POLLARA AND EARNSCLIFFE

PUBLIC OPINION RESEARCH INTO BIOTECHNOLOGY ISSUES

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

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

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A. INTRODUCTION

Pollara Research and Earnscliffe Research and Communications are pleased to present this report on a public opinion research program conducted in the fall of 1999 for the Biotechnology Assistant Deputy Minister Coordinating Committee, Government of Canada. The research was comprised of three separate instruments: a telephone survey, a set of focus groups and a secondary analysis of previous public opinion research. This report presents the findings of all three.

The research was designed to accomplish two major objectives:

- to benchmark sentiment on a range of biotechnology issues, forming a baseline of data for subsequent regular waves of research; and
- to assess the relative strength of key public opinion drivers in order to facilitate the development of potential communications strategies.

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

- overall awareness and familiarity;
- perceived risks, benefits and drawbacks;
- assessments of government performance in biotechnology, preferred roles for government and future priorities;
- the acceptability of various products and processes;
- the acceptability of patenting various products and processes;
- public demand for information and consultation; and
- the testing of communications issues like key messaging, intervenor credibility and appropriate spokesperson models.

The telephone survey work was undertaken from September 17, 1999, to October 2, 1999, and spanned the period of the launch of public protests by a coalition of interests in Canada against genetically modified foods. One set of focus groups (one night of two groups in Toronto) was conducted prior to the telephone survey in order to pre-test the survey questionnaire.

The final results report on the views of a random sample of 1515 Canadians and carry a margin of error for the national sample of +/- 2.4%, nineteen times out of twenty. Margins of error are larger for sub-samples, ranging up to +/-3.5% for smaller regional samples. Precise margins of error can be provided for the variety of aggregated sub-samples.

Four further nights of focus groups (eight groups in all) were conducted in Montreal, Toronto, Rosetown, Saskatchewan, and Vancouver between October 16, 1999, and October 25, 1999. The research followed a consistent agenda for discussion and was designed to probe in more detail opinion underlying the results of the telephone survey. Each night of the main focus group wave comprised a group of approximately ten participants drawn from the general population and a group of similar size of *Involved Canadians*, our proprietary population segmentation of Canadians who are significantly more interested and involved in public policy issues.

The secondary analysis involved a search of publicly available research findings in biotechnology. This work was critical to identifying informational gaps to be dealt with in the survey and, as well, to identifying potential tracking questions and variables.

This report consists of several sections designed to provide an overview of all segments of the research and detailed reports on each. The initial summary section and the following section outlining detailed findings integrate results from the telephone survey and the focus groups. Following those sections are a short resume of the secondary research, the questionnaire for the telephone survey with national results expressed in percentages and the moderator's guide used in the focus groups. We have provided detailed cross tabulations to the Canadian Biotechnology Secretariat of the questionnaire but have not included them in this report. They are available upon request.

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

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B. OVERALL NARRATIVE

There is an emerging international consensus that biotechnology may represent the world's next generation of transformative technologies, potentially rivalling information and communications technology in potential scope and economic impact. It promises not only substantial benefits through products and processes like improved medicines and diagnostics and environmental cleanup agents but also will serve as an enabling technology to improve the products and processes of a variety of traditional industries, including agriculture and forestry. Because biotechnology involves processes that affect the very building blocks of life, individual genes and gene structures, it has become a controversial technology in some quarters as people raise concerns about unintended future risks to the food supply, human and animal health and the environment. As a result of both the significant scientific breakthroughs and controversies and protests generated by a variety of groups, media coverage of biotechnology has been increasing exponentially over the past year.

CURRENT AWARENESS AND BALANCE OF OPINION

Perhaps counter-intuitively, Canadian public opinion is still largely unformed and tentative at this stage of the biotechnology debate. Awareness and understanding remain comparatively low as does the general level of interest. It is fair to say that, as of the end of October 1999, opinion had not been crystalized in any substantial way, let alone galvanized in any particular direction. Even the genetically modified (GM) food debate has not penetrated the public consciousness very deeply.

Biotechnology seems to fit, at least on first impression, within the positively regarded constellation of high technology. General levels of entrenched negative attitudes towards biotechnology are quite low on a wide variety of dimensions. At the moment at least, the public opinion ground is not very fertile for a coalescing of strong negative attitudes.

Most people presume there are many potential benefits (initially economic), that they have been increasing and that Canada should seek to take advantage of them. In fact, a large majority think Canada should lead the world in the development of biotechnology. It is clear that a hierarchy of benefits emerges as people focus on the technology and its applications. Health and medical benefits are the strongest positive drivers of attitude, followed by environmental and then economic outcomes. Canadians generally seem to be approaching

biotechnology issues on a quite pragmatic level. As has been found before, the closer an application is to them personally, and the more potentially positive an impact it might have, the more they are willing to accept it.

The generally positive attitudes, however, mask a fair amount of internal tension. People harbour mixed and sometimes contradictory impressions and opinions as they grapple to understand and come to conclusions about biotechnology.

For instance, as awareness of the technology and its applications grows (at least in the surrogate environment of a survey and focus groups), concern grows as well, as does the determined conviction to seek out information. In general terms, when people focus on the means (processes), rather than the ends (products and outcomes), they can have more hesitation. In particular, the higher the order of life form, the larger the hesitation about genetic manipulation. Similarly, crossing the boundaries between life forms (plants, animals and humans) causes hesitation, and in some cases, strong opposition.

RISKS AND BENEFITS

People are not so much divided (one against another) as they are conflicted (personally torn) about a number of aspects of biotechnology. This is most profoundly evident when it comes to the question of risk. People accept on one level that the benefits of biotechnology are so considerable that they are willing to put up with some risk of longer-term unintended, and unfortunate, consequences. At the same time, they are far from certain that enough is being done to assess risks right now and are hesitant about whether enough could ever be known about long-term risks in advance.

For most applications, Canadians tend to believe that scientific assessment of the risk to health and the environment is the paramount criterion for acceptability. Large majorities say that if most scientific evidence says that a particular use of biotechnology is safe, it should be allowed. There is little support for the notion that the technology interferes with the natural order of things or concern that biotechnology changes things that nature or God created. A large majority reject the proposition that scientists have no business meddling with nature.

Most people want to assess biotechnology – its products and processes – on a case-by-case basis. And they base their conclusions on the assessment of potential benefit versus potential risk. There is, as well, an implicit "marginal personal benefit" calculation they tend to make. The internal calculation of the risk/benefit equation includes variables like the benefits accruing to large numbers of people rather than subsets, and the benefits tending towards systemic alleviation of significant problems rather than being more cosmetic or primarily profit-driven.

On the core question of risk, most people understand that it is endemic in modern society and impossible to eliminate. People tend, as a result, to believe that science should be the guide to approving new products. On the whole, science trumps ethical or moral concerns even if the conclusion is not altogether certain. For instance, "most available scientific evidence" is an acceptable standard for product approval.

FOOD

On the specific issue of food safety, there is a large level of confidence among Canadians. Large majorities agree that they assume products on store shelves are safe and must have been tested for safety by government. Generally, these attitudes are driven by what people want food safety to be, rather than by any specific understanding of current regulatory practises. In fact, many confuse food inspection with testing food for long-term risk. Nevertheless, there is a presumption that someone, somewhere, is in charge and making appropriate decisions.

On GM foods, most Canadians are very surprised to find out how pervasive GM ingredients are in processed foods, and wonder about how that could have happened without their knowledge or consent. They don't know why those ingredients have been added and presume the potential risks are larger than the potential benefits. However, that does not lead to a determination among most to stop consuming GM food. Rather it leads to a demand for more information in order to facilitate "informed choice." Not surprisingly, this translates into a high level of support for the idea of labelling. At the same time, it is clear that the bottom line for people is safe food, implying that labelling would not be a panacea for easing concerns.

As of the end of October, it was clear that critics of GM foods had not yet galvanized opposition. However, the research indicates that of all the biotechnology areas, this is the one most capable of being redefined negatively. There are substantial uncertainties in the food area and a major event of some sort (even of the indirect kind that occurred in Britain and parts of Europe) could catalyze widespread opposition to GM foods.

ROLE OF GOVERNMENT

Most people seem less than pleased with, but short of critical of, the way in which the federal government has managed biotechnology issues. Only one in five say that the government is doing a good or excellent job of handling its responsibilities in this field, while one in four say it's doing a poor job and the rest say "fair." The highest levels of satisfaction are for securing the economic benefits, while the greatest dissatisfaction is around the effort to inform the public. This kind of pattern normally implies that many people don't really know much about what government is doing in this area but can't indicate that they feel entirely sanguine about the issues.

Canadians feel that the federal government should have a number of important priorities when it comes to biotechnology, but the most important ones are: protecting against health or environmental risk, and ensuring the ethical use of biotechnology. In fact, Canadians seem to be asking that government operate on a dual track; they seem to want to know that government is taking the lead in extracting the benefits while understanding and actively managing the risks of biotechnology. It is unclear that they want to know much more about how government goes about doing that but they seem to want to know that it is doing what is necessary, and doing it well. They are currently unconvinced that is the case.

While most people want government to increase its regulation of biotechnology, this is clearly not a view that stems from a desire for an adversarial relationship, or even a concern that there are major gaps right now. There is very strong support for the idea of working in partnership with the private sector on new inventions and applications, and strong endorsement of the idea of encouraging private sector voluntary efforts to provide information about products.

PUBLIC ENGAGEMENT AND INFORMATION

Generally, Canadians hear a polarized cacophony about biotechnology, particularly about GM foods, and don't want much to do with it. They generally distrust most stakeholders to provide accurate information, including industry, NGOs, government and even many scientists, whom they believe are influenced by corporate funding of research.

They want neutral independent information to help them through the rhetoric and politics. They tend to trust only regulators, independent or academic researchers, and health professionals to be sufficiently disinterested to provide information worth consuming. To most, trustworthiness in this area equates to independence and a lack of stake in outcome.

People would generally like the government to provide more information (providing it is balanced and multi-sourced) about biotechnology and most would take some comfort from the fact that the government is willing to make the information available. Fewer would actually access it. Similarly, most would welcome the offer of consultation because it demonstrated openness but very few would participate. In general, they would prefer to delegate further inquiry and decision making to experts.

Most people think that decisions about biotechnology are too complicated for them and should be based mainly on the views of experts rather than those of ordinary citizens, and on science rather than ethics. Generally, they would like the public interest to be the main criterion for that decision making. They want public opinion to *influence*, but science and experts to decide.

More informed, educated and involved Canadians seem somewhat more positive about biotechnology and more likely to believe in scientific inquiry. However, they are less persuaded about all of the claims of potential benefits, more likely to be concerned about potential risks and more resistant to the notion that the risks can be resolved. They are also less trusting that government is managing and regulating properly. As is normal, they say they are paying much closer attention than others and want more information and involvement.

If government is to successfully communicate with Canadians about its management of biotechnology, there may currently be some underlying policy issues to be addressed. Government will have to demonstrate that it has an integrated and forward-looking plan to understand and manage the risks of biotechnology. Among the elements of such a plan would be: a strong, independent regulatory system; a comprehensive science effort to fully understand the potential risks to health and environment; a comprehensive long-term testing capability to assess products and processes; independent, arm's-length advice on difficult issues; and a co-ordinated and centralized locus for information seekers.

CONCLUSIONS

Most Canadians are disengaged on biotechnology and many indicate that won't change much, though that may not be the case for GM food. Of all GM applications, food raises the most concerns and its potential benefits are the least understood or accepted. However, there is a general presumption that someone, somewhere, is in charge of monitoring and regulating food safety and that appropriate decisions are being made. That presumption leads most to watch the GM food debate with a bit of wariness, in large part because of what people *want* to believe. Despite its growing intensity, the debate has not crystallized opinion as yet. However, it is reasonable to infer that a major catalyzing event might do so.

By and large, the issue of understanding and managing the risks of biotechnology is seen as a technical science issue that should be resolved in that arena. Most people believe as well that, while secondary, ethical issues are important and expect deliberations, however difficult, to occur on them. Most people would like their opinions to influence decisions, but they believe the public interest should guide decisions and that, in the main, those decisions should be made by experts.

Currently, most Canadians have heard very little about government involvement in biotechnology but presume it focuses more on measures to enhance the industry than to regulate its products and processes. They would re-balance government activity to provide a dual focus for government: to limit or regulate practices in order to minimize risks and to promote development so as to maximize benefits. To meet that test, credibility for the federal government would

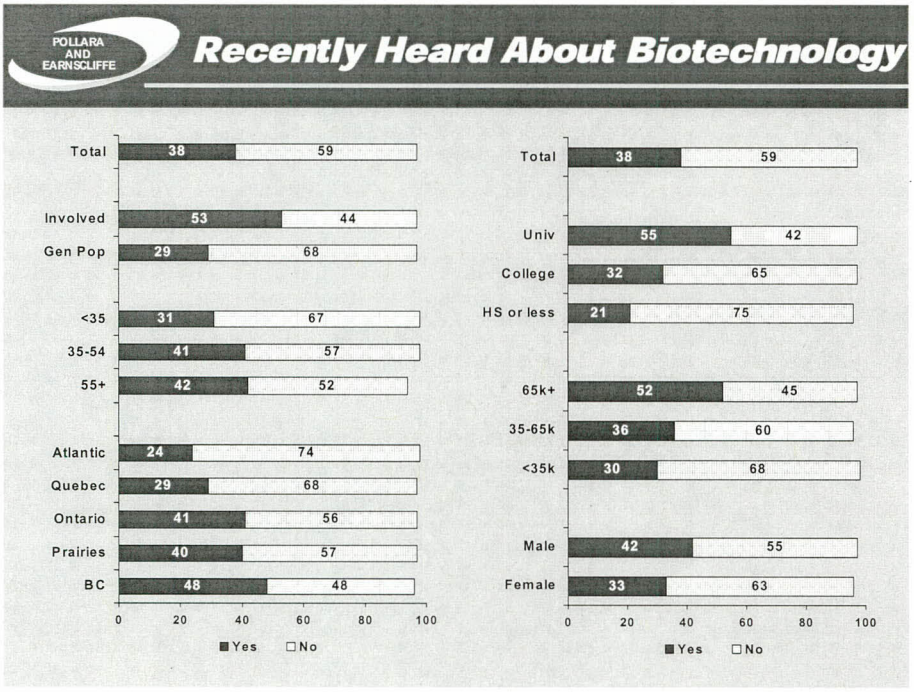
likely rest on perceived competent management, implying a persuasive, communicable, integrated "plan" to deal with the benefits and risks of biotechnology.

As debate intensifies, it seems clear that concern about biotechnology will grow. Initially, at least, that concern is more likely to manifest itself in uncertainty and a desire for more information than in a demand to curtail biotechnology efforts. Participants in the research wanted to feel they had the option to become more informed and that government would provide venues for them to seek out neutral, balanced information. The same was true for efforts at consultation. Most would take comfort from the fact that government was mounting consultations because that would symbolize transparency and inclusiveness. However, the vast majority would choose not to participate, delegating their involvement to the more expert.

C. DETAILED FINDINGS

AWARENESS AND INTEREST LEVELS

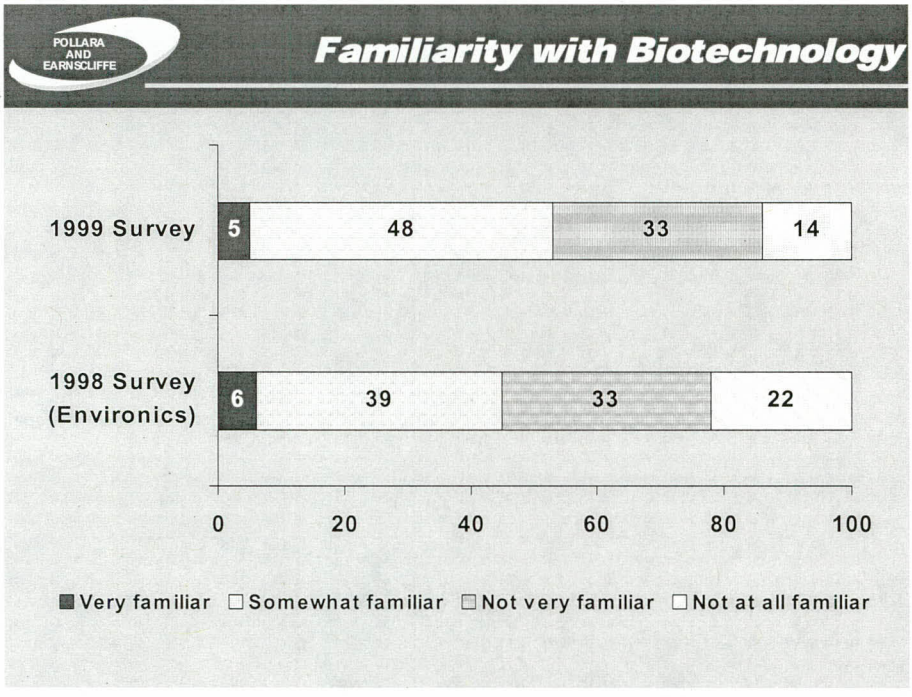
Canadians have not been paying much attention to biotechnology over the past year, are not very familiar with the issues and show relatively low levels of interest[1]. There has been some increase in concern among those who have been paying attention but entrenched levels of opposition to the technology are quite low. Increased media coverage of both the technology and emerging opposition to some of its applications does not seem to have catalyzed significant increases in awareness or solidified underlying opinion in any particular direction. In fact, most people are neutral to positive about the technology and believe there are significant benefits to be derived from it.

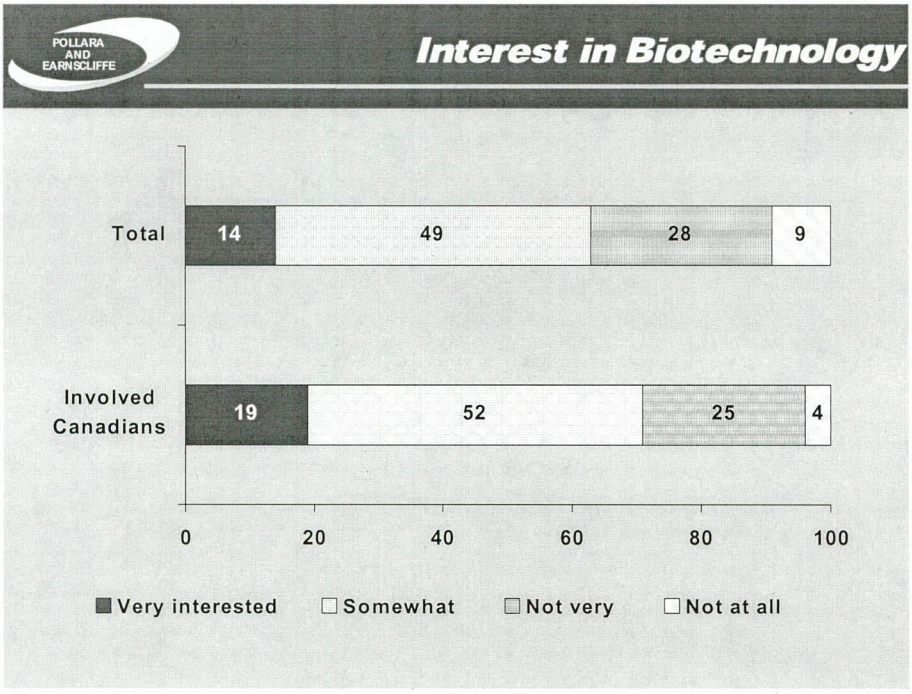


[1] See Environics Research Group, *Renewal of the Canadian Biotechnology Strategy: Public Opinion Research* (1998). The Executive Summary of this report is available at: http://strategis.ic.gc.ca/cbs under "Publications."

Few people normally think or talk about biotechnology. For instance, only slightly more than one in three had heard something about biotechnology in the last three months and fully two out of three had never discussed it prior to becoming involved in this public opinion research. Though there is a moderate awareness that biotechnology involves some sort of genetic manipulation, few understand the precise methodology of biotechnology or many of its applications (the only application that was consistently mentioned was cloning "Dolly" the sheep.)

Familiarity with biotechnology is still relatively low. Only 5 percent of Canadians say they are very familiar with the technology, a number that has remained static over the year despite significantly increasing media coverage. All told, just over half express any familiarity with biotechnology. Interest in learning more is modest compared to other significant public policy issues. On the whole, the relative lack of knowledge about applications makes the technology seem quite distant on a personal level. Interest tends to grow as the potential health and medical benefits are understood, as it does when some of the more controversial applications are discussed. This tendency is more pronounced among people who are generally more involved in public policy issues.

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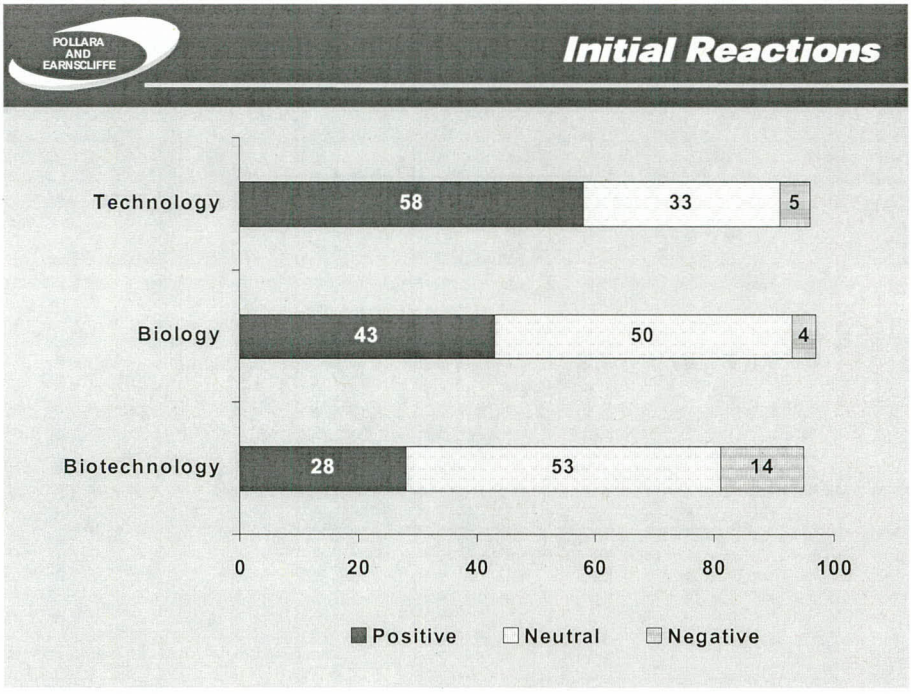
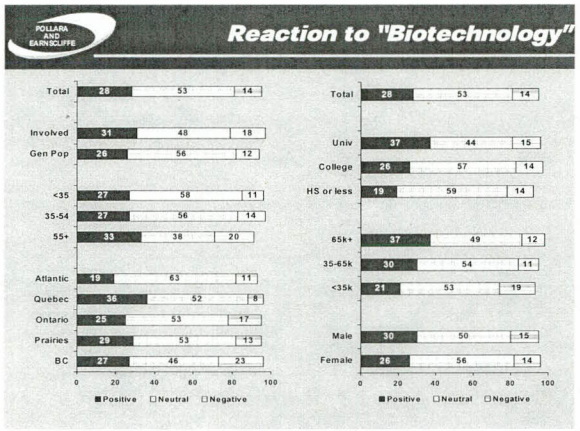
Interest in Biotechnology
Total
14
49
28
9
Involved Canadians
19
52
25
4
0
20
40
60
80
100
Very interested
Somewhat
Not very
Not at all

Impressions of biotechnology are neutral to positive for most people. The survey tested overall impressions of three terms – *technology, biology* and *biotechnology* – to determine whether people differentiate between the terms. The results showed clear differentiation with higher comfort levels with *technology* and *biology* than *biotechnology*. However, only one in seven had negative reactions to the term *biotechnology*, with one in four expressing positive reaction.





Focus group probing showed similar proportions but indicated that the small minority who were negatively inclined towards biotechnology were more deeply entrenched in their opinions than the others. In general, though people differentiate among the various technologies, there is a positive halo cast over related issues by Canadians' increasingly positive attitudes towards high technology. They tend to invest in it their hope for the country's success in the coming years and believe high technologies will be the drivers of the new economy. Initially, then, they tend to focus on the potential economic outcomes and benefits of these technologies in formulating their assessments of them.

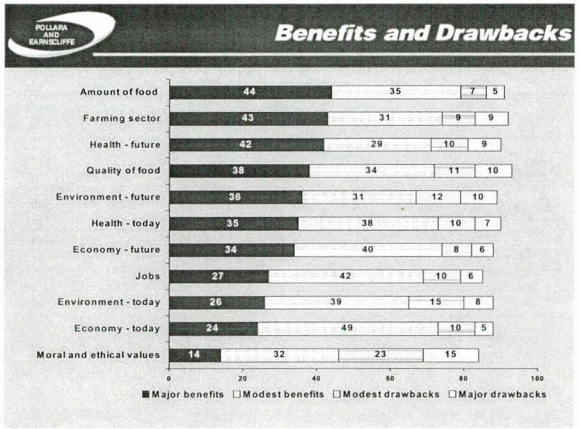
Within that economic paradigm, most people associate biotechnology with leading-edge health and medical technology. Their general framing involves research and development, laboratories, highly skilled jobs and economic benefit. Few immediately associate biotechnology with controversy despite increasing media coverage of the GM food issue.

Focus group probing showed that there is virtually no knowledge of the breadth and extent of the Canadian biotechnology industry. Most people could not identify any companies; nor could they estimate the size of the industry and its relative importance to the Canadian economy. Nevertheless, the attractiveness of the high technology paradigm leads most to believe that Canada should try to assume a leading role in biotechnology, though they wonder if the country has the money and expertise to be fully competitive internationally. Many also wondered about how the "brain drain" might be affecting this industry, leading some to suggest that supporting this industry would be an important means of stemming that tide.

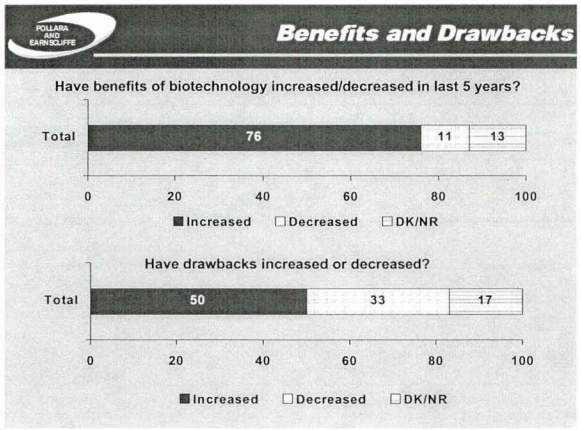
BENEFITS AND DRAWBACKS

Most people see a broad array of benefits from biotechnology, including positive outcomes in food availability, health, the environment and the economy. A few see more drawbacks than benefits, and the focal points for them are the moral and ethical questions that arise from use of the technology.

In fact, discussion indicates that most people are torn in their views toward biotechnology, arising from a degree of internal tension about the issues involved, and harbour a mix of positive and negative views.



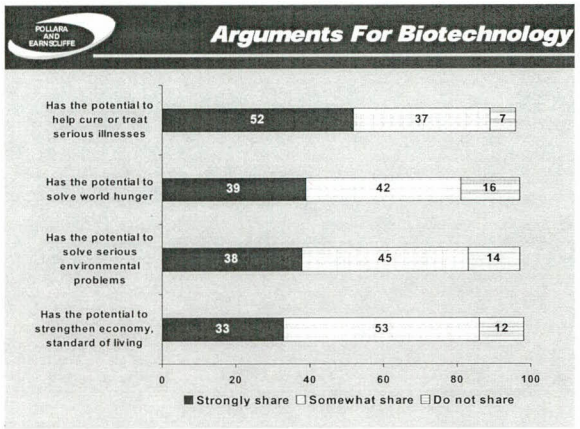
Canadians believe that both the drawbacks and benefits of biotechnology have grown over time. This implies both a recognition of the growing potential of biotechnology and an undercurrent of discomfort about some of the risks and dilemmas it engenders. On balance, this leads most people to hedge their overall views and assess benefits versus drawbacks on a case-by-case basis.



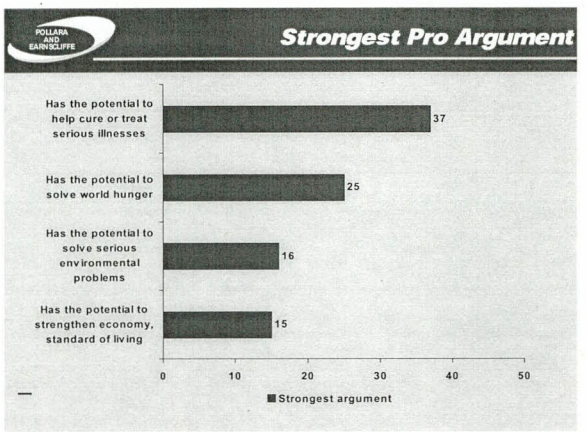
The survey presented arguments – pro and con -- about biotechnology in order to try to determine the opinions underlying the assessments of the benefits and drawbacks of the technology.

Most people shared several positive views of biotechnology while holding, simultaneously, some of the negative views offered. These results are further evidence that there is a tangible level of internal tension for most people as they think about the technology.

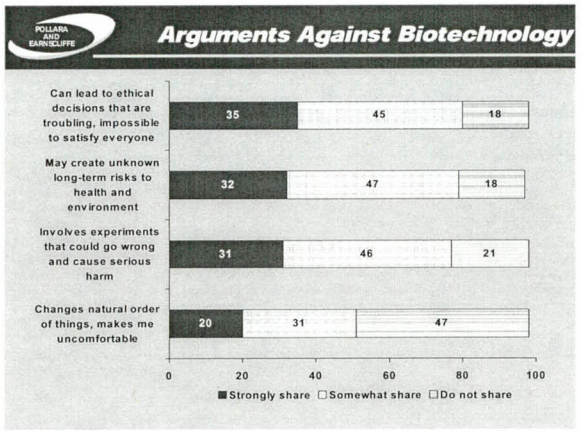
The results show that the strongest arguments in favour of biotechnology involve curing or treating serious illness and the potential to solve world hunger. Interestingly, though initial favourable impressions of biotechnology centre around its economic potential, the more powerfully persuasive arguments involve benefits that might impact more personally. However, it should be noted that as presented, the statements left many participants, especially *Involved Canadians*, wanting more specifics.



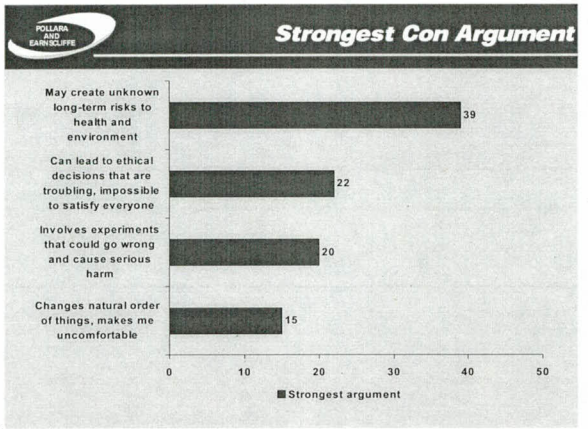
When pressed to pick the strongest argument in favour of biotech, people overwhelmingly migrated to the health benefits of biotechnology. Environmental and economical arguments were far less powerful. The gap in responses is very significant.



The strongest arguments against biotechnology revolve around long-term risks and the potential for future ethical dilemmas. The latter area proved to be quite troubling to many and divisive in detailed discussion. It was also clear, however, that arguments centering around religion, morality or the natural order of things were less persuasive.There is little support for arguments that changing things God or nature created should mean ending biotechnology efforts. While some people express discomfort with changing the natural order of things, they have become resigned to biotechnology along a broad front of activity and believe it to be part of modern science.



Again, when people were asked to choose the strongest argument against biotechnology, they migrated to the risk arguments. Other arguments were substantially less powerful. The gap between the arguments is very large.



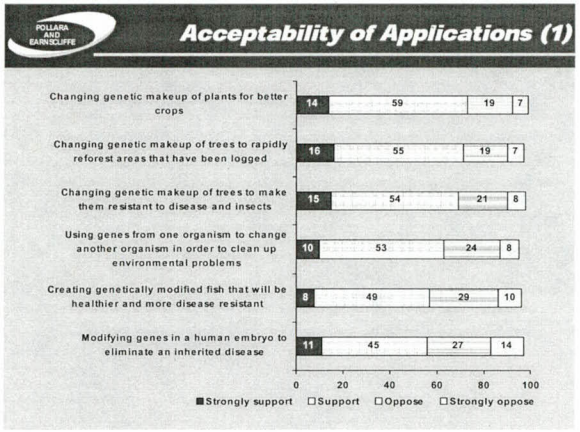
On the whole, negative messaging is stronger than positive messaging. Even in the absence of detail about what the risks are or might be, the negative messages about long-term risks are disconcerting to most.

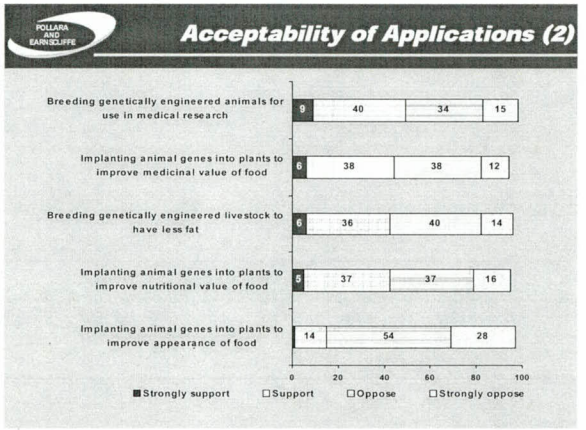
APPLICATIONS – EVALUATING RISKS AND BENEFITS

It was in the evaluation of individual biotechnology applications that the underlying dichotomy in public opinion became quite evident.

On the whole, people are most positive about the potential outcomes (benefits) implied by use of the technology. When it comes to the means to achieve them (processes and applications), the divisions become much more apparent. The relative acceptability of applications was fairly consistent between the survey and focus groups, with some applications proving to be universally acceptable, some universally unacceptable. Several applications created substantial divisions of opinion.

Eleven applications of biotechnology were tested and majorities supported a little over half of them. However, only three found strong majority support and all involved changing the genetic makeup of trees and plants. Others were generally positive, while only one found strong majority opposition – implanting animal genes into plants to improve the appearance of food.





The focus group discussions devoted extensive time to probing underlying opinion on applications in order to understand fully the survey results and the hierarchy of acceptability that had emerged.

Participants based their views on assessment of potential benefit versus potential risk on a case-by-case evaluation. In fact, that was the underlying dynamic throughout most of the research. They wanted to understand the risk/benefit equation so they could come to an educated conclusion. In general, it was only when the benefits seemed to substantially outweigh the risks that they were willing to accept an application.

On the benefits side, the primary test people employ in their assessment is the "**marginal personal benefit**" of the application. If the benefit accrues only to some subset of the population, it carries much less weight than an application of wider-ranging benefit. A separate but related implicit calculation was the degree of intrinsic social benefit an application carried. For example, applications with the potential to reverse serious illnesses were likely to be much more acceptable than applications than improved producers' economic efficiency.

When it came to evaluating potential risk, people believed risks to be higher when the application entailed genetic modification among higher order organisms, or across boundaries of plants/animals/humans. As well, as an application seemed to involve products that might end up in the food chain, resistance increased because the risk was deemed to be potentially more profound.

Within this dual context, a clear hierarchy of acceptability emerged.

- Health and medical applications were most resonant, even those that included manipulation of human genes.
- Environmental applications encountered mixed results. Most were positive but a number raised concerns about potential implications for biodiversity. Separately, if an application threatened to lead to products that might become part of the food chain, opposition increased.
- GM food applications were least resonant largely because most foresaw potential negative health consequences in the future with few tangible immediate benefits. Consistent with their point of departure, participants indicated less reluctance to consume functional foods[2] should they become more prevalent.
- Plant-plant applications were generally accepted, particularly when an environmental benefit was included; for example, reduced use of chemical pesticides.
- Animal-animal applications generated much more mixed results; for more than half, the potential drawbacks outweighed benefits.
- Applications that crossed animal with plant genes were much less acceptable, even in cases of nutritional or medicinal benefit.
- Applications that crossed the animal/human boundary were difficult for most to understand and accept in the abstract but easier to deal with in the way of concrete example, in some cases. There was little opposition, for instance, to xenotransplantation of animal organs to prolong human life.

[2] A functional food is similar in appearance to, or may be, a conventional food, is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions (Bureau of Nutritional Sciences, of the Food Directorate of Health Canada).

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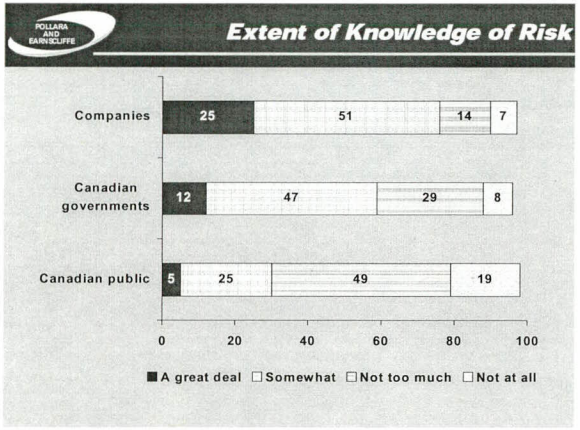
In general, these findings suggest that there is no simple way to deal with the varied applications of biotechnology. Most people find no unifying principle around which to organize their thoughts and attitudes and will resist attempts to develop one. They resolutely cling to a case-by-case assessment and a risk/benefits analysis of each. In most cases, benefits will trump risks if the application fits within the paradigm of personal relevance, intrinsic value and widespread social benefit.

Most people believe that risks are endemic in modern society and cannot be eliminated altogether. They are relatively sanguine about this belief even in biotechnology, where they tend to regard the potential risk level as higher than normal.

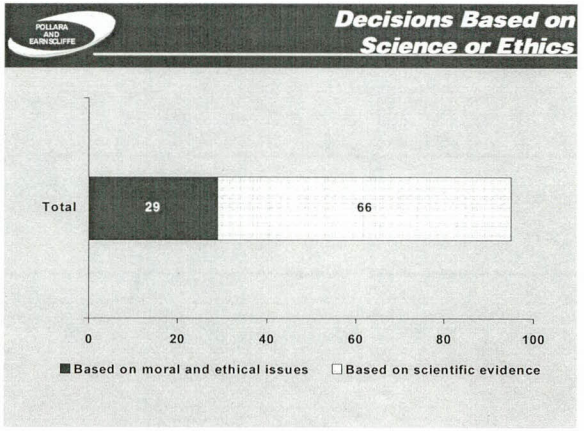
Significant proportions of Canadians believe that accepting the risks of biotechnology is a fair trade off for achieving its benefits, rising to two-thirds who believe that trade off is appropriate when it comes to health benefits.

However, there was a general caveat that they expected research into the safety of various biotechnology applications to be comprehensive and publicly available. Underlying this demand for further research is a general assumption that no one knows or understands a great deal about the risks of biotechnology, least of all the Canadian public. Though people think biotechnology companies know the most of all, followed by governments, the following graph shows people believed everyone in the system is relatively uncertain about potential risk.



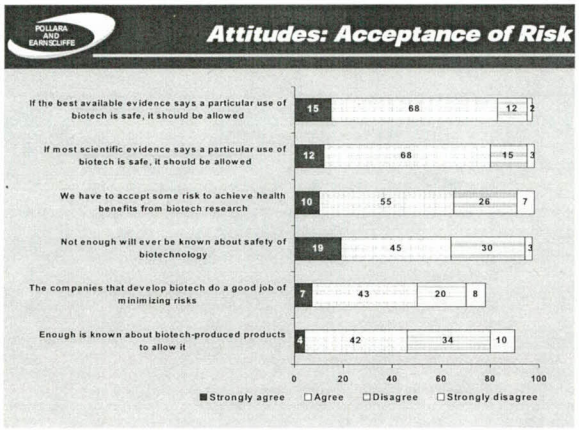
Most believe that science should be the primary guide to decision making about biotechnology applications. They do not see biotechnology as an overarching moral or ethical dilemma though they acknowledge it has some of those dimensions.

Most express a preference that science overrule ethics if the two come into conflict. Again, people tend to see biotechnology within a technological and science framework rather than as a social or philosophical issue.

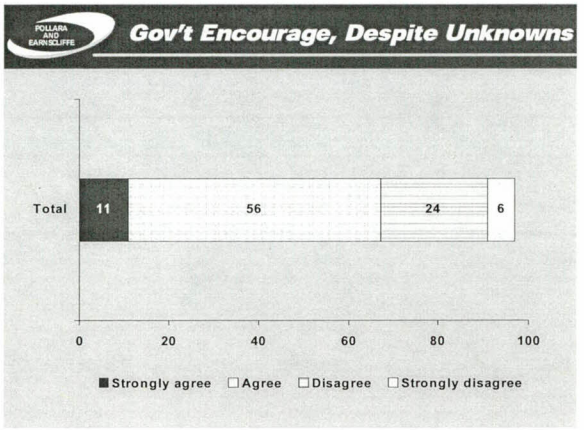


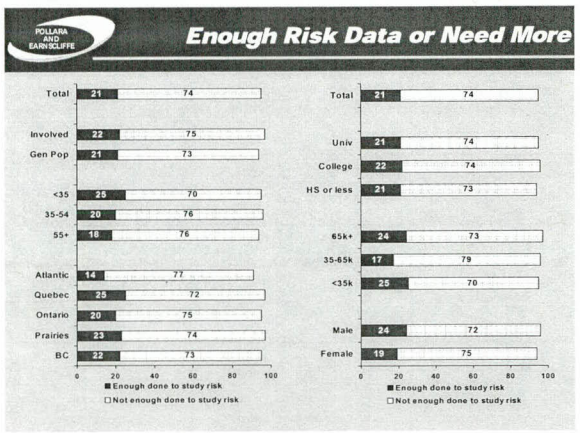
Ultimately, if an application is deemed safe by the "best available" scientific research, most say that their concerns would be reduced. This is not to say that the "best available" scientific evidence would make all biotech products acceptable; rather that science is the most effective means to abate perceived drawbacks. Even the lesser standard of "most available" scientific evidence is sufficient for most people.

When pushed in the focus groups, this seems to have been a relatively reasoned-through conclusion, given the majority feelings that not enough will ever be known about the safety of biotechnology, and the divided views about whether companies do a good job of minimizing the risks of biotechnology and whether enough is known about biotech-produced products to allow it.



When it comes to the role of government and the acceptance of risk, Canadians want their government to continue to encourage the development of biotechnology despite the unknowns while, at the same time, encouraging and engaging in risk-related research.





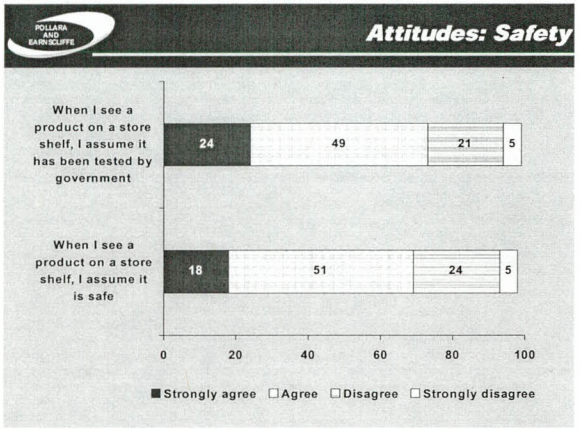
POLLARA AND EARNSCLIFFE

GM FOOD

The telephone survey asked a number of questions about GM food, which are reported on below. Because protest groups launched their anti-GM food initiative in mid-September 1999, the focus group research wave was deliberately conducted four weeks after the start of the telephone survey in order to probe more deeply into the issue. While consistent with the survey results, the focus groups revealed underlying concerns that indicated that attitudes towards GM food were quite volatile and capable of rapid redefinition. The focus group results are integrated into the results reported below.

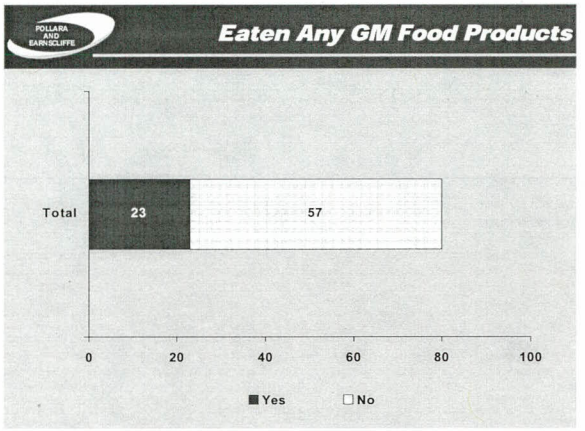
The GM food debate has not penetrated very deeply as yet in most areas of the country and where it has registered, it mostly seems like a complicated and somewhat ideological conflict led by interest groups and not a fundamental argument about safety and science. The area of the country where GM food is most controversial is British Columbia, particularly around Vancouver.

Most people believe the food on grocery shelves must be safe and has been tested by government. Currently, it is this underlying belief that is the main block to people becoming more perturbed about GM foods. Focus group discussion reveals that this belief is more grounded in what people *want to believe* than it is in what they *actually know* about Canada's regulatory or food inspection system.



Though people believe their food is safe and has been tested, there is widespread confusion between testing and inspection. Most believe the testing of food involves spot inspection, largely meat and fresh produce. Few have thought through the testing or inspection of processed foods. There is virtually no understanding or awareness of the actual regulatory system for approval of new foods. Indeed, in the context of discussing GM food, participants tended to probe for more information about the food-testing system in Canada. Their expectations are that GM food has undergone more rigorous testing than organic food in order for it to have been allowed on store shelves.

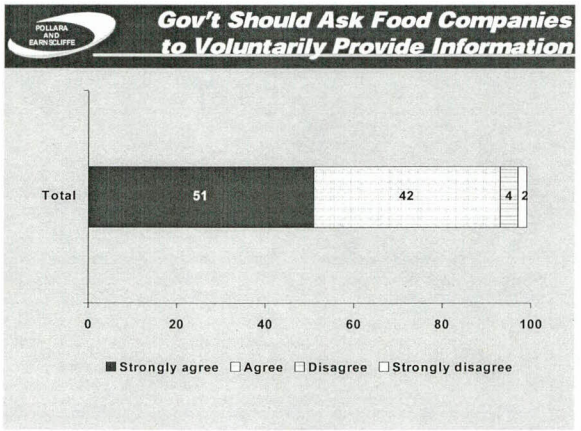
Virtually all were strongly surprised to hear about the actual proportion of GM ingredients in processed foods. In the focus groups, people seemed quite taken aback when they were told that current estimates are that anywhere from 60 to 75 percent of processed foods contain ingredients or come from plants that have been genetically modified. The reason for the surprise becomes clearer in the light of survey findings that indicate that a majority of Canadians do not believe they have eaten GM foods in the past month.



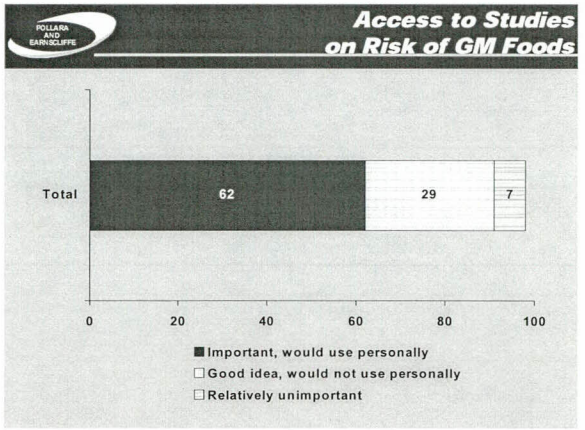
The surprise led a few people to the assumption that GM foods must be safe because they hadn't heard of ill effects of such widely consumed products. Most others moved towards concern that so many foods could have been altered without their knowledge or consent.

In general, few people could see any advantage to GM foods or ingredients. Most did not know why GM ingredients were added other than for "insufficient" reasons like food appearance or the reduction of producer cost. As a result, they saw no obvious marginal benefit over other food, but a much higher marginal risk.

There were mixed views about GM ingredient labelling. Most people advocate an "informed choice" approach to GM foods and are determined to find out more about them. That leads to them wanting some form of labelling. Many accept voluntary labelling as a reasonable step. Some would prefer general information, in booklet form, to be available in grocery stores. An overwhelming majority think government has a role to play in encouraging the dissemination of information.

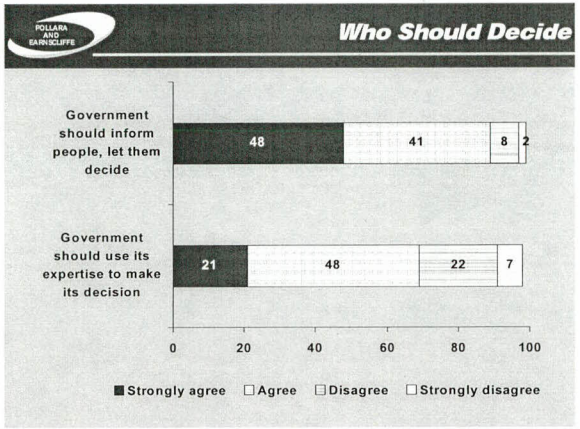


A majority of people say they would like to have access to studies about whether human health is at risk from long-term exposure by eating GM food. Interestingly, however, a significant number (36 percent) say that isn't important or they would not use the information personally.

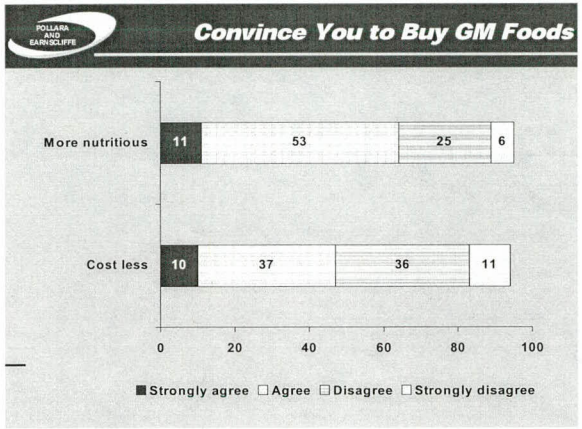


When it comes to mandatory labelling, some, mostly those who are less engaged, are not sure that level of compulsion is necessary and they are unsure what a label would say precisely or how it would advance their consumer needs. Some even thought labelling would create an element of chaos in grocery stores, raising fears without giving people adequate choice of alternatives. Others, primarily involved Canadians, tended to lean toward mandatory labelling as a preferred solution.

This mix of views extends to whether people want government to simply decide what should be available to consumers or whether it should inform people and let them decide for themselves.



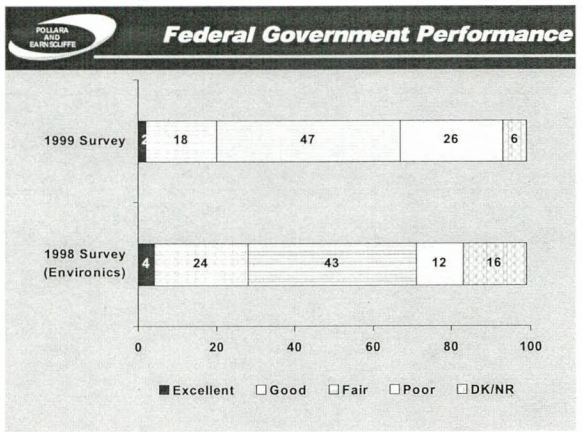
Currently, there seems to be little widespread determination to stop consuming GM foods. Most people generally conceded that the current debate wouldn't much affect their consumption, in part because they don't know how to go about finding alternatives, and in larger measure because they are not sure they need to. And once again, Canadians seem to employ a rational risk/benefit ratio to this kind of decision making. A strong majority of Canadians say they would buy biotech-produced foods if they were more nutritious than other food, but that drops to an evenly divided view if the sole advantage was cost.



PERFORMANCE OF THE FEDERAL GOVERNMENT

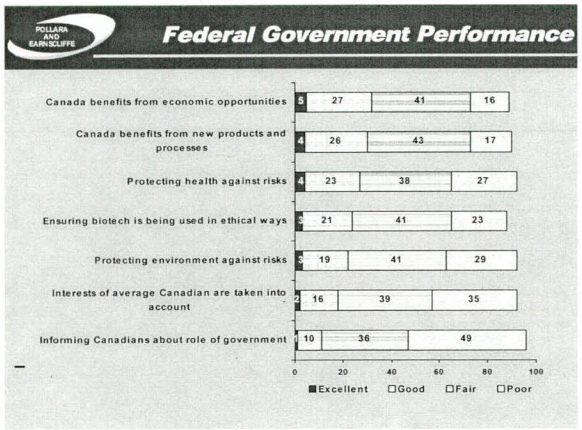
Overall, Canadians rate government performance on biotechnology as fair, but there has been erosion over the past year. The percentage of people rating its performance as poor has grown by 14 points over the year and those rating its performance as good or excellent has dropped by eight. This is not a reflection of growing discomfort with biotechnology; its roots seem to be deeper.

In focus groups, most participants who felt that the federal government had not performed well on biotechnology-related issues thought so because they had not heard anything about what government had done or about the components of the regulatory system. Similar to food inspection, most assumed that some type of regulatory framework was in place. They also assumed that there was probably some form of economic support in the form of R&D incentives. However, many expressed concern that government cutbacks had eroded the effectiveness of both the regulatory system and the support system.

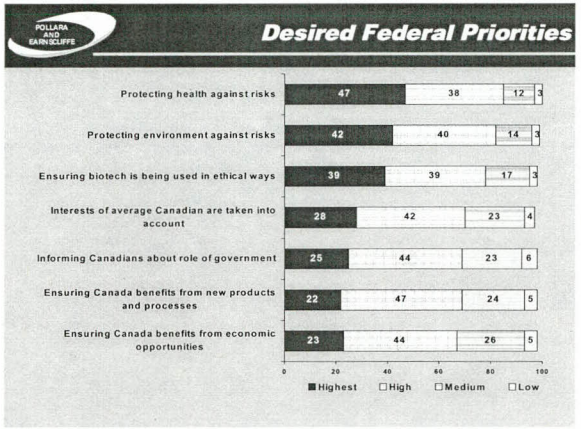


Satisfaction with government is highest in its performance at ensuring that Canada benefits from products, processes and opportunities. Its "poor" ratings are quite low in this area – under 20 percent.

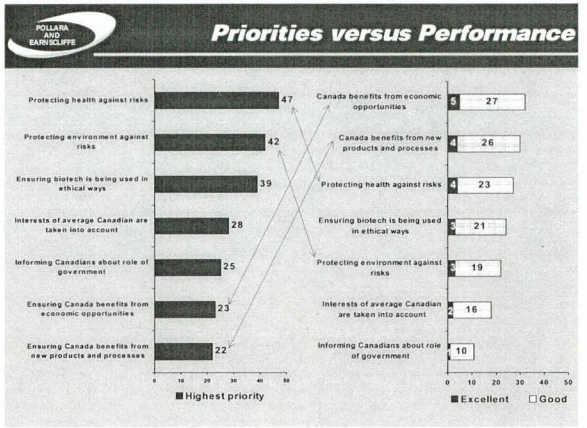
Conversely, dissatisfaction levels are highest around government ensuring that it takes the interest of Canadians into account and informing them. Perhaps more significantly given Canadians' priorities, it receives relatively poor ratings for protecting them against risks to health and environment and from unethical use.



The key to reading the significance of satisfaction/dissatisfaction levels is to understand the relative importance of priorities assigned to the federal government by Canadians. Generally, people expect Ottawa to fill a number of roles in biotechnology. Of the seven items tested, three stood out more prominently than the rest – protecting against health risks, protecting against environmental risks and ensuring that biotechnology is used in ethical ways. Dissatisfaction levels in these three drive overall dissatisfaction more strongly than the question of public inclusiveness.

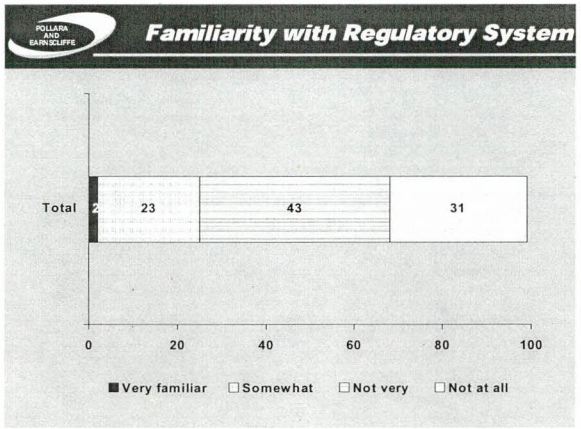


The point is most evident when Canadians' priorities for the federal government are plotted against their assessment of government performance in those areas. The mismatches are quite clear. Satisfaction with government performance is most evident in the two areas of lowest priority. And satisfaction levels are lower in the three areas of highest priority.

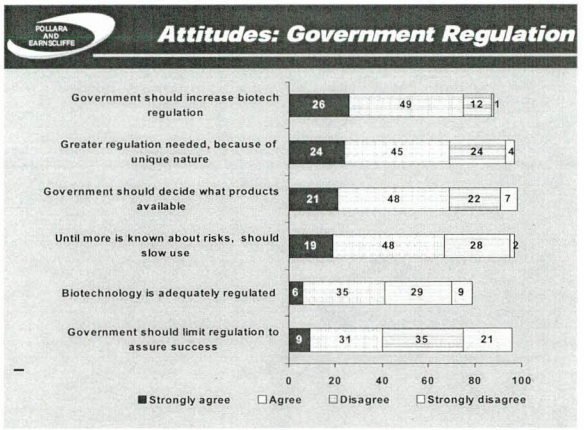


ROLE OF THE FEDERAL GOVERNMENT

Canadians know little about current government practices, and few describe themselves as familiar with the regulatory system. And though that lack of knowledge tends to diminish satisfaction levels, most people are still willing to assume that somehow the appropriate things get done.

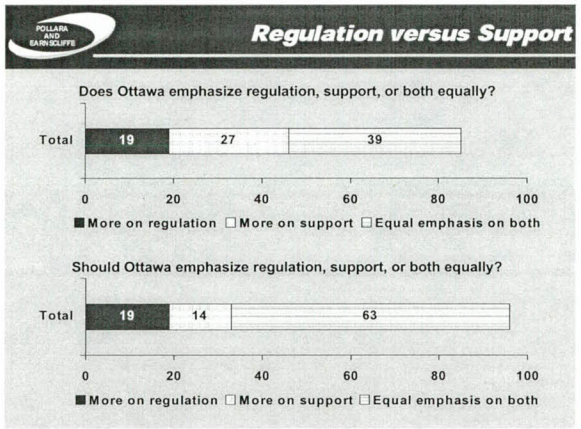


But this low level of knowledge and modest levels of concern are only a partial picture. Many would support greater regulation and believe the system should be unusually stringent because of risks. There is division over whether biotechnology is adequately regulated and opposition to limiting what regulation there is in order to promote economic success. In fact, most people would be willing to slow introduction of biotechnology products until more is known. This is not a function of negativity toward the biotech industry but rather a reflection of concern about unknown risks.



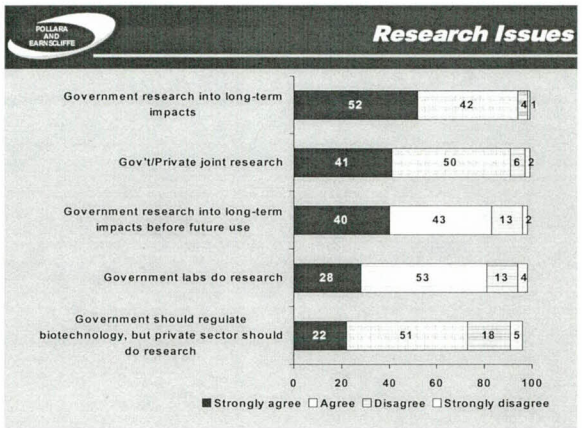
The public's priorities for the federal government are clear and consistent. The first priority is a comprehensive regulatory testing system before biotech products get to market, along with long-term study of potential health and environmental impacts. Economic support to industry is deemed to be important, but much less important than health and environmental regulation and related research.

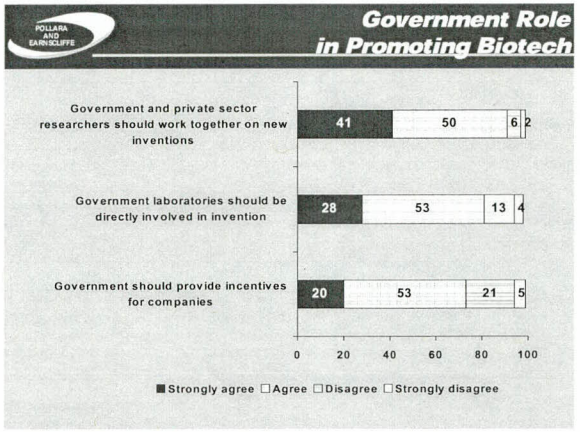
The survey tested the desired weight of support of industry versus regulation and found a quite balanced view.



There is broad support for a two-track policy approach, including a strong regulatory and scientific oversight system in addition to fostering the development of the industry. Canadians believe that the government can play the dual roles as long as the regulatory system is insulated from economic pressures. In effect, the public wants to achieve the benefits of biotechnology with a minimal number of drawbacks.

In addition, the survey tested various formulations of the roles of government and the private sector in research. The results indicated strong support for various combinations, some of them contradictory. It is likely that respondents don't actually know enough about how research is done to express a clear preference for who carries it out. Similarly, in this particular context, the demand for the increased certainty that would be generated by further research overwhelmed the desire for moving ahead on biotechnology. However, given all the other data in the survey, it is likely that the result in this one variable was more a function of the fundamental support for further research than an expression of opposition to the technology. The point is further made in the second graph, which shows strong support for full government involvement in moving biotechnology efforts ahead.

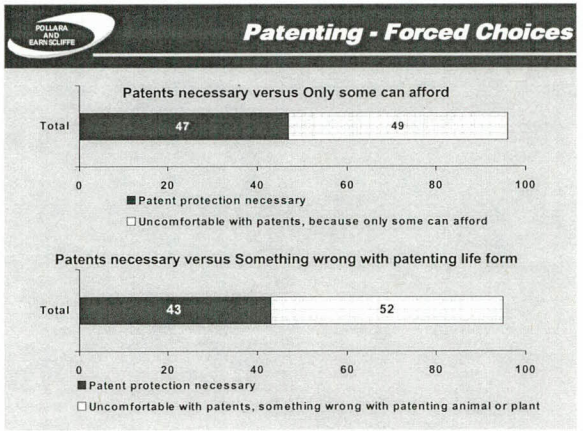




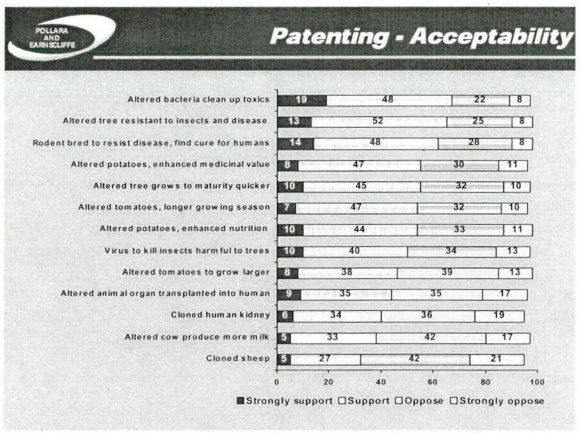
PATENTING

The research project – both in the survey and focus group instruments – devoted some effort to begin to determine Canadians' attitudes towards patents in the field of biotechnology. It was clear, particularly in the focus group discussions, that the concept of patenting is difficult for most people to fully grasp. **At best, against this background, Canadians currently are quite divided about the utility and appropriateness of patenting in biotechnology and have difficulty coming to systemic conclusions.**

For instance, the survey asked people whether patenting was necessary or made them uncomfortable in two different scenarios. One scenario suggested that without patenting there would be uneven access to benefits. The other posited that there was something inherently wrong with patenting life forms. In either case, there was a consistent group that opted for patenting and a consistent group (slightly larger) that opted against it.



In the survey, respondents were asked to differentiate the desirability of patenting 13 different biotechnology applications. There was strong majority support for three, majority support for six others and opposition to four. In general, support for patenting seemed to follow the same general pattern as approval for the use of the applications themselves. Difficulties arise the higher up the order of life the patenting involves, when it crosses boundaries or if the benefit seems marginal. Specifically, there is more acceptance of patenting applications that solve environmental, crop and health challenges. There is less acceptability for applications that mix plant and animal genes, alter animals themselves or primarily serve esthetic purposes.



In discussion, patenting issues often left participants torn and confused, but discussion eventually led to a majority leaning against most forms of patenting. The basic problem is that most people have not really thought through the issues and implications of patenting. They have trouble separating the more problematic issue of "owning" living things, or parts of them, from the generally endorsed principle that inventors should derive benefits from their inventions. Separately, many people find it hard to see how you can "invent" and protect something that involves living organisms. It takes quite a bit of discussion and education for people to begin to take more thoughtful positions on patenting.

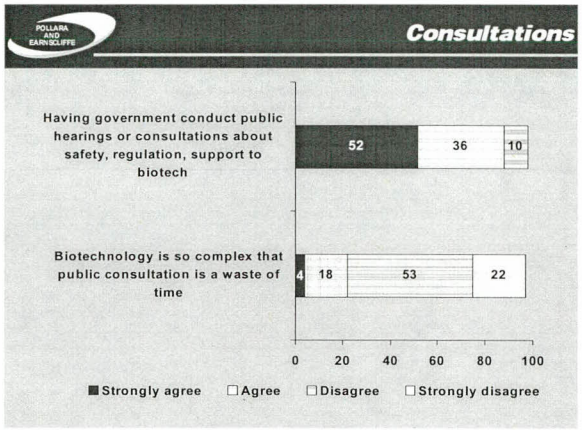
For the most part, participants who believed strongly in the benefits of biotech were amenable to biotech patenting and those who were negative towards biotech resisted the idea of biotech patenting. In addition, those who had expressed mixed views previously were more likely to lean negatively on patenting issues. In discussion, some participants again sought to evaluate applications on a case-by-case basis. When they did so, the key factors that affected decision making were the extent to which the application created something new or involved lower life forms (generally deemed more acceptable), or patented a process that already naturally occurred or involved higher life forms (generally deemed much less acceptable).

PUBLIC PROCESS AND INVOLVEMENT

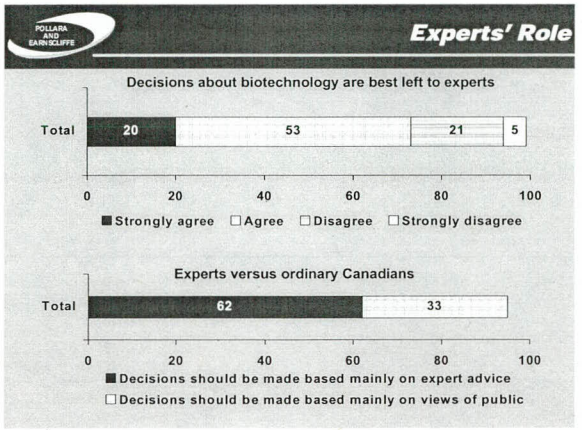
Overall, Canadians find biotechnology issues difficult to sort through and fully understand. As a result, though they want public opinion to *influence* the outcomes, they tend to delegate final resolution and decision making to experts. However, they articulate a consistent set of principles they would like to guide the process. These include:

- The public interest should be a paramount criterion to decision making.
- Ethical dimensions are important, though perplexing, and should be legitimate factors in decision making.
- If an outcome is very desirable and science says it is safe, this would typically overrule ethics if the two come into conflict.
- There should be a balance between facilitating the achievement of the various benefits and stringently regulating to understand and manage risks.
- Deliberation and decision making should be transparent and inclusive of expertise from all sides of the debate. Members of the public who want access to consultation should have it.
- Comprehensive, neutral information should be easily available and should facilitate informed choice by consumers.

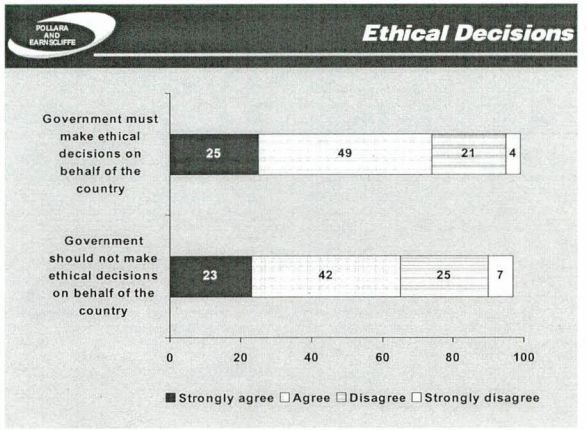
It seems clear that the public differentiates between consultation and decision making. A clear majority of Canadians want consultation processes. Focus group discussions reveal that they want them primarily because they demonstrate openness and a willingness to share information. Most people say they would not personally participate in town halls or consultation sessions but they do want them to be mounted. They believed that other, more expert people would likely engage and that was sufficient.



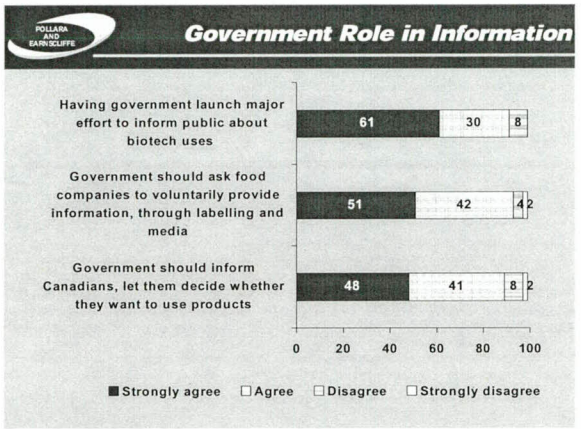
When it comes to decision making, most Canadians clearly indicate they believe experts are better placed to weigh all the factors and come to a reasoned conclusion.



It is the ethical dimension of biotechnology that seems the most troubling to sort out for most Canadians. The survey tried to determine whether the public felt that the government should make those decisions on behalf of Canadians. Half of the respondents were asked whether they agreed that government *must* make those ethical decisions on behalf of Canadians, and half were asked whether they agreed that government should *not* make ethical decisions on behalf of Canadians. The separate samples agreed with *both* propositions in roughly the same proportions.



Focus group discussions indicated that participants were comfortable with the notion that individual experts or government advisory panels would be heavily involved in decision making. However, they believe those experts and panels should be drawn from the full spectrum of expert opinion. They are insistent as well that these expert processes not preclude the dissemination of comprehensive information to all Canadians who desire it. That information would include access to studies about human health risks from biotechnology applications, including GM food. It would also involve providing sufficient information to facilitate informed choice, including voluntary labelling.



Focus group discussions established that Canadians do not want advocacy from government – they are having enough trouble sorting out the rhetoric in the current public debate. They do not even want an aggressive government campaign that "pushes" information out to them. They want the option of being able to "pull" comprehensive, neutral information as they need it. They would have no objection to, in fact would endorse, a government web site and/or registry that combined all available information and where they could sign up for updated material to be sent or e-mailed. Most participants would like to see a biotechnology web site and/or a registry. Similarly, they would endorse the dissemination of information booklets in grocery stores. A government advertising campaign that simply publicized the points of access to information would be acceptable as well.

COMMUNICATIONS AND INFORMATION ISSUES

Communications considerations were largely probed in the focus group wave of research. There were, as reported above, questions on the survey instrument that tested key messaging and attitudes towards consultations and information dissemination. However, the probing of strategic communications considerations was largely assigned to the focus group process because of the depth of probing required.

In general terms, the positive communication drivers for biotechnology are clear and involve the larger benefits framework that incorporates better outcomes in the areas of health, medicine and the environment. Though economic advantage works well conceptually, it is less useful in positively weighting the underlying risk/benefit equation. Negative messaging centering around long-term risks to health is powerful as well, more so than argumentation that centers around moral and ethical issues. On balance, negative messaging is more powerful unless countered with individual benefits of indisputable, widespread application or a comprehensive framework that yokes together the wide range of potential benefits.

Communications surrounding GM food applications are much more challenging. There is virtually no way to create credible positive messaging around them; there is only the prospect of trying to assure people they are safe or at least benign. Largely, participants don't understand why there are GM ingredients in food, and the linkage to agricultural crops is only hazily understood. It is reasonable to infer that people would prefer, all things being equal, not to have to confront the issue. They are nervous about any kind of additives to food and do not easily distinguish them from GM ingredients. Functional foods might provide an acceptable rationale over time but few people have heard that they are even possible.

One of the major blocks to effective communications is a widespread distrust of institutions and potential spokespeople on all sides of the debate. People had heard many competing claims and found it difficult to separate out rhetoric and self-interest. There are few voices people would believe to be completely trustworthy in providing information about biotechnology. Though some of the attitudes were predictable given current levels of public cynicism about government and business, others were less so and, in some cases, quite textured.

- On a government level, there was widespread mistrust of politicians and senior civil servants. In addition, there was concern about the basic competence of government officials to fully understand and manage risk. The only people in government that were deemed to be relatively trustworthy were officials involved in regulatory processes. Even government scientists were regarded with some suspicion because people believed they had a vested interest in continued employment and hence would emphasize the need for their services and vigilance.

- Business was widely perceived to be in a conflict and would be expected to extol products out of self-interest.

- Scientists in general were regarded with some suspicion because people tended to believe the scientists were too heavily influenced by potential funders of research. Curiously perhaps, participants tended to differentiate between scientists and university academics, who they felt were the most independent in the scientific community.

- Interest groups continue to be a source of some suspicion among Canadians. They tend to be regarded as uni-dimensional. People tended to believe that interest groups always represented one side of a debate and were not to be trusted to provide dispassionate or even credible views.

- The most trustworthy spokespeople were those identified as having independent status and nothing obvious to gain. That was the basis for accepting the word of university academics. Others that fall into that category are doctors, other health professionals and hospital researchers.

- Most people were also willing to accept the word of expert panels or advisory boards as long as they were clearly at arm's length from government and industry.

As a general proposition, participants believed that trustworthiness was directly correlated to an interlocutor's independence which, in turn, seemed to equate with that person having nothing to personally gain by their intervention. Understanding that such people might be hard to find, second best for most people were expert groups or panels that represented the spectrum of opinion and were formally at arm's length from major stakeholders, including government and industry.

POLLARA AND EARNSCLIFFE

CONCLUSIONS

At this time, the public is disengaged on biotechnology and, in the absence of a catalyzing event, is unlikely to become engaged. Though current voices of opposition to biotechnology and GM foods have been able to attract significant media coverage, they have thus far not been sufficiently credible and/or widely enough heard to shake fundamental opinion.

It seems clear that heightened awareness leads some people, particularly those who are more active and involved, to become more uncertain about biotechnology. After exposure to specific applications, concern rises and the determination to seek more information seems to get firmer. In the absence of available information (research studies, etc.) that satisfies these concerns, uncertainty can lead to opposition among this segment of the population.

For others, particularly members of the general public who display little initial awareness and interest, further information on biotechnology is difficult to cope with and they can become confused by the issues. This segment of the population tends to believe the issue is quite complicated, an argument between competing factions and, as a result, a debate they are not sure is worth following closely. While information may be useful for some, these people are more likely to rely on experts (including advisory bodies to government) to represent them.

If these research instruments are a possible surrogate to the broader evolution of public debate (in that, the process is informative and to an extent deliberative), they show there is a risk that uncertainty, and potentially opposition, toward biotechnology may develop if engagement occurs with limited levels of awareness. The key drivers of opposition views center on long-term health and environmental risks and the relative effectiveness of government regulatory systems.

There are some applications and patenting issues that are clearly a step too far for a majority of people. Applications that provide potential health or environmental benefits and are of benefit to all are most likely to be acceptable. Applications which are deemed to be cosmetic or are not seen as fulfilling a societal need tend to be met with resistance. As the issues begin to involve higher and higher life forms or more and more crossing of plant, animal and human boundaries, many begin to dig in and their opposition becomes quite determined. They will only be swayed by the clearest of potential medical benefits.

As awareness grows, people tend to reject a comprehensive view of biotechnology. Rather, they seek to segment applications (or categories of applications) and to evaluate the marginal benefits of each on a case-by-case basis. This case-by-case evaluation approach leads to the rejection of broadly stated messages about biotechnology.

Canadians seem quite sanguine about the inexorability of scientific inquiry and discovery and quite willing to understand and accept that risk management is a fact of life (though they would hew closer to zero risk than may be possible). Some are resigned to the fact that their food supply may contain GM ingredients, although a majority questions whether the benefits of these foods outweigh their potential risks. They are uncomfortable about much of this but presume that someone's in charge and that, somewhere, the appropriate decisions are being made. It will be difficult to shake this general posture because they aren't sure whom to trust in any debate about these issues and they do see tangible potential benefits. **By and large, most people see biotechnology as a technical scientific issue to be resolved on those grounds.**

Canadians say they want direct involvement in consultations and decision making about biotechnology, but that appears to be more a call for transparency than for full inclusion. When pushed, most readily admit they are unlikely to become personally involved. They would applaud the decision to open the process and hope other people will participate in their stead. They believe an offer to consult is sufficient to establish appropriate motive as is the promise to provide information when they want it. **However, there is a clear demand for "informed choice" on GM food, whether that involves some form of labelling and/or information at the grocery store.**

It is clear that the most desired way ahead for government includes a visible two-track process. Most people want to reap the significant benefits of biotechnology but only within a rigorous framework of strong regulatory oversight and determined, directed research to settle the long-term human health and safety issues. While Canadians would be content with government playing multiple roles, they do not want one-sided information. They reject any notion of an advocacy effort by government. They want government to present information about biotech in as neutral a form as possible, including both risks and benefits. Government credibility rests on its ability to be seen as a player that can realize the benefits of biotech but is prepared to reject any applications that threaten the health or safety of Canadians.

GM food is generally viewed as the least beneficial aspect of biotechnology and is therefore the most likely launching point for opposition.

Given the circumstances described above, a large-scale government communications strategy is a potentially risky proposition, one that could potentially trigger heightened public concern about biotechnology. Any communications effort would have to rest on a foundation of persuasive policy intervention designed to address public concerns about regulatory and scientific efforts.

D. INVOLVED CANADIANS

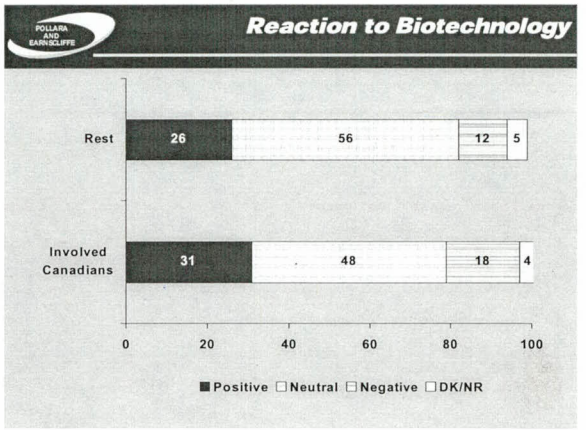
Earnscliffe has developed a proprietary segmentation tool to help clients understand the ebb and flow of public opinion, by shedding light on those who lead opinion formation and movement at the grass roots level. The segment in question totals roughly 30 percent of the adult population and is known as the "*Involved Canadians.*" *Involved Canadians* stand out from the rest of the population by virtue of the fact that they are much more likely to:

- Take an active interest in the conduct of public affairs and politics
- Play a role in community groups, political parties and NGOs
- Consume more news and information and make contact with the media

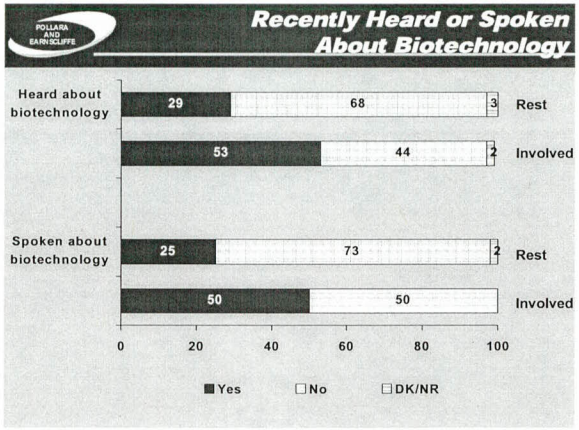
A complete overview of our current knowledge about this segment is available on request. We have been studying this segment for the last five years and feel the evidence is very solid that these people lead and shape public debates, and that understanding the tilt of their opinions is critical in developing successful communications strategies.

As part of our analysis of this data set, we have examined the ways in which *Involved Canadians*' opinions and perceptions compare to those of the rest of the population. These findings are highlighted in this section.

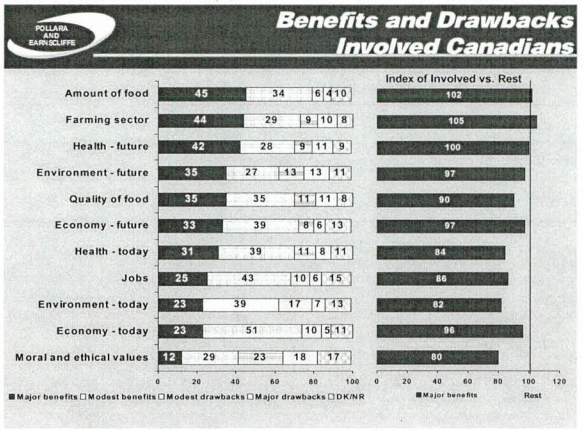
- *Involved Canadians* are more polarized in their responses to the term "biotechnology." This is a normal pattern where an issue is, or is about to become, controversial. *Involved Canadians* are 5 percent more likely to have a positive feeling about biotechnology, and 6 percent more likely to have a negative feeling, compared to the rest of the population. *Involved Canadians* are 31 percent positive, 18 percent negative and 48 percent neutral in response to the term. In contrast, the term "technology" produces no difference in reactions between the *Involved Canadians* and the rest of the population.



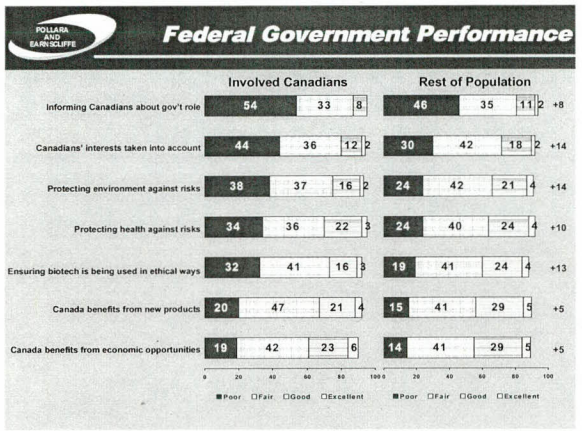
- *Involved Canadians* are roughly twice as likely to have heard about biotechnology in the last few months and to have had a conversation with someone about the subject at some point in time. Put differently, this 30 percent of the population accounts for almost 50 percent of the public audience for this debate.

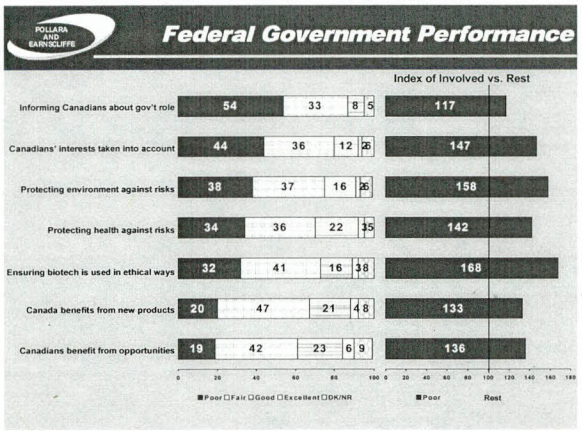


- With respect to the benefits and drawbacks associated with biotech, *Involved Canadians* are slightly less enthusiastic about the benefits and slightly more nervous about certain potential drawbacks, most notably: the effect on farmers, food quality, the long-term condition of the environment, and moral and ethical values in Canada.

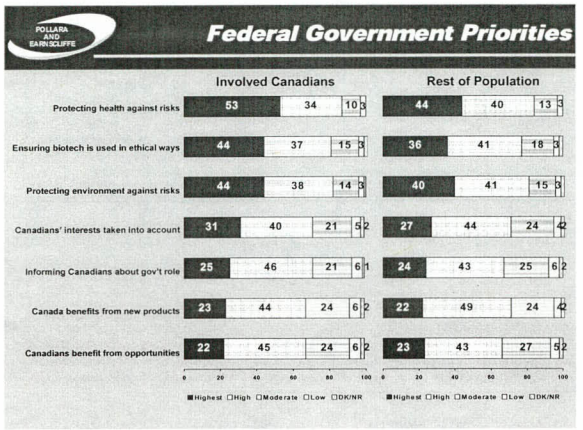


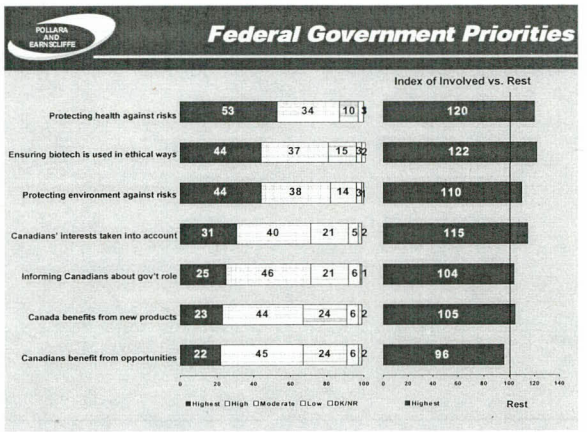
- The *Involved Canadians* segment is considerably more critical of the federal government's management of biotechnology. The number of *Involved Canadians* offering poor ratings is some 5 percent to 14 percent higher across a range of variables. The heaviest criticism is for "taking the interests of average Canadians into account," "ensuring the protection of the environment," and "ensuring that biotechnology is used in ethical ways."



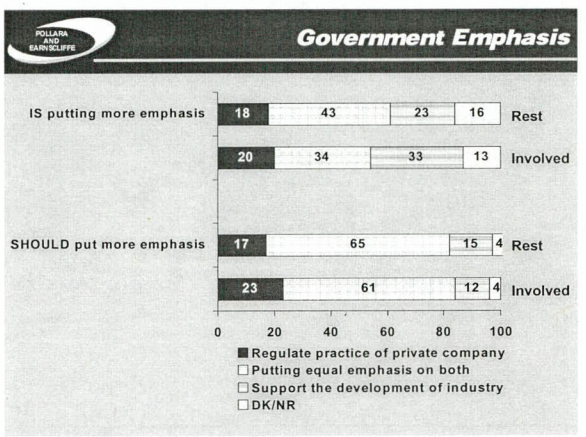


- When asked to establish their priorities for the federal government with respect to biotech, compared to the rest of the population, *Involved Canadians* put more emphasis on ensuring the ethical use of biotechnology, protecting the health of Canadians, and ensuring the protection of the environment.

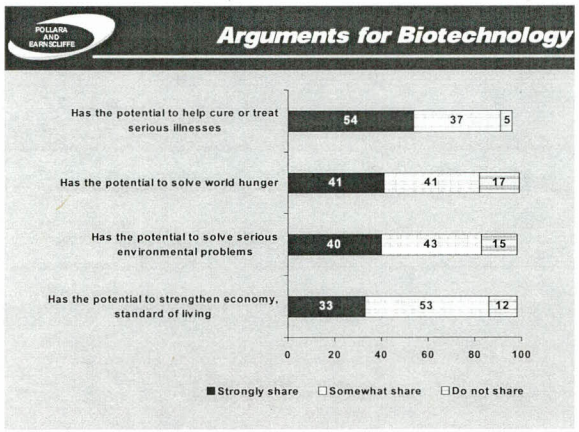




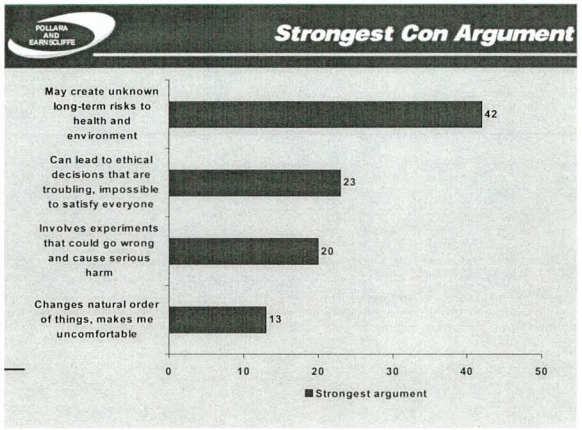
- *Involved Canadians,* like others, tend to favour a balance of regulation and industrial support but are more likely to feel that the tilt currently is a little too much in the direction of industrial support, rather than regulation.



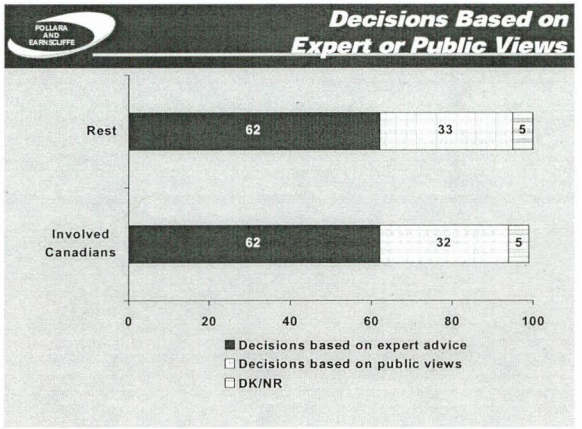
- *Involved Canadians* are just as likely as others to feel that biotechnology can help combat environmental problems, world hunger and serious illness and can strengthen our economy. Their concerns are not a function of a disinterest in the benefits, but a wariness of the drawbacks.

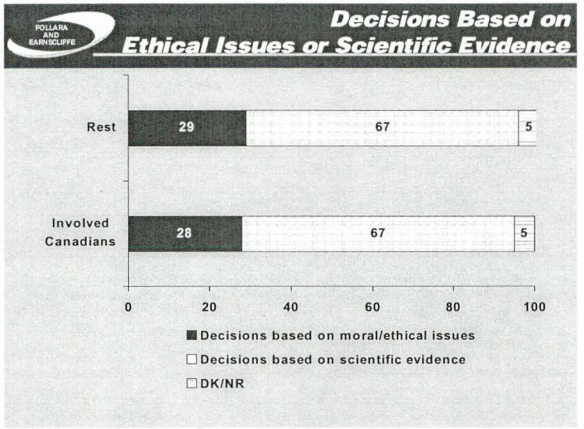


- When probed on their reactions to arguments against biotechnology, *Involved Canadians* are considerably more worried about long-term health risks, experiments going wrong and the potential for unethical decisions to be made. Worth noting is that their ethical concerns do not appear based on a religious factor: they are less swayed by arguments that have to do with changing things which God or nature created. By a considerable margin, their chief concern is about long-term health risks.

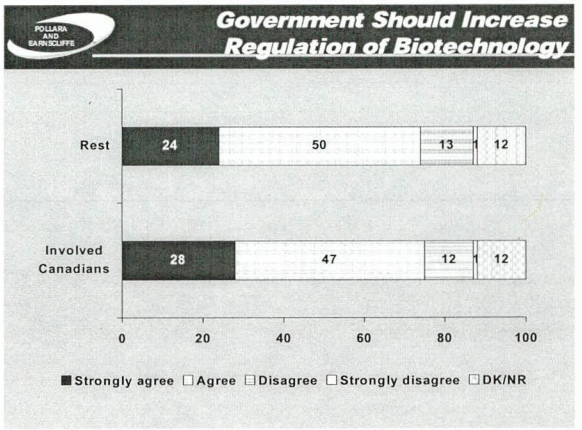


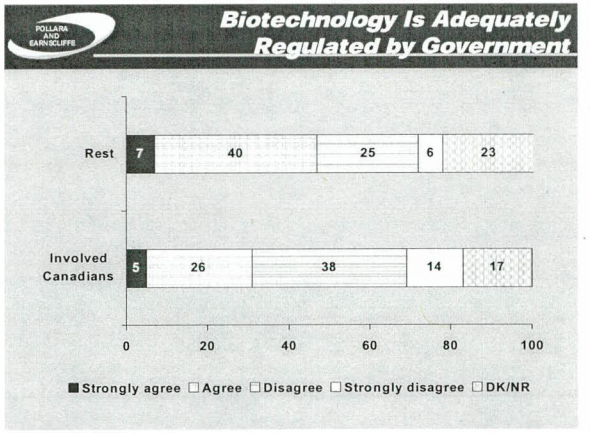
- *Involved Canadians* want expert opinion and scientific evidence to be the main influences guiding decisions about biotechnology, and are no more interested than others are in seeing the debate turn mainly on ethical issues and public concerns.

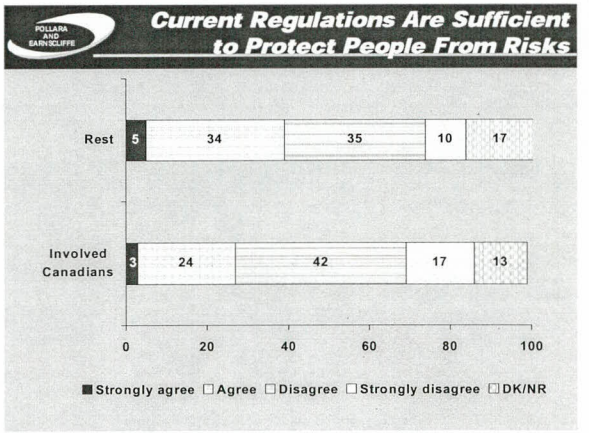


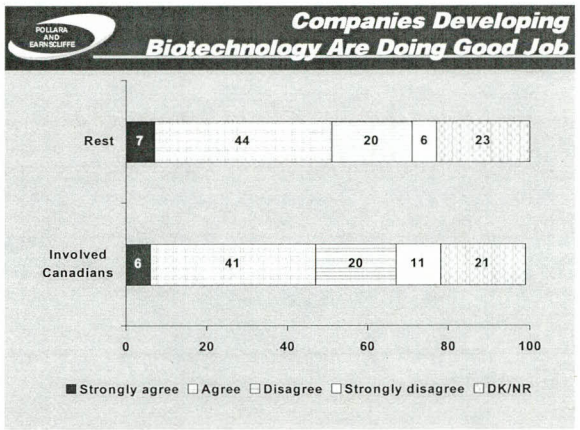


- A variety of probes in this study reveal a pattern whereby *Involved Canadians* are leading a push for greater regulation by government in the field of biotechnology. At the same time, it is important to note that this is a difference in degree not direction and that *Involved Canadians* very clearly signal a desire for the biotech sector to be allowed to develop and deliver benefits to Canada.

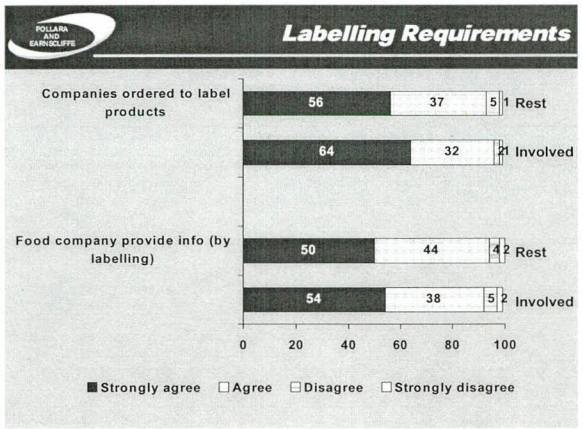


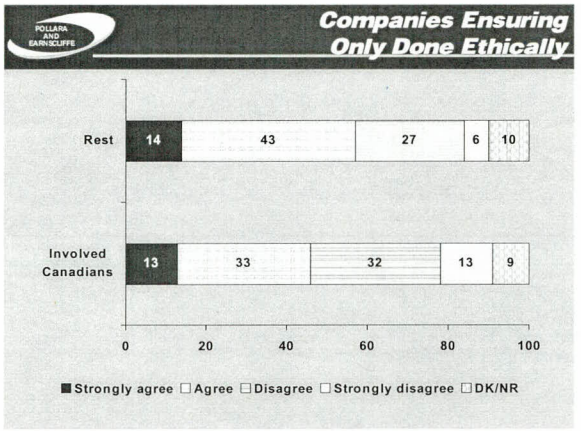




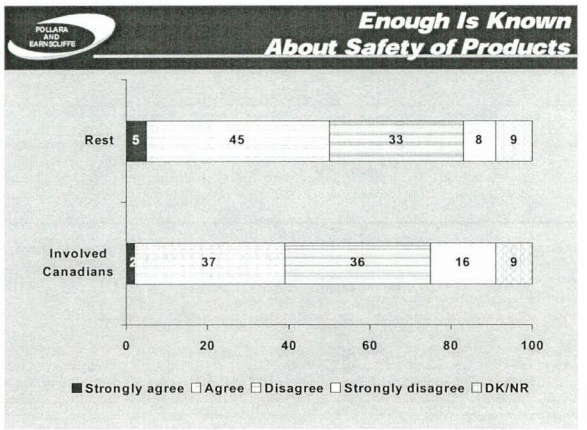


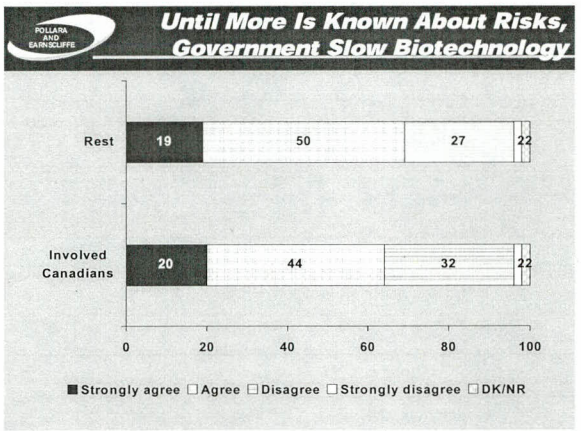
- *Involved Canadians* are more strongly in favour of labelling requirements. They are more doubtful that left to their own devices, companies would adequately protect them against risk. They are even more skeptical that companies would ensure ethical uses of biotechnology.





- While *Involved Canadians* are more likely to feel that not enough is currently known about biotechnology and its impacts, they are not more inclined to see government put the brakes on development in this area. Rather, they seem to prefer a high level of research, development and innovation, coupled with a higher level of oversight to protect the public interest.





- When it comes to specific biotechnology applications, *Involved Canadians* are more likely than others to signal discomfort with transgenic applications.

- Predictably, *Involved Canadians* are considerably more likely than others to support consultation processes and to say that they would make use of same personally.

In summary, these results suggest that *Involved Canadians* are helping shape opinion and media commentary in a number of ways. They are believers in the benefits of biotechnology but think that not enough is currently known about the risks, and that government needs to play a greater role in learning about and helping to mitigate risks. In particular, they are focussed on long-term health risks, environmental hazards and ethical dilemmas posed by biotechnology applications. They are clearly not anti-development, or anti-business, but they sense that current government approaches are perhaps more laissez-faire than would be ideal.

E. CLUSTER ANALYSIS

In sizeable quantitative studies such as this one, it is often useful to use multivariate techniques such as regression, factor and cluster analysis to help shed further light on the interrelationships between values, perceptions, opinions and socio-demographic variables.

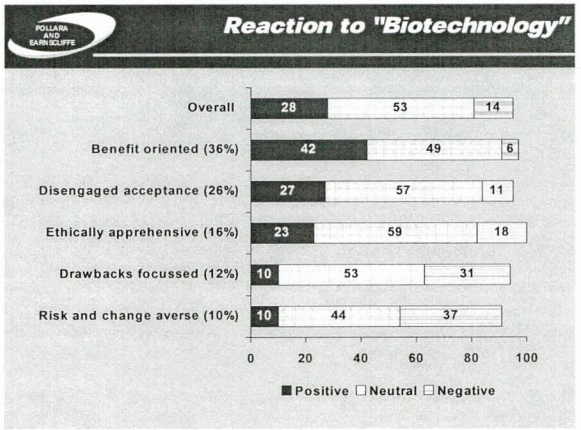
Earnscliffe has applied both factor analysis and cluster analysis techniques with this study.

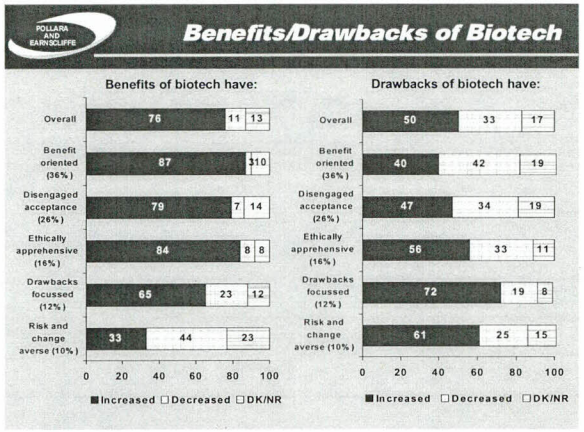
The population divides into five attitudinal clusters with regards to biotechnology. Two of them comprise a majority of people and are positive to neutral. Three of the clusters tend to range from the apprehensive to those who tend negatively towards biotechnology. For ease of identification we have named them and provided their proportions in the general population. They include:

- Benefit oriented (36 percent)
- Disengaged acceptance (26 percent)
- Ethically apprehensive (16 percent)
- Drawbacks focussed (12 percent)
- Risk and change averse (10 percent)

The findings can be summarized as follows:

- **Benefit oriented:** The single largest cluster represents roughly one in three adult Canadians (36 percent). This cluster (no sharp socio-demographic differences) is the most generally supportive of biotechnology, but their support is not unqualified. Instead, this group is most notable for the strong sense it has of the benefits to be won from biotechnology. They are not fervent advocates for biotechnology per se, but are the kind of people who feel that technology in general is a good thing. They are most convinced that the benefits to the economy and to the farming sector will be significant. They are also inclined to assume that there will be environmental benefits as well.



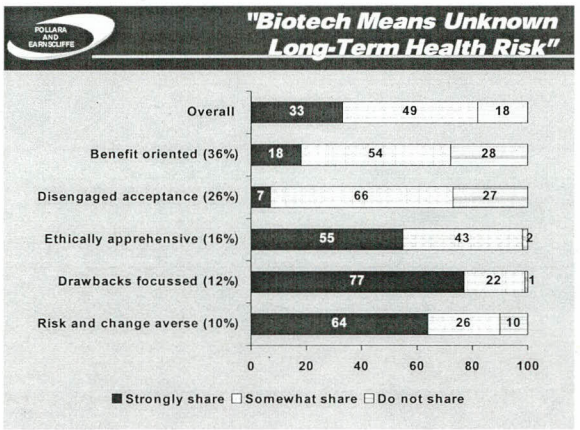


Nevertheless, it is important to note that almost half of this group do not consider themselves really familiar with the concept of biotechnology, and about the same number say they have a neutral, rather than positive or negative, reaction to the term.

This group cannot be construed as core supporters, because there is a tentative or "subject to change" aspect to their views. At the same time, they are clearly the strongest base of supporters which presently exists for biotechnology.

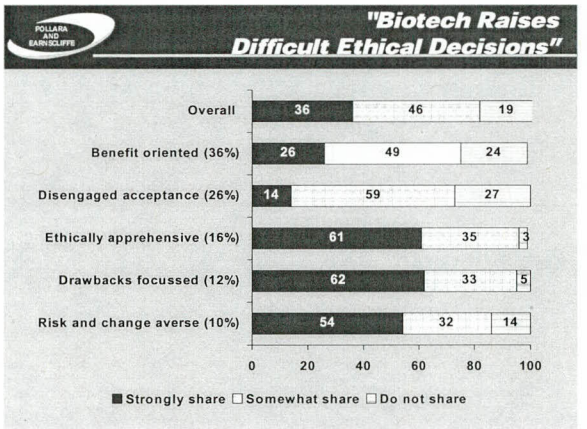
- **Disengaged acceptance (26 percent)**: This cluster, which represents one in four adults (skew younger), is generally less interested in biotechnology but inclined to feel that it has a somewhat positive potential. The large majority of this cluster see a variety of benefits to be derived from biotechnology but are much more likely to characterize these benefits as "modest" rather than major. Equally, they recognize the risks that others see but seem more inclined to feel that the risks are modest as well.

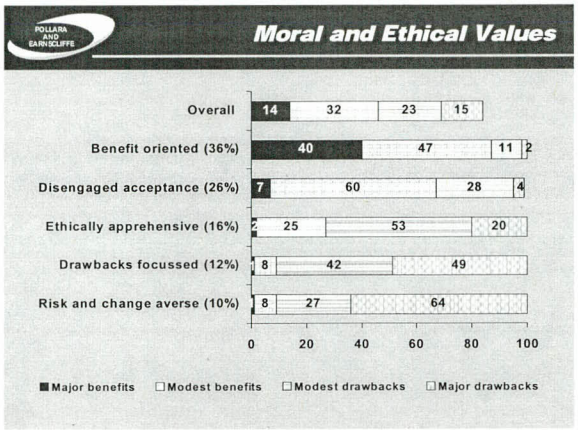
For those in this cluster, the strongest arguments for biotechnology are the contribution to the fight against hunger and illness; the strongest arguments against are the unknown long-term risks, and the ethical questions.



Compared to the rest of the population, this cluster is less anxious to see more government regulation and more inclined to feel that business is capable of providing a fair degree of protection of the public interest on its own. This tendency is just that; it should not be confused with a more radical laissez-faire point of view.

- **Ethically apprehensive (16 percent):** This cluster, which represents 15 percent of the population, can be described as rather tentative in their approval of biotechnology. Twenty-three percent have a positive reaction to the term, 59 percent are neutral, and 13 percent are negative. While this group (skew Ontario, male, baby-boom, higher income and education) tends to identify a number of benefits to be derived from biotechnology, and estimates these benefits as considerable, there is a significant level of concern about moral and ethical questions.

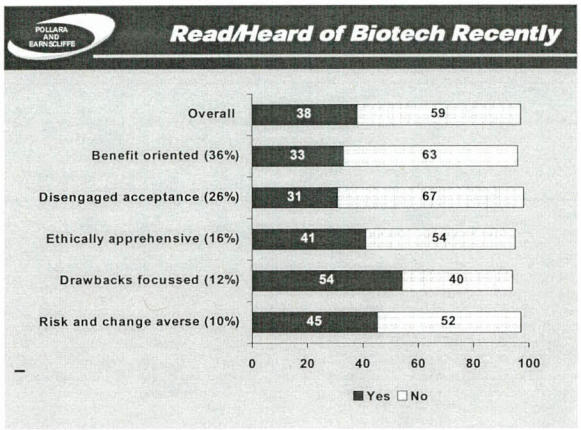




When thinking about the benefits, this cluster is more likely than most to concentrate on the medicinal and health potential, and less focussed on the economic side of things. When thinking about the drawbacks, ethical concerns rank second, some 16 percent higher than average. (As with every other cluster, health risks top the list of concerns.)

This cluster is some 22 percent more likely than average to be concerned about using science to change something which nature or God created. While on the whole this cluster is willing to see the continued development of biotechnology, they are a little more anxious to have evidence that government oversight is vigorous and public debate is a part of the process.

- **Drawbacks focussed (12 percent):** This cluster is the most attentive to the public debate about biotechnology. They (skew slightly older, BC, Ontario, average income, better educated) consider themselves to be more familiar with the subject and are more likely to have had a discussion about it. Compared to other people, they are more inclined to be attentive to the drawbacks where health, food, the environment and ethics are concerned.



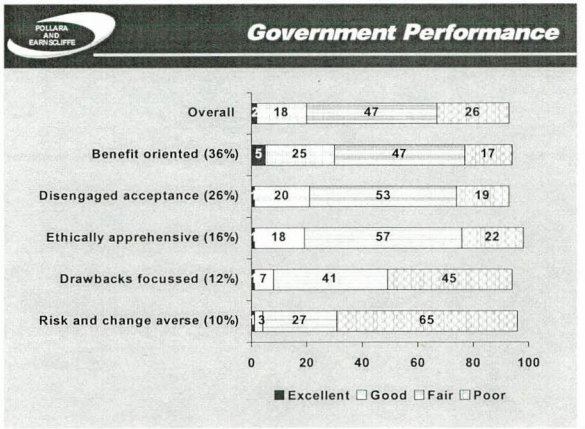
While these people believe that the benefits of biotechnology have been increasing in recent years (65 percent), they are even more convinced that the drawbacks are on the rise (72 percent).

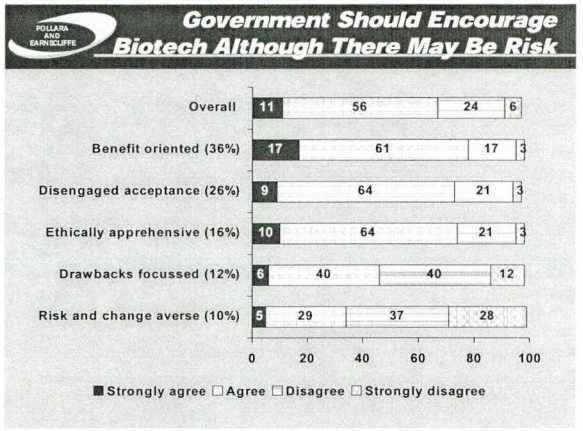
This cluster is more convinced than any other that government policy shows an inappropriate tilt towards support of industry over industrial regulation, and are more convinced than any others that the potential for long-term, unknown hazards to emerge is considerable. They want to see more public involvement and more consideration of the ethical matters raised by biotech applications.

- **Risk and change averse (10 percent):** This cluster, which represents some one in ten Canadians (skew older, lower income, BC and Ontario), is the most adamantly uncomfortable element of Canadian opinion. It is important to observe that their discomfort with biotechnology is part of a broader distaste with the pace or impact of technology in general. As a group, they are more uncomfortable with the terms "biology," "technology" and "biotechnology" than any other. Only 11 percent have a positive reaction to the term "biotechnology," while 37 percent have a negative reaction.

  Individuals in this group report being more interested in the subject of biotechnology than any other group and they see drawbacks across the board, even in terms of economic impact. As an example, fully 92 percent see drawbacks for Canada's farming sector and 78 percent see harm to the economy in general. While one in three think that the benefits have been increasing of late, almost two in three think the drawbacks have been increasing.

They are harshly critical of government's performance, especially when it comes to the protection of the environment and public health. The focus of their concerns is almost equally on long-term health risks and the unknowns associated with altering things natural. They strongly urge that government slow the pace of development until more research is done, and are not convinced that enough can ever be known about some applications and the risks they pose.





F. SECONDARY ANALYSIS

The secondary analysis of existing data had two main functions: (1) to guide the development of the primary research by identifying gaps of knowledge as well as important attitudes that needed to be tracked, and (2) to add depth to the analysis. Though a number of studies were sampled (surprisingly, the current body of research is quite small), there were two primary ones in terms of utility and comparability with the current research.

AWARENESS LEVELS

The primary research conducted by Pollara Research and Earnscliffe found very low levels of awareness or interest in the issue. This is very consistent with previous work in this area.

A 1997 study (paid for by the Social Sciences and Humanities Research Council and the Canadian Institute of Biotechnology, fieldwork by Ekos Research Associates – from here on in described as "the Calgary study") found that only one-third of Canadians could offer up any unaided description of biotechnology. Of those who did, most were of the most general variety, meaning that only around 15 percent of Canadians could, at that time, offer a specific description of biotechnology. The most commonly offered description had to do with "medical cures," followed by variations on genetic engineering. The fact that the top-of-mind descriptions focused around medicine rather than food is quite significant and reinforces the finding in the current work that the issue is so far not being dominated by food concerns in Canada, as it clearly is elsewhere.

Similarly, in a separate 1999 Pollara study, after a very extensive preamble that should have had the effect of boosting awareness (and claimed awareness levels), only 16 percent said they had read or heard "a lot" about biotechnology and another 35 percent said they had read or heard "some" about it. This compares with 38 percent who told Earnscliffe that they had heard something about it in the last three months and 53 percent who described themselves as very or somewhat familiar with the topic.

TOP-OF-MIND REACTIONS TO THE CONCEPT

Previous studies have found trepidation about biotechnology – a sense that though some good comes of it and that it may be inevitable, a fear that there could be some associated dangers. There is also a sense that perhaps not enough is known about the science and all of its ramifications. This concern, such as it is, is mostly driven by the unknown.

The Calgary study tested reaction to a number of different sciences such as solar power and space exploration and asked whether each technology would improve lives, worsen them or make no difference. Included on the list were biotechnology and genetic engineering. Their findings indicate that a strict focus on the term "biotechnology" could lead to an underestimation of the potential public opinion problems. As we have just seen, very few people know what biotechnology is and are inclined to react benignly to it. The Calgary study found 72 percent saying it would improve life. However, the results for "genetic engineering" were strikingly worse. Only 54 percent said it would improve life, a drop of 20 points, just through a change in vocabulary. Of the rest, 26 percent said it would worsen life and the rest were unsure.

This leads to two key observations. Questions that use the term "biotechnology" are likely deriving the highest possible favourable response, and different wording could well yield different results.

The other finding that seems clear from previous research is that attitudes about this issue are primarily driven by estimations of the impact on people's health. For example, there is little opposition and lots of support for most biotechnology applications that lead to medical advances. On the other hand, the area of biotechnology that people have the most trouble with is food, and concerns there are related to a sense that we do not understand all the long-term health implications.

POLLARA AND EARNSCLIFFE

The Pollara study asked people about their comfort level with what they had heard about biotechnology and food. Remember that the Calgary study found that food does not produce top-of-mind association with biotechnology. Pollara found that people were, by a three-to-two margin, inclined to describe themselves as uncomfortable with what they had heard about biotechnology. Sixty percent of those who were uncomfortable cited concern about the long-term health implications. Quite significant is the fact that women were much more likely to be uncomfortable with what they knew about the relationship of biotechnology and food than were men.

The Calgary study found that two-thirds of Canadians felt that using biotechnology in the production of food and drink was useful for society. It also found that 55 percent felt it was risky for society. Only 15 percent felt it was definitely not risky.

That being said, Canadians seem clearly more prepared to accept some risk for economic gain than do residents of Europe.

WHAT MOTIVATES OPINION

The Calgary study concluded that familiarity with the concept was not correlated to support or opposition.

It certainly does not appear obvious that more information will lead to greater support or comfort levels. For example, two-thirds of Canadians either think it is impossible to transfer an animal gene into a plant (30 percent) or don't know (32 percent). It is at least a hypothesis that if they did know about that it might diminish their comfort level. Similarly, the fact that 40 percent of Canadians are not certain that their own genetic makeup cannot be changed by eating genetically modified fruit does not lead one to think that labelling will necessarily enhance sales of genetically modified products.

Those examples are obviously not the only facts people could absorb about biotechnology, and there is also a significant lack of knowledge in areas that could build confidence. However, when assessing the level of knowledge ordinary people are likely to attain and the kinds of facts that tend to receive broad dissemination, a diminishment of support seems more likely over the medium term than growth. Current support levels are built upon a base of little knowledge (or interest) combined with an assumption that proper regulations and safeguards are in place.

The Calgary study determined that if people felt a biotech application was excessively risky, they would oppose it. However, lack of perceived risk did not mean people would support it. Support would depend mostly on the perceived utility of the application. That is why health care advances and food supply advances were most positively received.

Given the inherent uncertainty and risk associated with the whole area, people seem to divide applications into three categories - too risky and shouldn't be considered, not as risky but not important enough to do, or not too risky and very important. The applications that fall into the too risky category have to do with gene transfer between animals and humans. This is a concept that people seem very uncomfortable with and raises risk to a different level. Previous risk research had determined that of the levels of risk, the most potent are those which elicit dread or fear of the horrible in people. For reasons that are obvious to anybody with a passing familiarity with pop culture, the inter-species transfer of genes falls into that category.

REGULATION

The Calgary study found that there clearly is a demand for a credible regulatory framework in this area. Almost 70 percent of respondents rejected the notion that regulation should be left mainly to the industry, and 50 percent think current regulations are insufficient. Given that almost nobody would have had any idea what current regulations would have been, that finding reflects an assumption more than an assessment.

POLLARA AND EARNSCLIFFE

Pollara gave people four favourable statements about biotechnology and asked people which they agreed with most. The plurality of people gravitated to a statement that implied a significant degree of regulation – "I personally don't see any risks in genetic engineering of food if the program is **highly supervised** and qualified people are handling it."

However, there is some pragmatism about regulatory issues. In the Calgary study, 62 percent agreed that some risk is acceptable if it enhances Canada's economic competitiveness.

CREDIBILITY ISSUES

The Calgary study found that the Canadian government is badly lacking in credibility on this issue. When asked who should regulate biotechnology, the plurality chose an international organization like the UN or the World Health Organization. This may reflect the supposition on the part of respondents that the organizations at the forefront of food supply and of science in this area operate internationally and cannot be adequately supervised by a national government. It surely also reflects the cynicism people have about governments acting in their interest as opposed to the interest of corporations. It also seems likely that the name World Health Organization sounded appropriate given that people's concerns centre primarily around health issues.

The same study found that the second preferred oversight body involved scientific organizations. This would be in large part because of perceived expertise. It also confirms the Pollara/Earnscliffe findings that people want decisions based more on scientific evidence than on moral considerations in most cases.

The most credible organizations, in terms of sourcing information, appear to be universities, environmental organizations and consumer organizations. The demand for information (in reality quite slight) is not a demand for information from government, as only 27 percent of Canadians (the Calgary study) described public authorities as a credible source of information on the subject.

Government does have more credibility on this than industry, which clearly does not have the standing to carry a debate on its own.

The medical profession has significant credibility on organ transplant issues. Agricultural experts can be persuasive with some people on issues related to crop production.

Pollara found that most people are content to passively receive their information from mass media sources. However, among some key target audiences, such as women and homemakers, there is a greater than average willingness to seek out information from things like pamphlets or special newspaper inserts.

G. APPENDICES

1. **Moderator's Guide**
2. **Questionnaire with National Results**

POLLARA AND EARNSCLIFFE

Moderator's Guide

Probing on general level impressions

1. ▪ When you hear the word biotechnology, what are the first five thoughts which come to mind right away? Please write them down on a piece of paper.

2ab ▪ Overall, do you have a positive reaction or a negative reaction to the term biotechnology? Please tell us what you wrote down, and where you developed these impressions.

3a→d ▪ Have your views changed in the last couple of years, and why? Do you think your views can be changed about biotechnology? Do you think that your views on this could change, and if so, what would make them change? What would change them, and are there some people or organizations who would be more likely to cause a change in your opinions?

4a→c ▪ Many people say that they are not all that interested in this subject. Those of you who feel that way, can you talk about why it is not all that interesting to you? What about those of you who are interested? Why does it interest you?

5 ▪ Biotechnology has applications in a number of fields. Please write down five examples of biotechnology-related products or applications that you have heard about.

6 ▪ From what you know about biotechnology, in general, do the potential benefits outweigh the potential risks, or vice versa?

Biotechnology as industry

7a→d ▪ Compared to other countries, does Canada have a substantial biotechnology industry? Why or why not? Should we be trying to be leaders, followers, or in the middle of the pack? Why?

8ab ▪ Compared to other Canadian industries, would you say that biotechnology is very important, moderately important, or not very important to the **future** of the Canadian economy? Why do you say that?

9ab ▪ Can you name four or five companies which you think are involved in biotechnology? Is the industry made up of small companies or large ones, are they located in one region more than others, who are the employees, and how profitable are they?

10a→d ▪ Have you heard anything about this industry over the past couple of years? What have you heard, and from what source? Do you hear more about this from government, from the industry, or from interest groups? Is what you hear more negative than positive or more positive than negative?

POLLARA AND EARNSCLIFFE

11a→c ▪ Over the past couple of months, would you say you have heard more, less, or no more or less than in previous months? Do you think that this will subside or that you will be hearing more and more in the future? Thinking about what you have been hearing lately, is it more and more positive, or more and more negative about the impact and potential impact of biotechnology?

A. COMMUNICATIONS TESTING

12ab When it comes to learning about the potential benefits of biotechnology, who are you more likely to trust to have the most reliable information? In addition, do you trust them to give it to you in an honest and clear fashion?

13 How about when it comes to the potential drawbacks associated with biotechnology?

Thinking about each of the following arguments, which two or three stakeholders would you be most anxious to hear from, and most likely to trust… (In each case, a specific probe will be made of the role of the federal government, if it is not explicitly raised by the participants.)

14a→c ▪ Biotechnology has the potential to help solve world hunger.

15a→c ▪ Biotechnology has the potential to help solve serious environmental problems.

16a→c ▪ Biotechnology has the potential to help cure or treat serious illnesses.

17a→c ▪ Biotechnology has the potential to strengthen our economy and improve our standard of living.

18a→c ▪ Biotechnology is one of the modern technologies that will drive the future economy of the world.

19a→c ▪ Biotechnology involves changing things that God or nature created, and that makes me uncomfortable.

20a→c ▪ Biotechnology may be creating unknown, long-term risks to health or the environment.

21a→c ▪ Biotechnology involves experiments which could go wrong and cause serious harm.

22a→c ▪ Biotechnology can lead to ethical decisions which are troubling and impossible to resolve to everyone's satisfaction.

With respect to these four points of view which have to do with biotechnology, imagine that you wanted to get information about them. Where would you like to get it, in what form, and from what stakeholders? What would be the least effective way of getting it to you?

23a→d ▪ Biotechnology has the potential to help cure or treat serious illnesses.

24a→d ▪ Biotechnology has the potential to help solve world hunger.

- Biotechnology may be creating unknown, long-term risks to health or the environment.
- Biotechnology can lead to ethical decisions which are troubling and impossible to resolve to everyone's satisfaction.

27 What in particular would you like to hear from the federal government about each of these four points of view?

How likely would you be to consume information from the federal government if it were delivered in the following ways:

- At a special biotechnology web site, which was advertised and promoted.
- Via e-mail to all those who indicated they wanted regular updates.
- Through newspaper and magazine advertisements or inserts.
- Through a documentary video which was available to everyone who wanted a copy for a dollar or two.
- Through a publication or a brochure which you could send away for.
- Through an extended five-minute televised segment, bought as advertising.

29 How much and in what ways should the government attempt to involve people like you in decisions about biotechnology policy?

30 Would you be interested in participating in a consultative process like a town-hall meeting on biotechnology?

31 Would you be interested in attending a two-day conference to explore biotechnology issues in detail with a group of other Canadians?

B. BIOTECHNOLOGY APPLICATIONS

People seem to be more comfortable with some applications of biotechnology than with others. For each of the following, ***please tell me if you feel positively or negatively toward them***. In each case, tell me if you feel that there are no or few risks, or if you think that the benefits outweigh whatever risks there may be.

- 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 and quantity of food.
- Using genes from one organism to change another organism in order to help clean up environmental problems.

- Changing the genetic makeup of trees to make them resistant to diseases and insect attack.
- Modifying genes in a human embryo to eliminate an inherited disease.
- Creating genetically modified fish that will be healthier and more disease resistant.

There are some other applications which people seem to have more concerns about. I would like to understand why, for each of the following, and whether you think despite the concerns, they should go ahead, or not.

- Breeding genetically engineered livestock animals to have less fat.
- Implanting animal genes in plants to help improve the nutritional value or appearance of food products.
- Breeding genetically engineered animals for use in medical research.

Let's try to clear up what elements are more likely to create acceptance or rejection. I would also like to know whether your views on the applications should be interpreted as hard directions to government, or impressions which you would like taken into account. Are there any exceptions to that?

C. RISK MEASUREMENT AND MANAGEMENT

As mentioned earlier, the field of biotechnology raises issues of risk and benefit to society. I'm going to ask a few questions that attempt to get at how you feel about what the risks and benefits are, and how you think decision makers should approach decisions regarding biotechnology.

- Some people are confident that enough is being done to study and monitor the risks associated with biotechnology. Others are worried that not enough priority is being attached to this. Which of these points of view is closest to your own? Why?
- Some people say until more is known about the risks, governments should slow the use of biotechnology. Others say we have to accept some risk to achieve health benefits from biotechnology research. What do you think is the best approach? Please explain your point of view?
- If most scientific evidence says that a particular use of biotechnology is safe and should be allowed, should that be the approach we use? OR should we use a precautionary principle, where we ban a product if there is any potential of future risk (knowing that no one can rule out the risk of virtually anything). Why?

POLLARA AND EARNSCLIFFE

D. GM FOODS

- From what you know, is all the food that gets to the grocery store tested for safety? How, when, by whom?
- If you had to guess, what percentage of the processed food we eat on a daily basis do you think is genetically modified or comes from plants that have been genetically modified?
- The amount is anywhere between 60 percent and 75 percent. What impact does that have on your views of genetically modified foods?
- Do you feel that the authorities are doing enough to ensure your safety when it comes to GM foods? What would reassure you?
- Is having GM food a good thing, a bad thing, or not much of an issue to you at all?
- What do you need to know about the GM aspects of food that you buy at a grocery store?

How would you feel about the following approach? (test likely scenarios)

- Government communications campaign
- Information at the grocery store
- Voluntary labelling
- Mandatory labelling

E. PATENTS

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

Some people feel that the idea of patent protection is necessary in the field of biotechnology, because we need to encourage inventions in this area for all the benefits which they can bring. Others are uncomfortable with the idea of patents in the field of biotechnology, because there is something wrong with the idea of patenting a life form such as an animal or a plant. Which of these two points of view is closer to your own? Let's discuss your views.

Why are some applications more acceptable for patenting, such as:

- Altered bacteria to help clean up toxic spills.
- Rodents bred to resist disease in order to help find cures for human diseases?
- Altered trees to become more resistant to insects and diseases.

(In each case, probe downside of patent protection, to test firmness of views.)

POLLARA AND EARNSCLIFFE

Why are some others less acceptable, such as:

- Cloned sheep
- Cloned human kidney
- Altered cow to produce more milk
- Altered tomatoes which grow larger

(In each case, probe upside of patent protection, to test firmness of views.)

FINAL QUESTION

I'd like to go back for a minute to the beginning of this discussion. Could you consider how your view evolved over this discussion? Would you say that the information during the discussion influenced your view, and if so did the discussion tend to increase or decrease your concern about this issue? Did it inspire you to follow this subject more closely, or not?

POLLARA AND EARNSCLIFFE

Questionnaire

October 8, 1999 **PERCENT**

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

Positive 43
Neutral 50
Negative 4

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

Positive 58
Neutral 33
Negative 5

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

Positive 28
Neutral 53
Negative 14

3. Can you please tell me the main reason why your reaction with biotechnology is (positive, negative, neutral) OPEN-ENDED, NOT YET COMPLETE

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

Yes 38
No 59

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

Yes 34
No 65

POLLARA AND EARNSCLIFFE

6a 6ab 6b

Biotechnology applies science to living things such as plants and animals in order to develop new products and processes.

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

Very familiar 5
Somewhat familiar 48
Not very familiar 33
Not at all familiar 14

7. Is biotechnology a subject you are very interested in, fairly interested in, not too interested in, or not at all interested in?

Very interested in 14
Fairly interested in 49
Not too interested in 28
Not at all interested in 9

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

8. The health of Canadians today

Major benefits 35
Modest benefits 38
Modest drawbacks 10
Major drawbacks 7

9. The health of Canadians over the longer term

Major benefits 42
Modest benefits 29
Modest drawbacks 10
Major drawbacks 9

10. Canada's economy today

Major benefits 24
Modest benefits 49
Modest drawbacks 10
Major drawbacks 5

11. Canada's economy over the long term

Major benefits 34
Modest benefits 40
Modest drawbacks 8
Major drawbacks 6

POLLARA AND EARNSCLIFFE

12. The number of jobs for Canadians

Major benefits 27
Modest benefits 42
Modest drawbacks 10
Major drawbacks 6

13. Canada's farming sector

Major benefits 43
Modest benefits 31
Modest drawbacks 9
Major drawbacks 9

14. The amount of food we produce

Major benefits 44
Modest benefits 35
Modest drawbacks 7
Major drawbacks 5

15. The quality of food we produce

Major benefits 38
Modest benefits 34
Modest drawbacks 11
Major drawbacks 10

16. Canada's environment today

Major benefits 26
Modest benefits 39
Modest drawbacks 15
Major drawbacks 8

17. Canada's environment over the long term

Major benefits 36
Modest benefits 31
Modest drawbacks 12
Major drawbacks 10

18. Moral and ethical values

Major benefits 14
Modest benefits 32
Modest drawbacks 23
Major drawbacks 15

POLLARA AND EARNSCLIFFE

END OF ROTATION

19. Over the last five years or so, would you say the benefits associated with biotechnology have increased or decreased?

Increased 76
Decreased 11

20. Over the same period, would you say that the drawbacks associated with biotechnology have increased or decreased?

Increased 50
Decreased 33

In each of the following areas, would you say that the federal government is doing an excellent, good, fair or poor job? How about (ROTATE)

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

Excellent 2
Good 16
Fair 39
Poor 35

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

Excellent 5
Good 27
Fair 41
Poor 16

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

Excellent 4
Good 23
Fair 38
Poor 27

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

Excellent 3
Good 19
Fair 41
Poor 29

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

Excellent....4
Good....26
Fair....43
Poor....17

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

Excellent....1
Good....10
Fair....36
Poor....49

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

Excellent....3
Good....21
Fair....41
Poor....23

END OF ROTATION

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

Excellent....2
Good....18
Fair....47
Poor....26

How much priority do you feel the federal government should attach to each of the following roles...the highest priority, high priority, moderate priority or low priority? (ROTATE)

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

Highest priority....28
High priority....42
Moderate priority....23
Low priority....4

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

Highest priority....23
High priority....44
Moderate priority....26
Low priority....5

POLLARA AND EARNSCLIFFE

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

Highest priority....47
High priority....38
Moderate priority....12
Low priority....3

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

Highest priority....42
High priority....40
Moderate priority....14
Low priority....3

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

Highest priority....22
High priority....47
Moderate priority....24
Low priority....5

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

Highest priority....25
High priority....44
Moderate priority....23
Low priority....6

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

Highest priority....39
High priority....39
Moderate priority....17
Low priority....3

END OF ROTATION

36. One role for government is to regulate the practices of private companies; another is to support the development of industry. 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?

Regulate practice of private companies....19
Support the development of industry....27
Putting equal emphasis on both....39

37. Which role do you think the government *should* put more emphasis on, or should it put equal emphasis on both?

Regulate practice of private companies 19
Support the development of industry 14
Putting equal emphasis on both 63

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

Very familiar 2
Somewhat familiar 23
Not very familiar 43
Not at all familiar 31

I would like to read you some statements which various people have made who are comfortable with the development of biotechnology. In each case, please tell me if you strongly share this view, share it somewhat, or don't share this view. The first one is: (ROTATE)

39. Biotechnology has the potential to help solve world hunger.

Strongly share view 39
Share it somewhat 42
Don't share this view 16

40. Biotechnology has the potential to help solve serious environmental problems.

Strongly share view 38
Share it somewhat 45
Don't share this view 14

41. Biotechnology has the potential to help cure or treat serious illnesses.

Strongly share view 52
Share it somewhat 37
Don't share this view 7

42. Biotechnology has the potential to strengthen our economy and improve our standard of living.

Strongly share view 33
Share it somewhat 53
Don't share this view 12

END OF ROTATION

POLLARA AND EARNSCLIFFE

43. Which of the statements above is the *strongest* argument in favour of the development of biotechnology?

Potential to help solve world hunger 25
Potential to solve serious environmental problems 16
Potential to help cure serious illness 37
Potential to strengthen our economy 15

Now, I would like to read you some statements which various people have made who are uncomfortable with the development of biotechnology. In each case, please tell me if you strongly share this view, share it somewhat, or don't share this view. The first one is (ROTATE)

44. Biotechnology involves changing things which God or nature created, and that makes me uncomfortable.

Strongly share view 20
Share it somewhat 31
Don't share this view 47

45. Biotechnology may be creating unknown, long-term risks to health or the environment.

Strongly share view 32
Share it somewhat 47
Don't share this view 18

46. Biotechnology involves experiments which could go wrong and cause serious harm.

Strongly share view 31
Share it somewhat 46
Don't share this view 21

47. Biotechnology can lead to ethical decisions which are troubling and impossible to resolve to everyone's satisfaction.

Strongly share view 35
Share it somewhat 45
Don't share this view 18

END OF ROTATION

48. In your opinion, which of these is the *strongest* argument *against* the development of biotechnology?

Changing things God/nature created 15
Create unknown long-term risks to health 39
Experiment going wrong, causing serious harm 20
Lead to ethical decisions 22

POLLARA AND EARNSCLIFFE

49. **Which of the following views is closest to your own? (ROTATE)**

Decisions about biotechnology should be based mainly on the views and advice of experts about the risks and benefits 62

Decisions about biotechnology should be based primarily on the average Canadian's views of risks and benefits 33

50. **And which of these two views is closest to your own? (ROTATE)**

Decisions about biotechnology should be based mainly on the moral and ethical issues involved 29

Decisions about biotechnology should be based mainly on the scientific evidence of risk and benefit. 66

Please tell me whether you strongly agree, agree, disagree or strongly disagree with each of the following statements which have to do with the role of government. (ROTATE)

51a. Government should provide incentives for companies to invest in biotechnology research.

Strongly agree 20
Agree 53
Disagree 21
Strongly disagree 5

51b. Government laboratories should be directly involved in helping invent new ways to use biotechnology.

Strongly agree 28
Agree 53
Disagree 13
Strongly disagree 4

52a. Government and private sector researchers should work together on new inventions and applications in the biotechnology field.

Strongly agree 41
Agree 50
Disagree 6
Strongly disagree 2

52b. Government should regulate biotechnology, but the private sector should do the actual research and development.

Strongly agree 22
Agree 51
Disagree 18
Strongly disagree 5

POLLARA AND EARNSCLIFFE

53a. Government should try not to regulate the biotechnology sector too much; otherwise, it will be less successful.

Strongly agree 9
Agree 31
Disagree 35
Strongly disagree 21

53b. Government should regulate the biotechnology sector more than other sectors, because of its unique nature.

Strongly agree 24
Agree 45
Disagree 24
Strongly disagree 4

54a. Government should inform people about biotechnology and let them decide for themselves whether they want to use biotech products.

Strongly agree 48
Agree 41
Disagree 8
Strongly disagree 2

54b. Government should use its expertise to make decisions about which products should be available, on behalf of consumers.

Strongly agree 21
Agree 48
Disagree 22
Strongly disagree 7

55. Government should encourage the development of biotechnology although there may be some unknown risks.

Strongly agree 11
Agree 56
Disagree 24
Strongly disagree 6

56a. When it comes to the use of biotechnology, government should not try to make ethical decisions on behalf of the country.

Strongly agree 23
Agree 42
Disagree 25
Strongly disagree 7

56b. When it comes to the use of biotechnology, government must make ethical decisions on behalf of the country.

Strongly agree 25
Agree 49
Disagree 21
Strongly disagree 4

57a. The government should increase its regulation of biotechnology.

57ab

Strongly agree 26
Agree 49
Disagree 12
Strongly disagree 1

57b. Biotechnology is adequately regulated by government.

Strongly agree 6
Agree 35
Disagree 29
Strongly disagree 9

58. The government should ask food companies to voluntarily provide information about foods developed through biotechnology, by means of product labelling and the mass media.

Strongly agree 51
Agree 42
Disagree 4
Strongly disagree 2

END OF ROTATION

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

59ab

59a. I'd like to see Canada lead the world in the development of biotechnology.

Strongly agree 24
Agree 48
Disagree 19
Strongly disagree 4

59b. Scientists have no business meddling with nature.

Strongly agree 9
Agree 21
Disagree 50
Strongly disagree 18

60. Current regulations are sufficient to protect people from any risks linked to modern biotechnology.

Strongly agree 5
Agree 30
Disagree 37
Strongly disagree 12

61ab

61a. Modern biotechnology is so complex that public consultation about it is a waste of time.

Strongly agree 4
Agree 18
Disagree 53
Strongly disagree 22

61b. Decisions about science and technology are best left to the experts.

Strongly agree 20
Agree 53
Disagree 21
Strongly disagree 5

62ab

62a. The government should conduct further research into the long-term health and environmental impacts of biotechnology.

Strongly agree 52
Agree 42
Disagree 4
Strongly disagree 1

62b. The government should conduct further research into the long-term health and environmental impacts of biotechnology before allowing any further use of biotechnology.

Strongly agree 40
Agree 43
Disagree 13
Strongly disagree 2

63ab

63a. The companies which develop biotechnology are doing a good job of minimizing risks.

Strongly agree	7
Agree	43
Disagree	20
Strongly disagree	8

63b. The companies which develop biotechnology are ensuring that it is only used in ethical ways.

Strongly agree	13
Agree	39
Disagree	29
Strongly disagree	9

64ab

64a. When I see a product on a store shelf, I assume that it must be safe.

Strongly agree	18
Agree	51
Disagree	24
Strongly disagree	5

64b. When I see a product on a store shelf, I assume that it must have been tested for safety by the government.

Strongly agree	24
Agree	49
Disagree	21
Strongly disagree	5

65ab

65a. I would buy biotech-produced food if it were more nutritious than other food.

Strongly agree	11
Agree	53
Disagree	25
Strongly disagree	6

65b. I would buy biotech-produced food if it cost less than other food.

Strongly agree	10
Agree	37
Disagree	36
Strongly disagree	11

POLLARA AND EARNSCLIFFE

66ab

66a. Enough is known about the safety of biotech-produced food made through biotechnology to allow them to be used.

Strongly agree	4
Agree	42
Disagree	34
Strongly disagree	10

66b. Not enough will ever be known about the safety of biotechnology.

Strongly agree	19
Agree	45
Disagree	30
Strongly disagree	3

67ab

67a. Until more is known about the risks, government should slow the use of biotechnology.

Strongly agree	19
Agree	48
Disagree	28
Strongly disagree	2

67b. We have to accept some risk to achieve health benefits from biotechnology research.

Strongly agree	10
Agree	55
Disagree	26
Strongly disagree	7

68ab.

68a. If most scientific evidence says that a particular use of biotechnology is safe, it should be allowed.

Strongly agree	12
Agree	68
Disagree	15
Strongly disagree	3

68b. If the best available scientific evidence says that a particular use of biotechnology is safe, it should be allowed.

Strongly agree	15
Agree	68
Disagree	12
Strongly disagree	2

END OF ROTATION

POLLARA AND EARNSCLIFFE

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

69. Changing the genetic makeup of plants to help create better crop harvests.

Strongly agree 14
Agree 59
Disagree 19
Strongly disagree 7

70a. Implanting animal genes in plants to help improve the appearance of food products.

Strongly agree 1
Agree 14
Disagree 54
Strongly disagree 28

70b. Implanting animal genes in plants to help improve the nutritional value of food products.

Strongly agree 5
Agree 37
Disagree 37
Strongly disagree 16

70c. Implanting animal genes in plants to help improve the medicinal value of food products.

Strongly agree 6
Agree 38
Disagree 38
Strongly disagree 12

71. Using genes from one organism to change another organism in order to help clean up environmental problems.

Strongly agree 10
Agree 53
Disagree 24
Strongly disagree 8

72a. Changing the genetic makeup of trees to make them resistant to disease and insect attack.

Strongly agree 15
Agree 54
Disagree 21
Strongly disagree 8

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72b. Changing the genetic makeup of trees in order to help rapidly reforest areas which have been logged.

Strongly agree 16
Agree 55
Disagree 19
Strongly disagree 7

73. Breeding genetically engineered livestock animals to have less fat.

Strongly agree 6
Agree 36
Disagree 40
Strongly disagree 14

74. Modifying genes in a human embryo to eliminate an inherited disease.

Strongly agree 11
Agree 45
Disagree 27
Strongly disagree 14

75. Breeding genetically engineered animals for use in medical research.

Strongly agree 9
Agree 40
Disagree 34
Strongly disagree 15

76. Creating genetically modified fish that will be healthier and more disease resistant.

Strongly agree 8
Agree 49
Disagree 29
Strongly disagree 10

END OF ROTATION

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

Some people feel that the idea of patent protection is necessary in the field of biotechnology, because we need to encourage inventions in this area for all the benefits which they can bring. Others are uncomfortable with the idea of patents in the field of biotechnology, because:

77a. The benefits of new inventions may only be available to those who can afford to pay more.

Idea of patent protection is necessary 47
Uncomfortable with idea of patents 49

77b. There is something wrong with the idea of patenting a life form such as an animal or a plant.

Idea of patent protection is necessary 43
Uncomfortable with idea of patents 52

Which of these two points of view is closer to your own.

I'd like to ask you if you strongly support, support, oppose or strongly oppose the idea of providing patent protection for the following biotechnology inventions. This would mean ensuring that inventors are rewarded, but that their inventions may be more highly priced or less available for a period of years. (ROTATE)

78a. A single cell organism, like bacteria, which has been altered so that it can be used to clean up toxic spills.

Strongly agree 19
Agree 48
Disagree 22
Strongly disagree 8

78b. Human tissue, like a kidney which has been cloned.

Strongly agree 6
Agree 34
Disagree 36
Strongly disagree 19

79a. Plants, like tomatoes that have had new genes inserted in them in order to grow larger.

Strongly agree 8
Agree 38
Disagree 39
Strongly disagree 13

79b. Plants, like tomatoes that have had new genes inserted in them in order to have a longer growing season.

Strongly agree 7
Agree 47
Disagree 32
Strongly disagree 10

80a. Plants, like potatoes that have had new genes inserted in them in order to enhance their nutritional value.

Strongly agree 10
Agree 44
Disagree 33
Strongly disagree 11

80b. Plants, like potatoes that have had new genes inserted in them in order to enhance their medicinal value.

Strongly agree 8
Agree 47
Disagree 30
Strongly disagree 11

81a. A rodent, like a mouse that has been bred to resist a particular disease in order to help find a cure for that disease in humans.

Strongly agree 14
Agree 48
Disagree 28
Strongly disagree 8

81b. A mammal, like a cow that has been modified so that it is able to produce more milk.

Strongly agree 5
Agree 33
Disagree 42
Strongly disagree 17

82a. A tree which has been genetically engineered so that it will grow to maturity more quickly.

Strongly agree 10
Agree 45
Disagree 32
Strongly disagree 10

82b. A tree which has been genetically engineered so that it will be more resistant to insects and diseases.

Strongly agree 13
Agree 52
Disagree 25
Strongly disagree 8

83. Animal tissue, like a pig's heart which has been altered so that it can be transplanted into a human.

Strongly agree 9
Agree 35
Disagree 35
Strongly disagree 17

84ab

84a. A sheep which has been copied or cloned.

Strongly agree 5
Agree 27
Disagree 42
Strongly disagree 21

84b. A virus which is created to kill insects that harm trees.

Strongly agree 10
Agree 40
Disagree 34
Strongly disagree 13

END OF ROTATION

For each of the following please tell me whether it is something which is important and you would use personally, something which is a good idea but which you would not use or get involved with personally, or something which is relatively unimportant. (ROTATE)

85. Having access to studies about whether or not human health is at risk from long-term exposure by eating genetically modified foods.

Important, would use personally 62
Good idea, not get involved with or use personally 29
Relatively unimportant 7

86. Having the government launch a major effort to inform the public about biotechnology uses and plans for the future.

Important, would use personally 61
Good idea, not get involved with or use personally 30
Relatively unimportant 8

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87. Having the government conduct public hearings or consultations with Canadians about safety, regulation and support to biotechnology.

Important, would use personally 52
Good idea, not get involved with or use personally 36
Relatively unimportant 10

END OF ROTATION

88abc

88a. To what extent do you think the risks are known and understood by the Canadian public?

A great deal 5
Somewhat 25
Not too much 49
Not at all 19

88b. To what extent do you think the risks are known and understood by Canadian governments?

A great deal 12
Somewhat 47
Not too much 29
Not at all 8

88c. To what extent do you think the risks are known and understood by the companies that produce biotechnology products?

A great deal 25
Somewhat 51
Not too much 14
Not at all 7

89. Some people are confident that enough is being done to study and monitor the risks associated with biotechnology. Others are worried that not enough priority is being attached to this. Which of these points of view is closest to your own?

Enough being done to study/monitor risks 21
Not enough priority attached to it 74

90. To the best of your knowledge, in the last month have you eaten any food products which have been genetically modified?

Yes 23
No 57