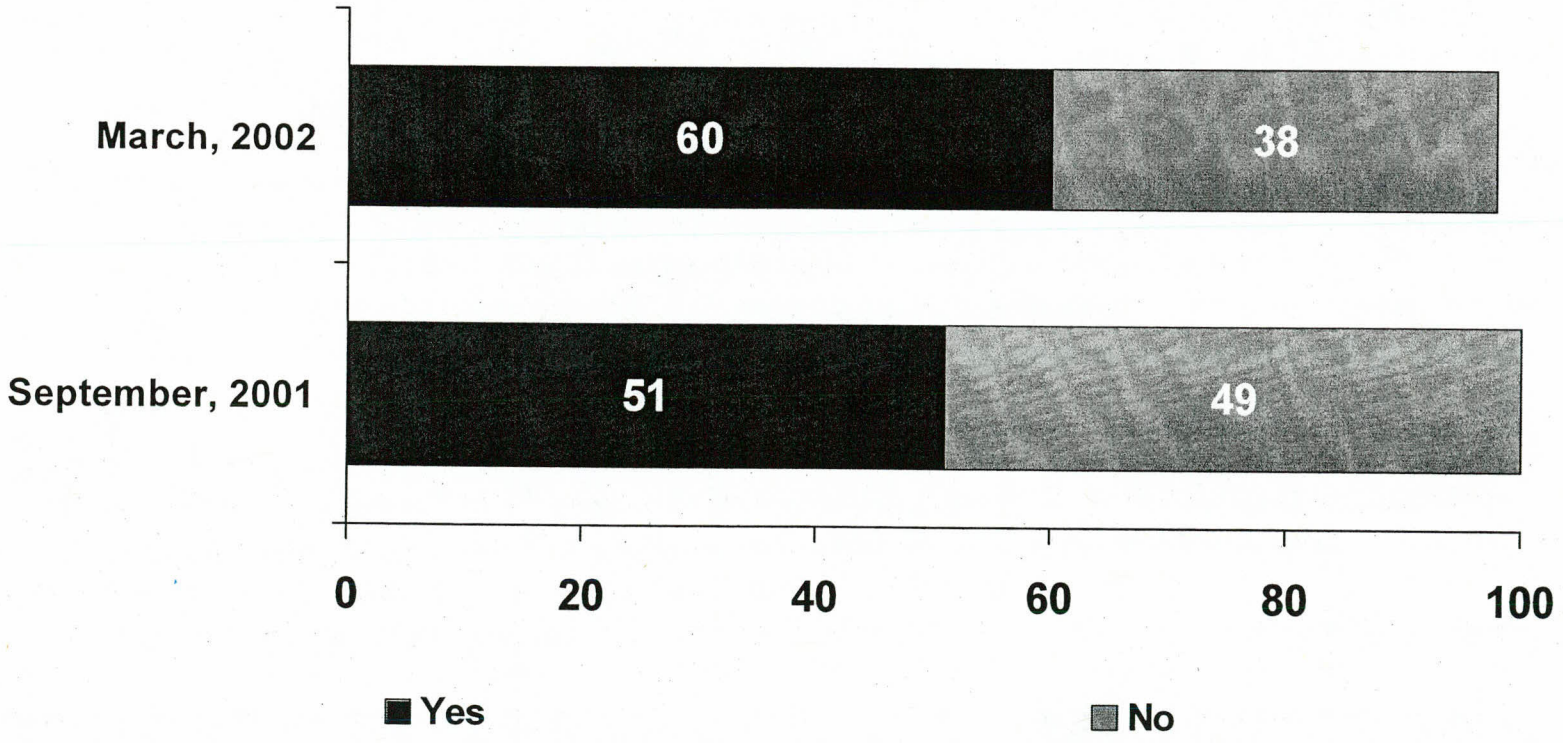
Stem Cells

- **Awareness of stem cell research remarkably high**
  - Few issues have gained public attention at such a rapid rate over such a short period of time
- **Even with a tendentious description of the issue, seven in ten very or somewhat supportive**
  - 13% adamantly opposed, down from 18% in fall 2000
- **The chief reason is the promise of unparalleled health benefits**
  - A remarkably high number of people believe that this research will benefit them personally
  - In groups, health benefits is the most often cited issue they have heard of
    - Followed closely by the controversy raised by President Bush
  - Unlike the US, broad support for government role in this area
- **But with greater knowledge comes somewhat greater uncertainty**
  - Twice as many in this wave than last said they "don't know" whether the technology will provide them/other Canadians health benefits

EARNSCLIFFE

Stem Cell Research

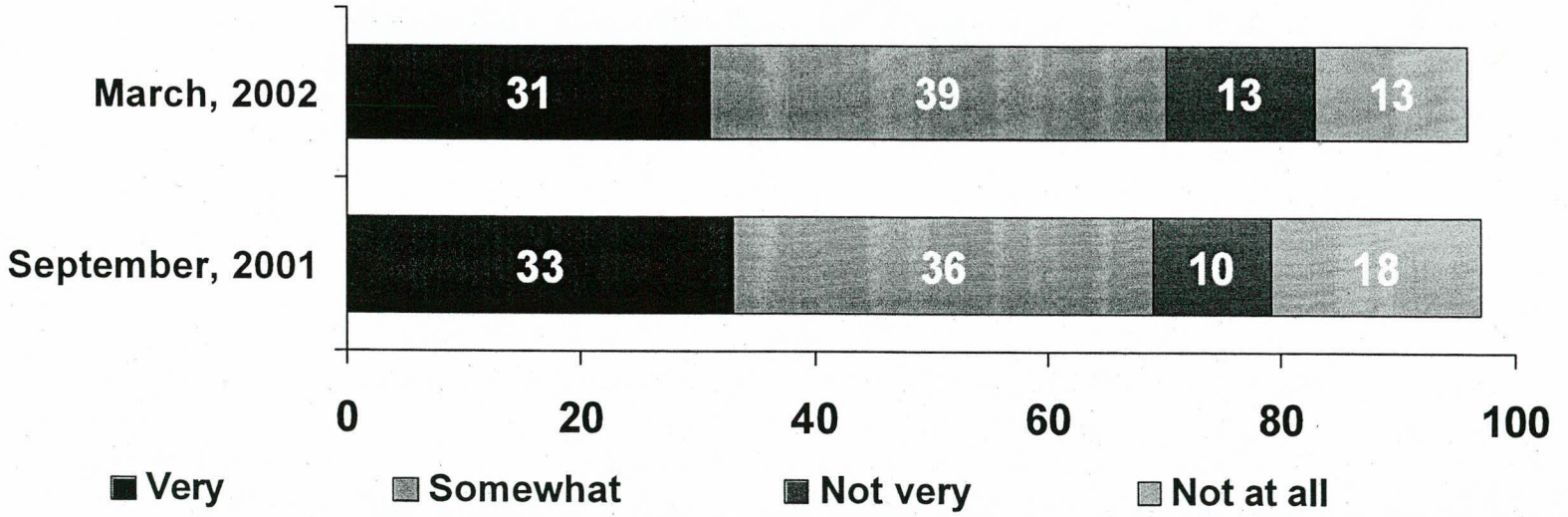
Over the last three months, have you heard about any stories or issues involving STEM CELL RESEARCH?



EARNSCLIFFE

Stem Cell Research Acceptability

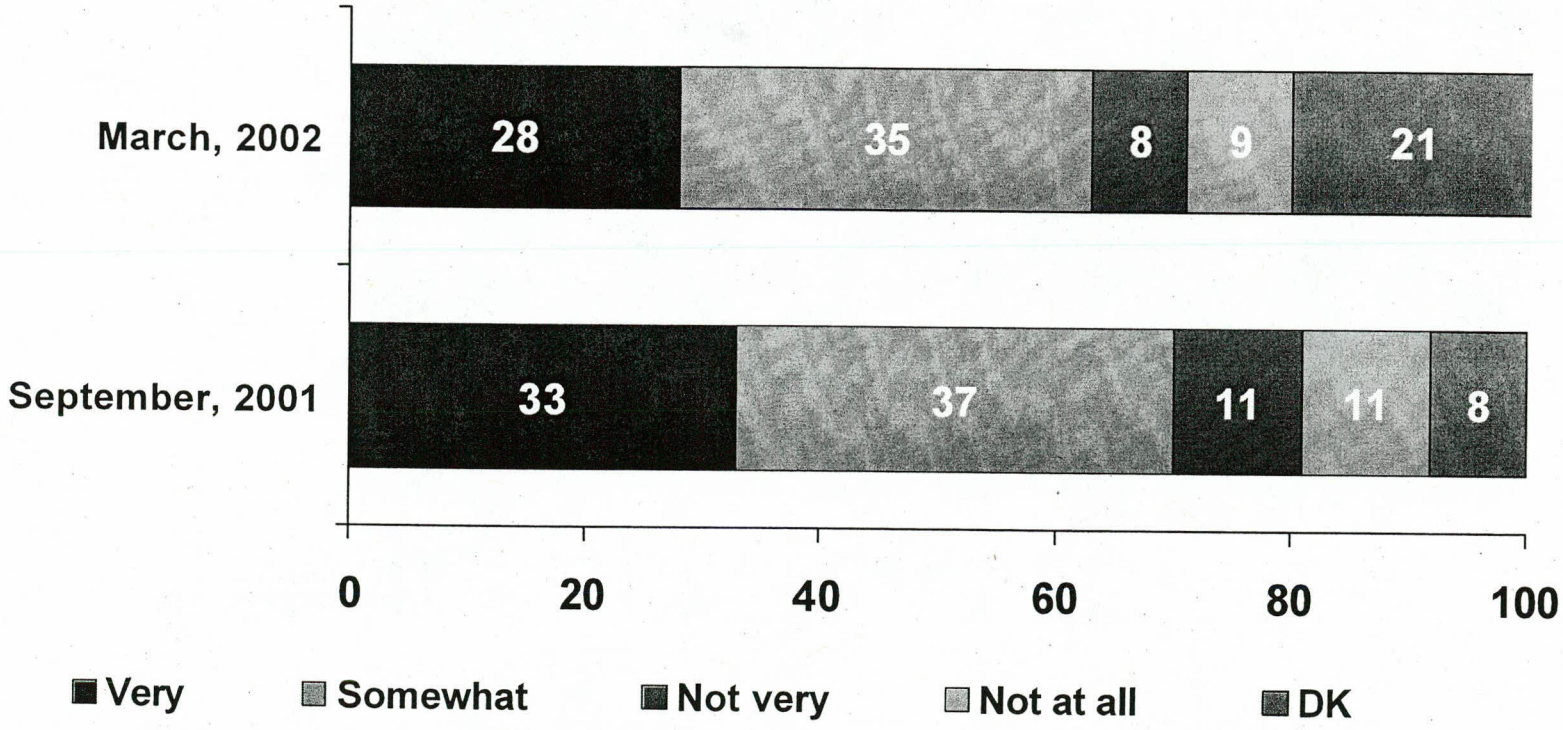
Stem cell research involves the use of certain human cells to study diseases and their cures. Unlike other types of human cells, stem cells have the unique ability to reproduce any type of cell in the human body. Many scientists say that research in this field will likely produce the most important healthcare 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, which 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?



EARNSCLIFFE

Stem Cell Research - Benefits

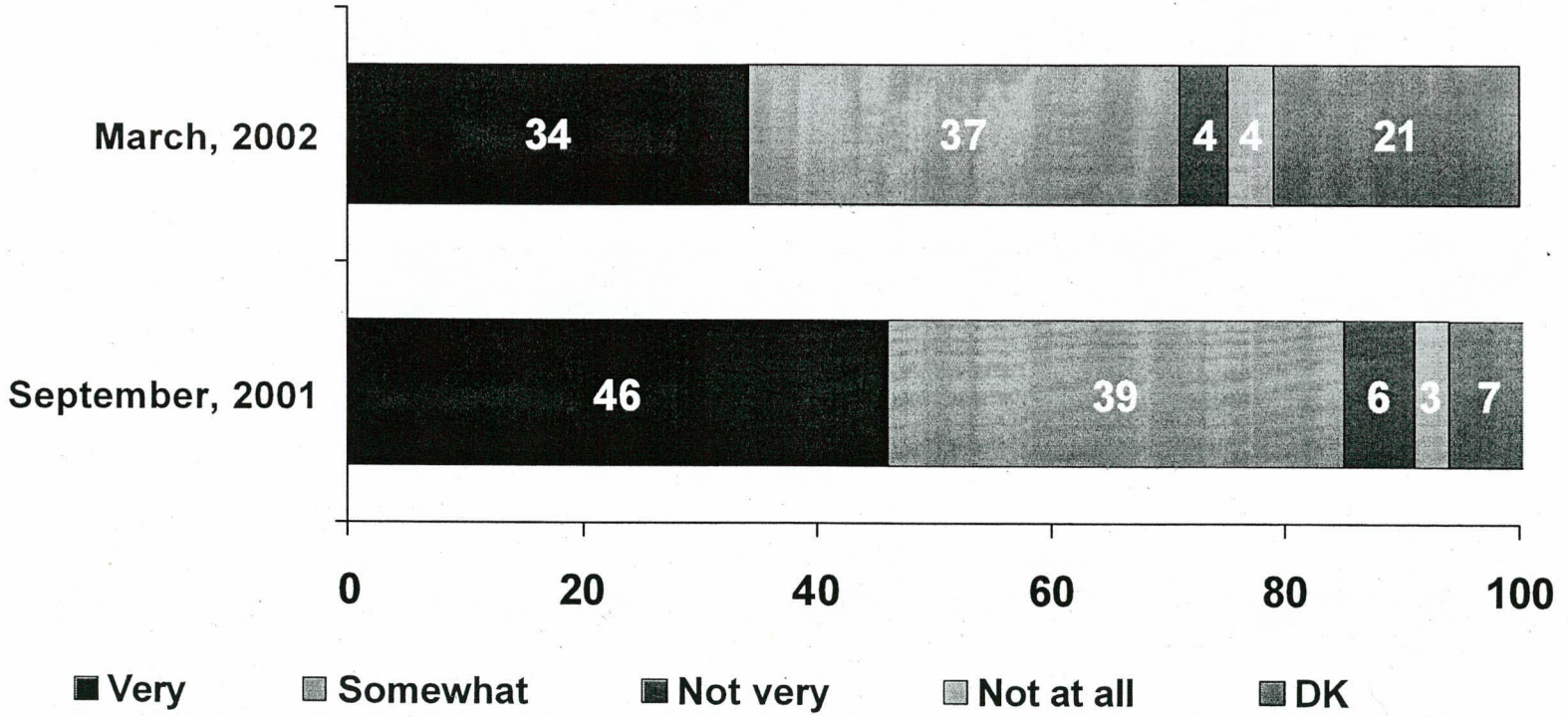
From what you know or have heard, how beneficial do you think stem cell research will be to your health?



EARNSCLIFFE

Stem Cell Research - Benefits

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



EARNSCLIFFE

Stem Cell Research – Gov't Role

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