

CONSUMERS AND BIOTECHNOLOGY: A SYNOPSIS OF SURVEY AND FOCUS GROUP RESEARCH

Conducted on behalf of
the Office of Consumer Affairs,
Industry Canada under the
Auspices of the National Biotechnology Strategy

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December 16, 1996

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EXECUTIVE SUMMARY

Biotechnology can be a confusing issue for consumers for a number of reasons. As a process of using parts of living organisms to create new products, biotechnology is not new. However, genetic engineering, which is a more precise application of biotechnology, is a relatively recent technology. Understanding biotechnology is further hampered by the fact that genetic engineering is not evident to the casual observer. Additional concerns are the rapid rate of change and the wide range and diversity of information confronting consumers.

In order to understand consumers' reaction to and perception of biotechnology, the Office of Consumer Affairs has undertaken a number of studies and focus groups over the past two years, largely under the auspices of the National Biotechnology Strategy. They showed that, in general, consumers are cautiously optimistic towards biotechnology. They also showed that although consumers have a limited knowledge of biotech issues, most are aware of specific applications, especially the more traditional ones related to food and health.

Although consumers welcomed the positive aspects associated with biotechnology ie. better food products and improved health care, they also displayed some anxieties about the possible negative long-term consequences. There was frequent mention of past examples of where other technologies have had some negative implications. The need to balance the risks versus the benefits was seen as very important. Generally, there was a greater acceptance of risk for products of a more altruistic nature such as breakthrough drugs, than for those which added marginal or superficial value.

Like other social issues, the complex nature of biotechnology leads consumers to consider a broad array of factors when making marketplace decisions, factors that extend beyond the traditional price and quality considerations. For example, people's opinions about the environment, the economy and, in particular, their moral beliefs, weigh heavily in their acceptance of biotech applications. However, this dependence on non-price considerations in addition to a lack of complete information can inhibit consumers from making marketplace decisions that are based upon traditional economic factors such as price and quality.

To overcome these barriers, people need to be able to make clear choices that are based on factual information with respect to biotech applications. Consumers are divided on who should be responsible for providing this information. This paper divides them into two groups: consumers that want greater regulatory protection (the institutionalists); and those who want to be provided with information that they could use to evaluate the products for themselves (the information-seekers). While most survey respondents admitted that government could play a significant role in this area by providing information and ensuring consumer safety, they also suggested that a consortium made up of representatives of government, academia, and the private sector might provide a more balanced perspective.

The paper does not draw conclusions as to what would constitute appropriate roles for government and other players with respect to biotechnology. However, in the concluding section, the paper does raise a number of issues that will need to be addressed in the months and years ahead to meet the concern of both those consumers advocating increased regulation and those consumers demanding a larger marketplace role. These issues include:

- Which regulatory mechanisms are most suitable to biotechnology?
- When do consumers need protection and when can their interests be met through the marketplace?
- Given the technical nature of biotechnology, is the general public capable of analysing the complex information regarding this enabling technology?
- What is the impact of information on marketplace decision-making?
- Who should provide consumer information and should they be held responsible for ensuring it is accurately and reasonably disseminated to the public?
- How does new information influence consumers' attitudes toward risk?
- What are the benefits and drawbacks of product labelling compared to other forms of information dissemination?

As such, this paper takes us into the current work plan of the Office of Consumer Affairs that will look at a number of biotechnology issues from a marketplace perspective.

1.0 INTRODUCTION

The April 2nd, 1996 edition of PEI's Charlottetown Guardian carried an article reporting the introduction of a new variety of potato, genetically engineered to resist infection by the Colorado potato beetle. In a province known for its "love of spuds," the NewLeaf potato could end the need to spray crops with chemical pesticides in the fight against the devastating impact of beetles.

Trying innovative ways to fight pests is not something new for farmers. However, unlike other, more traditional methods, the NewLeaf potato deflects beetles from the "inside-out" through the addition of an extra gene that produces bacteria that are safe for human consumption, but deadly to beetles. This type of genetic engineering is commonly referred to as biotechnology, a broader term describing the use of parts of living organisms to create new products with innovative characteristics.

Although initial reaction to genetic engineering may evoke images of *Attack of the Killer Tomato*, in fact, there are many traditional applications of biotechnology. The use of yeast to make beer and the selective breeding of animals to enhance desired characteristics are examples of how living organisms have been used to create consumer products in the past.

The Office of Consumer Affairs (OCA) of Industry Canada, in conjunction with other federal departments under the auspices of the National Biotechnology Strategy, has completed over the past two years, preliminary work to identify concerns and to highlight consumer issues with respect to biotechnology and its applications. This has included conducting a number of surveys and focus groups to expand our understanding of how much consumers already know about biotechnology, where there are gaps in their information, and how information impacts upon their perceptions and purchasing decisions.

Not surprisingly, these studies found that consumers proceed very cautiously with respect to biotechnology and its applications. They expressed concern over a broad range of unknowns. For example, while beetle-resistant potatoes may appear innocuous enough, the introduction of a broad range of genetically engineered products onto Canada's markets raises a number of consumer, social and ethical issues. Questions like: Who will ensure that the products are safe? When I go shopping, will I be able to choose between biotechnology and traditional products? What does biotechnology entail - are we talking about playing God? were raised.

Consumers indicated that although they want to be able to choose between products using biotech and traditional products, at present, many feel ill-prepared to make informed decisions. As a new, complex, and at certain times, alarming topic, biotechnology leaves many consumers confused. Thus, not surprisingly, rather than basing their marketplace decisions solely on traditional indicators, such as price and quality, consumers rely more heavily on their own personal experiences and values to decide among biotech products and applications and between

biotechnology applications and products and other products that are based on more traditional and familiar technologies. This reliance on incomplete information can, in turn, compromise their ability to engage in rational decision-making and can work as a barrier to the efficient functioning of the marketplace.¹

The purpose of this paper is threefold. First, it will take an inventory of the information that we have gathered over the past two years: assessing what we know and where we need to do more work. Second, it will provide a common reference-point for the authors of a series of expert analytical papers being developed in conjunction with the Office of Consumer Affairs as part of the National Biotechnology Strategy. Third, the paper will investigate whether the nature of biotechnology itself prevents it from operating within the traditional marketplace structure.

In order to achieve these three goals, the paper is structured into five sections. The first gives some background information on biotechnology, framing it as a new and complex issue. Using the survey and focus group results, the second section summarizes consumers' knowledge of, and reactions to, biotechnology. The third section highlights factors that influence consumers' attitudes toward biotechnology including those mentioned within the focus groups. In particular, it focuses upon those factors that impact upon consumers' ability to analyse information. The fourth section looks at two ways that marketplace barriers can be overcome, contrasting increased consumer awareness with more traditional legislative mechanisms.

The concluding section will outline a number of questions that need to be answered in order to determine which of the two options provides a better solution to overcome marketplace barriers. This will in turn, provide part of the foundation for the work of the Office of Consumer Affairs as it embarks on a work plan to investigate issues related to consumers and biotechnology.²

¹In their work on antitrust and consumer protection law, Dr. Robert H. Lande, professor at the University of Baltimore School of Law and Neil W. Averitt, attorney, Office of Policy and Evaluation, Bureau of Competition, U.S. Federal Trade Commission, suggest that marketplace failures can be broken into two categories: internal or "inside the head" failures and external or "outside the head" failures. Using this framework, the complex nature of biotechnology that leads to less than fully rational consumer decisions from an economic perspective would be an internal marketplace failure because it weakens consumers' decision-making capacities. This will be discussed in more detail later in the paper

²This work plan encompasses the preparation of about 15 expert papers which will be used to analyse biotechnology from an economic/marketplace perspective. The papers will discuss how firms, information, risk and regulation impact upon biotechnology and consumer decisions. In addition, an integration and implications paper will be prepared to summarize the findings of the analytical papers and set out the next steps for research, analysis, policy development, consultation and action. It is expected that these papers will be presented by their authors at a round-table conference in June, 1997.

2.0 BIOTECHNOLOGY: WHAT IS CONFUSING THE ISSUE?

Biotechnology can be confusing for consumers. Not only does biotechnology appear to have emerged as an issue relatively recently, it also involves complexities that are not necessarily evident to the casual observer. This paper will show that these qualities can have repercussions on the marketplace behaviour of consumers. First, however, it is important to understand what biotechnology is, and what it is not.

2.1 *Biotechnology is not new*

In fact, biotechnology is very old. The *Canadian Environmental Protection Act* (CEPA) defines biotechnology as "*the application of science and engineering in the direct use of living organisms or parts or products of living organisms in their natural or modified forms.*"³ Using this broad definition, biotechnology includes a number of familiar processes such as using yeast (which is a unicellular fungus) to make bread and beer or using rennin (an enzyme taken from the lining of calves' stomachs) to make cheese. Given that there are many of these traditional applications, why is biotechnology often associated with recent scientific advances?

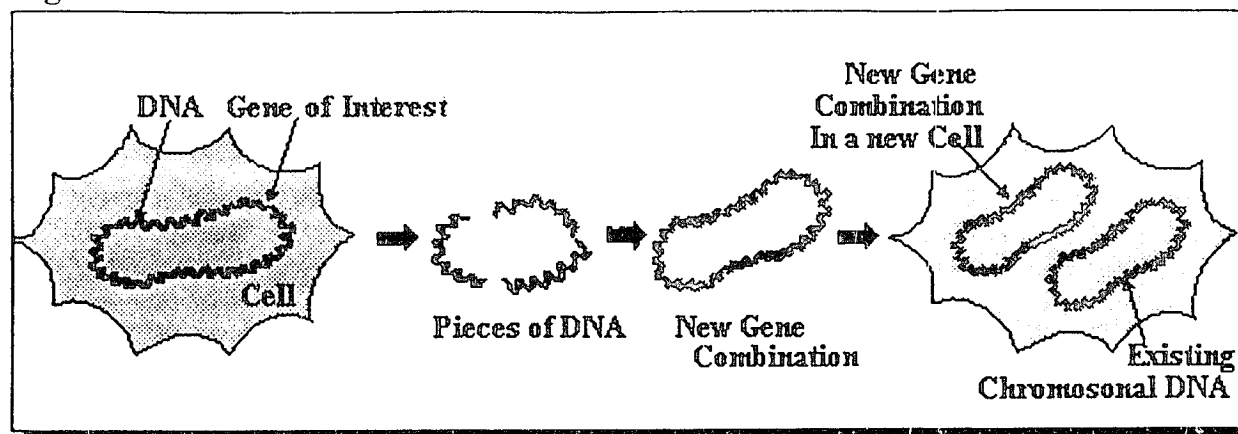
Most likely it is because much of the recent attention surrounding biotechnology concerns the issue of genetic engineering, which is, indeed, a new technology. Developed in the early 1970's, it was not until a decade later that the first genetically engineered products reached the market.

The process of genetic engineering basically involves scientifically altering an organism's genetic code. DNA (or the chemical, deoxyribonucleic acid) is found in the nucleus of all living cells and consists of genes that control the production of proteins. Each living organism has a unique arrangement of DNA and genes that create its own individual characteristics.⁴ As depicted in Figure 1 on the following page, scientists can alter the naturally-occurring characteristics of an organism by cutting and pasting genes. In some cases, this involves taking a gene from one organism and transplanting it to another. In other cases, this might involve rearranging the order of genes within the same organism. The result however, is an infinite number of genetic combinations.

³The *Canadian Environmental Protection Act*, Section 3(1).

⁴For a more complete discussion of DNA, please refer to the *Background Paper on Food Biotechnology in Canada*, Consumers Association of Canada, April 29, 1995, p. 4-5.

Figure 1: How are New Gene Combinations Made?



2.2 *Biotechnology is ... Hidden to the Observer*

Although a highly complex process, biotechnological change is largely hidden from the observer. This is especially true of genetic engineering which is not only a hidden process, but has, to date, made largely small, unremarkable, alterations to organisms' characteristics, rather than fundamental changes to the nature of a species. For example, returning to the NewLeaf potato, despite its beetle-resistant qualities, the casual observer would be unable to differentiate it from other "non-biotech" potatoes. As a result, consumers must seek out this information from specialists and others.

2.3 *Biotechnology Can...Raise Alarm*

For generations, people's imaginations have created fantastic stories that parallel genetic engineering. Movies such as *Jurassic Park*, where genetically-engineered dinosaurs create havoc, encourage the public to think of terrible outcomes that could result from re-arranging genes. Nevertheless, to date, genetic engineering has been used in small, largely inconspicuous ways and none of the negative events found in films, the popular literature, and the press, and forecasted by those alarmed by the technology, have come to pass. In fact, the scientific evidence up to now does not suggest that genetic engineering by its very nature would raise more health and safety alarms than other more traditional technologies.⁵

⁵The third report of the Standing Committee on Environment and Sustainable Development (the "Caccia Committee") looked at whether biotechnology merits specific process-oriented legislation to ensure consumer/environmental safety. Their recommendation to proceed with a system of providing protection under current legislation,

2.4 *Biotechnology Can Be ... Complex to the Layperson*

Biotechnology, and in particular, genetic engineering, has been made possible through advanced research in science and technology. Generally, the technical complexity of the technology prevents the public from understanding details of the product and the specific attributes of biotech applications. The result is an unequal relationship between the producer and the consumer which can leave the consumer without the necessary tools by which to analyse the costs and benefits of a product. The consumer is left to speculate on his/her own about possible consequences that may or may not be reasonable⁶. This situation is compounded by the rapid pace of change and the information overload of consumers.

Rapid Rate of Change

Technology is evolving at such a rapid pace that what is 'new' one year is obsolete the next. Just as consumers become comfortable with one technology, another, new process emerges. As noted recently in the Economist, "during the past two decades the global network of computers, telephones and televisions has increased its information-carrying capacity a million times over."⁷ As a result of this rapid rate of change, more and more time is being demanded of people who want to 'keep-up'.

This acceleration of technological change can be daunting, even to those specializing in a particular field. While the science of genetic engineering itself is not accelerating quickly, technology has promoted the rapid expansion of biotech applications. It would be presumptuous to assume that consumers have the time to keep up with all the changes to a level that would allow them to appropriately evaluate the pros and cons of biotech products. Moreover, relatively few consumers are early adopters of the products of new technologies. More of us are followers.⁸

with the *Canadian Environmental Protection Act* (CEPA) acting as a "safety-net" for processes not covered elsewhere, supports the view that biotechnology products do not by definition pose an additional safety concern.

⁶It should be noted that few consumers understand the internal workings of the computer, computer software, and the integrated circuit. While computer technology raised alarms when it was introduced, (eg. *Space Odyssey 2031*), today, consumers are more comfortable with the technology so that it no longer elicits the same kind of sensationalism in films, the press, and among certain public interest groups as does biotechnology.

⁷The Economist, *The Hitchhikers Guide to Cybernomics*. September 28th, 1996, p. 3.

⁸As cited in Derek Ireland's *Consumer Perspectives on Competition Policy, Intellectual Property, and Innovation in an Information Based Economy*, (August 1996: Office of Consumer Affairs, p. 20), "the 1995 CROP Environics survey shows that perhaps fewer than one in ten Canadians are eager to embrace the goods and services provided by new technologies, while about 50% or so bring varying degrees of enthusiasm to purchases of high technology goods and services. At the other end of the spectrum, about one in ten Canadians continue to resist and distrust technology, while the remaining 30% display varying degrees of reluctance to become full participants in the high-tech market and economy."

Information Overload

Even if consumers undertook a significant effort to try to keep up with the basics, the sheer amount of information available is huge and growing. Driving this growth in information are the rapid expansion in information technologies and the wider opportunities for the accumulation, dissemination and storage of information.⁹

Increasingly, new information distribution channels such as 1-800 numbers, Internet, and cable television are becoming more accessible to consumers in addition to more traditional newspapers and mail. However, although an expanded access to information could lead to greater consumer knowledge, wider choice, debate and consultation, in reality, the volume of information readily available to the consumer has never presented such a challenge! Even with the help of rapidly evolving "search engines" on the Internet to guide one through what Hal Varian has termed the "glut" of information¹⁰, consumers are simply unable to access and digest the breadth and complexity of information now becoming available on biotechnology as well as all other subject areas.

Biotechnology's appearance as a new technology, its inherently hidden attributes, and its complex nature compound the challenges which this technology must overcome to gain the public's attention and confidence. We will return to this momentarily, but first, the next section summarizes what consumers have said about biotechnology in the focus groups and surveys.

3.0 SURVEYS & FOCUS GROUPS: WHAT WE HAVE LEARNT SO FAR

Over the past two years, the Office of Consumer Affairs has conducted three separate studies designed to better understand consumers' attitudes and opinions with respect to biotechnology. The first, *Understanding the Consumer Interest in the New Biotechnology Industry*, was completed by Optima Consultants in November 1994 (hereafter referred to as the Optima report). It has two sections: the first, conducted in early 1994, consisted of a series of pre-survey focus group workshops in Montreal and Toronto used to pre-test the questionnaire; the second,

⁹In her article, *Consumers and the Marketplace for Information*, (Office of Consumer Affairs, Draft, March 29, 1996), Anne Pigeon notes that the growth in information is being driven by two factors: deregulation in the telecommunications and broadcasting sectors and the emergence of new information technologies such as the Internet.

¹⁰Varian, Hal R. *Economic Issues Facing the Internet*. Unpublished article, June, 1996 (Revised September 1996), p. 19.

reported on the results of a national telephone survey that took place mid-April, 1994.¹¹

The other two studies, *Environmental Applications of Biotechnology* and *Focus Groups on Agri-food Applications of Biotechnology*, used a focus-group format to gauge consumer reactions to food and environmental applications of biotechnology. These two final reports were released in March, 1996.¹² By using a focus group format, these reports provided anecdotal stories that offer insight into consumers' particular opinions and concerns. In addition, the focus-group format served to examine how much information, whether complete or not, impacts upon consumers' perceptions of biotechnology.¹³

In addition to these three studies, the Office of Consumer Affairs included two questions in CROP's annual survey of socio-cultural change in Canada¹⁴ and contracted Ekos Research Associates Inc. to undertake multivariate analysis of the Optima survey data to help develop a research strategy.¹⁵ The following section looks at the results of all of this work. In particular, it highlights consumers' knowledge of, and reactions to, biotechnology.

3.1 Consumer Awareness

The studies asked consumers about their current knowledge of biotechnology. The results were similar across all four projects: consumers, even the more highly educated, indicated that they

¹¹It should be noted that the Optima survey had a larger than normal proportion of participants, who, once they knew the topic of the survey, declined to participate. As well, a much larger than normal proportion (10% versus 2%) of respondents who agreed to take part, discontinued the interview, after it had begun. This may have affected some of the results that were received from participants who completed the interview. It should also be noted, that at present, very few biotechnology applications have actually made their way onto the Canadian market. As such, many of the opinions expressed have been described as "behaviour intention" rather than past behaviour.

¹²The two reports are: *Environmental Applications of Biotechnology: Focus Groups, Final Report*. Ottawa: Creative Research International, March 1996; and *Focus Groups on Agri-food Applications of Biotechnology, Summary Report*. Ekos Research Associates, March, 1996.

¹³Focus groups are designed to establish hypotheses and explore the range of opinions and views which may exist, whether they are based on complete information or not. In addition, these focus groups also served to examine how new information - whether complete or not - can impact upon the perceptions of consumers. Because of the qualitative nature of the study design, the reader is cautioned to view the findings as hypotheses rather than as definitive conclusions. Although consistencies and logic lend confidence to the analysis and interpretations, there is no way of determining the degree to which the opinions expressed are reflective of the study population at large.

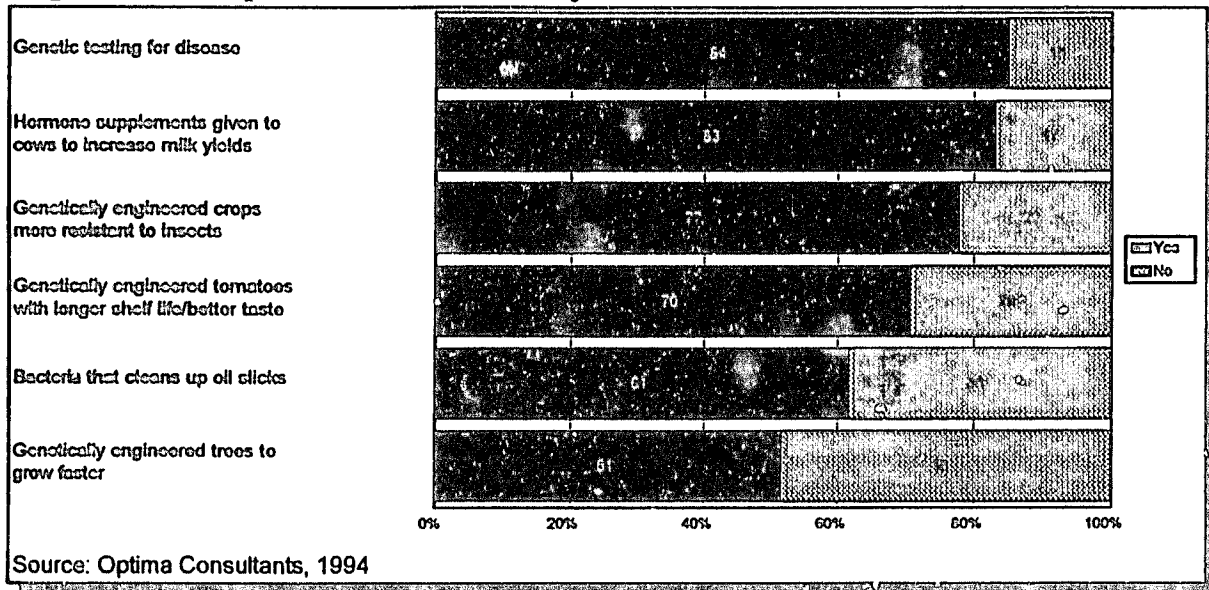
¹⁴CROP Annual Study: *Analysis of Industry Canada's Omnibus Questions included with the 1995 3SC Survey*. CROP Inc., January 1996.

¹⁵*Biotechnology Research Design, Final Report*. Ekos Research Associates Inc., December 22, 1995.

had little or no *knowledge* of biotechnology.¹⁶ This compares with 70% of consumers who consider themselves either very well informed or somewhat well informed of current issues in general.¹⁷

However, *awareness* of biotechnology, defined as having "heard of" the term, was substantially higher, even amongst those who had previously indicated little or no knowledge. When presented with examples of specific applications, consumer awareness was found to be even higher. For example, Figure 2 shows that more than 50% of the Optima respondents recognized biotechnology applications, even those more obscure products such as bacteria that clean up oil slicks. As well, half of the respondents had heard of at least five applications and an additional 38% had heard of three or four.

Figure 2: Respondents Familiarity with Various Biotech Products



General applications specific to food and health were the most easily recognizable, especially more traditional biotech applications such as the use of bacteria to make yogurt or issues widely reported in the media such as giving cows hormones to increase milk production. Environmental applications of biotechnology were less well known, with knowledge limited to very general applications such as composting and biologically-produced fuels. Appendix A outlines a number

¹⁶The Focus Groups on Agri-food Applications of Biotechnology noted that 20% of those who were aware of biotechnology indicated no knowledge. 80% indicated moderate knowledge.

¹⁷Optima, p. 13.

of applications that have resulted from biotechnology

Two factors explain the low-knowledge/high awareness dichotomy. First, as mentioned in the previous section, biotechnology -- particularly genetic engineering -- is new, complex and not evident to the casual observer. For example, changes to the genetic mapping of products can significantly affect a product's characteristics but are generally well-concealed from the consumer. As such, there may be awareness of a biotech application, but no association made between it and the genetic engineering process that created the novel characteristics. Second, although some consumers may be familiar with the products themselves, and understand that they are genetically altered, they may not associate them with the *term* biotechnology.

It is interesting to note how participants became aware of biotechnology. Although there was no consistency between focus groups, magazines (National Geographic), David Suzuki, government and local industries were all cited as sources of information. In particular, knowledge of alternative fuels was high in Vancouver and Saskatoon where some gas stations have been marketing a "gasohol" product.

3.2 *Consumer Reaction to Biotechnology Applications*

While some respondents welcomed the positive benefits associated with biotechnology, others focused more on the possible unknown side-effects often associated with new technologies. Like Thalidomide, silicone implants and asbestos, biotechnology is regarded as a very powerful technology with potentially alarming side-effects.

Although there were variations between focus groups on the level of support for biotechnology, the overall response to biotechnology was cautiously optimistic. The multivariate analysis conducted by Ekos Research Associates Inc. on the Optima data attempted to divide consumers into five groups of which 44% were characterized as positive towards biotechnology and an additional 32% were indecisive.¹⁸ Many respondents viewed biotechnology as a means of finding new solutions to old problems. As could be expected, familiar, traditional processes, such as composting, were more widely accepted than other less well-known applications.

Balancing risks against benefits was viewed as extremely important. Respondents seemed willing to accept products provided that the benefits outweighed the risks.¹⁹ As such, acceptance of biotechnology would appear to require that products be perceived as having added value above

¹⁸The five groups were broken down as follows: true believers (21%); fearful supporters (23%); indecisive (32%); disinterested (6%); and avid opponents (18%). *Biotechnology Research Design*, p. 26.

¹⁹As was pointed out in the *Biotechnology Research Design*, it is important to note that consumers risk/value assessment is based upon perceived risk rather than objective risk. (p. 16)

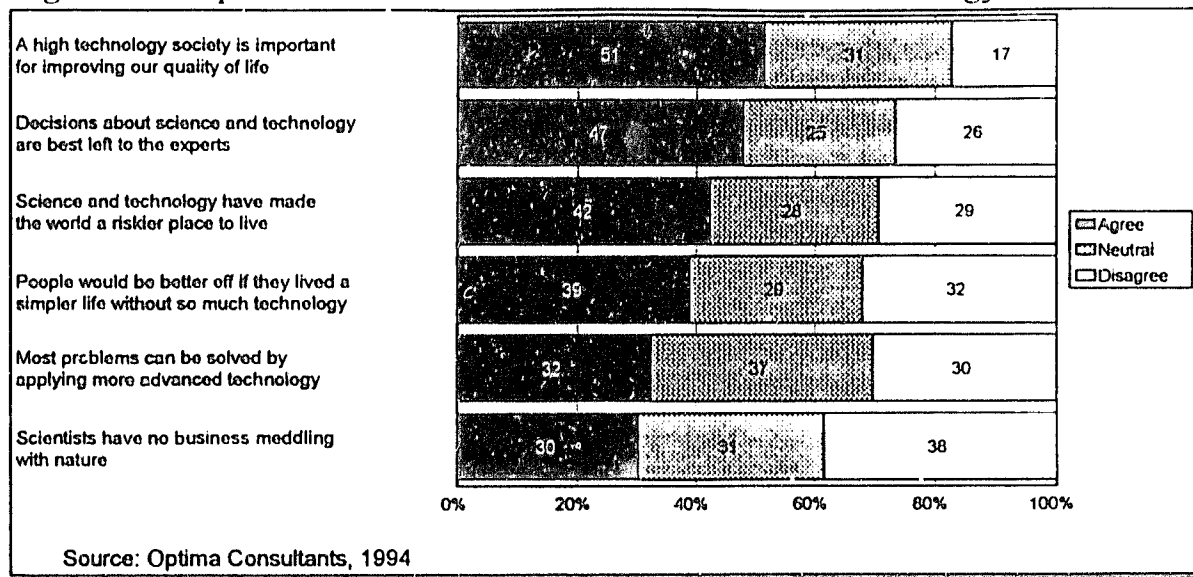
what was currently available to them on the market. As well, they were generally more accepting of biotech applications that responded to broad societal needs (such as new drugs to fight against disease) than products that offered only personal benefit. Respondents were particularly hesitant to endorse new products where improvements were either very small or potential harm was very large. The feeling that "all it takes is one mistake" was cited frequently.

The example of two similar, genetically-altered vegetables illustrates consumers' unwillingness to accept biotechnology products that are perceived to provide little additional value beyond what is currently available in other more 'traditional' products. When presented with a genetically-engineered tomato featuring longer shelf life and improved taste, consumer reaction ranged from neutral to negative. Although respondents did not reject genetically-altered food outright, many respondents questioned the need for a new variety of tomato when the tomatoes that were currently available were "perfectly good." In comparison, the response was generally more favourable to the genetically-engineered potatoes that reduce the need for environmentally harmful pesticides.

Although reaction to specific biotech products varied widely, environmental and health applications were generally better received than food products. Consumers were more willing to accept biotech risks associated with altruistic purposes such as protecting the environment and fighting diseases, than for purposes where the benefits are perceived as more trivial, such as improving the taste of food. More work is needed on whether these differences in risk/benefit tolerances are truly product specific or are related more to the current state of public knowledge where health and environmental applications are associated with major technological breakthroughs and food applications are associated with marginal improvements. If the second situation prevails, major breakthroughs in the food area could substantially alter public perceptions and consumer acceptance of agri-biotech applications.

More generally, biotechnology's association with science and technology raised concern among some of the survey group participants. For instance, a question in the Optima survey measured respondents' attitudes toward science and technology. More than 51% of respondents agreed with the statement that a high technology society is important for improving our quality of life (See Figure 3).²⁰ Nevertheless, the surveys also indicated that many people have difficulty adapting to what, for many can be, unfamiliar territory. Others expressed frustration with the rapid rate of change and higher levels of stress often associated with science and technology.

²⁰Optima, p. 7.

Figure 3: Respondents' Attitudes Towards Science & Technology

The studies also highlighted the impact of education on people's comfort with science and technology generally, and biotechnology in particular. They concluded that education was positively related to one's comfort with biotechnology. Two explanations of why people with more education have an easier time accepting biotechnology were offered. A greater ability to analyse the information on biotechnology and thus more reassurance that the product was safe was suggested as one explanation.

Anecdotal comments made by participants provide another explanation. These comments suggest that those with more education often have had more positive experiences with science and technology than those with less education. For example, one respondent in the Environment focus group attributed job-loss to the introduction of new technology in the workplace. He/she stated, "I used to work in offices. Now it's all computers and I'm in the dark"²¹ Among this group, there seems to be resignation to the fact that the rate of change makes it impossible to keep up with the issues. Although such experiences are only tenuously related to biotechnology, they can influence, and, at the extreme, perhaps undermine, the willingness of some consumers to accept new technologies such as biotech products.

The CROP survey also made some interesting observations on consumers' typical reactions to biotechnology.²² They found that only a minority of Canadian consumers are tempted to buy

²¹Focus Groups on Agri-food Applications of Biotechnology, p. 15.

²²CROP, p. 13.

biotech products. According to their research, people who are "very likely" to buy biotech products are typically individuals "with great faith in their personal potential, who like to experiment with and explore all aspects of their lives, including what they buy." This group would also tend to be more conscious of social status and to place a high value on success. Those respondents unlikely to purchase biotech products were characterised as being less secure individuals who perceive biotech products as threatening to the environment, their autonomy, and their personal potential. CROP also pointed out that insofar as this latter point of view is widely held, it represents a major impediment to the commercialisation of biotech products.²³ (See Appendix B)

From these results, it is evident that a number of factors influence consumers' perspectives with respect to biotechnology. The following section highlights some of their concerns.

4.0 CONSUMERS' CONCERNS

Traditional marketplace theory tells us that consumers are most influenced by the price of a product and its perceived quality. However, as previously mentioned, the nature of biotechnology as a new, complex subject area, as well as increasing amounts of information available to consumers and rising levels of consumer awareness and education²⁴ also raises the number of concerns that consumers bring to their marketplace decisions. In their work on antitrust and consumer protection law, Dr. Robert H. Lande of the University of Baltimore, School of Law and Neil W. Averitt, attorney, Office of Policy and Evaluation, Bureau of Competition, U.S. Federal Trade Commission suggest that both external and internal factors can prevent consumers from making rational decisions which can, in turn, inhibit the smooth functioning of the marketplace.

External factors, or those outside the direct influence of the consumer, prevent the market from providing sufficient marketplace options and thereby cause competition problems. Examples of external factors are too few producers, differentiated products, and monopolistic conditions that prevent the market from providing sufficient marketplace options and thereby cause competition problems. Internal factors are those that inhibit consumers from distinguishing between what is real from what is unreal.²⁵ Lande et al. suggest that there are five primary types of internal

²³CROP, pp. 20 & 29.

²⁴ According to the National Graduates Survey, in 1976, 13.9% of the population attended post-secondary education. By 1995, this had increased to 25.1%.

²⁵Lande, Robert H and Neil W. Averitt. *A Unified Theory of Consumer Sovereignty: Antitrust and Consumer Protection Law Combined*. Draft. October 24, 1996.

factors: coercion; vulnerability; incorrect information; incomplete information, and information that is unduly hard to process.

The complexity involved with biotechnology makes it particularly vulnerable to some of these marketplace barriers that are internal to the consumer (i.e. literally inside the consumer's "head"). The following section will briefly outline some of the non-traditional internal factors that consumers take into consideration with respect to biotechnology which might lie beyond traditional marketplace theory. It highlights the concerns that consumers expressed in the focus groups and surveys. In particular, the environment, the economy, safety and ethical considerations are examined²⁶.

4.1 *The Environment*

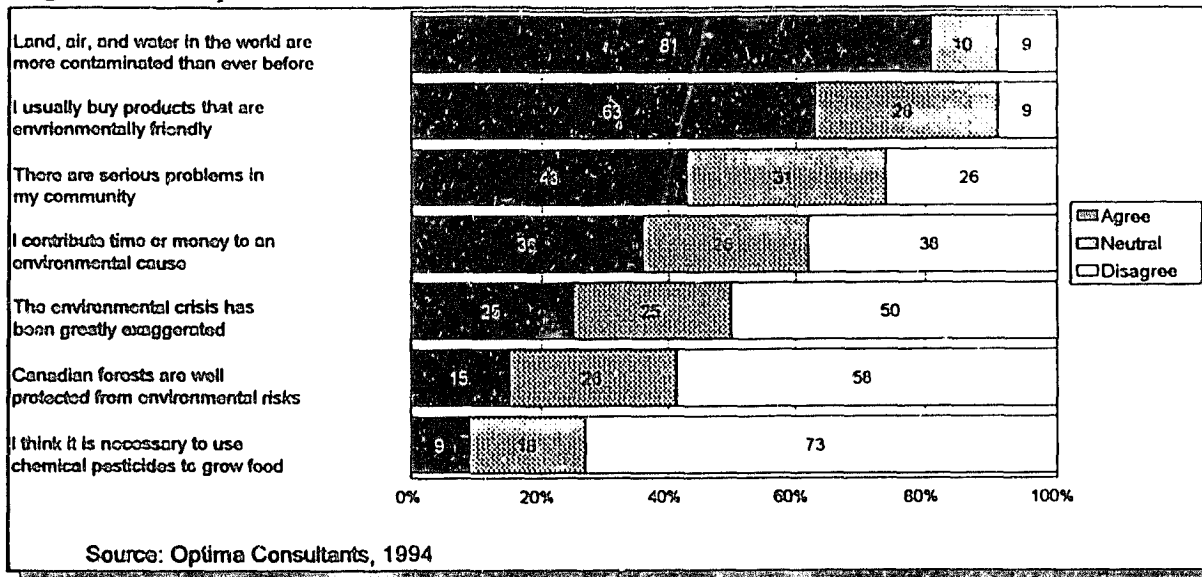
There has been an increased awareness, in recent years, in the consumer's consciousness of the environment as seen in the rise in popularity of environmentally-friendly products, recycling and composting. The Optima survey posed several questions to measure respondents' attitudes toward the environment in order to gauge how this will affect biotechnology (Figure 4). It found that respondents were very anxious about the safety of the environment with 81% agreeing that land, air, and water are more contaminated than ever before; as well, 63% of respondents regularly purchase environmentally-friendly products.

This increased awareness is reflected in the responses heard in the focus groups with respect to biotechnology. Biotech applications that were positively received were those that offered an alternative to current, environmentally-unfriendly practices or those that offered a solution to current environmental problems. Focus group respondents were able to readily identify the benefits from these applications to the environment.

However, respondents also had some concerns with respect to even seemingly positive applications of biotechnology. For example, some focus group participants suggested that using bacteria to clean up oil spills might discourage companies from taking preventive measures to avoid oil spills in the first place.

²⁶Derek Ireland also explores similar concerns from the perspective of how consumers are reacting to biotechnology within an information based economy in *Consumer Perspectives on Competition Policy, Intellectual Property, and Innovation in an Information Based Economy*. He suggests that consumers are applying social, political, "lifestyle" and other broader concerns to their purchasing decisions that in turn poses new challenges to both private sector marketers and government policy makers, including those responsible for competition policy and intellectual property. (See especially Section 3.3, p.21).

Figure 4: Respondents' Environmental Attitudes



4.2 The Economy

The perceived association between the expansion of high-tech industries and the subsequent creation of good employment opportunities, was noted numerous times by consumers. While consumers mentioned the importance of biotechnology to the Canadian economy, they were unwilling to endorse the development of unsafe or dangerous products for the sake of increasing employment or improving Gross Domestic Product. For example, of the Optima respondents, only 28% agreed with the statement, "Canadians should accept some risks from biotech developments if it strengthens the economy" while 41% disagreed.²⁷ Some consumers also raised concern that only certain segments of the population would benefit from biotechnology, while others would be left to absorb the risks.

4.3 Safety Concerns

Product safety was of primary importance to consumers. The bottom-line for consumers is that they want to know that a biotech application is safe (personally, environmentally, and socially) both now and in the future. Essentially there are two aspects which consumers consider with respect to risk: severity of the consequences and likelihood of occurrence. Of the Optima respondents, 69% said that they preferred a no-risk policy whereas 29% preferred an approach

²⁷Optima, p. 27.

that weighed both the benefits and the risks ²⁸

However, like virtually all other products, safety of biotech products cannot be absolutely assured. More often, the safety of a biotech product is determined through risk analysis that is based upon the best information available at the time. Regulation of biotechnology products for health and safety is the responsibility of a number of departments within the federal government: Health Canada, Agriculture and Agri-Food Canada, Fisheries and Oceans Canada and Environment Canada. They work closely together to ensure that products are properly assessed before being introduced into the Canadian market. Together, they use science-based risk assessments to determine the safety of a product. The Canadian risk assessment process to determine health, safety and efficacy compares favourably with those in other industrialized countries.²⁹ Of course, there is always the danger (however unlikely) that other factors will become known in the future that will undermine the safety of a biotech application.

4.4 *Ethical Considerations*

Ethical considerations were also frequently mentioned in the focus groups. Discomfort with genetic engineering led to discussions over whether it is desirable for humans to "play God." For example, whether or not scientists should be mixing genes between different species raised a number of ethical debates. Although some respondents suggested that curiosity and progress were instinctively human traits and should be supported, others questioned at what point the line should be drawn.

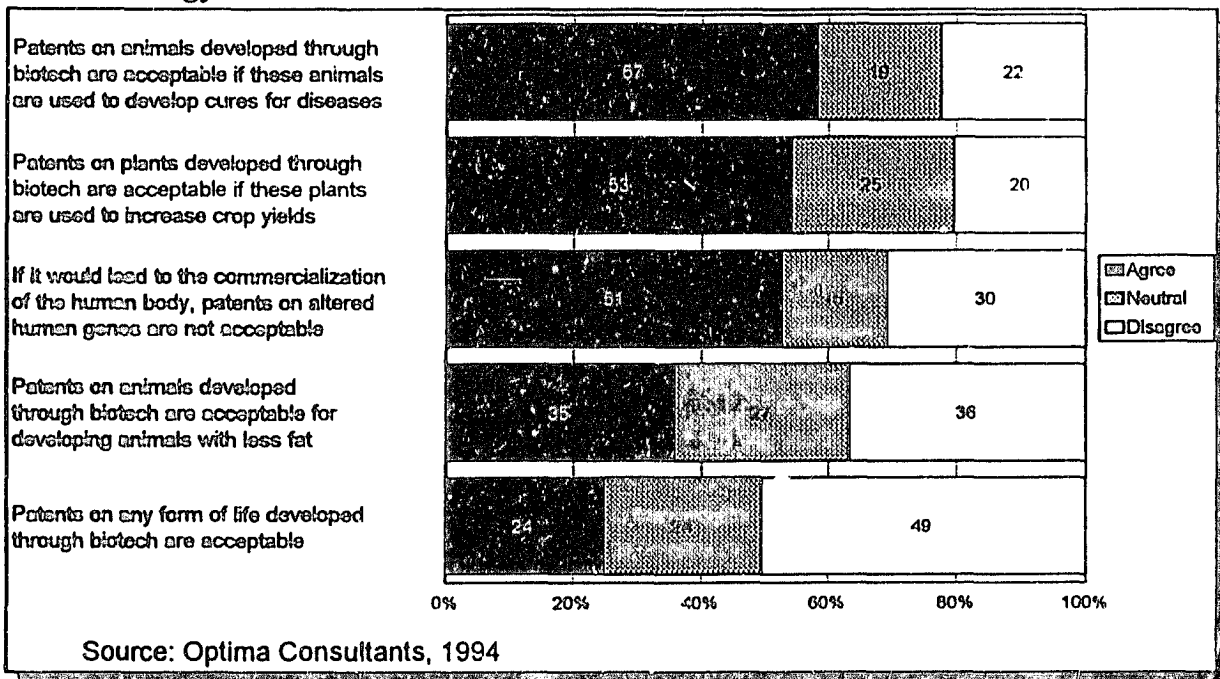
As noted earlier, respondents appear ready to set aside their ethical concerns if genetic engineering would lead to a major break-through of benefit to all of society, i.e. a cure for cancer or AIDS. In addition, there appears to be an hierarchical ranking of biotechnology in terms of acceptability. Whereas genetic engineering of fruit and vegetables seems to be relatively innocuous to most people (regardless of whether or not they would eat these products themselves), the alteration of animals' genetic composition is more controversial, while processes that tamper with human tissues raise even greater concerns. Perhaps the most contentious processes are those that involve copying genes originally derived from humans in conjunction with other living organisms. For example, although switching tomato and potato genes might not be highly controversial for many consumers, mixing human genes with those of other animals would be more likely to raise ethical debates.

²⁸Optima, p. 30

²⁹KPMG, *Improving Canadian Biotechnology Regulation: A Study of the U.S. Experience* and Consumers' Association of Canada (April 29, 1995, Conclusions), *Background Paper on Food Biotechnology in Canada*, (March, 1995, p. 72)

Ethical considerations also extend into whether firms should be allowed to have ownership of a living organism. The Optima survey found that 90% accepted the general principle of patents. However this support dropped to 24% (a difference of 66%) when it came to the patenting of genetically-engineered higher life forms. (See Figure 6).³⁰

Figure 6: Respondents Who Agree with Patenting Life Forms Created through Biotechnology



For example, if a firm in the biotech sector created a genetically-altered prototype of an animal, should it be allowed to protect its investment through patent protection? In a recent Canadian case, patent protection was denied to researchers of Harvard University for a genetically-engineered mouse which they had been developed to aid in scientific research. The Commissioner of Patents ruled that a genetically-altered mammal was now under the control of nature and thus could not be patented under Canadian law.³¹ Currently, the Commissioner's decision is being

³⁰ The 24% figure represents participants' responses to the question, Do you agree with 'patents on any form of life developed through biotechnology'. Support for patents on higher life forms increased to 57% when used to develop cures for diseases. (Optima, p. 19)

³¹ Specifically, the Commissioner of Patents ruled that a gene that had been altered through recombinant DNA techniques and introduced into a cell, that was in turn, introduced into a mammal was now under the control of the laws of nature so as not to give rise to a patentable invention for that mammal per se.

appealed by the President and Fellows of Harvard College to the Federal Court, Trial Division

5.0 OVERCOMING "INTERNAL" MARKETPLACE BARRIERS

The previous section looked at a number of concerns that affect consumers' decisions in the biotech market that could lead to "internal" marketplace failure (i.e. based on factors internal to the consumers' thought processes): the environment, economy, safety and ethical concerns. This raises the question of what can be done to promote balanced decisions with respect to biotechnology. In their work on marketplace forces, Hadfield et al. identify a number of ways that consumer protection can be assured. These include: regulation, setting minimum standards for the provision of services³², preapproval of products, product bans, provision of dispute resolution mechanisms, providing consumer information, and labelling.³³

In deciding upon the most appropriate methods, it is important to consider who will be the recipients/audience of the consumer protection mechanism and how it will be used. Hadfield et al., suggest that information is one of the key elements to providing modern consumer protection. Comparing consumer and competition policy they state,

*"Information lies at the heart of the essential problem of consumer protection as a distinct policy area: whereas competition policy engages a focus on the structure of markets and the options - price, quality, quantity- available to consumers; consumer protection policy engages a focus on the structure of transactions and, in particular, the match between what consumers expect and what they ultimately receive."*³⁴

Thus, to go back to Lande and Averitt's characterization of barriers to consumer transactions, information can help to overcome "internal marketplace barriers". This section will focus specifically on how information and other consumer protection mechanisms can be used and by whom. It will then take a brief glance at focus group participants' impressions on who should provide information.

³²Hadfield, Gillian, Robert Howse, and Michael J. Trebilcock. *Rethinking Consumer Protection Policy*, Faculty of Law, University of Toronto, Centre for the Study of State & Market. August 28, 1996. p. 12.

³³Hadfield et al. See especially, Section V. D: Choosing a Regulatory Instrument, p. 67-70.

³⁴Hadfield et al., p. 57.

5.1 *Who's to Decide?*

Almost all consumers expressed the need for assurance of safety. However, some people indicated a willingness to place more trust in outside agencies to make decisions for them regarding biotech applications -- these people could be called "institutionalists". Others indicated a greater desire to be more actively involved in the determination of whether a product was suitable for them -- these people could be termed "information-seekers". At this point it should be underlined that although this categorization is a useful tool for distinguishing between people's general tendencies, it should be viewed as a continuum on which many consumers display preference for one or the other category depending on the context, product and issue.³⁵

5.2 *The Institutionalists*

Although most focus group participants indicated that they would like to be involved in the decision-making process, some indicated that they would be more willing to trust the judgement of others. For many consumers, this refers mostly to safety standards (slightly more than 51% of respondents of the Optima survey indicated that decisions about the *safety* of biotechnology should be left to the experts³⁶); for others, this could be extended to include ethical, environmental, and/or economic considerations of whether a product should be made available on the market.

These responses should not be confused with disinterest. Rather, the institutionalists feel that the complexity of biotechnology and genetic information undermines their ability to make informed personal decisions. They would prefer mechanisms that would draw on the experience of experts to make decisions, rather than rely on their own incomplete knowledge to make these types of decisions. For example, when participants of the Environmental Applications focus group were asked about their information needs, responses that were given included, "I'd prefer to have confidence in experts than trying to make up my own opinion.", and "I wouldn't have the capacity to understand it all."³⁷

Although one might assume that this group consists of people with less formal education, in their work on consumer protection policy, Hadfield et al. suggest that even those with advanced education can, at times, feel that they are ill-equipped to make good decisions. They state that,

³⁵ As stressed at the start of the paragraph, most consumers appear to be institutionalists when it comes to safety issues.

³⁶ Optima, p. 27

³⁷ Environmental Applications of Biotechnology, p. 53.

"in some cases, consumers may need substantive protection, not because they are members of a vulnerable group, such as the poorly-educated, but because as a class, consumers are systematically unable to adequately process the information they need to make good decisions."³⁸ This is particularly true as consumers are faced with increasing amounts of information. As such, they make the case that there is some rationale for outside intervention that protects the consumer from the more serious consequences of information asymmetries. As well, some people may have institutionalist tendencies, not because they are willing to let experts decide on their behalf, but because they see the institutions as upholding their ideals or opinions.

Consumer protection instruments that institutionalists would most likely support would be those mechanisms that rely less heavily on consumer effort such as regulation, setting minimum standards for the provision of services, preapproval of products, and product bans.

5.3 *The Information-seekers*

While the majority of focus group participants supported a "institutionalist" approach to safety standards, the surveys suggest that when it comes to other consumer issues such as exercising their ethical preferences, they have a strong desire to have information provided to them on which they could base their own personal choices in the marketplace.³⁹ For information-seekers, products that offer individual and societal benefits are more likely to be well-received than those that pose risks. Information seekers also want to be able to make a risk assessment based upon their individual beliefs and preferences. They are more likely to have higher levels of formal education than the institutionalists and generally have greater confidence in their ability to ascertain what products/applications of biotechnology they are willing to endorse.

In order to undertake meaningful analysis however, these consumers need access to information that is complete, accurate and easily understood. Marketplace analysis tells us that information acts as a key dimension in consumer decision-making. Used as 'bargaining power'⁴⁰, information is the tool by which consumers are able to decide how to allocate their resources. Information asymmetries resulting from the unavailability of information to either or both parties to a transaction, may lead a consumer to make choices that he/she might not otherwise make.

³⁸Hadfield et al., p. 53.

³⁹The Optima study notes that 68% of respondents felt that choice was an important issue, even if they were uncomfortable with the products themselves. Optima, p. 17.

⁴⁰Bargaining models routinely identify private information as the source of bargaining power and a critical determinant of the costs of bargaining and the likelihood of breakdown. ... information is a key ingredient in the operation of reputation and repeat play mechanisms that discipline the exercise of bargaining power that may arise from a variety of sources. (Hadfield et al., p. 4.7)

Information is a public good in the sense that many can "own" the same information at the same time, and information "consumption" by one individual does not detract from the ability of others to be informed. As such, information, once it has been produced, can be widely disseminated at low additional cost. In the absence of such information, however, the cost to a consumer (in terms of time, effort, and money) of obtaining it for himself might well exceed its value to him, so that he will not undertake the effort. Thus, there is a rationale for some organised process of information production and dissemination. The rationale for government involvement (or non-profit organisations) stems from a credibility issue. Much of the information available on the marketplace is provided by private industry, which has a vested interest in providing only information that serves its marketing needs.

Having repairs done on your car is a classic example of a case in which the service provider (producer) has greater knowledge than the consumer. In this case, the mechanic is typically better informed on the details of motor engines and the consumer is left to make a judgement based upon the reputation of the company, price or warranty rather than knowledge of whether the repairs are needed, or the quality of the service that is being performed.

The Information-seekers were the most likely to embrace labelling of products. The environmental focus group participants identified three reasons to support labelling: to protect consumer choice; to provide information on what a product is made of for health reasons eg. allergies; and to encourage companies to provide safer products by having disclosure requirements. Not surprisingly, the analysis of Optima data conducted by Ekos Research Associates Inc. showed that those who advocated labelling of biotech applications also displayed a higher risk aversion; in other words, they were less likely to accept the perceived risks of biotech products, even if there were associated benefits. For these consumers, labelling provides them with a means to undertake risk analysis for themselves.

The demand for credible, quality information however, in itself raises a key question: Who can be trusted to provide reliable, accurate, non-biased information?

5.4 *Information*

The Creative Research Focus Group participants suggested that an ideal information source would:

- not be afraid to tell the truth
- be neutral
- have experience
- not have a vested interest; and
- not have a profit motive.⁴¹

In particular, respondents suggested a number of institutions that would provide credible information to the public. Four of the most commonly cited sources (government, universities, private sector and a consortium of the three) are discussed below.

Government

Almost all focus group and survey results supported a role for government with respect to biotechnology. Despite some misgivings about the efficiency of government, generally it was acknowledged that regulation and safety protection were two legitimate areas where government has made significant contributions in the past. Specifically, 62% of Optima survey respondents indicated that government should increase its regulation of biotechnology and 50% would hold government responsible if something were to go wrong.⁴² Nevertheless, some Focus Group participants pointed to the lack of appropriate precautions taken with respect to Canada's blood supply⁴³, suggesting a need for outside sources to monitor government's safety precautions.

While information is generally seen as a public or mixed public/private good, much of the information available on the marketplace is provided by private industry. However, once information has been shared, it can be rapidly distributed with no compensation to the original provider. As such, private industry will tend to provide only that information which serves its marketing needs. Thus, there is a natural tendency for consumers to expect not-for-profit organizations and governments to play a role in disseminating information.

⁴¹Environmental Applications of Biotechnology, p. 55.

⁴²Optima, p. 28.

⁴³The Krever Inquiry (headed by Justice Horace Krever, Ontario Court of Appeal Judge) has been mandated with looking into the safety of Canada's blood system. In particular, it is looking into problems associated with blood that was used for transfusions and the production of blood products in the early-eighties that was infected with the HIV and Hepatitis C viruses and ideas of how to revamp the blood system.

University

Some participants suggested that universities, as the source of much of the research and development for genetic engineering and biotechnology, would be well-placed to provide a safety-assurance role. Concern was raised however, that in the context of private-sector funding, impartiality is not guaranteed.

Private Sector

As with the university sector, some focus group participants suggested self-regulation by the private sector as a possible source of safety regulation. However, generally, participants were the most distrustful of an industry-regulated safety system. They felt that firms that had invested research and development resources into a product would be less likely to stop a product from entering the market over questions of safety.

Consortium/Multi-Stakeholder Approach

A number of respondents suggested that the best solution might be a board consisting of representatives from the government, university and private sectors. This set up, they concluded, would overcome some of the difficulties associated with individual sectors (government, universities, private sector), while drawing on the strengths of each⁴⁴.

6.0 SUMMARY & IMPLICATIONS FOR FUTURE WORK PLAN

Biotechnology has the potential to contribute new and valuable products to the marketplace. As has been noted, genetic engineering has already led to the introduction of a number of new and exciting applications. However, despite some enthusiasm for the benefits that biotech products might offer, consumers are clearly worried about the associated risks. As was pointed out, no consensus has been reached on how best to respond to these risks. While some consumers want increased legislation, others are demanding more information that will enable them to make their own decisions.

Each of these approaches raises a number of issues. For example, advocates of increased regulation would like answers to questions like:

Which regulatory mechanisms are most suitable to biotechnology? What are the strengths and weaknesses of the existing regulatory framework?

⁴⁴These suggestions are consistent with the work now being conducted by OCA and the Treasury Board Secretariat on the advantages and drawbacks of voluntary arrangements which have multi-stakeholder involvement and support. (See also, *Office of Consumer Affairs, Consumer Quarterly*, October 1996, Volume 1, Number 4, "Voluntary Codes & the Consumer Interest").

How appropriate is it, for example, to have regulatory and promotional activities carried out by the same government agency?

Is there a need for additional health and safety testing of biotechnology processes (as distinct from products)?

To what extent can government regulation be supplemented and extended by voluntary codes of practice and other industry-led arrangements?

What are the roles of market and non-market mechanisms in addressing the socio-economic and ethical issues raised by biotechnology?

While on the other side, consumers demanding greater decision-making power, have their own set of concerns such as:

Given the technical nature of biotechnology, is the general public capable of analysing the data?

How desirable is choice, and to what extent is it provided and facilitated by the market?

Who should provide information and should they be held responsible for ensuring that it is accurately and reasonably disseminated to the public?

What are the benefits and drawbacks of product labelling, as compared with other forms of information dissemination?

How does information influence consumer attitudes and perceptions about risk?

How do prior levels of risk aversion influence consumers' perceptions of risk?

What are the advantages and drawbacks of information dissemination by electronic means (eg. *Consumer Connection on Strategis*), compared with more traditional methods (ie. reports, brochures, pamphlets in hard copy?)

This paper does not try to answer these questions. Rather, its purpose is to create a common understanding of what we know about how consumers view biotechnology. Certainly, biotechnology, which has been with us for centuries, and genetic engineering, which offers such interesting prospects, are unlikely to disappear. What we need is an understanding of how the marketplace will respond and where and how the marketplace needs to be supplemented by non-market mechanisms. Using a marketplace framework, the Office of Consumer Affairs, working together with other government departments and our partners in the academic and consulting communities, are investigating these questions through conducting a work plan on biotechnology, the consumer and the marketplace. We hope, that in this way, the office will contribute to broadening the discussion of where markets are clearly sufficient and where intervention by government, or by multi-stakeholder partnerships, should be considered.

APPENDIX A

Examples of biotech applications

(Taken from draft of A Layperson's Guide to Biotechnology, Chemical and Bio-Industries Branch, Industry Canada)

FOOD APPLICATIONS

Flavr Savr tomato

This tomato has been genetically engineered to slow the rate at which it softens, meaning that it can be left to ripen on the vine longer than other tomatoes so that its flavour can develop more fully before it is picked.

Canola

Canola, a type of rapeseed, is found in numerous products, including salad oils, mayonnaise, coffee creamers, cosmetics, printing inks, suntan oil and livestock feed. Unfortunately, Canola is very often ravaged by weeds. To combat these weeds, improved canola varieties have been specially designed to tolerate glyphosate, the active ingredient in a brand name herbicide that is used to destroy the harmful weeds. To combat the effects of the herbicide, a gene is removed from a plant or bacterium and inserted into the genetic structure of a canola plant to become herbicide resistant. As a result, Canola is able to withstand herbicides and allowed to grow normally.

HEALTH APPLICATIONS

Insulin

Insulin is used in the treatment of diabetes and was originally extracted from animal sources, not always available in adequate supply. Through the use of genetic engineering techniques, scientists can produce large quantities of human insulin by placing the human insulin gene into bacteria. Because this insulin has the same composition as human insulin, diabetics are less likely to have allergic reactions to it than to the original animal insulin.

Human Growth Hormone (HGH)

HGH has been produced using similar methods as insulin and is used to treat children who are diagnosed with "drawfism", in other words, children who naturally lack an adequate supply of this growth hormone. The natural hormone was previously produced from cadavers. Supplies of the hormone were limited, and they carried the risk of transmitting disease.

Vaccines

Vaccines have been one of the greatest successes in medicine. They allow us to control some of the world's most deadly bacterial and viral diseases such as polio, tetanus, and

diphtheria. Smallpox has been eradicated because of intensive world wide vaccination efforts. A vaccine contains components of disease-causing microorganisms or their products. These components stimulate the body's immune system so that when we are exposed to a live disease-causing microorganism, we will be protected from it. Through genetic engineering, vaccines have been produced that are safer and less expensive than traditional vaccines, because they are less likely to cause side-effects. Vaccines for hepatitis B and influenza are produced by genetic engineering.

FORESTRY APPLICATIONS

Bacterial Insecticides

Since the 1960s, scientists have used a naturally occurring bacterium, *Bacillus thuringiensis* (B.t.) to help manage populations of forest pests, such as the spruce budworm and gypsy moth and agricultural pests such as caterpillars and potato beetles.

Fast Growing Trees

Although trees normally take years to reproduce, trees with superior growth characteristics can now be grown much more quickly. Tree "plantlings" are produced using tissue cultures which allow production of a large number of similar plants.

ENVIRONMENTAL APPLICATIONS

Clean-up of contaminated environments

An important application of biotechnology is the harnessing of naturally occurring microorganisms and plants to help clean up contaminated environments. Microorganisms can feed on toxic chemicals, breaking them down into non-toxic substances. They can be used to biodegrade sewage, oil spills and a variety of toxic chemicals found in waste. In the pulp and paper industry, enzymes produced by microorganisms are used to reduce the need for chlorine bleaching. Currently, researchers are genetically engineering microorganisms to biodegrade toxic chemicals like PCBs more easily than naturally occurring microorganisms can.

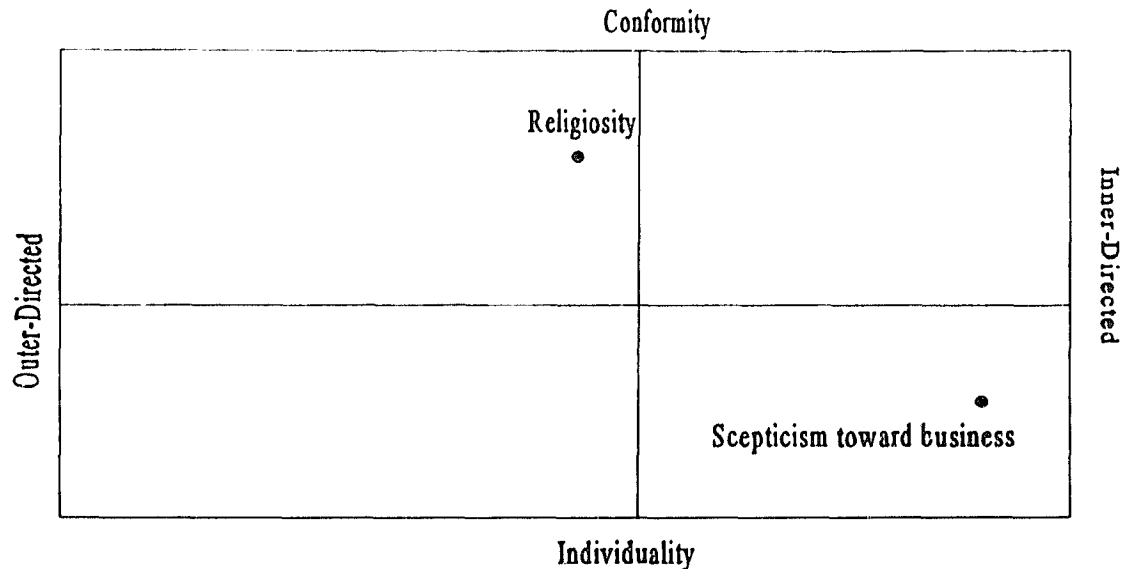
APPENDIX B

Each year, 2,600 Canadians aged 15 and over complete the 3SC survey questionnaire in their homes in the presence of a research representative. The questionnaire is composed of two sections: the first is a series of more than 200 questions that probe the individual's core values, motivations and socio-cultural characteristics; the second section contains client-specific questions. Responses are analyzed using a computerized statistical model and then placed on a socio-cultural map. The Office of Consumer Affairs included one question related to biotechnology in the January 1996, CROP Socio-Cultural Change Survey System. The question was:

1. Modern biotechnology alters the genes of living organisms in order to create or change products. Genetic engineering techniques can alter the genes of plants and animals or insert a piece of their genetic material into the cells of other plants or animals. For each of the following biotechnology products, indicate whether you would very likely, somewhat likely, not very likely or not at all likely buy this product if it were available on the market at a competitive price.
 - Tomatoes that have been genetically altered for longer shelf-life and better taste
 - Fruits and vegetables that have been genetically altered to be more insect-resistant
 - Pork that has been given hormone supplements to produce a leaner meat
 - Milk that is similar to human milk, easier to digest, and which comes from genetically altered cows
 - Milk from cows that have been given hormone supplements (somatotrophine) to increase their milk production
 - Salmon that has been genetically altered to grow faster

From the responses to this question, CROP "maps" the results against 81 trends that reflect Canadians' values such as religiosity, scepticism toward business, flexibility of personality and primacy of the family which were determined by the in-depth questioning of respondents. Each of these trends is mapped onto a grid as illustrated below. On the left are trends aligned with those who are more outer-directed; on the right are trends that are aligned with people who are more inner-directed. The vertical scale measures on the top those trends that are more conformist compared to those on the bottom that are more individualistic.

Socio-Cultural Map



The responses to the biotechnology question were mapped onto this grid. The result is a socio-economic map that attempts to characterize consumers as belonging to one of four personality profiles. The 1996 CROP survey found that at the present time, only a very small minority of Canadian consumers said they would be very likely to buy biotech products. They found that people who claim they would be very likely to buy genetically altered tomatoes, or pork that had been given hormone supplements tend to belong to a group displaying a greater propensity to experiment and explore. This group is more likely to view biotech products as new, prestigious and as leading-edge technology. Conversely, those consumers who said they would not be very likely to buy biotech products are more likely to belong to the group of consumers that is associated with needing more security.

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