GEORGE MORRIS CENTRE

Canada's Independent Agri-Food Think Tank

ASSESSMENT OF THE OPPORTUNITIES FOR MARKETING NON-GM PEI AGRICULTURAL PRODUCTS

Final Report

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EXECUTIVE SUMMARY

The federal-provincial Agricultural Policy Framework (APF) was introduced with the purpose to take agriculture off the "victim agenda" and produce farm products according to consumer preferences. In other words, farm products would be differentiated according to end use. One differentiation strategy that has received much attention is the idea of establishing Genetically Modified free (GM-free) production zones.

This report examines whether GM-free production and establishing Prince Edward Island (PEI) as a designated GM-free zone would be a differentiating factor that could improve the marketing of PEI products, and determine if it would result in a benefit to both organic and conventional PEI producers. To achieve this required gaining a detailed understanding of the potential national and international opportunities for marketing non-GM products.

The specific objectives of this project were:

- To provide an assessment of the global market for non-GM commodities and food products.
  - Markets assessed included Europe, United States, Canada and Japan.
- To prioritize key non-GM markets that PEI could capture.
  - Key markets reviewed included soybeans, canola, hay, potatoes, beef, pork, soybeans, grains, corn and berries.
- To develop an understanding of preferred market penetration strategies that could be used by PEI producers.
- To provide an evaluation of the potential success of establishing a GM-free production zone.

To meet the objectives outlined above, the project was divided into four phases of work:

- Phase I Market Structure and Demand
- Phase II Develop an Understanding of Penetration Strategies
- Phase III Specific Market Opportunities and Market Prioritization
- Phase IV Conclusions and Recommendations for Prince Edward Island

Part I involved investigation and information collection via a literature review and industry interviews to determine the size and scope of the international non-GM commodity and food market, including future trends. Part II provides an overview of penetration strategies and how they can be used for PEI. Part III prioritized key markets for PEI and summarized the findings from Part I and II. Phase IV concluded with an evaluation of the potential success of creating a GM-free production zone in PEI.

The following results emerged.

Conclusions from the Literature
A review of the available literatures indicated that it is difficult to empirically estimate the market demand for non-GM products, but some inferences can be made. The literature indicated that certain countries value non-GM food products (Europe and Japan in particular) and are willing to pay a premium for them. It shows, however, that consumers in the United States are relatively indifferent towards non-GM foods, and in many cases prefer products that indicate they are locally grown (as is the case with the Colorado-grown potatoes). The literature also

indicated that there is a varying degree of awareness regarding GM foods, and that the more aware consumers are of GM foods (particularly through the influence of consumer awareness and lobby groups), the more likely they are willing to pay a premium for non-GM food.

Similarly, the results from country surveys and polls regarding consumer's perceptions towards GM foods follow the same trends as the willingness to pay studies. In Japan and the European Union, consumers tend to favour non-GM foods; however, Europeans have generally become more accepting of GM foods when the results from previous Eurobarometer polls are compared.

An overview of the magnitude of GM-free production zones worldwide indicated that there are increasingly more regions declaring themselves as GM free. And while legislation that prohibits the importation of genetically modified foods is declining, there has been the introduction of legislation that makes producers of GM crops liable for any contamination of non-GM crops, should it occur.

Conclusions from the Case Studies
The major finding from the case studies was that if soybeans from the US mid-west, potatoes from the mid-west and veal from the Netherlands can be differentiated, then it should be obvious that any product from Prince Edward Island can be differentiated. With that noted, the following are the particular lessons from the three case studies and market penetration strategy literature reviewed:

1. It takes a long-term mind-set to develop a unique product and market.
2. Service and relationships are the keys to success.
3. What the consumer finds as valuable is the most important aspect of how to differentiate a product.
4. No differentiated relationship will work without trust.
5. Brand the product and make the brand unique and at the forefront.
6. Price the product uniquely for each customer based on service and the relationship.
7. PEI can begin with one branded product and expand into others as stakeholders (growers, customers, and others) become more interested in the brand.

Study Conclusions
Our research found that the marketing of GM-free products and the establishment of a GM-free zone are not mutually exclusive issues. In fact, they are two separate (albeit intertwined) issues. Respondents clearly told us that, in their opinion, non-GM and GM crops can be grown in the same general area. This belief was supported by published literature (for example: Huffman, 2004; PG Economics, 2003; Hucl & Matus-Cádiz, 2001). The success of producing GM, non-GM and organic crops in the same area relies entirely on producers abiding by protocols that relate to the segmentation of specific crops. The most important criteria to establishing the long-term profitable marketing of non-GM crops is the existence of production protocols, including isolation strips, and the establishment of effective post harvest identity preservation systems to ensure their integrity. Many claims that GM and non-GM crops cannot be grown in the same area are exaggerated (Agcare, 2004).

Throughout this research it became clear that basing the strategic intent of PEI's agricultural and agri-food industry on the production of GM-free crops alone would not likely provide producers with the same benefits as producing differentiated value-added products to discerning and health conscious consumers. There are four main reasons for this.

First, GM crops inhabit only a segment of the overall range of crops grown in PEI, not all producers would benefit to the same extent from the establishment of a GM-free zone. Second, profiting from the successful marketing of GM-free crops will rely on the same critical success factors as the marketing of all agri-food products. Third, history proves that not all producers are prepared to collaborate sufficiently to abide by strict production protocols required to support effective marketing initiatives. Finally, economic studies have shown that GM, non-GM and organic crops have been successfully grown in the same area, and that the greatest threat of contamination is likely to occur during post harvest handling and processing operations. For these reasons, the marketing of crops and agri-food products whose only differentiating factor is that they are produced in a GM-free zone, is not considered a viable option for increasing the profitability of PEI's entire agricultural and agri-food industry.

Developing production and processing capabilities in-line with defined market opportunities and developing close relationships (vertically and horizontally) along the entire value chain would likely benefit interested producers more than any other strategy. However, value chain development is a business-level strategy. Successful achievement requires the existence of companies possessing complementary culture, vision, leadership and structure. It is not an industry level strategy, which the development of a GM-free production zone would be. While increasing demand for organic foods (Fresh Produce Journal, 2004), and PEI's organic sector could benefit the most from the development of value chain alliances to market premium quality organic products, successfully implementing a business level strategy across an entire industry would be an almost impossible task (Collins & Lim Camacho, 2005; Dunne, 2003).

The research also identified that opportunities exist for PEI to benefit from marketing its products in line with the credence and brand recognition factors that are of increasing importance to the discerning consumer that PEI should target its operations towards. Given its limited physical and financial resources, taking full advantage of these opportunities will require PEI (industry and government) to invest considerable resources in developing the management capabilities required to produce and market agri-food products in accordance with market requirements. It is suggested that this include a process of raising producers' awareness of the need to develop closer collaborative links with their customers and the final market. Such initiatives will lead to a greater number of PEI producers that are able to leverage the region's unique credence factors in order to satisfy consumer demands and secure price premiums.

While opportunities undoubtedly exist for PEI's agri-food industry to prosper, the findings clearly showed that producers would not gain considerably from the establishment of a GM-free zone. Through the opportunity to benefit from reducing their transaction costs (i.e. through less need to test for the presence of GM material) companies involved in producing and delivering products to an end consumer would gain the most from the establishment of a GM-free production zone. Most consumers are not likely to perceive sufficient added value to pay additional premiums for purchasing products sourced from a GM-free zone. They expect to be assured that GM-free products do not contain GM material, regardless of whether or not they were produced in a guaranteed GM-free region.

Lessons learnt from regions that have sort to establish GM-free production zones illustrate that the independent nature of producers can challenge a system. This implies that the effectiveness of a GM-free zone would only be ensured through active policing in order to discourage the dissention of producers. Significant resources would be required to monitor and enforce the zone. With few added returns from the establishment of a GM-free zone, the cost of implementing and enforcing such a system would likely be far greater than the potential returns.

If production-related legislation was enacted, its objective should be to create the greatest possible harmony amongst the producers of organic, non-GM and GM crops. Doing otherwise would likely create resentment between the different interest groups and stakeholders. It would be seen by many of the industry stakeholders as a win-lose scenario. Resentment between stakeholders, often due to a lack of understanding of each others concerns and an unbiased awareness of market opportunities, appears to have been a significant factor in the failure of large GM-zones. The larger the zone, the more opportunity exists for resentment to build and manifest amongst the industry to the point that the initiative fails. Brazil is seen as a prime example of this scenario.

Ultimately, a strategy predominantly based on establishing a GM-free production zone would essentially see PEI remain a producer of commodities. Albeit some commodities would have a different physical 'footprint' compared to allowing the continued production of GM products. It is a 'push' strategy that would see others benefit from adding value through processing or delivery. Producers would remain caught in the 'commodity trap' of low prices, especially since the research suggests that the overall demand for products whose only differing attribute is non-GM is likely to diminish significantly in all markets over the next 5-10 years.

The final section of this report included a recommendation for a legislative approach that would benefit the majority of organic, non-GM, and GM producers alike. It would provide a foundation upon which PEI's agricultural and agri-food industry could utilize its efforts to establish closer links with participants operating the rest of the agri-food industry and, ultimately, end markets. The most beneficial outcomes of such an approach would be the identification of opportunities for PEI to benefit from the production of value-added differentiated products.

Throughout this report, the term 'value chain' is used to describe the concept of Value Chain Management (VCM). The essence of VCM is that through closely aligning their individual operations through the extensive sharing of information, organisations can focus their combined resources on producing a final good that meets the demands of the end market better than the competition (Roberts, Gregory, Cornwell & O'Keeffe, 2002). The adoption of VCM principles offers members of PEI's agricultural and agri-food industry the opportunity to improve their competitiveness and profitability.

VCM is about improving processes and quality; reducing transactions costs through eliminating wasted resources, products, or operations; and improving the relationships that exist between and within companies involved in supplying an end product to the consumer. VCM is therefore, ultimately, about enabling companies to adapt to changes occurring in the marketplace by working together to improve their long-term competitiveness (Collins, 2003). The benefits of VCM and, its applicability to the agri-food industry, are equally relevant to the marketing and production of premium products and commodities.

Recommendations
Section 6.0 is a discussion of the specific market opportunities that emerged throughout this research. Section 6.1 reviews the market opportunities for Europe (6.1.1), North American (6.1.2) and Japan (6.1.3). Section 6.2 summarizes the market opportunities and section 6.3 concludes with the legislative alternatives for PEI.

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1.0 Introduction and Background

Prolonged low prices for farm commodities are hurting Canadian agriculture. While it is generally agreed that Canada's agricultural industry must adopt a consumer-orientated business approach in order to remain viable, situated far from the end market (physically and emotionally) makes the process of translating market signals into business opportunities a difficult task.

The federal-provincial Agricultural Policy Framework (APF) was introduced with the purpose to take agriculture off the "victim agenda", and to exploit opportunities such as designing and producing farm products for a specific end-purpose, and according to consumer preferences. In other words, farm products would be differentiated according to end use. One particular differentiated strategy that has received much attention is the idea of GM-free production zones.

While many producers in North and South America have readily accepted the technology behind genetic modification (GM); many consumers remain wary of GM crops. In particular, strong opposition exists towards GM food products amongst consumers in Europe and Japan. Several countries have introduced legislation that requires GM products be labelled and some multi-national food processors have started to require non-GM raw product for their food production.

Although controversial, the concept of GM-free zones is being discussed and implemented around the world (China, Japan, Philippines, Vermont, California, British Columbia and numerous countries within Europe) in efforts to secure a market amongst consumers wary of GM products. There are currently nine US states with new legislation in various stages of development designed to pre-empt the rights of local cities and counties. In Iowa a new law blocks "a local governmental entity…from adopting or enforcing legislation which relates to the production, use, advertising, sale, distribution, storage, transportation, formulation, packaging, labelling, certification, or registration of agricultural seed" (Van Donkersgoed, 2005). Recently, Mendocino County in California became the first jurisdiction in North America to prohibit the "propagation, cultivation, raising and growing of genetically modified organisms" in a ballot designed to protect the health, welfare, economy, and private property rights of residents (Van Donkersgoed, 2005).

The idea of a GM-free production zone in Prince Edward Island as a tool for differentiation to improve marketing of PEI products requires further exploration in order to determine if it would result in a benefit to both organic and conventional PEI producers.

1.1 Purpose and Objectives

The purpose of this project is to provide the PEI Certified Organic Producers Co-op Steering Committee with an understanding of the potential national and international opportunities that exist in marketing non-genetically modified Prince Edward Island agricultural products.

The primary objective of this research is to explore the potential for a GM-free production zone in Prince Edward Island (PEI) as a means of differentiation to improve marketing of PEI farm products, and to determine whether it would result in a benefit to both organic and conventional PEI producers.

The specific objectives of this project were:

- To provide an assessment of the global market for non-GM commodities and food products.
    - Markets included in this assessment were Europe, United States, Canada and Japan.
- To prioritize key non-GM markets that PEI could capture.
    - Key markets reviewed will include seed grains, canola, canola seed, canola for oil, hay, potatoes, beef, pork, soybeans, grains, and corn.
- To develop an understanding of market penetration strategies that could be used by PEI producers.
- To provide an evaluation of the potential success of adopting a GM-free production zone.

1.2 Methods

This section of the proposal outlines the approach and methods that the George Morris Centre team will employ to meet the objectives and to accomplish the overall purpose of the project.

To meet the objectives outlined above, the project was divided into four phases of work:

- Phase I Market Structure and Demand
- Phase II Market Penetration Strategies
- Phase III Specific Market Opportunities and Market Prioritization
- Phase IV Conclusions and Recommendations for Prince Edward Island

Part I involved investigation and information collection via a literature review and industry interviews to determine the size and scope of the non-GM commodity and food market. Part II provides an overview of penetration strategies and how they can be used for PEI. Part III prioritizes key markets for PEI and summarizes the findings from Part I and II. Phase IV concludes with an evaluation of the potential success of creating a GM-free production zone in PEI. Each phase is described in detail below.

Phase I: Market Structure and Demand

To determine the size and scope of the non-genetically modified market and current consumer demand in various countries and for various products, a literature review was conducted. The research team also reviewed literature on the success of established GM-free production zones with respect to market demand and penetration strategies.

To determine the demand for non-GM products, the literature was reviewed for studies that depicted the willingness to pay for non-GM products. These studies were primarily found in academic journals. As well, the review examined attitudes towards genetically modified foods in various countries. Literature regarding consumer attitudes was found primarily in polls and surveys that had been conducted throughout the world. In particular, the Eurobarometer provided much insight into the attitude of European consumers towards GM foods. Finally, the acceptance of GM-free products worldwide was examined. This was conducted by investigating the magnitude of GM-free zones that currently exist worldwide, and through the review of select legislation that currently exists to inhibit the importation of GM products into countries.

The second task in this Phase involved a formatted interview of key industry stakeholders who have knowledge in consumer food demands in various countries and commodities, including wholesalers, suppliers and food manufacturers.

An interview template was developed (refer to Appendix A for the complete questionnaire) to ensure that the interviews were conducted consistently and to ensure that the proper questions were being addressed for the information that was sought. Types of information that was collected included:

- Defining the term genetic modification
- Description of operation
- Customer demand for non-GM products/commodities
- Country demand for non-GM products/commodities
- Commodities that are being demanded
- How much of the interviewee's total product is GM-free? (If there are various lines of products etc...)
- How would the interviewee's product line change if they had a reliable supply of non-GM input products? (What market opportunities would be presented?)
- Premiums for products guaranteed from a GM-free production zone
- Decision making influences
- Differentiation strategies for PEI

A response rate of 25-30 interviews/completed questionnaires was the target, with 33 interviews completed in total. Telephone interviews with key personnel were the optimal choice for the interview; however if individuals were unavailable for an interview respondents provided the completed survey electronically or by fax.

Phase II: Market Penetration Strategies

The third phase of the project involved an overall discussion regarding potential market penetration strategies. The discussion reviewed the following penetration factors:

- Price
- Product
- Packaging
- Promotion
- Protocols: this was especially important because it helped to determine how to prevent cheating on the island (producing GM crops) if PEI were to implement a non-GM strategy.
- Logistics/channels: how the product will get to the market

The second part of Phase II involved a case-study approach and analysis of three differentiated product market penetration strategies that have been used to successfully gain entry into commodity and product markets. The three case studies conducted were:

1. Peter's Farm Principle: A successful commitment to transparency along the value chain consisting of five pillars including: quality, animal welfare, traceability, security and open information to the consumer.
2. Big Bubba Soybeans: A successful collaboration between University of Missouri, Missouri Department of Agriculture, Neco Seeds and the Missouri Food and Fibre producers co-op to produce identity preserved, organic, non-GM soybeans.
3. Healthy Grown Potatoes: A successful collaboration between the Wisconsin Potato and Vegetable Growers Association, the University of Wisconsin Extension, and the World Wildlife Federation to produce potatoes that are grown using Integrated Pest Management (IPM) practices that were certified under the independent third-party Protected Harvest eco-label and marketed under the Healthy Grown brand.

The three case studies were developed using the business case-study model to explain the situation and the lessons learned. The framework of the case-study content was as follows:

- Case introduction: This discussion includes a description of the product, organization and market, and the timeframe that the product penetrated the market. This provides the reader with a visual picture of the situation.
- Motivation/Rationale: This discussion includes a description of the reasons why the organization chose to market a differentiated product. For example, for value-added reasons or to satisfy consumer demand.
- Strategy: This discussion involves an in-depth look at what the organization/association/growers did to differentiate the product, how they gained access to the commodity or product market and the logistics of the penetration strategy. Discussion will include:
    - Price
    - Product
    - Packaging
    - Promotion
    - Protocols
- Challenges: This section elaborates on any challenges that had to be overcome during the implementation and early stages of the penetration strategy. What was learned from the challenges that were faced?
- Impacts/Current Situation: This section provides the reader with an idea of the current situation of the product.

The research team analyzed the various penetration strategies that were used by these products and concluded with a discussion around whether there would be similarities in the strategies for the penetration of GM-free products, the lessons learned and what it could mean for PEI.

Phase III: Specific Market Opportunities and Market Prioritization

Based on the information obtained in Phase I the research team prioritized the potential markets that PEI could fulfill. A framework was developed to prioritize the markets which included examining factors such as:

- Demand for the product
- Price
- Current supply
- Possible trade implications
- Certification requirements
- PEI's production capability relative to the size of the market

Each of the top market opportunities were analyzed based on the factors included in the framework. Through the analysis, the markets were prioritized based on what the research team found to be the most potentially optimal markets for PEI to enter.

Phase IV Conclusions and Recommendations for PEI

The final section incorporates the information collected in Parts I through III to provide recommendations regarding the potential opportunities for non-GM agricultural products marketed in PEI. It specifically explores the potential for a GM-free production zone in Prince Edward Island (PEI) as a means of differentiation to improve marketing of PEI farm products, and to determine whether it would result in a benefit to both organic and conventional PEI producers.

2.0 Market Structure and Demand: Literature Review

Section 2.0 looks at the size and scope of the non-genetically modified market and current consumer demand in various regions, including the European Union, Japan, the United States and Canada. The first section of the literature review investigates the market demand for non-GM foods with the review of academic journals and willingness to pay studies. Section 2.2 examines the consumer's attitudes towards GM foods in the European Union, Canada, Japan, Australia, United States and southern Africa, through data collected in polls and surveys. Section 2.3 looks at the GM-free production zones throughout the world and the legislation that is in place regarding genetically modified food. Section 2.4 concludes with a summary of what was learned from the literature review.

2.1 Market Demand

Many issues exist in determining the size of the market for GM-free or Non-GM products. One of these issues is there is not a distinct category for GM-free foods, like for example, the way there is for organic foods. The second issue is, there is not a clear specific GM-free or Non-GM definition[1]. GM-free to one country is not necessarily defined in the same manner as another country. For example, Japan has a tolerance of 5% GM presence in "GM-free" products, while Australia has only a one percent tolerance. Many areas declare themselves to be GM-free, but unless it is backed by legislation or a standard that producers must adhere to (such as the certification process that is required in many countries for organic farmers), it is difficult to determine if these areas are really following GM-free or Non-GM practices.

The following discussion examines some of the recent literature that studied the consumer's willingness to pay for GM-free food in various countries and for various products.

Consumers Willingness to Pay

Studies have been conducted in many countries on the public acceptance of genetically modified (GM) food products. International comparisons are complicated by differences in adoption rates of GM crops and their processed products, differences in national legislation about their admissibility, and differences in labelling requirements (Ho and Vemeer, 2004). In most countries, public awareness and acceptance have been shaped primarily by mixed messages from action groups and the industry. On one side, concerned biologists, organic farmers, and environmental nongovernmental organizations (NGOs) have linked up with concerned consumers. On the other side, agricultural specialists and biotech industry representatives highlight the benefits of GM crops to farmers and consumers (Wansink and Kim, 2002).

Studies in Europe and Japan provide strong evidence that consumers are willing to take on the unknown risks of consuming genetically modified foods only if these products are offered at significant cost savings over non-GM foods. Burton, Rigby, Young, and James (2001), examined consumer attitudes toward genetically modified foods in the United Kingdom and concluded that male shoppers were willing to pay an extra 26% to avoid animal and plant GM technology, whereas female shoppers were willing to pay an extra 49%. The results of this study also indicated that attitudes towards organic food may be taken as a useful indicator of

[1] For the purpose of this report we have defined GM-free as the equivalent to non-GM, thus the term can be used interchangeably.

consumers' attitudes towards GM technology, as the value sets that underlie attitudes towards organic food, are also apparent in values that underlie attitudes towards GM technology.

Japanese consumers have also showed an unwillingness to accept GM food. A study by McCluskey *et al.* (2003), evaluated Japanese consumers' willingness to pay for GM-free food products and their willingness to accept payment for choosing GM food products. The study concluded that, of those surveyed, around 80% were not willing to consume any GM food products. It also found that a greater discount is required for respondents to consume GM food products when higher levels of self-reported risk perceptions towards GM food, higher levels of concern about food safety and the higher education and income levels are reported. In this instance, contrary to the UK report, gender was not a factor affecting respondents' willingness to pay for GM-free food products.

In contrast to the above studies, studies in the United States found consumers to be more accepting of genetically modified foods compared with consumers in Europe and Japan. A study by James *et al.* (2002) looked at the willingness of consumers in the United States to purchase Bt corn. While most of the other studies observed willingness to pay through methods such as contingent valuation, this was a pilot market experiment that used a revealed preference approach by altering the price of corn. Results found that at least 44% of the participants were willing to purchase Bt corn, while 17% were indifferent between GM-free and GM altered corn. This is a huge difference when compared to the studies performed in the UK and in Japan.

The majority of the studies that focus on the market for GM-free, and GM products, look at a customer's willingness to pay and willingness to accept products with GM-free and GM attributes. The table below briefly outlines some of the most current studies that were reviewed for this report.

Table 2.1 Summary of Consumer Willingness to Pay and Choice Preference Literature

Authors	Product(s) and Place	Methodology	Brief Results
Loureiro and Hine, 2001	Local (Colorado Grown), Organic and GMO-free potatoes United States	Survey to elicit the WTP using a payment card format Consumers presented with different bid intervals WTP estimated reflecting socio-demographic factors	- "Colorado Grown" carried a higher premium than GMO-free and organic - As consumers age one year, less willing to pay more for GMO-free
Ganiere, Chern and Hahn, 2004	All GM and GM-free food, United States	Telephone survey, dealing with stated preferences and behavioural intentions	- 61% of survey composed of non-opponents of non-GM technology, 5% were favourable to GM foods - 12% rejected biotechnology overall
Gifford *et al*, 2005	Non-GM, Organic and GM products, United States	Questionnaires and experiment sessions, a presentation and a series of practice and food auctions	- Survey indicated WTP of 4% more for non-GM, 8% more for organic - Actual bidding, 50% bid higher for non-GM vs conventional, average

Authors	Product(s) and Place	Methodology	Brief Results
			premium of 22% - 34% of auction participants were indifferent
James *et al.*, 2002	Bt-sweet corn, United States	Pilot market experiment measuring revealed preferences by altering prices of corn	- A sizable proportion of sample population (44%) were willing to purchase Bt-sweet corn, while about 17% were indifferent between the two
Huffman, 2003	Vegetable oil, tortilla chips and russet potatoes, Midwest US cities	Calculates WTP by combining sample surveys, statistical experimental design and experimental economics	- On average, participants discounted GM labelled foods by 14% - Participants who claimed to be knowledgeable about GM foods were also discounted GM labelled foods - Information from diverse sources effects consumers demands for GM food
Chern *et al.*, 2002.	Vegetable Oil and Salmon Japan, Norway, the United States and Taiwan	Uniform student survey in 2000 and 2001 Pilot national telephone survey in Norway and the U.S. in 2001	- Notable differences in attitude and perception of GM foods across the countries - American and Taiwanese more willing to consume GM foods than Norwegian and Japanese students - Overall, consumers are WTP a premium for non-GM foods to avoid GM food
Tonsor and Schroeder, 2003	Beef London, England, Paris, France, and Frankfurt, Germany	Choice experiment to evaluate WTP for different steak types – USDA Choice, USDA Choice No Hormones, USDA Choice No Hormones or GMO's, Domestic Typical, Domestic Source Verified	- Overall, consumers willing to pay premium for steak with no hormones and GMO-free - Consumers in Frankfurt and London preferred steak with no hormones and no GMOs to others
Burton, Rigby & Young, 2001	GM-free, GM modified by use of plant genes, and GM modified by use of plant and animal genes, United Kingdom	Mailed survey to households based on Choice Modelling Theory, individuals can choose between alternative options that contain a number of attributes with different levels	- Gender was significant in determining attitudes towards GM technology - Respondents divided into three groups: infrequent, occasional and committed purchasers of organic food - Infrequent consumers willing to increase amount spent on food to avoid GM-food - Committed and Occasional greatly increased purchases to avoid GM-food, indicating they would never choose

Authors	Product(s) and Place	Methodology	Brief Results
			GM food - Attitudes towards organic food may be useful indicator of attitudes towards GM technology
Moon *et al*, 2004	Breakfast cereals, United Kingdom	Survey to measure attitudes and perceptions regarding agrobiotechnology and behavioural intentions re WTP for cereals made of non-GM ingredients	- 58% willing to pay premium to avoid GM food - 45% said would not buy GM food at a discount - Strong demand for non-GM food in UK, but also economic incentive to offer GM food
Boccaletti and Moro, 2000	GM food products and non-GM Province of Piacenza in Northern Italy	Phone survey in 1999 to measure awareness and WTP for GM-foods, and to collect main explanatory variables believed to affect purchasing behaviour	- 46% of respondents had a positive attitude towards GM foods - 94% would like to see GM foods specifically labelled - Higher income indicates a higher WTP - Knowledge plays an important role in purchasing decisions
Ho and Vermeer, 2004	GM food products, China (Beijing and Shijiazhuang)	Survey of consumer awareness and acceptance of GM foods in four supermarkets in China	- A large majority of the respondents bought 'green' (non-GM or organic) products, only 14% never or rarely did - 77% said they would be willing to buy from organic agriculture only
McClusky *et al.*, 2003	Noodles (wheat), GMO & GMO-free, Japan	Survey eliciting WTP for GM-free products, using a contingent valuation method Survey done in a major grocery store, with incentive given to participate	- 80% of survey participants would not choose GM noodles over non-GM, even at discount of 5%, 10%, 25%, 40% & 50% - WTA compensation for choosing GM-foods affected by attitudes toward food safety and the environment, knowledge about biotechnology and risk perceptions toward GM foods - Gender did not significantly affect discount needed for GM food

The results from these studies show that the willingness to buy GM-free products varies depending upon the country that is surveyed. Overall, the following remarks can be made about the studies that were reviewed:

- These studies reveal that Japan and Europe have stronger attitudes regarding GM technology and are more willing to pay for non-GM foods.
- The United States is not as strongly willing to pay for non-GM foods.
- This may reveal that the markets PEI should focus on, if they were to proceed with a non-GM marketing strategy, should be Japan and Europe.

From the review of the literature, it has become apparent that there is little data available to empirically determine the size of the market for non-GM products. The willingness to pay for non-GM products has been researched selectively in various countries, but has done little to infer the actual size of the market. Another factor that contributes to the difficulty in determining the market size for non-GM products is the lack of commodity exchanges offering non-GM contracts. In 2000, the Tokyo Grain Exchange (TGE) became the first commodity exchange to offer a non-GM contract. Specifically, in May 2000, the TGE began offering a non-GM soybean futures contract. The size of the non-GM TGE contract is one third the size of the regular TGE contract (10,000 kg vs 30,000 kg). To date, this is the only non-GM contract that is available. It is difficult to determine if this signifies a lack of demand for non-GM products, or a lack of co-ordination between countries in what defines a commodity as being non-GM.

The next section of this review examined various attitudes towards genetically modified foods in various countries. The majority of the literature available focuses on the European Union because of their high intolerance towards GM products.

2.2 Attitudes Toward Genetically Modified Products

As can be seen from the results of the surveys above, consumers' attitudes towards GM products have a large impact on their acceptance of GM products. Consumers' attitudes towards GM products are influenced by many factors. These include consumer organizations and other nongovernmental organizations, concerns regarding health risk, distrust in government policy, lack of knowledge regarding genetically modified foods, and the lack of consumer choice to inadequate labelling (Franks, 1999).

This section outlines consumers' attitudes towards GM products in different areas of the world, specifically, the European Union, Japan, Australia, Southern Africa, Canada and the United States.

European Union

The European Union is recognized as being relatively anti-GM. Consumer attitudes regarding GM products and biotechnology are recorded every few years in a survey called the *Eurobarometer.*[2] The latest *Eurobarometer* survey on biotechnology and the life sciences occurred between September and October 2002, and included results from the 15 Member States[3]. The results were reported by Gaskell *et al.* (2002) and are summarized below.

[2] The Eurobarometer is a public opinion poll that is maintained by the Public Opinion Analysis sector of the European Commission. This poll has been around since 1973 and measures Europeans attitudes regarding a wide range of topics concerning European Citizenship, enlargement, social situation, health, culture, information technology, environment, the Euro, etc. http://europa.eu.int/comm/public_opinion/index_en.htm

[3] The 15 Member States include: Belgium, Denmark, Germany, Greece, Italy, Spain, France, Ireland, Luxumburg, the Netherlands, Portugal, United Kingdom, Finland, Sweden and Austria.

Overall, 25% of Europeans do not know how they feel about biotechnology (same result as 1999); while 44% were optimistic and 17% pessimistic about biotechnology. Optimism towards biotechnology has increased overall since the early 1990's, and the declining trend of optimism that was generally observed between 1991 and 1999.

However, attitudes regarding different types of biotechnology, i.e., medical compared to agri-food applications, differ greatly. Genetic testing for inherited diseases is seen as useful and morally acceptable and is generally supported, whereas the majority of Europeans do not support GM foods. These foods are seen as not useful and risky to society. Support for GM crops is lukewarm, and while they are judged to be moderately useful, they are still seen as almost as risky as GM foods.

With the exception of Spain and Austria, all of the EU countries showed large to moderate declines in support for GM crops over the period 1996-1999. After 1999, support stabilized in Germany and France, and increased in all other countries, barring Italy, which saw a 10% decline in support.

Support for GM food has generally increased post 1999, with the exception of Germany, Finland (stable), France, Italy and the Netherlands.

The following table outlines how EU consumers' perceptions have changed towards GM foods and GM crops between 1996 and 2002.

Table 2.2 Percentage of Supporters and Risk Tolerant Supporters for GM Food and GM Crop

	GM Crops			GM Food		
	2002	***% Change 1996-2002***	***% Change 1999-2002***	**2002**	***% Change 1996-2002***	***% Change 1999-2002***
Belgium	80	*(10)*	*8*	56	*(22)*	*19*
Denmark	73	*(7.4)*	*26*	45	*(4.7)*	*28.5*
Germany	67	*(8.2)*	*(3)*	48	*(14)*	*(2)*
Greece	54	*(30)*	*20*	24	*(51)*	*26*
Italy	68	*(21)*	*(13)*	40	*(2)*	*(18)*
Spain	91	*6*	*5*	74	*(7.5)*	*6*
France	55	*(30)*	*2*	30	*(44)*	*(14)*
Ireland	77	*(9)*	*15*	70	*(4)*	*25*
Luxembourg	54	*(23)*	*29*	35	*(37.5)*	*17*
Netherlands	85	*(2)*	*4*	65	*(17)*	*(13)*
Portugal	84	*(7)*	*4*	68	*(5.5)*	*24*
UK	75	*(12)*	*19*	63	*(6)*	*34*
Finland	84	*(4.5)*	*4*	70	*(9)*	*1.5*
Sweden	73	*0*	*20*	58	*38*	*41*
Austria	57	*46*	*39*	47	*36*	*57*

Source: Eurobarometer, 2002

With the exception of Sweden and Austria, all of the European countries show moderate to large declines in support between 1996 and 2002, but post 1999, the majority of the countries show an increase in support.

The following table outlines how supportive the EU countries are in terms of GM crops and GM foods.

Table 2.3 Level of Support for GM Foods and GM Crops, 2002

	GM Crops	GM Foods
Spain	Strong Support	Weak Support
Portugal	Weak Support	Weak Support
Ireland	Weak Support	Weak Support
Belgium	Weak Support	Weak Opposition
Sweden	Weak Opposition	Weak Opposition
Denmark	Weak Opposition	Weak Opposition
UK	Weak Support	Weak Opposition
Finland	Weak Support	Weak Support
Luxembourg	Weak Opposition	Strong Opposition
Germany	Weak Support	Weak Opposition
Italy	Weak Opposition	Weak Opposition
Netherlands	Weak Support	Weak Opposition
France	Weak Opposition	Strong Opposition
Greece	Weak Opposition	Strong Opposition
Austria	Weak Opposition	Weak Opposition

Source: Eurobarometer, 2002

The member countries were also asked what arguments would more likely induce them to buy GM foods.

- When asked if they would buy or consume GM foods if they contained less pesticide residues, were more environmentally friendly, tasted better, contained less fat, were cheaper, or were offered in a restaurant, there were more Europeans that indicated they would not buy or eat GM foods than those indicating they would.
    - The most persuasive reason for buying GM foods was the health benefit of lower pesticide residues, followed by a perceived environmental benefit.
- In the countries surveyed, between 30 and 65% of the total survey participants rejected all of the reasons (contain less pesticide residues, more environmentally friendly, etc) for buying GM foods.
    - Greece, Ireland and France have the highest percentage of respondents rejecting GM food for all of the reasons for buying GM foods, while the UK, Austria and Finland have the lowest.

In summary, support for GM food and crops has stabilized across Europe as a whole between 1999 and 2002. Most countries show small to moderate increases in support, while Italy shows a marked decline.

Canada

In 2004, Pollara, a full-service public opinion and market research firm, surveyed Canadians on behalf of Health Canada regarding their opinions towards biotechnology. The survey found that the vast majority of Canadians remain deeply suspicious of biotech food, despite the lack of evidence of adverse effects that are caused by it.

Overall, at least 92 percent of the 1,430 Canadians surveyed indicated that they had some level of concern regarding the long-term risks that biotech foods might cause for human health. One of the main health concerns cited was that proteins created by genetic modification could contain allergens.

In a news release concerning the biotech food survey, Greg Penner, a molecular biologist with NeoVentures Technology of Guelph, Ontario, said that media sensationalism was to blame for fuelling anxiety towards biotech foods. However, Peter Andree, an expert at Trent University in Peterborough, Ontario, said that people have a right to be cautious, as "there are still a lot of holes in our understanding of the full effects of genetically modified organisms."[4]

This poll can be compared to an Angus Reid World Poll[5] that was conducted in 1999 that looked at consumer awareness and acceptance of GM foods. It was found that the public was generally largely aware of genetically modified foods, but that 24% of Canadians who were aware of genetically modified foods did not believe there were any benefits to the technology. Risks associated with genetic modification that were most frequently cited include "food safety/health concerns/allergens", the "experimental nature" and "unknown impact".

As a whole, Canadians were more aware of the risks than the benefits. Among those aware of the issue, 77% of Canadians were able to cite a "risk" of genetically modified foods, as compared to 65% who were able to name a benefit.

Canadians appear to be concerned about the possible food safety and health effects of GM food products, but not to the same extent as the Europeans. The Angus Reid poll shows that the Canadian public is to a large extent aware of genetically modified food. And, although Canadians have shown reserve about GM food products, the production and utilization of GM food products is not as controversial as it appears to be in the EU.

Japan

Japan has over 44 biotech varieties which have been approved for food use. However, even though Japan approves the use of biotechnology in food, they are very stringent regarding biotech legislation. In fact, Japan has legislation in place (the Food Sanitation Law, which was amended in 2000) which prevents the import of products for food use which contain biotech varieties which are not yet approved in Japan. To enforce this legislation, the Japanese Ministry of Health, Labour and Welfare, routinely samples and tests imported foodstuffs at port entry. Foods found to contain unapproved biotech varieties must be re-exported, destroyed or diverted to non-food use. The Japanese government has an informal intolerance of 5% for biotech ingredients in products which are labelled non-GM.

Consumers in Japan, however, appear to be less tolerant of GM foods than the government. A 1998 survey undertaken in Japan on behalf of the Ministry of Agriculture, Forestry and Fisheries, found that 91% of respondents desired safety information on GM food products, 72%

[4] Pollara Public Opinion and Market Research website. 2005. News Release entitled "Survey: Canadians suspicious of biotech foods". Released January 25, 2005. http://www.pollara.com/new/POLLARA_NET.html

[5] Angus Reid Poll on Acceptance of GM Foods. *AGBIOTECH Bulletin,* 8(4). Retrieved June 3, 2005, from http://www.agwest.sk.ca/publications/agbiotech/abb_apr00.doc

wanted information on environmental impact, and 55% would like information on how genetically modified food differs from ordinary food. In 1997 and 1998, Japanese consumers had collected over two million signatures protesting against GMOs and demanding labelling for all GM products.

Similarly, the Angus Reid World Poll on consumer reaction to biotechnology indicated that 82% of participants surveyed in Japan felt negatively towards GM foods.

Japanese consumers are highly cautious regarding GM food, and this stems from a multitude of reasons such as a series of food scares including beef-mislabelling, mad cow disease, and contamination of GM corn feed in the human food chain. Japanese consumer groups take credit for persuading their government to stop GM rice trials and – after a March 2004 meeting between US officials and representatives of 414 Japanese consumer and environmental groups opposed to biotech foods – for Monsanto's recent decision not to release GM wheat on the global market (Feffer, 2004). As the world's largest importer of food, and considering the acute opposition towards GM food, Japan could be regarded as a potential market for GM-free food products.

Australia

Australia has been quick to react to global concerns regarding GM foods and offers many GM-free crops and products. As well, there is a low tolerance for accidental presence of GM food in non-GM labelled food. Section 1.5.2 of the Australian Food Standards Code requires labelling of all GM food and ingredients, and has a tolerance level of only one percent for the accidental presence of GM material.
A three-year survey conducted by the Biotechnology agency of the Commonwealth Government, beginning in 2001, indicated that public concern regarding GM foods and crops has been increasing. In 2003, 54% of people believed that the risks were higher than the benefits, compared to 51% in 2002 and 49% in 2001. In 2003, only 27% believed that the benefits were higher than the risks, compared to 32% in 2002 and 20% in 2001. 19% of the respondents were uncertain of GM technology (17% in 2002 and 31% in 2001).

According to the Biotechnology agency poll, the Australian public perceives the risks of GM food products as:

- Potential allergens in food 65%
- Multinational control of food supply 59%
- Unknown long term environmental effects 55%
- Unknown long term health effects 45%

In comparison, the perceived key benefits of GM food products were:

- More efficient use of agricultural land 55%
- Decreased use of chemical and pesticides 54%
- Higher crop yields resulting in cheaper food 44%
- Improved nutritional value of food 41%

Although Australia has recently opened its doors to GM food products through the introduction of food labeling laws, and the federal approval of GM canola to be grown on a trial basis in Australia, there is still strong debate and resistance around the topic. In fact, the majority of the Australian states have placed moratoriums on or banned the commercial production of GM crops.

However, despite the large resistance of GM food and crops by the producers and consumers, it is unclear how large the market is for GM-free products in Australia. The majority of the focus regarding GM food appears to come from producers, who wish to protect their ability to market their products as GM-free.

United States

The United States appears to be one of the most accepting and tolerant countries with respect to genetically modified food and crops. There are many reasons why this is possible.

A recent survey by the International Food Information Council (released in June 2005) found that a majority of U.S. consumers continue to be open to the benefits of food technology, but are less interested in the subject compared to other food issues. 48% of those surveyed indicated that they had avoided some food or ingredient over the past few months, but less than 0.5% of those respondents avoided foods produced through biotechnology.

Other highlights of the survey include:

- U.S. consumers continue to indicate a willingness to purchase products of food biotechnology, particularly if biotechnology is used to reduce pesticides (64 percent), or improve taste and freshness (50 percent).
- A majority (62 percent) of US adults expect food biotechnology to provide benefits for them and their families over the next five years, primarily in the form of better health/nutrition or improved food quality/taste/variety.
- While 70 percent report hearing or reading a lot, some, or a little about biotechnology, only 12 percent have heard a lot, and those who have heard nothing increased since the last survey to 30 percent of consumers (26 percent in 2004).

A longitudinal study was performed in 2001 and 2003 by Hallman *et al.*, which looked at the American public's perceptions of genetically modified foods. The results were as follows:

- Americans pay little attention to agricultural biotechnology.
  - Only half of Americans surveyed were even aware that foods containing GM ingredients were being sold in stores.
- Americans do not have much knowledge about agricultural biotechnology.
  - Self-reported knowledge of biotechnology is low.
- Opinion on the acceptability of GM foods is split.
  - About half of Americans surveyed report that they approve of plant-based GM foods, and a quarter approve of animal-based GM foods.
- Opinions of GM food are easily influenced.
  - Approval increases when specific benefits of GM food are mentioned.
- Demographics and styles of choosing foods are related to acceptance of GM foods.
  - Women, people over 64, and people with low levels of education are less likely to approve of GM foods.
  - People who value naturalness and healthfulness in their foods are slightly less likely to approve of GM foods.
  - People who have purchased organic foods in the past are less likely to approve of GM foods.

Previously, a Gallup Poll conducted in 1999 found that slightly more than half of U.S. consumers did not view GM foods as a potential health hazard, which supports the findings of a report by

Hobbard (Professor of Sociology and Food Science, North Carolina State University) that only 16% of Americans rated biotechnology as a serious hazard (Fraser, 2001).

In summary, these surveys indicate that Americans are generally unaware of GM foods, or have other food concerns on their mind. Thus the overall acceptance of GM foods in the United States may possibly be because of the ignorance of Americans toward GM foods. If they do not know that they are eating GM food, then it would be more difficult to have an opinion about it. The media and consumer groups have had a strong influence in the European Union in terms of lobbying against GM food. The media attention and lobbying has not been as prevalent in the United Sates.

Developing Countries – Southern Africa

Countries in southern Africa are very concerned about GM food and have in the past refused food aid because of the possibility of it containing GM food. In a report by Huffman *et al*., (2003), they examined the issue of why southern African countries are wary of GM-food aid, particularly when this area experienced severe drought between 2001-2003 that reduced available maize supplies and left many people starving.

The report concluded that these countries (particularly Zambia, Mozambique, Zimbabwe, Swaziland and Lesotho) refused GM corn because they feared that the EU would "ban their agricultural exports if they became 'contaminated' with transgenetic materials from Bt corn." The EU has imposed a moratorium on the marketing approvals for GM corn based on the precautionary principle.

GM-food aid is seen as a threat because there is the potential for southern African farmers to plant GM seeds from an aid shipment, (e.g., seeds not crushed in the milling process), which could contaminate local maize varieties by pollen drift or physical mixing (*BBC News* 2002; *Economist's Editors* 2002). Over time these farmers might not be able to convince European buyers that their maize is GM-free or livestock and poultry are fed non-GM feed. Although imports of GM foods are not barred from the European Union by law, NGOs, led by Greenpeace and Friends of the Earth, have lobbied and demonstrated effectively, creating fear, rage and scepticism about biotechnology, and thereby, making EU consumers wary of GM foods (Nestle 2002).

From these reports, it appears that southern African countries are fairly anti-GM, although mainly for trade reasons and not for perceived health risks. Much of the food (grain) exports from the southern African countries are destined for European countries, and thus they do not want to compromise the trade relations. However, it is not likely that the southern African countries would serve as a potential market for non-GM food, as they are often reliant on (western) grain in the form of food aid.

The next section of the report examines the depth of GM-free production worldwide. It gives an overview of areas that have declared themselves as GM-free production zones. As well, it outlines various legislation that is in place regarding the production/and or importation of genetically modified foods.

2.3 GM-Free Production Zones

There are currently many pre-established/designated GM-free production zones in the world. The majority of these GM-free production zones are located within Europe. The term GM-free, however, is not a legally binding term, as quite often a region can simply declare itself to be a GM-free region. And while a certain area may consider itself GM-free, problems can arise during transportation of the product from its GM-free location, to its final destination. For example, if the product is being shipped overseas, and the shipping area is not a GM-free area, then there is the possibility that the product could become contaminated with other non-GM free products.

According to the latest Eurobarometer poll (2002), 70% of Europeans have rejected GM foods, and therefore many food retailers and manufacturers have pledged to source their products from GM-free sources. Thus, there is evidence that GM-free designated products have a willing market place.

Table 2.4 gives a comprehensive overview of regions in the world which have declared themselves as GM-free.

Table 2.4 GM-free Declared Production Zones of the World

Country	Description
Africa	
Zambia	German company, FECO GmbH Irrigation Systems, is working with 20 Zambian farmers through the Zambian firm MASCROP to grow non-GM crops intended for export to Germany.
Asia	
China	Jilin and Liaoning provinces GM soy free
Japan	Eight rice farmers in Takashima, Shiga Prefecture have started their own GM-free zone.
Europe	
Albania	In April 2004, five communes from the Vlore region declared themselves a GMO-free zone.
Austria	Initiatives by: Tirol, Vienna, Carinthia, Salzburg, Burgenland, Steirmark, Upper Austria and Lower Austria Provinces.
Belgium	39 communities in the Flemish speaking part of Belgium, and 81 in the French part have declared themselves GMO free.
Cyprus	2 Local governments.
Finland	2 GMO-free municipalities.
France	1,250 French municipalities, 15 regions, and 5 departments have declared themselves GM-free.
Germany	50 GM-free zones have been declared, representing 430,000 hectares of farmland that farmers have promised not to plant with GM crops.
Greece	Every prefecture in Greece has voted to declare themselves GM-free.
Hungary	31 municipalities have declared themselves GMO-free.
Ireland	1,000 GMO-free zones have been declared throughout the

Country	Description
	island of Ireland by farmers, food producers, hotels, restaurants, markets, pubs and retailers.
Italy	1,806 municipalities in Italy have so far chosen to declare their territories GMO-free. The combined area of those communities that have already signed a resolution against GMOs and those that recently have indicated to ban GMOs means that nearly 80% of Italy's territory is declared GMO-free.
Poland	9 GMO-free regions, covering 2/3 of Poland's territory and population.
Portugal	August 2004: the Algarve region declared itself GM-free.
Slovakia	The Cross-border region of Pannonien has declared itself GM-free covering 10 Slovakian, 23 Austrian and 12 Hungarian municipalities.
Slovenia	1 region: The GMO-free Bio-region ALPE ADRIA, covers the whole area of Slovenia, the Austrian provinces of Carinthia and Styria and the Italian provinces of Friuli-Venezia Giulia and Veneto.
Spain	The region of Asturias declared itself GMO-free in May 2004.
United Kingdom	Over 44 areas in England have approved a GM-free resolution. 35 councils in Wales and 3 regions in Scotland have approved similar resolutions. Over 50 local authorities have voted for GM free policies.
North America	
Canada	In June 2004, Powell River, British Columbia, declared itself a GM-free zone.
United States	In Vermont, 79 towns have passed resolutions against GMO's. Brooklin, Maine approved a resolution to declare the city a GM-free zone.
South America	
Brazil	The province of Parana is attempting to establish itself as a GM-free zone.
Australasia	
Australia	Most states in Australia have a ban on GM crops of some form, including West Australia, South Australia, Victoria, New South Wales, Australian Capital Territory, Tasmania,

Sources: The Center for Food Safety (2005), Friends of the Earth Europe (2005) and the Non-GMO Report (January 2005), Network of Concerned Farmers (2005)

In addition to many countries having implemented self-declared GM-free zones, there are also regulations that exist in many countries which ban, or severely restrict the importation of GM-products, particularly GM-food. The table below (2.5) provides a list of some of the regulations that currently exist.

Table 2.5 GM-Free Legislation and Regulations

Country	Legislation/Regulations
Asia	
China	The provincial government of Heilongjiang, China's leading soybean producer, has ordered GM soybeans be kept out of the province.
Japan	Regulations are being established under the Hokkaido prefecture that would effectively ban the commercial production of genetically modified crops. It would apply to all crops and would include constant monitoring to prevent cross-pollination of GM crops with other crops. In Iwate, Ibaraki and Shiga prefectures, the authorities have established guidelines that restrict GM crop production.
Philippines	In July 2004, a GMO-free ordinance was passed in Bohol province banning Bt corn and GM crops from entering the province.
Europe	
Finland	The councils of two municipalities have banned the use of GMO's in public provisions, such as schools, day cares, nursing homes, etc.
Germany	Parliament adopted a new law allowing farmers to plant genetically modified crops, but the law assigns liability to farmers of GM crops if their crops cause economic damage to neighbouring conventional or organic farmers through GM contamination of non-GM crops.
Hungary	In January 2005, Hungary became the first country in Eastern Europe to (temporarily) ban genetically modified maize by outlawing the planting of Monsanto's MON 810 Hybrid seeds.
Italy	The new Italian co-existence law allows each region to ban or permit cultivation of GM crops.
Netherlands	The local government of Culemborg declared itself GMO-free in August 2004, and the municipality is not permitted to use GM crops.
Spain	Andalucía and the Basque country have a 5-year moratorium on growing GM crops in place.
Switzerland	3 cantons have effectively banned the commercial release of GMO's. In the Canton Ticino a law has been included into agricultural canton laws banning the cultivation of GMOs. The parliaments of the cantons of Vaud and Jura have proposed similar laws.
North America	
United States	Mendocino County, California has ruled it unlawful for anyone to "propagate, cultivate, raise, or grow genetically modified organisms" in that county. Vermont Act 97 requires manufacturers of genetically modified seeds to label and register their products. Trinity County, California passed an ordinance banning GM crops and animals in 2004. Marin County, California also made it unlawful for anyone to "propagate, cultivate, raise, or grow genetically modified organisms" in that county. Arcata, California, passed an ordinance which outlaws the sales, distribution, propagation, cultivation, raising or growing of seeds or crops of genetically engineered organisms. In California, legislation was introduced that would protect farmers

Country	Legislation/Regulations
	from economic losses due to genetically modified crops. If this legislation passes, known as the Farmer Protection Act, manufacturers of genetically modified plants would be held liable to any producer, grain and seed cleaner, handler or processor injured by the release of that plant into California. The Vermont Senate approved legislation that would hold seed companies liable for economic losses suffered by farmers due to contamination from GM crops.
Oceania	
Australia	Section 1.5.2 of the Australian Food Standards Code requires labelling of all GM food and ingredients, and has a tolerance level of only one percent for the accidental presence of GM material. The Australian government approved the planting of GM canola in 2003, but five states and one territory instituted moratoriums to block the planting of the first GM canola in Australia. Tasmania passed the GMO-control Bill 2004 to extend its moratorium on GM food crop until 2009.

Sources: The Center for Food Safety (2005), Friends of the Earth Europe (2005), the Non-GMO Report (January 2005 and May 2005)

The severity of the regulations and legislations varies depending on the country. The European Union has typically been seen as an area which does not accept importation of GM products, and many countries have tailored their crop production to meet their demands. New co-existence legislation in European countries, such as Italy, does not outright ban the existence of GM crops, but rather gives each region the ability to choose whether or not to ban GM crops. As well, legislation in Germany holds producers of GM crops accountable for any contamination that may occur in non-GM crops.

In some countries, even though GM crop production has been approved, many regions have opted not to allow the growing of GM crops. Such is the case in Australia, where GM crop production has been approved (for canola), but five of the states and one territory have posed bans or temporary moratoriums on GM canola production.

Australia also has a very low tolerance (1%) for the accidental presence of GMOs in food that is labelled as GM-free, and Japan has an informal tolerance level of 5%. The issue of labelling GM foods continues to be an issue in many countries, and the future will most likely see many more countries with legislation mandating the labelling of GM-food products.

Opposition to genetically modified organisms by European citizens has primarily been motivated by food safety and environmental concerns. In late 2003, the European Union adopted a new set of regulations pertaining to the commercialization of genetically modified food and feed. A centralized procedure for the pre-market approval of GM food and feed was instituted (European Parliament and Council, 2003). The regulations also mandate that operators adopt appropriate traceability systems to ensure that GMOs and products with GM ingredients can be identified along the food chain. In addition, new labelling rules were introduced to enable consumers to better identify food products that contain GMOs or ingredients derived from GMOs (Merel *et al.,* 2005).

2.4 Select Country Analysis

This section looks at the motivation for adopting GM-free zones, legislative challenges and market factors of success/failure with a GM-free zone. The countries included in this review were Japan, Italy, Germany, Brazil and Australia.

Japan

In Japan, consumer groups opposing genetically modified food are very influential and vocal about their concerns. There are many consumer organizations that are devoted entirely to campaigning against genetically modified food, including the Seikatsu Group Club and the No!GMO campaign. These consumer campaigns are an effective indirect marketing tool for GM-free products. The No!GMO campaign has gone as far as examining products without any GM labelling for GMOs. If found the name of the food company would be disclosed. This disclosure exerts tremendous pressure on the food companies as it could result in a loss of customers. As a result of this pressure, some companies have started to adopt voluntary segregation programs to reduce the possibility of GMO mixing (Matsumoto, 2004).

Farmers adamant about preventing genetically modified plants from infiltrating their fields are declaring GM-free zones to bolster public awareness and to fight the influx of GM plants. GM rapeseed has been detected in 11 locations within Japan near ports. However, Japan does import GM rapeseed.

Other factors, such as protecting brands and protecting crops from GM contamination are also factors which influence the adoption of GM-free zones. For example, the prefecture of Hokkaido adopted GM-free status to protect their unique “Hokkaido brand” crops, and keep them free from contamination and to prevent cross-breeding with other crops.

The decision to become a GM-free zone is undertaken individually by each prefecture, and they have the ability to establish their own guidelines to restrict GM crop production and to enforce penalties.

The Hokkaido prefecture has compiled a draft ordinance that carries penalties for offenders who embark on commercial GM crop production without a permit. If this passes, it would be the first such regulation at the local government level. Hokkaido has resulted to this measure because they are determined to protect their unique “Hokkaido brand” crops, and keep them free from contamination and to prevent cross-breeding with other crops.

Labelling requirements can have an effect on the demand for food, particularly in countries such as Japan where GM foods are a public concern. Labelling of genetically modified foods in Japan is mandatory. Foods that are made from non-GM foods, and which have been identity preserved, can be voluntarily labelled as “not genetically modified”. There is a mandatory labelling requirement for foods that have not been identity preserved, and they must be labelled as “not segregated from GM product”.

GM-free zones (including ports) are monitored to a certain extent, but are not 100% reliable. As mentioned above, GM rapeseed has been found near Japanese ports, yet GM rapeseed is not imported to Japan. Japan tests imports for unapproved GM-material. If unapproved material is discovered, then Japanese authorities have the authority to destroy it or to send it back. This was evidenced in August 2005 when Bt-10 Biotech corn was discovered in as many as nine

feed grain cargoes originating from the United States. Currently, the cargo is being destroyed or sent back to the United States. The Japanese ministry has proposed accepting feed grain cargoes with up to one percent of Bt-10 corn (they currently have a zero tolerance) to smooth the flow of corn supplies to the Japanese livestock industry, but this would require approval by Japan's Food Safety Commission.

The large shipments of corn and soybeans that Japan receives from the United States are processed in Japan for GM-free food and livestock feed. Processing companies and distributors can declare themselves as GM-free or as only willing to distribute GM-free products. Japan's largest soybean protein food products company, Fuji Oil Co. Ltd, no longer uses GM soybeans, directly as a result of consumer safety regarding bioengineered crops.

Italy

Opposition towards GMOs in Europe is particularly strong. A number of authors have noted that European consumer and environmental NGOs (Non-Governmental Organizations) have been critical in mobilizing this opposition towards GMOs (Bernauer and Meins, 2003 and Ansell *et al.,* 2003). Their success is measured in the rather stringent regulations that the European Union has regarding GMO's. Their success can also be measured in the number of GM-free zones that have been established in European countries such as Italy. Consumer concerns and pressures from NGOs have certainly been influential in the establishment of GM-free zones in Italy. NGOs such as Friends of the Earth Europe and Green Peace have considerable influence on consumer's decisions.

The Italian movement against GMOs played a relevant role in shaping the Italian government's position with respect to GMOs, and in doing so also had an indirect impact European-wide (Ansell *et al.,* 2003). The influx of cases of BSE in the United Kingdom and the importation of GM soy from the United States in November, 1996, were two events which helped to form the movement against GMOs, and Greenpeace became the first NGO to lobby against GMOs in 1997. The formation of a coalition of two advocacy groups – comprised of environmentalists, major farmer's associations, consumer groups, industry groups and 500 Italian NGOs – created a cartel to lobby the Italian government through joint position documents and joint campaigns. This coalition was effective in pushing the government to maintain the moratorium against GMOs. The focus of the advocacy groups is to focus on either influencing policy-makers or raising public awareness of GMO issues.

Greenpeace Italia played a large role in influencing public opinion. Its educational campaign was directed at consumers and took place in supermarkets and squares of cities and towns, where GM-free organic products were advertised. This campaigning was accompanied by direct action, such as labelling supermarket products with GM ingredients or raised with GM food.

In Italy, the labelling of GM plants and foodstuffs is governed by EU laws[6]. Therefore, every food and fodder containing more than 0.9% of genetically modified organisms must be labelled as containing genetically modified material. Each GMO is given its own ID code, in order to identify what kind of genetic modification it went through. There are certain non-authorized

[6] In the EU, products containing traces of genetically modified substances are to be labelled as genetically modified. If the food unintentionally contains less than 1% genetically modified material, it does not need to be labelled as genetically modified.

GMO products within the EU where the threshold level is 0.5%, and if this threshold is overcome, the product is banned from the market (Bionet, 2005).

The amount of premium being received by Italian producers and processors, if any, is difficult to determine. It is quite possible that some consumers are not willing to pay a premium, as put forth by Roberto Frione, managing director of Milan-based Jakil SpA. Frione says that the market is not willing to pay extra for GM-free soymeal, and as a result much of the soymeal imported into Italy is genetically altered (GENET, 2000).

In Italy, each region or district has the authority, under Italian law, to overturn decisions that are made at the EU-level and they are responsible for their own enforcement. Thus, each region will have its own method for monitoring GM-free zones.

Testing is done to determine if GM-free zones are contaminated with GM seeds/crops. In 2002, a Turin court launched an investigation into 10 seed companies for allegedly selling corn seeds contaminated with GM material. The investigation was a result of tests carried out by a state-owned seeds agency in Milan (Italy Launches GM Seed Probe", Chemical Week August 14, 2002).

In Italy, the co-existence law allows for the regions to draw up agreements with farmers (on a voluntary basis) in order to adopt direct management measures to ensure coexistence between transgenic and non-transgenic crops.

Farmers identified in these agreements will be bound to comply with the measures cited in the plan and those who expose farmers to direct and indirect damages caused by non-compliance will be liable for said damages.

The law establishes a “Committee on Transgenic, Conventional and Organic Crops” who will be responsible for proposing measures related to the harmonization of inspection procedures and identification of the types of compensation for damages.

Germany

In Germany, GM plants and foodstuffs which contain or have been made from GM plants must be labelled according to EU labelling regulations. Outside of the EU laws, Germany does not have any specific regulations for GM plants and foodstuffs.

However, since 1998, foods that do not contain any GM plants and have been made without using any ingredient derived from GM organisms can be labelled as “ohne Genetechnik” (without “gene technology”), if the producer can supply evidence according to very strict rules (Bionet, 2005). The labelling of GM and GM-free foods in itself is an effective marketing tool, particularly when consumer concern and activism regarding GM foods is particularly high. A study by Philips and Foster (2000) found that 82% of German consumers were less likely to buy GM-labelled products.

The market success is difficult to determine because data is not tracked on sales of GM-free food versus sales of GM food. However, campaigns within Europe have been successful in lobbying against the importation of GM food and in increasing consumer support for GM-free food. Many food makers opt to not include GM ingredients in Europe because they know the European consumer is not likely to buy GM food products. On December 20th, 2004, EU

environment ministers blocked the approval of Monsanto's GM oilseed rape GT273. And in November of 2004, European environment experts also voted by a large majority against proposals to overturn the bans on genetically modified crops in five countries, including Germany.

The German coexistence law to protect GM-free farming has a site register which provides farmers with precise information about the cultivation of GM crops in their neighbourhood. The law provides for a compensation scheme should a GM-free farmer's crops become contaminated with neighbouring GM crops and a "material negative effect" arises. A material negative effect arises from three particular cases:

- The product cannot be placed on the market because of cross-contamination with GMOs.
- If owing to cross-contamination with GMOs a neighbouring farmer is obliged to label his produce as "genetically modified".
- If owing to the presence of GMOs a neighbouring farmer is no longer able to label his produce as "organic" or as produced "without genetic modification".

The amendment lays down fundamental obligations, such as observing minimal distances between fields and good farming practices.

Under Directive 2001/18/EC, an applicant must submit a monitoring plan with any request for authorisation to market GMOs at the Community level. The monitoring procedure is designed to ensure that any unforeseen effects of the GMO on human health or the environment can be traced and identified.

Brazil

Brazil is an excellent example of the difficulty of producing and segregating GM and non-GM crops unless a legal framework exists to verify the attributes and integrity of a crop in line with market demands, and the intellectual property rights of breeders (which ultimately affects that ability of stakeholders to capture a share of a product's end value).

Brazilian farmers have a history of informal seed trading. Many Brazilian farmers (particularly those managing smaller operations) purchase and plant a relatively small amount of certified seed from established seed breeders compared to their annual crop (Confidential Respondent, 2005). In order to save costs, it is common practice to exchange uncertified seeds with other farmers or to obtain seed at a discounted cost through the 'shadow market'. Research conducted in Brazil has shown that the main concern of many producers, particularly those situated in the Rio Grande do Sul (a major soy growing area), was the lowering of production costs to remain competitive against larger operations - not ensuring the phytosanitory or legal status of a crop.

A significant challenge that the Brazilian agricultural industry faced was the continued illegal use of GM soy (producers continued to obtain seed on the shadow market) and producers not paying royalty fees to Monsanto. The concern was that the illegal use would compromise Brazil's ability to comply with intellectual property rights agreed with International Union for the Protection of New Varieties (UPOV) and World Intellectual Property Organization (WIPO) and would have exposed Brazil to trading embargoes and penalties. Another significant challenge faced by the nation's agricultural industry stemmed from the impact that the lack of segregation

measures had upon farmers wishing to produce and market crops according to specific product attributes; particularly certified GM-free (Confidential Respondent, 2005).

Another problem faced by Brazil's soybean industry is that in many areas the necessary infrastructure does not exist to allow the segregation of GM and non-GM soybeans. The inability to enforce property rights, prevent opportunistic behaviour by producers, and monitor transactions undertaken in the shadow seed market, combined with a wider discussion by interest groups surrounding transgenic crop production, led to an environment in which it was difficult to support the production of GM-free soybeans. The establishment and enforcement of GM-free zones would have been even more challenging.

With producers in Rio Grande do Sul illegally planting GM soy since 1999 (Confidential Respondent, 2005), and biotech seeds accounting for around 80 percent of the regions soybean crop (CropChoice news, 2003), Brazil had to find a way of re-establishing an environment where GM and non-GM producers could operate harmoniously without negatively impacting each others' prosperity. In order to comply with international agreements, the Brazilian government granted temporary permission for the production of GM soy. Simultaneously, the government entered negotiations with Monsanto and with interest groups to identify methods for ensuring producers respected the company's internationally-recognized intellectual property rights and to develop long term policies surrounding the production of transgenic crops in Brazil.

The 2005 agreement was signed between Brazilian environmentalists, religious groups, farmers and seed companies for rules surrounding biotechnology in general, and GM crops in particular (Confidential Respondent, 2005). Since the agreement, Monsanto has begun to collect royalties from farmers producing GM soy through the testing of crops delivered to traders. To discourage opportunistic behaviour, a penalty of US$150 per tonne is now applied to producers that fail to declare the use of GM crops. The standard royalty is US$20 per tonne. Decreased opportunity to produce GM crops with a low risk of being caught, and the application of a mandatory royalty and penalties for attempting to evade payments, appears to be slowing the adoption rate of GM soybeans in Brazil.

As expected, the 2005 agreement leaves open the possibility for states to declare themselves GM-free zones (Ewing, 2003). Not all GM-free products are processed within the GM-free zones and the Brazilian port of Paranagua has stepped up its ban on GM exports (Non-GMO Report, August 2005). Similar to the lack of rural infrastructure necessary to segregate GM and non-GM crops, the port claims that it also does not have the capability to segregate GM and non-GM.

A substantial market remains for Brazilian GM-free products in the European Union, particularly non-GM soy. The ability for Brazil to supply the EU with GM-free soy was the focus of the Non-GMO Soy Summit held in June 2005 (Non-GMO report, August 2005). According to Jochen Koester, summit chair, "the main goal of the summit was to convey to Brazilian soy producers that there is an ongoing and strong demand for non-GM soy products in Europe".

An important aspect that allows Brazilian soy processors and suppliers easier access to the European market is having their products certified as non-GM through firms such as Cert ID, SGS, and Eurofins/GeneScan. This allows food and feed manufacturers to avoid GM labelling and to make "positive" non-GM labelling claims on their products, which is an attractive marketing feature for European consumers (Non-GMO report, August 2005).

Currently, GM-free soy is the predominant soybean crop in Brazil. The approval to plant GM soy in Brazil has been accepted, but Enrique Traver, CEO of Brazilian soy processor IMCOPA, said that the adoption of GM soy by Brazil's farmers might not be as rapid as predicted (Non-GMO Report, August 2005). He cited the fact that there is a shortage of GM soy seed and that GM seeds are not optimized for Brazil's climate and soil conditions.

Australia

There is much opposition in Australia to genetically modified crops and food. One key group of producers who oppose GM crops is the "Network of Concerned Farmers". This group is an Australia-wide network of conventional and organic farmers who are concerned about the economic, environmental and social impacts of genetically modified crops. They describe their role as "providing independent, practical, detailed and accurate information to farmers and the broader community on all issues related to GM crops" (Network of Concerned Farmers, www.non-gm-farmers.com, 2005). Groups such as the Network of Concerned Farmers have been influential in eliciting consumer and producer support against the introduction of GM crops and food in Australia.

Australia adopted the Gene Technology Act 2000 in accordance with the Gene Technology Regulator (the Regulator) as an independent statutory office holder with responsibility for implementing the legislation. The Act is the Federal component of a national scheme for regulating certain dealings with genetically modified organisms (GMOs). The object of the national regulatory system for gene technology is to protect public health and the safety of people, and to protect the environment from risks associated with gene technology. Essentially, the system operates by identifying and assessing risks posed by, or as a result of, gene technology and by managing public health and environmental risks through regulation of dealings with GMOs.

Section 21 of the Gene Technology Act 2000 (Commonwealth) allows the Ministerial Council to issue a policy principle as follows:
"recognising areas, if any, designated under State Law for the purpose of preserving the identity of one or both of the following:

- GM crops;
- non-GM crops;

for marketing purposes;"
The Act also addresses the scope of GM-free and GM zones. Under the Act, only areas designated for preserving product identity for marketing purposes can be recognised by policy principles. Under the Act, the Gene Technology Regulator is already empowered to address issues of human health and safety as well as environmental risks in relation to any request for a licence to deal with GMOs. As well, only designated areas relating to crops, not to other organisms which may or may not be genetically modified can be recognized and areas can be designated for the purpose of preserving the identity of GM crops, non-GM crops or both. Local governments do not have the authority to designate GM-free or GM zones, and this can only occur at the State or Territory level.

It is uncertain what methods are/will be used to market GM-free products, but it has been suggested that marketing campaigns be built around regional labels (e.g. wine regions), production system labels (e.g. free-range eggs, organic products) and "ecological labels" (e.g.

dolphin-friendly tuna). In the same way, product differentiation in the market-place might be built around production in a GM-free zone.

To support a stringent standard for "GM-free" claims, it would be necessary to enhance the reliability and integrity of segregation and identity preservation systems for non-GM crops (Government of Western Australia, 2002). Currently, there is no such system in place, and the position held by the Government is that any additional costs faced by non-GM producers, particularly in terms of segregation and identity preservation, should be borne by GM producers.

The basis of this argument is that the need for costs of improved identity preservation systems for non-GM products might not arise unless GM production proceeds elsewhere. Furthermore, non-GM producers might reasonably expect GM producers to meet the full cost of any systems designed to ensure segregation of GM crops. Clustering of GM producers in a GM zone would facilitate such investments (Government of Western Australia, 2002).

The Government of Western Australia (2002) also puts forth, that, where non-GM producers seek some additional marketing benefits from differentiating products produced within a GM-free zone, it may also be argued that they should be prepared to meet the costs of gaining such benefits. In other words, it may be difficult to make GM producers liable for costs incurred within GM-free zones when, by definition, GM production is excluded from such zones.

There also costs associated with foregoing the use of GM technologies and these may apply across all agricultural and food production enterprises within the GM-free zone. The costs may be measured in both environmental and economic terms. Foregone benefits might, for example, include (Government of Western Australia, 2002):

- any savings in agricultural inputs (water, fertilizer, herbicide use),
- yield improvements provided by production traits (insect resistance, disease resistance), or
- any price premiums provided by improved or novel product traits (longer shelf-life, enhanced appearance, higher vitamin content, specialized oil characteristics).

Preventing GM crops from being grown in an area would reduce chances of contamination from GM crops. A GM-free zone could:

- help in maintaining a "clean, green" food marketing image for that area,
- facilitate production of organic and other food products that do not utilize genetic modification, and
- serve as a reference area for assessing the impacts of gene technology on the environment, public health or trade.

The Gene Technology Regulator is currently free to license GMOs for field trials and commercial release in any area of the State. Designation of an area as a GM-free zone under State legislation would restrict licensing of trial and commercial releases to areas outside the GM-free zone. A GM zone, on the other hand, would give notice that GM crops can or will be grown in that area.

There is no legislated limit on the size or means of definition of designating areas as being GM or GM-free. For example, a GM-free or a GM zone could be designated by reference to an administrative boundary such as a local government district, a port or shipping zone, being the

entire catchment from which a particular crop may be drawn, or other specific geographical boundaries.

2.5 Conclusions from the Literature

A review of the available literatures indicates that it is difficult to empirically estimate the market demand for non-GM products, but some inferences can be made. The literature indicates that certain countries value non-GM food products (Europe and Japan in particular) and are willing to pay a premium for them. It shows, however, that consumers in the United States are relatively indifferent towards non-GM foods, and in many cases prefer products that indicate they are locally grown (as is the case with the Colorado-grown potatoes). The literature also indicates that there is a varying degree of awareness regarding GM foods, and that the more aware consumers are of GM foods (particularly through the influence of consumer awareness and lobby groups), the more likely they are willing to pay a premium for non-GM food.

Similarly, the results from country surveys and polls regarding consumer's perceptions towards GM foods follow the same trends as the willingness to pay studies. In Japan and the European Union, consumers tend to favour non-GM foods; however, Europeans have generally become more accepting of GM foods when the results from previous Eurobarometer polls are compared.

An overview of the magnitude of GM-free production zones worldwide indicates that there are increasingly more regions declaring themselves GM free. And while legislation that prohibits the importation of genetically modified foods is declining, there has been the introduction of legislation that makes producers of GM crops liable for any contamination of non-GM crops should it occur.

3.0 Market Structure and Demand: Interviews

In section 3.0 of the study it is determined if the GM-free production zone is of value to buyers and consumers through interviews with international buyers and food experts. Section 3.1 describes the survey methods including a description of the types of respondents and the survey instrument. Section 3.2 is a summary of the interview/survey results by question. Section 3.3 concludes with the common themes that emerged from the interview process. Specifically, the highlights refer to the drivers and issues surrounding the establishment of a non-GM production zone from the perspective of the consumer, retailer, processor/distributor, producer and life science/input supplier and what the interview results suggest for Prince Edward Island.

3.1 Survey Methods

The survey method used for this project was a questionnaire that enabled data to be gathered from chosen respondents through the means a of semi-structured interview format (the specific questions asked are listed in the survey results below). A letter of introduction preceded the questions. The letter explained the purpose of the research initiative and the types of information sought (refer to Appendix A).

A list of suggested respondents was compiled according to what the project team thought would provide detailed insights into issues, opportunities and trends surrounding the establishment of a GM-free production zone, and the possible impact of such a zone on the processing and marketing of non-GM crops and products across a wide geographic area.

The list was passed on to the PEI Certified Organic Producers' Cooperative Steering Committee who agreed to the suggested respondents, with the provision that a number of specific people be prioritized due to the usefulness of the information they could likely provide.

In every case (but one) the questionnaire and covering letter was sent to the respondent at least three days in advance of the interview. The only exception was a respondent who indicated at the time they were approached with the questionnaire that it was a convenient time to conduct the interview. All respondents were informed of the objectives underlying the consultation process.

At the end of every phone interview respondents were invited to submit further comments by email or phone should they wish. As none of the respondents took advantage of this opportunity, it is fair to say that the interview process gave each respondent adequate opportunity to voice their opinions.

All but two interviews were conducted by telephone. Two were conducted face-to-face. All lasted 20 to 60 minutes. This gave the interviewees time to reflect on their answers as they worked through the questionnaire. This process also provided an opportunity for them to relate a specific answer to another part of the questionnaire; usually as a way of underlining the importance of an issue or a point they had raised regarding the issue in question. The interviewer took great care not to solicit a particular response by loading questions or voicing his own opinion. All responses are therefore the interviewees' personal thoughts and opinions.

3.1.1 Respondents

The 33 respondents interviewed for the purpose of this project can be grouped into two types:

- The first group comprises respondents who are directly involved in the production, processing or marketing of agri-food products, and therefore have detailed insights into their particular sectors. The results of these interviews are referred to as the primary data.
- The second group comprises respondents chosen for either their knowledge of the international agri-food industry and/or drivers of the GMO debate, particularly relating to consumers. The results of these interviews are referred to as the secondary data.

By comparing and contrasting responses from the two separate groups it was possible to verify whether the information provided by the research process was legitimate and held up to scrutiny.

The companies interviewed supply customers in Europe (including the United Kingdom, Netherlands, Germany, France, Belgium, Denmark and Austria), Asia (including Japan, Korea, Malaysia and Indonesia), Australia, South America and North America. The 'secondary data' respondents possess a detailed knowledge of the international agriculture and agri-food industry, including structure, trends, drivers and food marketing dynamics.

The responses therefore reflect an in-depth knowledge of market developments and drivers, which ultimately determines whether a viable return can be secured from specific products, whatever their specific physical or credence attributes. It also ultimately determines who in the chain will benefit from supplying a particular product type to a particular market.

3.1.2 List of Respondents

There were two respondents that requested that their name remain confidential, which are depicted as XXXX in the list below. One company is a high profile multinational food supplier that markets a range of common household foods. The other is a well known Canadian retailer. To help ensure that the information gained from the research process was accurate and open, all of the respondents were assured that their individual comments would remain confidential.

Agri-Food Companies

- 'Hindsight' & ex-Waitrose (retailer), England
- Sunterra (producer, meat processor, retailer), Alberta
- XXXX, multinational producing household name foods for retail and foodservice
- Perfection Fresh Pty Ltd, Australia
- Maple Leaf Foods Inc., Canada
- De Ruiter Seeds Inc. (North America), Arizona
- Showa Trading Company, Japan
- XXXX, retailer, Canada
- Henricks Seeds, Ontario
- Griffith Laboratories, Ontario
- Queen's Pasta, Ontario
- Holistic Blend, Ontario
- Arrowhead Mills, Texas

- Clarkson Grain, Illinois
- Cloutier Agra Seeds Inc., Manitoba
- Dahlgren and Company, Inc., Minnesota
- Didion Milling, Wisconsin
- Favored Grain, Illinois
- Lakeview Organic Grain, New York
- Garden Protein International, British Columbia
- Campbell Company of Canada, Ontario
- Grain Millers Specialty Products, Minnesota
- SK Food International, North Dakota

Industry Service Providers & Researchers

- School of Natural Rural System Management, University of Queensland, Australia
- Nafferton Ecological Farming Group, University of Newcastle, England
- Soil Association, Bristol, England
- Wageningen University, Netherlands
- Canadian Pork International, Ontario
- Department of Nutritional Sciences, University of Toronto
- Wye Agricultural College, University of London, England
- Dow AgroSciences Canada Inc., Alberta
- Maple Leaf Bio-Concepts, Ontario
- Plant Biotechnology Institute, National Research Council Canada, Saskatchewan
- Council for Biotechnology Information, Ontario

3.2 Summary of Survey and Interview Results

The following is a summary of the interview results by question. The letter and questionnaire distributed to the respondents has been attached in Appendix A. For those questions in which a quantitative response was calculated, the data analysis has been included in Appendix B. A detailed breakdown of interview responses is contained in Appendix C.

1. What do you consider the term Genetic Modification (GM) to mean?

Without exception, every respondent stated that the most important issue is to understand what the term “GM” means to consumers. Many countries and consumers possess different perspectives about what the term GM means for them. Having been the recipients of countless reports and broadcasts from the media or interest-groups, consumers have (in simplified terms) become polarized about the issue of GM/GMOs and accepted one of two stances. The first is distrusting and passionate. The second is blasé and dispassionate.

Consumers’ and cultures’ historical experience and societal view of food has also been influential in shaping their perceptions towards GMO. For similar reasons health, wellness and environmental issues have become intertwined in many countries. This has led to a blurring of discussions surrounding the production of organic versus non-GM products. The aspect of consumer choice and opinion that appears most similar across all countries is that the more affluent and educated the consumer, with greater their health and/or environment concerns. In certain segments, those concerns translate into wariness of GM foods and desire towards organic; particularly towards food that is viewed as fresh, relatively unprocessed, or pure.

2. Please list or describe the farm and food products that you purchase and produce.

Respondents came from all levels of the agri-food industry. They included input suppliers (including seed breeders and distributors), producers (animal and crop), intermediaries (elevators, grain merchants, feed manufacturers and suppliers), food manufacturers (frozen, fresh, meat and vegetable), retailers, market/consumer researchers, and scientists. Together they accounted for every major type of food product.

3.a) In your experience in the last decade, has there been an increase or change in the demand for products or markets that you serve with respect to <u>non-GM</u> commodities/products?

The responses to this question painted something of an anomaly. On one hand, respondents said that the demand for non-GM crops was increasing. Many of the same respondents also said that the demand for GM crops was expanding too. While this may at first glance appear to be a contradiction, the respondents' comments about increased demand were not always reflected in increased volume. Consumption of GM products and foods containing GM ingredients (*and therefore production of GM crops*) are increasing as manufacturers demand it for cost-reduction purposes, some of the land that once produced non-GM crops now produces GM crops. Brazil is a significant example of this shift in production.

With fewer suppliers of non-GM products, demand has increased. Yet the overall consumption of non-GM products has remained fairly stagnant. The only notable area where increased demand has been directly reflected in increased consumption of non-GM crops and foods is in the growing organic and natural sectors. While it remains small compared to the overall agri-food industry, the organic sector has gained the most profile internationally. The second area of expected growth for non-GM products is in animal feed for organic and natural meat production.

In Asia, the greatest driver of interest in non-GM foods is not the physical aspects or health/safety concerns surrounding GMOs, it is the added traceability that usually accompanies non-GM and/or organic products. For Europeans, a desire for non-GM foods most definitely stems from a lack of confidence in the scientific and governmental fraternities. This has emanated from incidents such as BSE, FMD and salmonella in eggs.

While the percentage of GM, non-GM, organic and natural food consumed in a market differs between countries, virtually all respondents stated that if a price difference did not exist between GM and non-GM foods, virtually all consumers would prefer to consume non-GM foods. That was stated to be the case amongst all consumers; even in the US where consumers generally display the most blasé attitude towards GM foods.

The greatest driver in consumers' and industry's acceptance of GM foods and ingredients are lower prices, greater consistency and dependency of supply. In addition, with the expectation that GM crops will be the predominant source of supply for the expanding biofuel, biomaterial and biomedical industry, higher demand for GM crops will likely also translate into higher volumes. This assumption is underlined by the view that a) European farmers are showing increased interest in producing GM crops and b) with greater usage of biofuels and bioproducts, European consumers' wariness towards GM products will likely subside to a large extent.

In summary, 29 of 33 or 88% of the respondents indicated there has been an increase in the demand for products or markets that serve them with respect to non-GM commodities/products. Refer to Appendix B for a quantitative assessment of responses for question 3a.

3.b) If you answered that there has been an increase in demand in the question above, from what level of industry do you believe the greatest changes in demand for non-GM crops has been driven, and how?

Respondents said that consumers are clearly driving the resistance this is expressed towards GM crops. However, the level of resistance towards GM crops is very nation specific. Northern European consumers are most opposed, concerned and vocal. Japanese consumers are less vocal; though do influence industry through their role in managing consumer cooperatives.

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The media has had a varying degree of influence upon consumers' attitudes towards GM crops and products; which differ according to specific markets. Part of this influence stems from the media's (and consumers') increasing focus on issues surrounding health and well being. The relationship between the media and special interest groups also plays a role in shaping consumers' perceptions towards GM-related issues. This is particularly evident in societies that have experienced significant food safety scares (i.e. Northern Europe) and therefore lack trust in the ability of governments and scientists to ensure the safeness of food; or where food quality has historically played a significant role in societal behaviour.

In Asia, while a segment of Asian consumers seek non-GM products, most Asian consumers show no discernable difference between the demands for GM or non-GM products. This includes Japan. For Asian consumers, traceability is often the bigger issue: particularly regarding food providence and integrity. Where concerns do exist towards GM foods, a direct correlation exists between the level of concern and higher levels of consumer affluence.

While North American demand for non-GM products have at least in part been driven by a sector of the food industry promoting themselves through a specific differentiated value-proposition to interested consumers (i.e. Whole Foods Markets), the opposite scenario exists in Europe and Japan, where consumers have driven manufacturers to supply non-GM products.

3.c) Which commodities or products with non-GM attributes are most demanded?

The greatest demand for non-GM products is amongst those foods that are considered fresh, pure, or minimally processed when consumed:

- In order of suggested priority for consumers (given response rate):
  - Soy – particularly if used in soymilk, tofu, miso
  - Vegetables
  - Fruit
  - Bread (wheat)
  - Corn
  - Meat – gaining importance: especially in organic sector
  - Canola (oil)

3.d) Which countries are the focus of demand for products with <u>non-GM</u> attributes?

The demand for non-GM foods differs regionally:

- European: Germany, Austria, Scandinavia, UK, Belgium, Italy, Greece, Spain.
  - Mainly Northern Europe due to stronger environmental groups.
    - Clear link to organics and related interest groups.
- Asian-Pacific: Japan, Korea, Singapore, Australia, NZ, China
  - Particularly amongst affluent health conscious consumers.
    - Clear link to organic and lifestyle choices / behaviours.
- Americas: US (California, New England, New York), Canada (Montreal, Toronto).

3.e) What data is available to illustrate the trends reflected in your response above?

Respondents stated that they had personal experience of consumers voicing concerns towards GM products; particularly at the retail level in the UK. Virtually all respondents stated that they had anecdotal evidence of ongoing consumer interest in the GM/non-GM debate.

Other than surveys conducted by 'interested parties' – such as the UK's Soil Association (organic), most publications that respondents cited as illustrating the ongoing wariness of a certain segment of consumers towards GM foods originated from the mass media.

4. Based on your experience, where do you see growth in the <u>non-GM</u> market (if any)?

Respondents generally thought that the extent of markets (for non-GM crops) per overall population will differ greatly and therefore be country specific. Some markets will exhibit high demands for non-GM crops, others will exhibit little demand. In any one nation, respondents expect the final market for non-GM crops to equate to approximately 10% of the overall population; and then solely in developed nations. The extent that consumers of a particular market exhibit increased interest in health and well being will be a significant determinant in driving long-term demand for non-GM foods.

Four respondents said that they expect to see little growth in demand for non-GMs. They stated that the GM/non-GM debate is polarizing and that they expect GM crops to secure the majority of markets when varieties are developed that offer tangible consumer benefits.

In summary, 5 respondents (15%) indicated there won't be much growth, 17 (52%) indicated it would be country specific and 11 (33%) indicated growth would be international. Refer to Appendix B for a quantitative assessment of responses for question 4.

5.a) How much of your product line (if any) is currently marketed based on GM attributes, <u>or lack of</u>? Can you describe how your product line has changed in the last decade by filling out the following table?

The only companies that knew that their product line was 100% non-GM for 1995, 2000 and 2005 were dedicated organic enterprises. They were also the only group of respondents that appeared to have retained a consistent level of traceability and verification standards. Most other relevant companies had to estimate the percentage of GM / non-GM products they had consumed over the last 10 years. Virtually all companies that were not dedicated organic suppliers had consciously accepted a higher level of GM products over the last 10 years.

In summary, the average percentage of the product line that was non-GM in 1995 was 70%, in 2000 it declined to 66% and by 2005 the average was 64%. Refer to Appendix B for a quantitative assessment of responses for question 5a).

5.b) If your product line currently has non-GM products, what country/state/province are you purchasing your raw farm product from?

In the US, virtually all non-GM crop production was located in the central states (i.e. North and South Dakota, Minnesota, Iowa, Colorado). Certain, far lesser amounts, came from California and New York. In Canada, the main production of non-GM crops where located in Manitoba, Ontario, Saskatchewan, Quebec and Alberta. This appears partly due to the ability of these more expansive areas to impose greater isolation breaks between GM and non-GM crops.

That said, at least one major Canadian food producer purchased products from Europe to guarantee ingredients were in fact GM-free.

5.c) Are the inputs from a declared GM-Free Zone?

None of the respondents purchased products from a declared GM-free zone. The only exception was a company that purchased products from Europe. They considered Europe (in theory) to be a GM-free zone.

In summary, one (3%) respondent indicated their products were from a declared GM-Free Zone. Refer to Appendix B for a quantitative assessment of responses for question 5c.

6. What influences your organization's decisions when determining the make-up of product lines with respect to the use of GM and non-GM inputs?

Every respondent stated that the demand they placed upon suppliers depended entirely on demands of the immediate customer and the ultimate consumer. Final attributes sought were a combination of benefits sought by the consumer and the price that the market would accept.

7. How would your organization's product line change if it had access to a reliable supply of non-GM inputs? (What market opportunities would be presented?)

The overall response was that companies sourcing non-GM supplies already have supply. If new supply came on-stream, they could expand their markets of interest because virtually all suppliers of non-GM/organic products were certain that market opportunities existed - particularly in the organic and natural sectors.

A number of suppliers stated that access to a reliable supply of non-GM products would not impact their business at all because many sectors of the agri-food industry have not been impacted by the existence of GM crops (i.e. vegetables and fruit).

8.a) Based on your experience, would consumers be willing to pay more for a guaranteed GM-free product?

Respondents estimated that 10% of consumers would pay premiums for non-GM products. For straight non-GM, the expected maximum premium was suggested to be 10-15% above regular food prices; and then most likely only for products most associated with GM and eaten in a

relatively 'pure' form (i.e. corn, soy). Markets that have made a conscious decision to only consume non-GM products (i.e. Europe) expected food to be GM-free without paying premiums.

It was stated that premiums of approximately the same amount could be achieved for non-GM animal feed. This included non-GM canola meal at a price of US$147 per short ton landed in Windsor, Ontario during October 2005 (US$17 higher than GM canola meal). Since that price is for a commodity, if it was possible to develop close relationships with the customer and excellent protocols to guarantee quality, the price could likely be higher.

A number of respondents stated that organic products (including animal feed) could demand far higher premiums than those paid for straight non-GM. Possible premiums were calculated at 250% above prices paid for GM products; particularly if extensive protocols were in place. An example of prices paid by a respondent was US$16.00 per bushel for certified organic feed grade soybeans versus $4.50 - $5.00 per bushel for GM feed grade soybeans.

In summary, 64% (21/33) of the respondents agreed that consumers would be willing to pay more for a guaranteed GM-free product. Refer to Appendix B for a quantitative assessment of responses for question 8.a).

8.b) If you answered yes to 8a), would your organization pay a premium for a guaranteed GM-free farm product?

76% of the respondents said that they would (tentatively) be willing to pay a premium for a guaranteed GM-free farm product. Refer to Appendix B for a quantitative assessment of responses for question 8.b).

9. If your organization purchased GM-free commodities/inputs, would it feel more comfortable purchasing these inputs from a GM-free zone, rather than from dispersed producers who individually supply GM-free product?

While overall, customers of non-GM products gave a 'muted' yes to feeling more comfortable sourcing products from a guaranteed GM-free zone rather than dispersed producers, virtually every respondent clearly stated that protocols would be more important to them than geographical designated regions. Though the greater the distance between the suppliers and the end market, the more value they felt might be gained from purchasing products from a GM-free geographic region, protocols would remain the single largest issue.

Customers' overall interest in purchasing from GM-free zones was through the opportunity it would provide to reduce transactions costs associated with testing or rejecting shipments due to the presence of GM material. It was not driven from an expectation of it enabling them to capture higher returns from the end market.

A number of respondents stated that the establishment of a GM-free production zone would provide more theoretical than practical benefits, not least due to the cost of implementing and maintaining the zone. Lessons learnt from other countries and regions that have tried to implement GM-free zones are that not all producers would be equally committed to the vision. Some producers would therefore be tempted to cheat the system and produce GM crops, like the case of Brazil which eventually undermined the entire system.

In summary, 48% (16/33) would feel more comfortable purchasing inputs from a GM-free zone. Refer to Appendix B for a quantitative assessment of responses for question 9.

10.a) Do you perceive any added value with respect to the fact that PEI would be an island producing crops in an environment guaranteed free of GM material?

The biggest factor within the respondents answers was who perceives benefit from purchasing from an island that is a guaranteed GM-free zone and why?

Consumers were deemed likely to view an island as just one factor in their purchasing decision. It would not be the overriding factor or the sought after product attribute when purchasing. Overall, while it adds a certain perceived value, for most consumers that value would not be sufficient to pay an added premium. It therefore needs to be bundled with other factors that can increase value. For example, credence factors like "Anne of Green Gables" or "clean and green".

Retailers were said to be extremely wary about becoming involved in the GM debate. They prefer to let others make decisions surrounding marketing for fear of exposing themselves to any backlash (particularly given the passions and sensitivities surrounding the GM debate) and therefore act as guardians of consumers through responding to their wishes.

Manufacturers and distributors indicated they were likely to experience the greatest overall benefit from the establishment of a GM-free zone because it would reduce transaction costs by minimizing the need (and cost) of testing for the presence of GM material; and the cost of rejecting shipments than having to secure alternative supplies. Their business risks would therefore be minimized by having access to a dependable supply of GM-free crops; which would also increase the effectiveness of their traceability systems.

In summary, 67% of respondents (22/33) indicated there would be perceived added value from the fact that PEI would be an island producing crops in an environment guaranteed free of GM material. Refer to Appendix B for a quantitative assessment of responses for question 10.a.

10.b) Do you perceive other attributes related to PEI that makes it desirable as a supplier of GM-free farm products?

All respondents (in one shape or form) stated that PEI had enormous and valuable credence factors that could be used to highlight and enhance the marketability (and value) of PEI products; whether they be GM, non-GM or organic.

These include the pristine clean and green unspoiled environment, the history, and the rustic nature of the environment. Particularly in Japan, Anne of Green Gables was deemed a powerful credence factor that PEI producers could take advantage of through well-targeted marketing efforts.

10.c) Could PEI supply the amount of GM-free product that you would require?

Note that a statistics table was used to illustrate PEI's crop and livestock production capabilities. Refer to Appendix A (questionnaire) to view the table provided.

Organic and natural feed crops were most commonly referred to by respondents as products that could meet their requirements, particularly for corn, soy, and barley in the US, Europe (especially UK, Germany, Netherlands), and Asia. It was estimated that demand for all these products were either on the increase in these markets, or could quite easily establish their own markets. Most other products were of insufficient volume to meet the overall requirements.

10.d) What specific traceability requirements would be required for you to purchase non-GM inputs?

Respondents stated that any non-GM protocols should be based on best-practice protocols developed and adopted by the organic industry. They need to be workable, practical and, above all, verified by a reputable third party.

11. Are there other differentiation strategies that you would suggest for PEI?

The most common differentiation strategy that respondents suggested for PEI to follow (outside of GM-free) was organics; particularly corn, soy, barley, meat, fruit, berries and potatoes. They also said that establishing effective production/marketing protocols would have far greater long term benefits than focusing on the establishment of a geographic GM-free zone per se.

The second most common suggestion was to focus on meeting value-added opportunities. These may encompass value-added concepts surrounding both products and services; not simply refining commodities into processed products. Establishing and maintaining protocols to ensure product integrity from involved suppliers would itself be value-adding as it presented customers with an extra level of '*trustworthiness'* from suppliers.

12. If you are interested in PEI's production potential, can we provide your contact information to our client in Prince Edward Island?

- 15 of the 33 respondents said that their contact details could be made public.
  - Respondents that expressed particular interest in exploring PEI's potential included:
    - David Hendricks, Hendrick Seeds, Ontario
    - Jim Taub, Favored Grain, Illinois
    - Mary-Howell Martens, Lakeview Organic Grain, New York State
    - Richard Hind, Waitrose and "Hindsight" Relationship Development, UK
    - Carlo Leifert, Nafferton Ecological Farming Group, UK

- Names and contact details of the 15 respondents that gave permission for their names to be made public are included in Appendix D.

3.3 Interview Summary and Conclusions

The following discussion points are the common themes that emerged from the interview process. Specifically, the highlights refer to the drivers and issues surrounding the establishment of a non-GM production zone from the perspective of the consumer, retailer, processor/distributor, producer and life science/input supplier. Section 3.3.2 concludes with what the interview results suggest for Prince Edward Island.

3.3.1 Drivers and Issues Surrounding the Establishment of a Non-GM Production Zone

Consumers

Consumers are driving the GM debate and resistance (partly influenced by media and interest groups); particularly in Northern Europe, and to a lesser degree in Japan. In Europe, political interests are an additional in-direct driver of consumer resistance. In Japan, the most resistance towards GM comes from some of the powerful and vocal consumer cooperatives, which account for approximately 33 percent of all retail trade.

None of these consumers are driving the establishment of GM-free zones. The assurances that they expect from GM-free foods would not be increased from sourcing products from GM-free zones. Therefore limited additional returns could be captured from the marketplace and a need would exist to bundle a GM-free zone with other product attributes in order to secure premiums. International resistance to GM foods is expected to continue subsiding amongst the majority of international consumers.

Retailers

Retailers are arguably the second greatest overall driver (though potentially the main driver if located in Northern Europe) behind the establishment of GM-free zones. Retailers would benefit from the establishment from a reduction in transaction costs, increased opportunity to manage financial, political and legal risks, and improved traceability. While not pushing the GM debate, having access to a sure supply of GM-free products would present opportunities for interested retailers, particularly in products that are consumed in a fresh or minimally processed state.

Processors and Distributors

Overall, this sector of the agri-food industry is the most important driver for the establishment of GM-free zones. The establishment would provide access to a reliable supply of quality GM-free products if they sought to differentiate themselves. Specifically it would enable processors and distributors to reduce their traceability and transaction costs; and better manage market, strategic, financial, and political risks.

Unless marketed with additional attributes, the products would not be valued by most retailers and consumers, therefore premiums paid to producers would likely have a ceiling of 10-15% above regular products. This is almost identical to premiums paid for non-GM products that are currently sourced from a regular basis. The prohibitive cost of implementing an integrity related GM-free geographic zone would likely destroy any premium associated with supplying non-GM products.

Producers

Respondents stated that producers' views towards the GM issue are becoming increasingly polarized. Two groups of producers are essentially emerging:

1. 'anti-GM': this group includes producers that believe GM crops are wrong, or are attracted by GM-free market opportunities;
2. 'pro-GM': this group includes producers who want access to GM crops in order to manage their risks or have less of a desire to invest the efforts required to differentiate or diversify;

Environmental concerns influence both camps through either seeking to protect biodiversity (anti-GM) or reduced chemical usage (pro-GM).

Experiences learnt in Brazil also illustrate the impact that the desire of many producers to remain independent (and follow a personal desire) can outweigh the ability of government institutions to implement and enforce legislation surrounding the establishment of a GM-free zone. The establishment of such a zone (and negatively impacting the operations of producers seeking to grow GM crops) could also be open to extensive legal challenges.

Life Science and Input Suppliers

Given the extent to which GM-crop production has expanded across North America (and is now entering Europe on a limited basis; Evans, 2005), it is unlikely that life science or crop input suppliers would be particularly concerned at the establishment of a niche GM-free production zone.

Input suppliers with a specific focus (i.e. organic seed breeders and suppliers) would likely be extremely interested, and supportive, of an island that implements extensive production protocols – even if not a GM-free zone.

3.3.2 What the Interview Results Suggest for Prince Edward Island

GM-Free Zone?

Establishing a GM-free zone along geographic lines will be difficult and risky. As Brazil has found, seeking to take a 'town hall' approach to address a business issue is open to resistance by determined producers. It is likely better therefore to work with committed producers to implement stringent production protocols.

Communication (outside of the interview process) with people possessing detailed knowledge of PEI initiatives surrounding biodiversity and bioproduct also stated that seeking to establish PEI as a GM-free zone would attract a significant level of resistance. Enforcing the legislation would therefore likely be costly, open to litigation, and ultimately have the possibility of failure.

Given the market opportunities for certain GM-free / organic crops, and the possibility of contamination from GM crops, a preferred method appears to be implementing legislation that holds the actions of individual farmers liable to punishment if they negatively impinge upon the operations/business of others. Under such a system, a farmer wishing to produce GM crops

would have to first declare his intensions, take all possible actions to prevent the spread of GM crop outside of their own property, and potentially be liable for any spread of GM material.

Marketing Strategies

Respondents generally commented that PEI's limited volume of production, and its isolated nature was a double-edged sword. Small size implies capabilities in supplying specialized markets without flooding them or negatively affecting pricing. Competing in the high volume commodity market on the other hand, requires significant land, capital and infrastructural resources; which PEI does not possess. The suggested strategy is therefore clear: focus on the specialized market.

Part of the problem with a small production base is the limited opportunity to cost-effectively develop unique credence factors if supplying a large number of products and the limited production base over which the marketing costs can be spread. Since there is a segment of the market where consumers are increasingly drawn to environmentally-related attributes of food, products should be marketed effectively (through the appropriate channels - channels are usually smaller in volume than commodity outlets), with a focus on these high value markets, supported by the promotion of PEI's unique credence factors.

To take advantage of these opportunities, PEI almost undoubtedly needs to invest in management capability, not legislative restrictions regarding a GM-free zone (although liability legislation for GM producers should be considered). Physical resources have limited value without the business skills required to produce and market higher value products. Chain relationships will be the critical success factor for PEI to successfully implement a differentiation strategy. Particularly as international evidence is mounting that inter-business relationships are more important than the region of production. Developing long term relationships with customers will significantly reduce risks that are typically faced by smaller suppliers.

The majority of respondents stated that the development and implementation of stringent production and handling protocols (including an extensive traceability system) could assist PEI producers to secure greater returns from the market than any other single approach. It would certainly benefit producers (of organic and non-GM) crops far more than seeking to introduce a GM-free zone. Traceability is an increasingly important issue for processors, retailers and consumers alike. Possessing the ability to offer customers and processors the assurance that only extensive traceability systems can provide, will greatly assist PEI to differentiate itself and secure long term premium markets.

The majority of respondents, when asked about potential differentiation strategies that PEI (as an island) could employ to secure high value markets, stated that (in conjunction with extensive production and handling protocols) organics appeared to be the most obvious choice. Linking organic production with PEI's unique credence factors appears to be a marketing strategy ideally suited to promoting crops grown in the pristine rural environment that people most commonly perceive when thinking of PEI.

The demand for organics is growing[7] rapidly and is not as country specific as the demand for non-GM. Establishing a marketing strategy for PEI based around supporting those producers that wish to convert to organic, and that encompasses protocols which producers of non-GM crops could also follow to secure specific markets, would appear likely to provide the most benefits to PEI as a whole. It would also differentiate PEI as a producer of high quality-assured crops.

The next section highlights principles that PEI could utilize in order to develop a penetration strategy based on marketing high quality differentiated products to specific target markets.

[7] A report by Padel *et al*. (2003) looked at the expected growth rates for the organic market within Europe until 2007. These growth rates are illustrated in the table below:

Expected Market Growth Rates Between 2002 and 2007 for the Total Organic Market and for Specified Categories in Selected European Countries (%)

	Denmark	Austria	Switzerland	United Kingdom	Germany	France
Total Organic Market	1.5	4.6	4.5	11.0	4.8	6.1
Convenience Products	3.3	8.4	7.0	8.8	7.3	10.0
Meat Products	1.7	3.2	8.0	12.3	3.1	10.0
Dairy Products	1.0	3.4	1.5	8.8	6.7	6.5
Fruit & Vegetables	4.0	5.7	5.0	8.3	7.1	5.0
Cereal Products	2.5	5.3	2.0	6.0	4.6	5.3

Source: Padel, Seymour and Foster, 2003

The United Kingdom is expected to have the highest growth rate among western European countries for the organic market, but this rate of 11% is below the 20-40% growth rates that had previously occurred in the United Kingdom.

Other important markets for organic products are in China, South Korea, Singapore, Hong Kong and Taiwan. Countries like Malaysia and India are expected to show growing markets for organics, as organic farmers step up production in these countries.

In the United States, organic food and beverage sales currently represent only about two percent of overall grocery sales, while organic fruits and vegetables captured four percent of overall produce sales in 2002. (Produce Marketing Association, Organic Fresh Produce Industry 2003 report).

Agriculture Canada estimates organic retail sales will increase by 20 percent a year to C$3.1 billion in 2005. Much of the growth stems from public unease about the impact of industrial farming on the environment and the health of the entire food chain, according to the Canadian Organic Growers, a national advocacy and education organization.

4.0 Penetration Strategies

The purpose of this section is to provide a discussion around penetration factors with respect to potential markets. This section begins with an introduction to market penetration strategies taken from the literature (more specifically marketing management text books and articles) (section 4.1). Then some penetration case studies are discussed to provide real-life scenarios that have been experienced in the agri-food industry (section 4.2). Finally, potential penetration strategies for PEI products are discussed (section 4.3).

4.1 Introduction to Market Penetration Strategies

The PEI Certified Organic Producers Co-op Steering Committee identified that prolonged low prices for farm commodities underline that changes are required in the agricultural marketing system. As a result the group identified creating a GM-free production zone on Prince Edward Island as a possible 'breakthrough' idea to improve the issue of consistent low farm prices. Professor John A. Weber of Notre Dame developed a framework, which he calls 'gap analysis', to determine growth opportunities and 'breakthrough ideas' (Kotler and Turner, 1995, p. 357). Weber would describe the creation of a GM-free production zone as an innovative product differentiation. The next steps involved in the process include working out the details and implementing a marketing strategy.

When launching a new or differentiated product or input commodity, strategic elements such as price, promotion, place and product quality and service are important parts of the implementation and penetration strategies. Penetration strategies are also referred to as 'branding' the product or commodity or 'positioning' the product.

Product Quality and Service

Coughlan et al. (1996) suggest that the first consideration in branding a product should be the quality dimension. Whenever producers and/or manufacturers attempt to brand a product then quality becomes a crucial component of the strategy. In order to brand a product, producers and manufacturers must engage companies whose vision and strategies match the product's intended brand image (Coughlan et al. 1996). Also, there must be a consumer group that would be interested in this higher quality product and willing to purchase it. This part of the product positioning also includes design and packaging of the product, servicing customers, and any other value-added element to the product.

Promotion and Packaging

When a manufacturer or producer promotes a product, they are looking normally to promote to a target or niche market audience. Therefore, in order to reach the correct target audience, messages must be formulated to be effective at presenting the essence of the positioning strategy to those potential target customers (Loudon et al. 2005). Other forms of promotion must also be formulated to send the appropriate message regarding the branding strategy of the product (Loudon et al. 2005).

There are two basic promotion strategies, Push and Pull. The 'Push' strategy involves using all channels of distribution and resources to 'push' the product into the marketplace and giving the purchasing outlets incentive to promote and shelve the product (Business Resource Software

Inc., 2005). Whereas, a 'Pull' strategy involves initially promoting the product to the end user. The end user then creates a demand for the product within the purchasing outlets.

Price

Loudon et al. (2005) suggest that pricing and marketing go hand in hand, and that price must fit the market that the branding strategy is attempting to capture as well as current market conditions. Many pricing strategies exist including penetration pricing to develop a large volume of sales in a rather short time span or a skimming pricing strategy that is a higher priced strategy and usually coincides with key quality and convenience factors and a comparable pricing strategy where prices are set comparably to competitor products.

The following penetration pricing strategy discussion is taken directly from the tutor2u website (http://www.tutor2u.net/business/marketing/pricing_strategy_penetration.asp).

'Penetration pricing involves low price setting in order to profit based on volume of sales and market share. This strategy is most often used when entering a new market or when building on a small market share. This will only be possible where demand for the product is believed to be highly elastic, i.e., demand is price-sensitive and either new buyers will be attracted, or existing buyers will buy more of the product as a result of a low price. A penetration pricing strategy may also promote complimentary and captive products. The main product may be priced with a low mark-up to attract sales (it may even be a loss-leader). Customers are then sold accessories (which often only fit the manufacturer's main product) which are sold at higher mark-ups.

Before implementing a penetration pricing strategy, a supplier must be certain that it has the production and distribution capabilities to meet the anticipated increase in demand.
The most obvious potential disadvantage of implementing a penetration pricing strategy is the likelihood of competing suppliers following suit by reducing their prices also, thus nullifying any advantage of the reduced price (if prices are sufficiently differentiated the impact of this disadvantage may be diminished). A second potential disadvantage is the impact of the reduced price on the image of the offering, particularly where buyers associate price with quality.'

As per the Steering Committee's identification of the possibility of creating a GM-free production zone on Prince Edward Island, penetration pricing may not be the most appropriate penetration strategy for the growers. However, the following example shown in Figure 4.1 shows four options that combine price and promotion. The following discussion is taken directly from Turner and Kotler (1995, p.349-350).

Figure 4.1: Four Introductory Marketing Strategies

		Promotion	
		High	Low
Price	High	Rapid-Skimming Strategy	Slow-Skimming Strategy
	Low	Rapid-penetration strategy	Slow-penetration strategy

(Source: Turner and Kotler, 1996; p. 349)

'A rapid-skimming strategy consists of launching the new product at a high price and a high promotion level. The firm charges a high price in order to recover as much gross profit per unit as possible. It spends heavily on promotion to convince the market of the product's merits even at the high price. The high promotion acts to accelerate the rate of market penetration. This strategy makes sense under the following assumptions: a large part of the potential market is unaware of the product; those who become aware are eager to have the product and can pay the asking price; and the firm faces potential competition and wants to build up brand preference.

A slow-skimming strategy consists of launching the new product at a high price and low promotion. The high price helps recover as much gross profit per unit as possible, and the low level of promotion keeps marketing expenses down. This combination is expected to skim a lot of profit from the market. This strategy makes sense when the market is limited in size; most of the market is aware of the product; buyers are willing to pay a high price; and potential competition is not imminent.

A rapid- penetration strategy consists of launching the product at a low price and spending heavily on promotion. This strategy promises to bring about the fastest market penetration and the largest market share. This strategy makes sense when the market is large; the market is unaware of the product; most buyers are price sensitive; there is strong potential competition; and the company's unit manufacturing costs fall with the scale of production and accumulated manufacturing experience.

A slow-penetration strategy consists of launching the new product at a low price and low level of promotion. The low price will encourage rapid product acceptance; and the company keeps its promotion costs down in order to realize more net profit. The company believes that market demand is highly price elastic but minimally promotion elastic. This strategy makes sense when the market is large; the market is highly aware of the product; the market is price sensitive; and there is some potential competition.'

Placement

Placement decisions such as the types and number of purchasing outlets and other tactical issues for channels of distribution are also an important part of the product positioning. Distribution can be intensive, selective and exclusive and will fall after the branding of the product. For example, in the distribution of niche market goods it is less important to have many purchasing outlets than it is to target the correct purchasing outlets for the good (Coughlan et al. 1995). Coughlan et al. (1996) suggest that the more targeted the audience, then the more targeted the distribution of the product must be.

In any case, a company or organization must choose a penetration strategy that directly relates to its intended product positioning (Kotler and Turner, 1996). Roberts and Berry (1985) also suggest that the selection of the appropriate market penetration strategy will also depend on the firm's or producer's familiarity with the product market to be entered. The following are examples of agri-food products that have recently penetrated the markets.

4.2 Penetration Strategy Case Studies

To more clearly understand how the differentiated agri-food products have penetrated the market three agri-food case studies were conducted. These case studies describe real

scenarios in detail which highlight the rationale for differentiation, the strategies used to penetrate the market and the lessons learned through the process.

The intent of the case studies was to provide factual information on the successes and challenges involved in developing, designing and implementing penetration strategies. Thus, serve as tangible examples that could be referred to in considering alternatives for PEI's future differentiation initiatives.

Content of Case Studies

The following three case studies were developed using the business case-study model to explain the situation and the lessons learned. The following bullet points reiterate the framework of the case-study content:

- Case introduction: This discussion includes a description of the product, organization and market, and the timeframe that the product penetrated the market. This provides the reader with a visual picture of the situation.
- Motivation/Rationale: This discussion includes a description of the reasons why the organization chose to market a differentiated product. For example, for value-added reasons or to satisfy consumer demand.
- Strategy: This discussion involves an in-depth look at what the organization/association/growers did to differentiate the product, how they gained access to the commodity or product market and the logistics of the penetration strategy. Discussion will include:
    - Price
    - Product
    - Packaging
    - Promotion
    - Protocols
- Challenges: This section elaborates on any challenges that had to be overcome during the implementation and early stages of the penetration strategy. What was learned from the challenges that were faced?
- Impacts/Current Situation: This section provides the reader with an idea of the current situation of the product.

4.2.1 Peter's Farm and My Eyes

Introduction

Peter's Farm veal products were first marketed in 1997 and produced on 32 farms. Today, 42 farms across the Netherlands adhere to the Peter's Farm Principle method of veal production. The Peter's Farm Principle is the commitment to transparency that every person along the value chain agrees to in their production process. Peter's Farm Principle consists of 5 pillars including: quality, animal welfare, traceability, security and open information for the consumer.

1. Quality: Peter's Farm veal products have been studied at the CSO (Dutch Center for Taste Research) and has determined that these products offer the highest quality in taste and

tenderness due to their animal welfare conditions compared to housed and individually housed veal.

2. Animal Welfare: Calves at Peter's Farms live in herd with plenty of space in which to sit, stand, walk or play. These calves also decide for themselves how much they eat in one day through the use of microchips and individual feeding systems. The Agricultural University of Wageningen determined that Peter's Farm calves were raised under superior welfare conditions compared to their competitors.

3. Traceability: Peter's Farm has created an interactive website for consumers in which consumers can input the barcode of the Peter's Farm product to trace their purchase back to the farmer that raised the calf. All calves have been tagged with microchips that allow a computer to keep track of the amount of food they ate in the individual feeding rooms, where the calf was raised and when it was transported. As well, consumers can input a product barcode into Peter's Farm website[8] and to find out information about the farmers that housed the calf and how the calf was raised, what it ate, etc…

4. Security: As a part of the Principle, farms that wish to join the veal producing team at Peter's Farm must implement a number of quality controls and must become ISO 9002, PVE/IKB[9] and HACCP certified.

5. Open Information for Consumers: In order to demonstrate to its consumers that it lives up to the first four pillars of the Farm Principle, Peter's Farm prides itself on providing consumers with an open portal into the production process through a very thorough website, a 'my eyes' live webcam at many of the farms and open houses at the 42 farms. The website provides consumers with information regarding each step of the production cycle including where the calves come from, transportation practices, design of the barns they are raised in, feed mixes and the computerized individual feeding systems, health and safety protocols used by the farmers, and information regarding the marketing of the product.

Motivation/Rationale

Since 1997, Peter's Farm has branded their product based on the 'Peter's Farm Principle' and has received higher value as a result. This traceability system was not developed in order to provide a solution to a food crisis but in order to provide a better connection with the consumers and add value both to the customer and to the farmer through total transparency. Veal is also an industry in which there is a lot of speculation regarding animal welfare and Peter's Farm dispels that speculation with its openness regarding production practices and live webcams into the farms.

Strategy

In terms of strategy, Peter's Farm Veal was based on a 'total concept strategy' that included all five of the Peter's Farm Principles. Sjoerd Koopman, a partner of My Eyes, explained that "there was no priority to any of the five principles; it was left up to the audience to decide for themselves which principle they felt the most alignment with. In general, the market penetration

[8] www.petersfarm.com
[9] PVE/IKB is the abbreviation for the Integrated Chain Management consumer certification label that is managed by the Dutch Government marketing board for meat, dairy and eggs.

strategy used by Peter's Farm was to promote the quality differentiated product through packaging and the transparency of the production process. It was the Farm's 'gut feeling' that consumers would respond to this type of product.

Uniquely, when consumers purchase Peter's Farm products, they can enter the product barcode into the Farm's website to follow the path of the product starting from the farm that it was raised at and meeting the farmers. Peter's Farm is the first organization to co-brand itself with 'my eyes'. 'My eyes' is a symbol of transparency to consumers and Peter's Farm products are marketed with the 'my eyes' logo for recognition.

In order to support such a transparent system and to substantiate the claims made by the product, data and information collection processes are required by all members of the value chain. In order to become a part of Peter's Farm product's value chain, stakeholders must agree to become involved in the extensive data collection process and continuously work within the 'Knowledge Exchange'. The 'Knowledge Exchange' acts as the vehicle that ensures that all of the necessary connections are accessible and that information can be exchanged between the participants (www.myeyes.info/pf_knowledgeexchange.asp, Viewed on 05/10/05). The 'Knowledge Exchange' is supported by an IVI system that was developed by ALPURO, a sister company to Peter's Farm. The IVI system is the technology that supports the collection and exchange of information from all stakeholders in the value chain. Koopman explains that "absolutely, every aspect of production including animal birth, national livestock registration, feed production, use of medicines/vitamins/minerals on the farms, mortality rates, feed conversion, transport, slaughter, grading, selection, cutting, packing, logistics, sales and distribution are entered into the system".

Koopman explains that 'in the beginning, it was the food service markets where the first in-roads were made, and with retailers it took a longer period for them to come on board. The most successful part of penetrating the market for Peter's Farm was the press coverage that the company received due to the uniqueness and openness of the product. Peter's Farm took part in over 80 media interviews and television spots 'which created a sense of position in the market even before the product was widely available on the shelves' explains Koopman.

Challenges

Peter's farm is a unique case, in that the traceability system and commitment to total transparency was a goal from the outset. Therefore, the organization hammered out the challenges prior to ever beginning production and there was no shift in the production processes of the stakeholders to accommodate a traceability system since it was an essential condition from the start. Also, any other farmer or stakeholder wanting to get involved with veal production through Peter's Farm must adhere to the traceability and transparency systems when they come on board.

Therefore, the unique challenge that faced Peter's Farm was to develop a traceability system that not only focused solely on traceability but also added value to the product. Therefore, the value chain needed a reliable and efficient data storage system as well as a unique system that would show value to the consumers, hence, the product barcode scheme and total transparency of the website that has influenced the profitability of the organization.

Impacts/Current Situation

Koopman (2005) explained that Peter's Farm has gained a massive amount of exposure because of their non-conventional approach. They are proud of what and how they produce and they want to share that with consumers. This exposure created the impulse in the marketplace for major retailers to list the brand in their stores. Albert Heijn, Tesco and Waitrose are among the biggest European supermarket chains selling Peter's Farm Veal.

The uniqueness of the product website and the organization's commitment to total transparency has also resulted in an excess of 10,000 hits a month and has allowed Peter's Farm to consistently achieve its financial goals of receiving extra value from its product.

4.2.2 Big Bubba Soybeans

The University of Missouri and the Missouri Department of Agriculture have focused research and development efforts on helping farmers find ways to add value and to differentiate traditional commodity crops that have dominated the state's agricultural industries. Research into hilum soybean varieties' characteristics and performance has been conducted through the Univerisity of Missouri's Agricultural Experiment Station. Identity preserved soybean research was initiated to help farmers make informed decisions regarding value-added soybean production.

Big Bubba is a branded soybean product produced from the clear hilum soybean variety. Clear hilum soybeans are food grade and are used in tofu and soymilk production. In addition to being food grade versus feed grade, these Big Bubba beans are differentiated through identity preservation and non-GM, organic production methods. Big Bubba beans, like most varieties of food grade soybeans have higher production costs and lower yields than traditional feed grade varieties. The Big Bubba is a larger, wide-eyed bean with comparatively high yields of protein and oil. The bean is also identity preserved which means that the product can be traced through the value chain back to the production unit.

While the bean has these characteristics, it is not suggested that the Big Bubba is particularly superior or exceptional compared to other food grade beans. In fact the main uniqueness of the bean itself is the name. In the US south, a person who is considered to be a large, white, redneck is often affectionately referred to as "Bubba".

In the late 1990's Neco Seeds, a relatively small seed production enterprise in Harrisonville, Missouri, began to produce and market Big Bubba soybean seeds. Neco worked in close cooperation with the University, the department of Agriculture and local producers. Today and for the last eight years, Neco and producer cooperative marketing enterprise, Missouri Food and Fiber (MFF), have been successfully marketing Big Bubba to tofu and soymilk processors domestically and in Taiwan and other south east Asian nations. MFF is a new generation cooperative with over 130 original members.

Business Rationale

North American producers have the choice of producing and marketing commodity product or a differentiated product. Commodity product has the advantage of lower costs and marketing expenses but returns are generally lower and more volatile. Differentiated production requires greater production and marketing effort but in theory, it can bring higher returns if the production

and marketing efforts are successful. The fundamental business focus for Big Bubba from the perspective of Neco and MFF is one of differentiation. This choice was made in order to reduce income volatility and increase market stability.

Strategy

Differentiation in a market that is traditionally commodity oriented is very challenging and requires exceptional focus and effort. From a logistical perspective, the first point of differentiation for Big Bubba was to stay out of the broker market. MFF decided that if they were to differentiate Big Bubba, they would need to market the product on their own, without a third party intermediary. Third party brokers often lack the ownership and focus that is required for branding and differentiation. With brokers, the product can often become anonymous.

MFF chose to do the hard work of sales and marketing on its own. MFF did sales calls and demonstrated the product line to customers domestically and internationally. MFF developed relationships with buyers and customers. They brought producers to Taiwan and buyers to Missouri to help solidify the personal component of the value chain.

Another aspect of the relationship is service. In fact the key point of differentiation may well be service. MFF customers are typically smaller scale processors who have different supply requirements. MFF tries to anticipate customer needs and to see challenges before they develop. MFF takes customer relationships and the value chain network as the key component of their business. Each customer is an individual business relationship that is seriously nurtured. The most important part of the relationship is trust. The customer knows that Big Bubba will deliver the product attributes and that MFF will deliver the services and product that have been agreed to in the relationship. At the same time, MFF also knows that some customers are simply not worth pursuing because both sides cannot develop a win-win business relationship. Basically if price is an issue in the course of the relationship, MFF is not interested in the business.

Another strategy developed by MFF was to differentiate on price. Big Bubba is likely one of the higher or the highest priced edible soybean on the market. This pricing strategy is consistent with the marketing message of higher value and unique characteristics. The Big Bubba brand is known for its name, its characteristics and its value. Price has to be consistent with this message. With regard to price, there is no set guideline other than to price what the market will bear. Cost of production and competition has reduced importance in the ultimate pricing decision.

Another aspect of the strategy was the packaging. Big Bubba is not sold in bulk containers like nearly all soybeans. Instead Big Bubba is sold in individual bags with the brand on the bag. This is obviously more expensive for MFF than bulk. This tactic not only keeps the brand alive but it is also a benefit to MFF customers who are often smaller processing businesses that cannot easily handle bulk shipments.

Challenges

Key challenges for Neco and MFF were the expense and effort associated with the development of customer relationships. The market research into prospective customer needs, market size and pricing was done by MFF. Experience shows that it usually takes at least 2-3 years to establish the collaborative trusting relationships which enable the type of business that

MFF and Neco have developed by demonstrating commitment to service and consistently delivering customer-defined value.

Another key challenge has been communication. Significant portions of MFF customers are Asian. As a result language is an issue, as is basic understanding of the customer's real needs.

Current Situation

Big Bubba's sales growth has been significant. This year total sales are 2-3 times greater than they were three years ago. With the growth, however, has come the reality of the market size and future prospects. In order to continue to grow MFF must help the market grow and move with the product. MFF must develop new customers and must generate new opportunities for existing customers. In addition, well over 90% of production in the US utilizes GMO technologies. The supplier base for MFF and Neco therefore is limited. In addition, this limited supplier base must be particularly qualified for identity preserved production methods. This creates supply challenges as the market and MFF continue to grow.

4.2.3 Healthy Grown Potatoes

The Healthy Grown project is a joint collaboration between the Wisconsin Potato and Vegetable Growers Association (WPVGA), a team of extension specialists from the University of Wisconsin-Madison (UW), the World Wildlife Fund (WWF) and the International Crane Foundation (ICF). The project began in 1996 as a partnership between WWF and WPVGA, and was joined by the UW (1998) and ICF later. The purpose of the collaboration was to minimize the use of toxic chemicals while supporting the adoption of alternative pest control measures (integrated pest management systems) in potato agriculture. Healthy Grown is the first produce to be grown using Integrated Pest Management (IPM) practices, and the first to be certified under the independent third-party Protected Harvest eco-label (certification for stringent growing standards), and marketed under the Healthy Grown brand. Healthy Grown potatoes have been sold since 2001.

The Healthy Grown brand is independent of the Protected Harvest organization, and the two have different roles in the collaboration. Healthy Grown markets the certified potatoes, whereas the nonprofit Protected Harvest, established as an independent certification organization in 2001, ensures high growing standards, certification integrity and is responsible for conducting consumer outreach.

Motivation/Rationale

Healthy Grown values itself on its ability to *give consumers value-added choice: value added in quality, competitive pricing and the healthier grown label.* Offering this choice is a main motivation behind the development of the label.

Healthy Grown claims that their potatoes are a response to consumer demand, and lists the following supporting factors (Houlihan, 2001):

- *Food safety concerns impact 88% of buying decisions.*
- *One in two Americans switches product brands based on environmental friendliness.*
- *Nearly 50% of consumers look for environmental labeling on products.*
- *Retail sales of natural foods are the fastest growing segment of the grocery industry.*

- *Three out of four shoppers consider pesticide use in producing foods a serious issue – making "protected Harvest certified "Healthy Grown"" potatoes powerfully appealing.*

WWF and WPVGA signed a Memorandum of Understanding specifying their common goals for pesticide use and risk reduction in 1996. Their more general objectives include: (WWF/WPVGA/UW):

- To promote the development and adoption of biointensive IPM practices.
- To enhance habitat quality.
- To refine measurement systems for IPM adoption.
- To look for marketplace incentives for ecologically produced potatoes.
- To identify policies and programs to support environmental goals.

According to Jeff Dlott, President of the Protected Harvest Board of Directors, *the major potato growing states have produced an overabundance of safe potatoes too often sold at less than the cost of production. This is not an economically, environmentally, or socially sustainable situation. Farms go out of business, families and communities suffer, decision makers are pushed to reduce costs and increase yields often at a cost to the environment…This program is about giving consumers a choice to buy a product that was produced in a healthier way for the environment and rewards growers for their investment of time and money to reduce environmental impacts and sustain families and communities* (Houlihan, 2001).

Strategy Used

Price

Protected Harvest seeks to undercut the price of its organic crop product counterparts while setting a price slightly higher than conventional product alternatives with the purpose of yielding enough revenue to offer growers a premium for adopting the stringent standards associated with the label. The goal is to capture the market share of the environmentally conscious high to mid-range quality consumers.

Product

At this time, potatoes are the only crop under the Protected Harvest label. The potatoes come in 3, 5, and 10-pound bags.

Packaging

The product is endorsed by the WWF, bearing its Panda logos on its bags. This WWF endorsement signals to the consumer that the WWF stands by the Protected Harvest claim of eco-labeling high standards, integrity and credibility. The Protected Harvest certification seal is on the package, representing that it meets all eco-label standards (a set of environmental or social standards, with claims that are measurable, verifiable, free of conflict-of-interest and available to the public). Protected Harvest prides itself in exceeding eco-label standards, by being *aggressive in setting very challenging goals, including the adoption of Biointensive IPM practices, the reduction of pesticide use, and the development of performance measures for soil and water quality, wildlife habitat, and ecosystem health* (Protected Harvest, 2002).

Promotion

To consumers, Protected Harvest promotes its label with the following focus:

- Environmental consciousness: Products are grown under stringent environmentally friendly standards.
- Safety: Products appeal to the health conscious individual, concerned with issues such as children's consumption of pesticide residues.
- Credibility: Products are credibly certified by a thorough third party independent process.
- Competitive prices: Prices are lower than those of organic alternatives and competitive with conventional products.

To growers, Protected Harvest promotes its label with the following focus:

- Credibility: Third-party certification to document that growers use "green" production practices ensures that they are seen as credible.
- Consumer loyalty: The Protected Harvest label informs consumers of product eco-label authenticity, and gives the growers a competitive edge in the marketplace.
- Market Support: Protected Harvest is working to gain industry recognition, and growers can take advantage of this recognition.
- Leadership: Growers can rely on the support of Protected Harvest's alliances and collaborators, including industry, policy-maker, environmental, academic and consumer communities.

To retailers, Protected Harvest promotes its label with the following focus:

- Meeting customer wants: Consumer demand for environmentally friendly food is growing and has not been satisfied.
- Capturing market share: Protected Harvest products are aimed at capturing not only high-end (organic market) buyers, but also more mainstream mid-level buyers, that could make up 10-30 percent of consumers.
- Realizing superior retail margins: Competitive but marginally higher in price than their conventional counterparts, Protected Harvest products are more appealing to consumers than the more expensive organic alternatives, offering a premium to growers and retailers.
- Offering a credibly certified product: The Protected Harvest label exceeds eco-label standards, and is a collaboration of scientists, environmentalists and growers, ensuring quality and credibility.

Protocols

Farmers producing Healthy Grown potatoes must follow BioIPM standards. These standards are classified into nine divisions: scouting, information sources, field management, general pest management, weed management, insect management, disease management, soil and water quality, and storage. Each section has a point system associated with it, with growers acquiring more points for employing "better" practices under each section, and fewer or no points for employing "worse" (or regular) practices. To comply with the standards, a grower must reach a point score of at least 40 to 50 percent of total points available under each division, and 70 percent of all points (sum of all divisions).

Implementing better practices, as well as employing general approaches to practice implementation (i.e. scouting, record-keeping, decision-making practices) can score high points.

Some practices are mandatory to certification. These include scouting fields, keeping scouting records, rotating fields out of potatoes for at least one year, and removing or burying cull piles.

Pesticide application scores are awarded based on a toxicity rating system, in which a grower has a limit of usable toxicity units (800 for short season potatoes, and 1,200 for long season potatoes, adjusted for late blight pressure). The toxicity unit restrictions were established based on the lowest 10 percent of toxicity unit scores from industry wide data collected by the Wisconsin Agricultural Statistic Service in 1998. The standards also prohibit the use of twelve specific pesticides, and offer restrictions on the use of some materials.

The toxicity rating system was established in collaboration with growers, crop consultants, university researchers, and environmental experts, led by Dr. Charles Benbrook. The system involves a toxicity factor measurement based on: acute mammalian toxicity; chronic mammalian toxicity; ecotoxicity (risks to small aquatic organisms, fish, and birds); and impacts on the viability of biointensive IPM (effects on beneficial organisms, bees, and resistance management). Toxicity unit measurements are the product of the toxicity factor and the volume of a one-time specific active ingredient application to one acre of land in pest management (Houlihan, 2001).

In the certification process, the grower must apply to Protected Harvest, specifying which fields he wants to certify, and then be audited for Protected Harvest standards compliance by a third party certify and auditor, Scientific Certification Systems. The audit materials include a handler identification sheet and a signed affidavit, as well as the audited standards materials. These are sent to Protected Harvest's certification committee by Scientific Certification Systems for final approval and certification, and for the grower to be informed of a decision.

Beyond the grower, the Healthy Grown standards apply to packers and handlers. The process includes a chain-of-custody handler audit, from field to retail, including storage, packing, pallet loading, and transportation.

Challenges

A challenge in the implementation of the Protected Harvest label was the expected misperception of the products as part of a specialty organic sector, since many of the staff come from the organic community. However, according to Carolyn Bricket, Executive Director of Protected Harvest: *We are glad to report that that has not happened. In fact, we feel that we've been embraced as an important effort to move mainstream agriculture along the continuum of sustainability* (Uhland and Spencer, 2004).

The current challenge is to distribute the product to retail stores, so that consumers have access to it. To achieve this, Healthy Grown is targeting its marketing towards retail buyers. However, it is also pushing a consumer outreach campaign to ensure that consumers' interest in the product influences retailers to stock their shelves.

Future Challenges

According to Jeff Dlott, President of the Protected Harvest Board of Directors, two challenges lie ahead to improve the Protected Harvest program standards (Houlihan, 2001):

1. *A need to refine and add to the soil and water quality section including developing better measures for soil quality and reducing the toxicity association with fumigation.*

2. *A need to develop meaningful standards for improving ecosystem function including biodiversity in and around farmland, including the development of direct measures and indicators to assess ecosystem functions including biodiversity, water cycling, nutrient cycling and other key ecological processes that occur at a larger scale than individual farms.*

Impacts/Current Situation

In 2001, 1.5 million pounds of "Healthy Grown" potatoes were marketed in retail stores.

The Integrated Pesticide Management and other Protected Harvest standards for agricultural production decreased the use of 11 targeted pesticides by 37 percent compared to the 1996 baseline industry standard (Healthy Grown). Furthermore, due to the program, pesticide use in general was reduced by 250,000 kg between 1997 and 2000.

The Healthy Grown collaboration was the recipient of the Department of Agriculture's "Secretary's Honor Award" in 2003 for "Maintaining and Enhancing the Nation's Natural Resources and Environment" (Healthy Grown).

Currently, Protected Harvest is developing a similar program for dairy, almonds, tomatoes, plums, peaches, nectarines, winegrapes, and other fresh product. However, it states that *because our standards are very stringent it will take a little time before we can develop a set of production practices that are stringent enough to carry the Protected Harvest seal.*

4.2.4 Case Study Summary

The first message is that if soybeans from the US mid-west, potatoes from the mid-west and veal from the Netherlands can be differentiated, then it should be obvious that any product from Prince Edward Island can be differentiated. With that noted, the following are the particular lessons from the three case studies and market penetration strategy literature reviewed:

3. It takes a long-term mind-set to develop a unique product and market.
3. Service and relationships are the keys to success.
3. What the consumer finds as valuable is the most important aspect of how to differentiate a product.
3. No differentiated relationship will work without trust.
3. Brand the product and make the brand unique and at the forefront.
3. Price the product uniquely for each customer based on service and the relationship.
3. PEI can begin with one branded product and expand into others as stakeholders (growers, customers, and others) become more interested in the brand.

4.3 Potential Penetration Strategies for PEI Non-GM and Organic Products

The following describes the potential penetration strategy for PEI products with respect to commodities (4.3.1), GM-free zones (4.3.2), collaboration (4.3.3), value adding (4.3.4) and organic accreditation (4.3.5). Non-GM and organic crops are the focus of this section as they cover the larger cross-section of crops and tend to relate to providing premiums to smaller production volumes (as necessary to be of benefit to PEI).

4.3.1 Commodities

PEI's agricultural and agri-food industry does not have access to significant amounts of financial, scientific or physical (production and processing) resources. It also has to contest with the tyranny of isolation, located away from large easily accessible markets and a limited logistical infrastructure for cost-effectively delivering products. It is therefore, by definition, not an efficient producer of commodities. Attempting to compete in the commodity market is not a sound strategy for PEI.

A strategy based on establishing a GM-free production zone would essentially see PEI remain a producer of commodities. Albeit some commodities would have a different physical 'footprint' compared to allowing the continued production of GM products. It is a 'push' strategy that would see others benefit from adding value through processing or delivery. Producers would remain caught in the 'commodity trap' of low prices, especially as our research suggests that the overall demand for products whose only differing attribute is GM-free is likely to diminish in all major agri-food markets over the next 5-10 years. Also, as consumers become more sophisticated in their choices, research respondents said that they expect demand will hinge more on factors that are specific to a particular product (for example grass-fed), not solely the existence of GM-free ingredients (Planck, 2005).

4.3.2 GM-free Zones

Depending on the exact definition of 'GM-free' zone, a move to establish a GM-free zone in PEI would attract considerable resistance from PEI's growing biotech and pharmaceutical research initiatives (anonymous respondent, 2005). A section of PEI's agri-food industry believe that biotech and pharmaceutical opportunities offer significant value-adding and value-creation prospects that can benefit PEI's economy over the long-term, and are committed to supporting the development of such a sector in PEI.

The only instance that establishing a GM-free zone could increase producers' returns to any real extent would be to provide an environment that strengthened a secondary value-proposition. The natural choice, given the link in consumers' perceptions between the two, would be organic. Certified organic producers would gain the most from a GM-free zone.

That said the majority of respondents felt that protocols would prove more dependable than geographic zones. Establishing sound business relationships along the chain and open communication between suppliers and buyers therefore appears to carry more weight than establishing a geographic zone. This was a critical finding of our research.

Rather than establishing a GM-free zone, a more opportune approach would be introducing legislation to ensure adequate due diligence amongst Genetically Engineered (GE) crop

producers. It would make them liable for mishandling products if such resulted in the contamination of neighbouring organic/non-GM crops. This would protect the interests of all parties. It could also provide a process for compensating organic/non-GM producers if their crops were found to be contaminated through the activities of a neighbouring producer.

Given that the establishment of a suitably rigorous traceability system is another of our recommendations, the ability to identify the location of specific (GM/non-GM/organic) crops would assist in deterring the occurrence of false accusations surrounding crop contamination. The basis of such a legislative approach could be drawn from co-existence laws introduced in Germany and Italy.

4.3.3 Collaboration

In an environment of less and larger buyers due to business consolidation and demands surrounding significant volumes of consistently high quality products, the success of any non-commodity strategy relies upon groups of producers collaboratively adhering to a series of market-driven protocols. This is particularly the case given the relatively small size of PEI farms compared to many of their US and western competitors and the need to maximize the efficiency of transport, logistics and traceability systems.

The need to establish a group(s) of producers that are committed to following a particular strategic path and develop close relationships (vertically and horizontally) and establishing appropriate communication strategies throughout the process of producing and delivering end products to consumers will be crucial to PEI breaking out of the 'commodity trap'. Particularly as our research found that producing value-added differentiated products, not commodities, is really the only option that PEI producers could utilize to secure the greater long-term returns.

Breaking out of commodity production will require producers to adhere to stringent production protocols. Failing to adhere to agreed protocols could undermine the entire strategy. The success of a non-commodity strategy will therefore first and foremost rely on involving producers that are committed to embracing a particular strategy and invest in a business model that may not provide increased returns in the immediate future. A governance process will be required to coordinate the producer group by establishing roles and responsibilities, ensuring participants adhere to their responsibilities (including production protocols), and communicating market signals, production and performance-related information along the entire chain.

The importance of implementing clear market-driven production arrangements is shown by respondents rating collaboration and communication amongst producers and the rest of the chain as holding far greater sway over their purchasing decisions than a geographic zone. They believed that close business-to-business relationships would translate into greater adherence to production protocols, and therefore less chance of contamination, than if procuring from a geographic zone simply because it had declared itself GM-free.

Without the existence of a strong, well coordinated producer group(s), producers will find it difficult to imbed themselves in the chain and achieve consistent improved returns. Operating as coordinated group(s) will also allow suppliers and buyers to reduce transactions costs and provide customers with a single point of contact for communication purposes. This often translates into receiving greater interest from large international customers.

4.3.4 Value-Adding

From the consumer viewpoint, the term 'value-added' can encompass many scenarios. Given that commodities are not the suggested strategy, PEI should focus on producing products that possess attributes that consumers' value above the competition. That requires understanding the drivers of specific markets in order to identify the most valuable tangible and intangible attributes that a product must possess to capture a share of the available market.

Value adding requires investment in management capabilities. The evidence clearly states that establishing legislation-based solutions to marketing challenges often does not assist the adoption of value-adding activities. Stakeholders begin to rely on the legislation as the basis of innovation. Food marketing experts and many businesses consulted during this project stated that PEI has many unique credence factors that, along with producing high quality products, could promote PEI agri-food products and acquire premiums far more than establishing a GM-free zone. Credence factors provide consumers with an emotive draw.

The success of marketing initiatives associated with the FoodTrust initiative (for instance the Fresh Obsession Potato program, where consumers pay a premium for differentiated high quality potatoes whose marketing is supported by an effective communication strategy), illustrates that marketing differentiated PEI products can secure premiums for all concerned. We suggest taking that type of effort to the next step. Focus on producing certified organic foods along international best practice methods and protocols.

This would secure the attention of international buyers. Especially if their promotion is linked to highlighting credence factors such as PEI's clean and green unspoilt environment, an island isolated from urban development and, above all, 'Anne of Green Gables'. Our research identified that the benefits of successfully establishing a link between 'Anne of Green Gables' and PEI agri-food products would have far greater weight in the marketplace than a GM-free production zone. Especially in Japan if targeting female consumers.

PEI's current processing infrastructure provides added opportunities to utilize a proportion of locally-produced organic feed crops to produce, process and market certified organic red meat. A potentially enormous and growing opportunity undoubtedly exists to market certified organic meat and value-added meat products across Canada, into the US, and overseas to markets such as Europe and Asia, especially Japan. Certified organic meat appears to be a factor associated with the secondary development of organic markets, producing organic meat would enable PEI's red meat industry to take advantage of market growth ahead of many competitors.

4.3.5 Organic Accreditation

Gaining certified organic accreditation requires producers to navigate a three year transition period. Crops or animals produced during the transition period must be produced according to organic production techniques, though cannot be marketed as certified organic. All attempts should therefore be made to market them as natural; particularly in the US, Europe and Asia where legislation surrounding the marketing of 'natural' products is not as restrictive as in Canada. Whether the products are marketed directly or indirectly as 'natural' will depend on the marketing legislation that is specific to each market, the demand for natural products and the ability to secure premiums. An example of such a market is illustrated by 'Laura's Lean', a successful natural beef program based in the US.

Following an established set of internationally-recognized best practice production protocols would attract the added interest of suitable buyers and perhaps even provide access to the peripheral organic market prior to a producer achieving certified organic status. Having a group of collaborative producers work through the three-year transition phase together would provide additional market opportunities due to the ability to meet volume and quality consistency requirements of international buyers.

Such an approach could benefit the producers of non-GM crops too because buyers will be found for GM-free crops that are not organic. By virtue of concerns surrounding contamination of GM material into non-GM products, it will be more practical to share logistical resources between non-GM and organic agri-food products than GM and either non-GM or organic. Developing protocols that allow the handling on non-GM and organic agri-foods through the same facilities will increase the cost effectiveness of logistic arrangements: further benefiting both types of producer.

Embracing a strategic approach that combines the production and export of organic crops, and the production and export of organic processed red meat would provide two distinct and value-added opportunities for marketing organic products. Taking such an approach would allow for the highest quality crops to be exported, thereby ensuring consistency of quality, while providing a market for lesser quality crops (within reason) by utilizing them locally. This would assist in maintaining the financial viability of an industry where logistical costs and quality assurance are prerequisites for maintaining long-term contracts, yet yields of the highest quality grades are less than 'regularly' produced crops.

5.0 Conclusions

The purpose of this project was to provide the PEI Certified Organic Producers Co-op Steering Committee with an understanding of the international and national opportunities that exist with regard to marketing GM-free agricultural and agri-food products produced in PEI and to prioritize market opportunities. It also sought to evaluate whether PEI producers would benefit from the establishment of a GM-free production zone.

Our research found that the marketing of GM-free products and the establishment of a GM-free zone are not mutually exclusive issues. In fact, they are two separate (albeit intertwined) matters. Our research illustrated that virtually all the GM-free crops currently grown in North America were produced in the same general area that GM crops were grown, and were successfully marketed as GM-free (Huffman, 2004; PG Economics, 2003; Hucl & Matus-Cádiz, 2001). The success of producing GM, non-GM and organic crops in the same area relies on producers abiding by protocols that relate to the segmentation of specific crops. The most important criteria to establishing the long-term profitable marketing of non-GM crops is the existence of production protocols, including isolation strips, and the establishment of effective post harvest identity preservation systems to ensure their integrity. Claims that GM and non-GM crops cannot be grown in the same area are often exaggerated (Agcare, 2004).

Throughout this research it became clear that basing the strategic intent of PEI's agricultural and agri-food industry on the production of GM-free crops alone will not likely provide producers with the same benefits as producing differentiated value-added products to discerning and health conscious consumers. Particularly as GM crops only inhabit a segment of the overall crops grown in PEI. Developing production and processing capabilities in-line with defined market opportunities and developing close relationships (vertically and horizontally) along the entire value chain would likely benefit interested producers more than any other strategy. However, value chain development is a business-level strategy. Its successful achievement requires the existence of companies possessing complementary culture, vision, leadership and structure. It is not an industry level strategy, which the development of a GM-free production zone would be. While the increasing demand for organic foods (Fresh Produce Journal, 2004), and PEI's organic sector could benefit greatly from the development of value chain alliances to more effectively market premium-priced organic products, successfully implementing a business level strategy across an entire industry is an almost impossible task (Collins & Lim Camacho, 2005; Dunne, 2003).

The research also identified that opportunities exist for PEI to benefit from marketing its products in line with the credence and brand recognition factors that are of increasing importance to the discerning consumer that PEI should target its operations towards. Given its limited physical and financial resources, taking full advantage of these opportunities will require PEI (industry and government) to invest considerable resources in developing the management capabilities required to produce and market agri-food products in accordance with market requirements. It is suggested that this include a process of raising producers' awareness of the need to develop closer collaborative links with their customers and the final market. Such initiatives will lead to a greater number of PEI producers that are able to leverage the region's unique credence factors in order to satisfy consumer demands and secure price premiums.

While opportunities undoubtedly exist for PEI's agri-food industry to prosper, the findings clearly showed that producers would not gain considerably, as a whole, from the establishment of a

GM-free zone. The most likely straight-forward benefit of establishing a GM-free zone would come to companies that are producing a product that is ultimately sold to consumers. They would benefit from a reduction in transaction costs (i.e. through saving costs associated with testing to ensure the absence of GM material, having to continually search for sources of certified GM-free products, or experiencing the need to recall and/or reject products due to the presence of GM material in certified GM-free products).

The biggest single challenge in attempting to secure financial returns for producers and offset the cost of establishing and maintaining a GM-free zone, is that most consumers are not expected to perceive sufficient added value(on top of premiums already paid for GM-free products sourced from elsewhere) to warrant the payment of added premiums for products sourced from a guaranteed GM-free zone. They expect to be assured that GM-free products do not contain GM material, regardless of where they were produced.

The successful marketing of GM-free products, and the ability for producers to achieve sustainable financial premiums for their products, will therefore rely more on other factors, such as adherence to production, handling, and processing protocols, and communicating an effective value proposition to consumers. These are the same critical success factors that apply to all marketing initiatives for differentiated agricultural and agri-food products. The development of closely-aligned value chains that can provide producers with sustainable price premiums is a business-level strategy. Their success is based upon the existence of companies possessing complementary culture, vision, leadership and structure. It is not an industry level strategy, which the development of a GM-free production zone would be. Expecting a business level strategy to be adopted across an entire industry or region is an unrealistic expectation (Collins & Lim Camacho, 2005; Dunne, 2003).

Lessons learnt from regions that have sort to establish GM-free production zones illustrate that the independent nature of producers can challenge a system. This implies that the effectiveness of a GM-free zone would only be ensured through active policing in order to discourage the dissention of producers. Significant resources would be required to monitor and enforce the zone. With few added returns from the establishment of a GM-free zone, the cost of implementing and enforcing such a system would likely be far greater than the potential returns.

If production-related legislation was enacted, its objective should be to create the greatest possible harmony amongst the producers of organic, non-GM and GM crops. Doing otherwise would likely create resentment between the different interest groups and stakeholders. It would be seen by many of the industry stakeholders as a win-lose scenario. Resentment between stakeholders, often due to a lack of understanding of each others concerns and an unbiased awareness of market opportunities, appears to have been a significant factor in the failure of large GM-zones. The larger the zone, the more opportunity exists for resentment to build and manifest amongst the industry to the point that the initiative fails. Brazil is seen as a prime example of this scenario.

Ultimately, a strategy predominantly based on establishing a GM-free production zone would essentially see PEI remain a producer of commodities. Albeit some commodities would have a different physical ‘footprint’ compared to allowing the continued production of GM products. It is a ‘push’ strategy that would see others benefit from adding value through processing or delivery. Producers would remain caught in the ‘commodity trap’ of low prices, especially since our research suggests that the overall demand for products whose only differing attribute is non-GM is likely to diminish significantly in all major agri-food markets over the next 5-10 years.

The final section of this report includes a recommendation for a legislative approach that would benefit the majority of organic, non-GM, and GM producers alike. It would provide a foundation upon which PEI's agricultural and agri-food industry could utilize its efforts to establish closer links with the rest of the agri-food and, ultimately, end markets. The most beneficial outcomes of such an approach would be the identification of opportunities for PEI to benefit from the production of value-added differentiated products.

6.0 Recommendations for Prince Edward Island: Specific Market Opportunities

Section 6.0 is a discussion of the specific market opportunities that emerged throughout this research. Section 6.1 reviews the market opportunities for Europe (6.1.1), North American (6.1.2) and Japan (6.1.3). Section 6.2 summarizes the market opportunities and section 6.3 concludes with the legislative alternatives for PEI.

6.1 Market Opportunities for Europe, North America and Japan

6.1.1 Europe

Certified organic feed crops are in demand in Europe, with Germany and the UK as the world's second and third largest consumers of organic food. Non-GM is the basis for selling products through many European retailers, particularly in the UK. While food prices are higher in Europe than North America, which means that they often remain a market of interest for Canadian producers, non-GM is the basis for selling products through many European retailers, particularly in the UK. Exporters can therefore only expect to secure added premiums by supplying agri-food products to Europe's organic markets.

The most likely European food export opportunities appear to be in certified organic potatoes and apples, followed by red meat (particularly pork). Fruit, followed by cheese, wine and preserves represent other opportunities. European consumers are discerning and reasonably affluent. If promoted correctly and directed and marketed through differentiated retailers (such as Waitrose in the UK), markets exist for these products. An alternative market would be high quality foodservice outlets, including restaurants and hotels. The target should be differentiation, not volume.

PEI's processing infrastructure can be used to good effect to add value to raw products. European consumers are more familiar with produce sold in packages, so controlled or modified atmosphere technologies could be used to extend the shelf life of products. The use of microwaveable packaging is increasingly sought by European consumers that purchase frozen produce, particularly in the UK. This offers the opportunity for PEI to utilize processing facilities on a year-round basis by stockpiling produce by freezing in bulk or storing in modified atmosphere storage facilities, then processing out of season. Similarly, the highest value meat and meat products are often sold in tray packed form. Both approaches provide PEI with opportunity to increase returns and utilize regional labour more efficiently.

Given the potential credence factors associated with PEI and the nature of the more affluent European consumer market, securing market access would be based more upon providing the correct mix of quality, consistency and service than delivering at the lowest prices. Projecting the correct credence factors, and doing so in a way that can conjure consumer's empathy with a clean, green and undeveloped environment will be important to capturing premiums in the European market.

Europe (perhaps the UK in particular) is investing efforts to become more self reliant by reducing imports of organic foodstuffs, particularly high value perishables (Fresh Produce Journal, 2004). Yet the feed market looks set to remain and even grow substantially, particularly for certified organics. Opportunities exist to supply GM-free feed too, though the latter will not

capture the same premiums and will be subjected to competitive pricing. GM-free and organic feed that is particularly in demand are soy and barley because Europeans tend to prefer meat with white marbling. Another export feed item which could be developed is hay, particularly for the equine industry.

The most cost effective route for exporting all products to Europe, whether by air or sea, would likely be through Halifax. Rotterdam is the location of Northern Europe's largest feed import operation. Feed crops would be best transported in shipping containers in order to minimize the chances of contamination from GM material. Food crops could be packaged and flown if sufficiently valuable.

6.1.2 North America

The North American market for certified organic products, particularly feed crops, is expanding at an estimated 25 percent annually (source - interviews). A number of respondents stated that 2005 prices are up to 300 percent above that of GM feed. A specific quote given was US$16 per bushel for organic soybeans compared to US$5 per bushel for GM products. While prices will not remain this high indefinitely, quality certified organic feed will continue to capture higher premiums than straight non-GM crops. The reason for the higher prices is the increased demand for organic meat, particularly beef. In addition to soy, certified organic barley can secure excellent markets in the US as well, particularly as the availability and price of organic corn can fluctuate widely.

Besides beef, the market for certified organic pork and lamb is also expanding across North America. The Canadian Food Inspection Agency and Alberta Agriculture & Food have stated that the potential Canadian market for certified organic red meat is phenomenal, particularly if federally inspected. The market for certified organic value-added meat products is also considered immense. With demand for certified organic meat anticipated to continue expending for sometime, PEI has an opportunity to utilize current processing infrastructure to supply processed meat to Canada and the US.

While Canadian legislation makes the marketing of 'natural' meat an almost impossible benchmark to achieve, the same case does not exist in the US. Markets could therefore exist for meat produced without the use of GM feed, hormones, or antibiotics. With US producers increasingly turning to GM crops, the market for non-GM crops is expected to continue, though the existence of rigorous traceability and production protocols will be required to secure this market over the long-term. Though premiums will be limited.

The market for organic vegetables and fruit is another option that PEI producers should consider. Retailers currently import the majority of the organic foodstuffs sold in Canada. Our respondents said that access to a reliable supply of consistent high quality organic produce was the biggest single handicap to expanding the market. PEI should consider utilizing its vegetable and fruit processing facilities to value-add lesser quality grades of produce, thereby increasing the industry's viability. Only a negligible segment of consumers would be prepared to pay premiums for produce grown in a GM-free zone.

Other food marketing opportunities include certified organic dairy products, including cheese, yogurt and milk (perhaps flavoured if targeting children). Organic grains such as barley, rye,

wheat and oats are sought by the bakery industry, so market opportunities exist for these products too.

The most profitable food markets for PEI to target are on the East Coast. This includes Boston, New York and Washington; as well as Toronto, Ottawa, Quebec, and Montreal. The cost effective transport option will likely be road. If targeting high-end restaurants and retail stores, airfreight may be an option.

For feed, a number of respondents suggested shipping directly by sea from Charlottetown to Maine or further south. Most US certified organic feed is produced in the Midwest, which can be costly to transport to the East Coast, so shipping by sea or rail direct from PEI may offer cost advantages over US competitors.

Once again, for all the above products (particularly food items) and markets, PEI's credence factors will be a significant factor in securing price premiums. That said adherence to strict protocols and service/delivery arrangements will be the primary reason that customers establish long term relationships will PEI's agriculture and agri-food industry. The credence factors will help set PEI apart from the competition.

6.1.3 Japan

While it is quite common for the terms 'Asia' and 'Japan' to be used interchangeably, Japan in not representative of the wider Asian region. Asia is a geographic grouping of heterogeneous nations. No two Asian nations are identical in regards to food taste and consumption behaviour. Japan is particularly unique, specifically in the dynamics surrounding how food consumption patterns are interwoven with societal norms and customs. The place that food holds in society, particularly the importance of the production environment, the need for detailed traceability protocols, and the importance of stories surrounding food production methods sets Japan apart from the rest of Asia.

GM products are widely imported into Japan and available through most retail outlets. With estimations suggesting that a maximum of ten percent of Japanese consumers are particularly adverse to consuming GM foodstuffs, attempting to differentiate food on the basis of being GM-free would secure few financial returns for PEI producers. Such a strategy would likely leave PEI exporters in an uncompetitive situation. Particularly as the Japanese consumers' adversity to GM-free foods will likely erode further with the development of GM food grade soybeans.

Amongst European and North American consumers, taste and texture drives consumption. Hence the growth in demand for flavoured soymilk. In Asia, particularly Japan, business success is based more on building credibility for Canadian soybeans in regards to protein, quality and environmental factors rather than palate. With other high quality soybean producing regions located closer to Japan than PEI (Australia in particular), the only premium priced soybean market that PEI can realistically hope to capture in Japan is certified organic, linked to credence factors that 'tell' an appealing story. The same appears likely for corn and canola.

Certified organic is of growing interest to Japanese consumers. Their interest in organics goes beyond soy, which is one of Japan's staple foods. Meat, potatoes, fruit and vegetables; all are increasingly sought by Japanese consumers. Credence factors are also of immense importance to Japanese consumers. While quality, consistency and packaging are incredibly important to

securing market share, more than half the respondents that were interviewed said that 'Anne of Green Gables' would have far greater impact on securing premium markets than having produced foods in a GM-free zone.

Consumer cooperatives are incredibly powerful grass-roots lobbyists. Failure to meet expectations on a regular basis and products could be shunned by retailers and consumers alike in a short space of time. Identifying market requirements, consistently meeting those requirements, developing close relationships with Japanese buyers, visiting the market regularly, and following through with commitments while learning from experience are the key success factors of doing business in Japan. There is also a need to partner with Japanese-based representatives that are familiar with the marketplace.

Initially at least, PEI should consider Japan a market for only a small number of high value items. Certified organic soybeans, dehydrated fruit or berries, pork and potatoes appear the most likely to secure premium returns. Promotions must incorporate credence factors such as being produced in a clean and green undeveloped isolated environment. In addition, females are especially intrigued by the 'Anne of Green Gables' story. It is a unique credence factor that only PEI can offer.

Other than for extremely high quality or time sensitive goods, sea freight is the only cost-effective logistic option, with Halifax the most likely port of departure. Product would be containerized and shipped in chilled (controlled atmosphere), frozen, or processed format. The essence of purity gained from perceiving PEI to be the source of food produced in an isolated clean and green environment will be important to engaging Japanese consumers' interest. However quality, consistency, product appearance and health-related factors will drive repeat purchases.

6.2 Market Prioritization

From describing the European, North American and Japanese markets, we suggest that PEI's agricultural and agri-food industry focus on developing the necessary protocols and traceability systems (assumes international best practice methods and protocols) for producing and supplying the following products according to specific market requirements. As noted, allowing the production of GM crops in PEI would not prevent producers from continuing to produce and market both non-GM and organic crops; or securing premiums if produced and marketed according to market demands.

The suggested configurations of products and markets in order of priority are listed below. It is clear that overall marketing opportunities are immense; particularly if PEI utilize the credence and environmental factors associated with PEI that were raised by the research respondents.

Organic Opportunities (Higher Premium)

1. Supply certified organic feed crops to North American and European (particularly UK) organic beef and pork producers.
2. Develop an integrated industry to supply certified organic processed and value added beef and pork products to North America, Europe and Japan.
3. Supply certified organic potatoes to North America, Europe and Japan
    - In the case of Japan make linkages to 'Anne of Green Gables', clean and green unspoiled environment and an island isolated from urban development.

4. Supply certified organic hay to the equine industries of North America and Europe.
5. Supply certified organic dairy products and cheese to North America and Europe.

Non-Organic Opportunities (Lower Premium)

1. Supply 'naturally-produced' non-GE feed crops to Europe and North America.
2. Develop an integrated industry to supply 'naturally-produced', non-GE processed beef, pork and lamb to North America, Europe and Japan.
3. Supply 'naturally-produced' dairy products and cheese to North America and Europe.

6.3 Legislation Alternatives

The research indicated that there would be significant resistance to establishing Prince Edward Island (PEI) as a GM-free zone. Likely resistance would come from a number of sources, including individual companies, industry associations and bio-tech research/innovation initiatives. Many of these institutions are well connected and be prepared to invest significant resources in resisting such a move. Establishing a GM-free zone could be viewed unfavourably due to a number of concerns, including an inability to innovate to the same extent as more resource-rich competitors, loss of market opportunities, and an inability to develop the research and/or human resource capabilities needed to ensure the island's future prosperity.

Provinces, in-fact entire nations, have unsuccessfully attempted to establish themselves as GM-free production zones. The most renowned is Brazil. Lessons learnt illustrate that attempting to limit the business opportunities of producers' raises resistance from many quarters. This can lead to concerted attempts to undermine the legislation, regardless of the potential long-term opportunities for other producers. The exception to widespread resistance to the establishment of sizeable GM-free zones appears to be a number of European countries, where resistance to GM crops is well-imbedded in social norms and consumers clearly voice preference for non-GM products. The same situation does not exist in Canada. Attempting to establish PEI as a GM-free zone 'per se' is therefore not an approach that we would advise. It would have the potential to create enormous and long-term division within a relatively small community, with clear winners and losers existing on both sides of the equation.

As described earlier in the report, implementing due-diligence legislation that placed the onus of responsibility for ensuring the responsible handling and production of GM-crops upon individual farmers and stakeholders is an alternative and likely more palatable approach. Adopting such an approach could well be an effective way of controlling the actions of individual stakeholders while not limiting their business opportunities. It would protect the interests of both GM and non-GM/organic producers. It could be introduced as a method for providing PEI with a system to establish a particularly high standard of quality and Identify Preservation protocols for all crops and foodstuffs: commodity, value-added and processed. Such a system would not need to be onerous, just well designed and effectively implemented.

While we do not advocate legislating against the production of GM crops in PEI on an "across the board" basis, canola is a particular case in point that could be addressed as an individual item in order to improve the effectiveness of the 'due-diligence' measures suggested above. The risk of GM canola material infecting non-GM canola or canola-related crops (both in terms of the distance that potential contamination can take place, the ease of contamination, and the number of host plants that can be contaminated) is distinctly greater compared to other crops. Those same risks inherently represent the possibility of undermining the effectiveness of any

'due diligence' legislation, and the value that such legislation could provide industry stakeholders.

Due to the negative impact that the production of GM crops could have on surrounding crops and associated agri-food businesses, a clear case exists to argue for canola to be considered separately from other GM crops. Particularly as the potential harm that contamination by GM canola material has upon trade and marketing remains an unknown, while quantity (The Australian, 2005) and premium markets appear to exist for guaranteed GM-free canola meal, oil and seed.

Isolation strips, ranging from three metres for soybeans, are sufficient to limit the movement of GM material in most crops. Canola is different. Isolation strips for canola would have to be in excess of three metres wide to be effective (CFIA, 2005). That includes potential host plants. The combination of a natural barrier (water) reducing contamination risk, limited production of canola on the mainland surrounding PEI, along with the establishment of effective production protocols, presents an opportunity for PEI producers to capture premiums sufficient to mandate that GM canola should never be grown on the island.

If PEI does decide to introduce legislation surrounding GM crop production, it is recommended that it focuses on legislation that provides an effective linkage between preventing the introduction of GM canola into PEI and ensuring that individual farmers are responsible for their actions should they decide to produce GM products (other than canola).

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APPENDIX A: Survey and Interview Questionnaire

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Opportunities for Marketing Non-GM PEI Agricultural Products

Prolonged low prices for farm commodities are hurting Canadian agriculture. While it is generally agreed that Canada's agricultural industry must adopt a consumer-orientated business approach in order to remain viable, situated far from the end market (physically and emotionally) makes the process of translating market signals into business opportunities a difficult task.

The federal-provincial Agricultural Policy Framework (APF) was introduced as a way to take agriculture off the "victim agenda", and to exploit opportunities such as having farm products designed and produced for a specific purpose, and according to consumer preferences. In other words, farm products would be differentiated according to end use. One differentiated strategy that has received much attention is GM-free production zones.

While many producers in North and South America have readily accepted the technology behind genetic modification (GM); many consumers remain wary of GM crops. Strong opposition exists towards GM food products amongst consumers in Europe and Japan. Several countries have introduced legislation that requires GM products be labelled and some multi-national food processors have started to require non-GM raw product for their food production.

Although controversial, the concept of GM-free zones is being discussed and implemented around the world (China, Japan, Philippines, Vermont, California, British Columbia and numerous countries within Europe) in efforts to secure a market amongst consumers wary of GM products. The objective of this research is to explore the potential for a GM-free production zone in Prince Edward Island (PEI) as a means of differentiation to improve marketing of PEI farm products, and to determine whether it would result in a benefit to both organic and conventional PEI producers.

In order to determine whether differentiation along these lines would be beneficial to PEI producers, there must be an understanding of the size of the global market for non-GM commodities; and how PEI producers could access this market. Attached is a questionnaire designed to provide an assessment of the global market for non-GM commodities and food products. As a purchaser of agricultural commodities for international markets, we would like to discuss the questionnaire and this issue with you by telephone interview.

A member of our research team will contact you by telephone to determine when you are available for an interview that we expect will take 20-25 minutes of your time. If time does not permit an interview, the survey can be completed as a questionnaire and returned to us by email or fax. Please advise if we should be contacting another individual from your organization.

All information collected will be held in the strictest confidence. When the data provided is analysed, your questionnaire will be given an identification number, i.e., person or organization names will never be used. Only our research staff will see the individual questionnaires.

We thank you in advance for your cooperation.

Sincerely,
Martin Gooch, MAgribus
Research Associate – Value Chains

Name, Position and Organization	Mailing Address	Telephone and Email

1) What do you consider the term Genetic Modification (GM) to mean?

2) Please list or describe the farm and food products that you purchase and produce.

3a) In your experience in the last decade, has there been an increase or change in the demand for products or markets that you serve with respect to **non-GM** commodities/products?

3b) If you answered that there has been an increase in demand in the question above, from what level of industry do you believe the greatest changes in demand for **non-GM** crops has been driven, and how?

3c) Which commodities or products with **non-GM** attributes are most demanded?

3d) Which countries are the focus of demand for products with **non-GM** attributes?

3e) What data is available to illustrate the trends reflected in your response above?

4) Based on your experience, where do you see growth in the **non-GM** market (if any)?

There won't be much growth ❑
Growth will be very country-specific ❑
Growth will occur internationally ❑

Comments:

5a) How much of your product line (if any) is currently marketed based on GM attributes, **or lack of**? Can you describe how your product line has changed in the last decade by filling out the following table?

	1995	2000	2005
% of GM Products			
% of non-GM Products			

Comments:

5b) If your product line currently has **non-GM** products, what country/state/province are you purchasing your raw farm product from?

5c) Are the inputs from a declared GM-Free Zone?
Yes ❑ No ❑

6) What influences your organization's decisions when determining the make-up of product lines with respect to the use of GM and non-GM inputs?

7) How would your organization's product line change if it had access to a reliable supply of **non-GM** inputs? (What market opportunities would be presented?)

8a) Based on your experience, would consumers be willing to pay more for a guaranteed GM-free product?

Yes ❑ No ❑

Please explain in detail below:

8b) If you answered yes to 7a), would your organization pay a premium for a guaranteed GM-free farm product?

Yes ❑ No ❑

Please explain in detail below:

_____

_____

_____

_____

9) If your organization purchased GM-free commodities/inputs, would it feel more comfortable purchasing these inputs from a GM-free zone, rather than from dispersed producers who individually supply GM-free product?

_____

_____

_____

_____

_____

_____

*What are your thoughts regarding Prince Edward Island, Canada as an input supplier of **non-GM** commodities and products?*

10a) Do you perceive any added value with respect to the fact that PEI would be an **island** producing crops in an environment guaranteed free of GM material?

10b) Do you perceive other attributes related to PEI that makes it desirable as a supplier of GM-free farm products?

10c) Could PEI supply the amount of **GM-free** product that you would require? (The Table on the following page describes PEI's crop and livestock statistics to give you an idea of their size and production capabilities.)

10d) What specific traceability requirements (i.e., production documentation, integrity protection systems, etc.) would be required for you to purchase **non-GM** inputs?

11) Are there other differentiation strategies that you would suggest for PEI?

If you are interested in PEI's production potential, can we provide your contact information to our client in Prince Edward Island? Note that even if you respond yes, your responses to the questions above will remain confidential.

❑ Yes ❑ No

The George Morris Centre thanks you for your time and interest.

Table 1: Prince Edward Island Crop and Livestock Statistics, 2003

Land in Crops (acres)		
Land in Crops, excludes Christmas Trees *		433,641
Improved Pasture *		29,192
Summerfallow *		520
All other agricultural land *		182,784
Crops on Farms Acreage and Production	*Harvested Acres*	*Production ('000 bu)*
Wheat	25,000	1,105
Oats	10,000	7000
Barley	90,000	4,680
Mixed Grain	15,000	855
Rye *	3,747	
Soybeans	5,800	197
Corn for Silage *	3,875	
Tame Hay	138,000	345,000
Potatoes	105,500	29,013 ('000 cwt)
Vegetables *	2,491	
Fruits *	8,298	
Livestock on Farms (# of animals)		
Total Cattle		85,500
Dairy Cows		14,500
Beef Cows		13,200
Heifers		19,200
Steers		17,400
Bulls		800
Calves		20,400
Total Pigs		127,000
Total Sheep		3,900
Total Horses and Ponies *		1,565
Total Hens and Chickens *		365,182

* 2001 Census data.

APPENDIX B: Quantitative Survey/Interview Data Analysis

Question	3a	4			5a			5c	8a	8b	9	10a	contact
Respondent	Incr=1 (includes organic); No change/decr=0	There won't be much growth	Growth will be very country-specific	Growth will occur internationally	% of non-GM products 1995	% of non-GM products 2000	% of non-GM products 2005	Inputs from a declared GM-free Zone Yes =1, No=0	Consumers WTP more for guar GM-free product Yes =1, No=0	Yes's from 8a): would pay premium for GM free prod Yes =1, No=0	More comfort purchasing inputs from GM free zone Yes =1, No=0	Added value b/c PEI island Yes =1, No=0	Yes =1, No=0
NEFG, UoN, UK	1			1	100	100	100	0	1	1	1	1	1
Clarkson Grain, Il	1			1	100	100	100	0	1	1	0	0	1
Sunterra	1		1		2	2	4	0	1	1	0	1	1
Hendricks Seeds	1		1		n/a	n/a	n/a	n/a	1	1	0	0	1
Wye College, UK	1			1	n/a	n/a	n/a	n/a	1	n/a	1	1	n/a
Holistic Blend	1		1		began 1996	100	100	0	1	0	n/a	1	1
XXXX Manufacturer	0		1		n/a	n/a	n/a	n/a	0	n/a	1	1	0
Favored Grain, Il	1		1	1	100	100	100	0	1	1	1	1	1
Perfection Fresh, Australia	1			1	100	100	100	0	0	n/a	0	0	0
Plant Biotech Institute	1			1	n/a	n/a	n/a	n/a	1	n/a	n/a	0	1
De Ruiter Seeds	1		1		n/a	n/a	n/a	1	0	n/a	0	0	n/a
Dow AgroSciences	0	1			n/a	n/a	n/a	n/a	1	1	0	0	n/a
Griffith Laboratories	1		1		n/a	0	25	0	0		1	0	1
Waitrose, UK	1		1		n/a	n/a	n/a	n/a	1	1	1	1	1
Canadian Pork Int.	1	1			0	0	1	0	0		no	1	1
Didion Milling, WI	1		1		70	50	5	0	1	1	1	1	n/a
Queen's Pasta	1			1	0	0	0	n/a	1	1	1	1	1
Lakeview Organic, NY	1			1	n/a	n/a	n/a	0	0		1	1	1
SNRSM, Australia	1		1		n/a	n/a	n/a	n/a	0	n/a	n/a	1	n/a
Cloutier Agra Seeds Inc.	1		1		n/a	n/a	n/a	0	1	n/a	1	1	1
Grain Millers Inc. MN	1			1	n/a	n/a	n/a	0	1	1	0	0	1
Campbell's	1	1			n/a	n/a	n/a	0	0	n/a	0	1	0
SK Food International, ND	1		1		100	100	100	0	1	1	0	1	1
Dahlgren & Company, MN	0		1		n/a	n/a	n/a	0	1	1	1	1	0
XXXX Retailer	1		1		n/a	n/a	n/a	n/a	0		0	0	n/a
Garden Protein	1		1		100	100	100	0	1	1	0	0	n/a
Maple Leaf Bio-Concepts	1	1			n/a	n/a	n/a	n/a	0	n/a	n/a	1	n/a
Dept Nutritional Sciences	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	1	1	1	n/a
Council for Biotech Info	0	1			n/a	n/a	n/a	n/a	0	n/a	0	0	n/a
Showa Trading, Japan	1			1	100	100	100	0	1	1	1	1	1
Maple Leaf Foods Inc.	1		1		n/a	n/a	n/a	n/a	0		1	1	1
Soil Association, UK	1			1	n/a	n/a	n/a	n/a	1	1	1	1	1
Wageningen, Netherlands	1		1		n/a	n/a	n/a	n/a	1	n/a	1	1	0
Totals	29	5	17	11				1	21	16	16	22	18
Totals	88%	15%	52%	33%	70	66	64	3%	64%	76%	48%	67%	55%

Total respondents 33

APPENDIX C: Detailed breakdown of Interview Responses

1. What do you consider the term Genetic Modification (GM) to mean?

- Most important question is what does the term mean to consumers?
  - Consumers are confused about exactly what the term 'GMO' means.
    - Ambiguity has led to negative connotations amongst majority of consumers.
  - No single understanding of what GM means. Means different things to each nation.
    - Historical experience and societal view of food, shapes perception towards GMO.
  - Emotive issue that raises most vocal response from those holding extreme views.
    - Interest groups and media have influenced consumers' perceptions of GMOs.
  - For health, wellness and environmental reasons organic and non-GM debates closely related.
    - Consumer segments overlap considerably.
      - ✓ Affluent, educated consumers with health and/or environment concerns.
      - ✓ Though value organic more monetarily because of additional benefits.
- Genetic Modification (GM) encompasses both recombinant and non-recombinant breeding.
  - Scientific perspective is that GM refers to the artificial (recombinant) creation of DNA to alter plant genes in order to express or suppress plant characteristics.
    - Should be referred to as Genetic Engineering (GE)
  - Currently three main types of GM methodology.
    - Hybridization.
    - Mutation.
    - Limited gene introduction.
      - ✓ Number of methods to increase, creating greater confusion for consumers.
  - For the most part currently viewed as a benefit for producers, not consumers.
- GM food and GM pharmaceutical crops often viewed differently.
- Increasingly associated with specific crops.
  - Particularly soybeans, canola, corn. Though negative connotations impact other foods too.

2. Please list or describe the farm and food products that you purchase and produce.

- Beans: soy (foodgrade, feedgrade, non-GM, GM), kidney, navy, etc.
- Grains: wheat (hard, soft), barley (distilling, foodgrade, feedgrade), oats, durum.
- Corn: all types, including white, blue, peaches & cream, non-GM, GM, maize, etc.
- Flour: all types including wheat, soy, corn, potato.
- Oilseeds: mustard, flax, soy, hemp.
- Vegetables: virtually all types.
  - Particularly brassicas, cucurbits, tomatoes, leafy greens, potatoes, root crops.
- Fruit: stone fruit, pomme fruit, mangoes, grapes.
- Meat: beef, veal, pork, lamb, chicken.
- Oil: coconut, canola, hydrolyzed vegetable protein (corn, soy), sunflower, flax, etc.
- Food additives:
  - Including spices, preservatives, vitamins, colouring, flavouring, sauces, condiments, etc.

3.a) In your experience in the last decade, has there been an increase or change in the demand for products or markets that you serve with respect to <u>non-GM</u> commodities/products?

- Demand for non-GM crops is increasing.
  - Mainly due to increased production of GM crops in North and South America.
    - Limiting supply of non-GM crops; especially for feed.
  - Demand for non-GM foods closely linked to increased demands for organic crops.
    - Larger increase in organic (by definition non-GM) than non-GM foods per se.
  - If no price difference, most consumers prefer non-GM over 'known' GM products.
    - Term 'GM' makes almost all consumers take a certain amount of notice.
  - For certain nations (i.e. Korea) it is not a case of being against GM crops per se.
    - Do not want untraceable crops 'dumped' onto their markets.
  - Demand linked to traceability and integrity assurances offered by non-GM products.
    - Level of traceability is a driver of demand for non-GM product in much of Asia.
      - ✓ Resistance to GM products per se is lessening across Asia.
      - ✓ Sustenance still main concern for all but affluent classes.
  - Consumers looking for more health assurances and convenience.
    - Brings into play health and credence factors: hence interest in organics.
  - Not an issue for most crops though consumer concerns spread to almost all foods.
    - Driving distributors, etc., to seek non-GM assurances outside soy, corn, canola.
  - UK supermarkets simply refuse to handle GM food products.
    - Consider themselves the custodians of their consumers' health and wellbeing.
    - Since 1991, have been legally responsible for the safety of their consumers.
      - ✓ Expectation is to see more GM crops sold within next 5 – 10 years.
      - ✓ Likely to drive further growth in European organic sector.
      - ✓ Leading to UK looking to decrease reliance on imported high value organics.
  - Much of the European demand for non-GM crops is for animal feed.
    - Second stage market growth.
- GM crop production is expanding:
  - Partly due to lack of USDA support for differentiating non-GM crops.
  - Consumers interested in sourcing non-GM food likely interested in organic too.
    - Little evidence of US consumers willing to pay real premium for non-GM crops. Organic is different: deemed non-GM with 'additional benefits'.
    - Direct health and nutritional attributes of greater importance to Canadians. Therefore, unless organic, will usually not pay premiums.
      - ✓ And revert to GM products due to lower prices.
  - Certain GM crops are marketed as offering specific 'health' attributes (i.e. Nexera canola = Natreon Oil – offering reduced trans-fats).
  - Brazil government failing in attempt to ensure country produces only <u>non-GM</u> crops.
    - Resulting in significantly increased supplies of GM commodities.
    - And reduced supply of non-GM commodities, which EU imported in volume.
  - Under tight regulation, the EU has begun importing limited volumes of GM products.
    - Resulting in limited though potentially large increase in demand.
    - GM crops are grown in limited amounts within the EU (i.e. Spain).
  - Greater usage of biofuels will increase demand for GM commodities as fuel stocks.
    - Expectation is that as more GM crops provide tangible consumer benefits (including fuel supplies), a certain level of resistance against GM crops will decrease.

  - North American supermarkets resisting being drawn into the GM / non-GM debate.
  - GM debate will become quieter so long as no major safety / environmental incidences occur.
- In summary, 29 of 33 or 88% of the respondents indicated there has been an increase in the demand for products or markets that serve them with respect to non-GM commodities/products. Refer to Appendix B for a quantitative assessment of responses for question 3a.

3.b) If you answered that there has been an increase in demand in the question above, from what level of industry do you believe the greatest changes in demand for <u>non-GM</u> crops has been driven, and how?

- Consumers are driving the resistance towards GM crops.
  - However, the level of resistance towards GM crops is very nation specific.
    - Northern European consumers most opposed, concerned and vocal.
      Japan is less vocal. Influence industry through consumer cooperatives.
      EU unlikely to pay premiums, non-GM is simply the basis for doing business.
    - Majority of US, Canada, Asian and Australian consumers show little resistance.
      - ✓ Most consumers insufficiently concerned to pay premiums for solely non-GM.
  - Media influences consumers to varying degrees in different markets.
    - Underscored by media's increasing focus on health and well being.
    - Relationship between media and interest groups and place in society also factor.
  - Different correlations between historical food safety scares and/or quality related issues that are influencing EU and Japanese markets compared to North America.
    - Traceability and quality assurance are important factors in both markets.
    - North America experienced no major food safety scares linked to science.
  - Europe and Japan in particular view food as part of the social fabric.
    - North America (particularly US) views food more as a grazing activity. Don't place same onus on the purity, health related expectations, or experiential perspectives upon food.
    - Initial resistance to GM foods resulted from poor marketing by Monsanto. Continued resistance due to informed consumers' widening health and environmental concerns: hence organic / non-GM link.
  - While a segment of Asian consumers seek non-GM products, most Asian consumers show no discernable difference between the demands for GM or non-GM products. Including Japan.
    - Traceability is often the bigger issue: particularly regarding food providence and integrity.
    - Non-GM is only a developed world issue; not where sustenance is main concern.
    - Organics is a far more recognized and valued differentiator.
  - North American (and some European) demand for non-GM products being at least partly driven by food industry wanting a point of distinction.
    - North American demand driven more by manufacturers than anyone else.
    - It is the opposite in Europe and Japan: consumers drive manufacturers to supply.
    - Most North American retailers desperately trying to keep out of GM debate.
      Unless in-direct point of difference desired by consumers. i.e., Wholefoods.
  - In all markets demand for non-GM foods are predominantly being driven by the same consumer segment that purchases organic and fair-trade products.
    - The same markets that demand organics are demanding non-GM.

    - Close link to organics due to environmental, insecticide, bio-diversity issues.
  - If GM labeling becomes mandatory in US from 2006:
    - Will significantly increase demand for non-GM crops: until price point reached.
    - Will then flow-on into increased demand for organic products.

3.c) Which commodities or products with <u>non-GM</u> attributes are most demanded?

- Mainly products that are considered either fresh, pure, or minimally processed when consumed:
  - In order of suggested priority for consumers (given response rate):
    - Soy – particularly if used in soymilk, tofu, miso
    - Vegetables
    - Fruit
    - Bread (wheat)
    - Corn
    - Meat – gaining importance: especially in organic sector
    - Canola (oil)

3.d) Which countries are the focus of demand for products with <u>non-GM</u> attributes?

- European: Germany, Austria, Scandinavia, UK, Belgium, Italy, Greece, Spain.
  - Mainly Northern Europe due to stronger environmental groups.
    - Clear link to organics and related interest groups.
- Asian-Pacific: Japan, Korea, Singapore, Australia, NZ, China
  - Particularly amongst affluent health conscious consumers.
    - Clear link to organic and lifestyle choices / behaviours.
- Americas: US (California, New England, New York), Canada (Montreal, Toronto).

3.e) What data is available to illustrate the trends reflected in your response above?

- Personal and anecdotal experience:
  - Number of enquiries from consumers and buyers.
  - "Can you confirm product is GM-free?" most common question UK consumers ask.
- UK consumer research.
  - Published in Soil Association reports.
- Organic crop and food related literature.
- Press-type commentary.

4. Based on your experience, where do you see growth in the <u>non-GM</u> market (if any)?

- Overall, growth will likely occur internationally amongst max 10% of the population:
  - Though the final size of the market segment will be country specific.
    - As will the range of products demanded.
    - A combination of politics and consumer issues will influence each market.
  - Food will drive primary growth; animal feed is likely to drive secondary growth.
    - As being seen in trend for organic products.
  - Increased interest in health and wellbeing will drive long-term demand.
- Four respondents said that they expect to see little growth in demand for non-GMs.

  - Stated that the GM/non-GM debate is polarizing and expect GM crops to secure the majority of markets when varieties developed that offer tangible consumer benefits.
- In summary, 5 respondents (15%) indicated there won't be much growth, 17 (52%) indicated it would be country specific and 11 (33%) indicated growth would be international.
  - The greatest expected growth in demand for GM-free is expected to be in niche markets or products such as 'organic' and 'natural' rather than straight 'GM-free".
  - The greatest reduction in demand for GM-free products is expected to be larger markets, such as Northern Europe.
    - Therefore, while demand for certain types of GM-free products will strengthen; this may not translate into an increase in the volume of GM-free products sold.
  - Refer to Appendix B for a quantitative assessment of responses for question 4.

5.a) How much of your product line (if any) is currently marketed based on GM attributes, or lack of? Can you describe how your product line has changed in the last decade by filling out the following table?

- The only companies that knew that their product line was 100% non-GM for 1995, 2000 and 2005 were dedicated organic enterprises.
  - Appeared only group with consistent level of traceability and verification standards.
- Most other relevant companies had to estimate percentage of GM / non-GM products.
  - Or had consciously accepted GM products over the last 10 years.
    - For a host of reasons: including cost, availability, assured supply, consistent quality.
- In summary, the average percentage of the product line that was non-GM in 1995 was 70%, in 2000 it declined to 66% and by 2005 the average was 64%. Refer to Appendix B for a quantitative assessment of responses for question 5a).

5.b) If your product line currently has non-GM products, what country/state/province are you purchasing your raw farm product from?

- US: Central States (including North and South Dakota, Minnesota, Iowa, Colorado), also California and New York.
- Canada: Manitoba, Ontario, Saskatchewan, Quebec, Alberta.
  - At least one major Canadian food producer purchased products from Europe to guarantee ingredients are in fact GM-free.
    - Considered North American suppliers unable to ensure a sufficient level of integrity protection.

5.c) Are the inputs from a declared GM-Free Zone?

- None of the respondents purchased products from a declared GM-free zone.
  - Europe considered the closest to an established GM-free zone (one respondent).
- Highlighting that products are guaranteed GM-free will encourage increased scrutiny.
  - Most respondents considered 100% GM-free an impossible target.
    - Stated that a threshold must be established. Usually 99.5% to 99.9%.
- In summary, one (3%) respondent indicated their products were from a declared GM-Free Zone. Refer to Appendix B for a quantitative assessment of responses for question 5c).

6. What influences your organization's decisions when determining the make-up of product lines with respect to the use of GM and non-GM inputs?

- Depends entirely on demands of the immediate customer and the ultimate consumer.
- Determine attributes sought by customer then calculate a price to see if willing to pay.
  - Price ultimately determined by what the end market is expected to accept.

7. How would your organization's product line change if it had access to a reliable supply of <u>non-GM</u> inputs? (What market opportunities would be presented?)

- Those that demand non-GM supplies already have supply. Greatest change would be:
  - Increased supply would provide opportunities to supply new or larger markets.
    - Particularly in the organic and natural sectors.
- Many sectors would not see a distinct change as GM crops unavailable anyway.
  - i.e., vegetables, fruit.

8.a) Based on your experience, would consumers be willing to pay more for a guaranteed GM-free product?

- Estimated that 10% of the consumer market would pay premium for non-GM products.
  - Maximum premium suggested at 10-15% above regular price for straight non-GM.
    - Only for products most associated with GMOs and eaten 'pure': i.e. corn, soy.
    - Conscious GM-free markets expect food to be GM-free without paying premiums.
      - ✓ Clear need to bundle tangible and intangible attributes to capture premiums.
  - Organics can demand highest premiums: calculated at 250+% compared to GM.
    - Across wider range of products. Not limited to products associated with GMOs.
  - Higher premiums paid for products consumers perceive to be in or close to raw state.
    - Especially pure, unprocessed, or minimally processed and offer health attributes.
- In summary, 64% (21/33) of the respondents agreed that consumers would be willing to pay more for a guaranteed GM-free product. Refer to Appendix B for a quantitative assessment of responses for question 8.a).

8.b) If you answered yes to 8a), would your organization pay a premium for a guaranteed GM-free farm product?

- Tentatively yes. Though overall more interested in organics and GM-free by design.
  - Limited opportunity for securing premium with solely non-GM products.
  - Only those closely associated with GM, i.e., corn and soy.
- Organics completely different scenario. Far greater opportunity to secure premiums.
  - Premiums for organics calculated at up to 250+% compared to GM.
    - Highest in crops closely associated with GM (i.e. corn, soy, perhaps wheat)
    - Potential to secure premiums for organic crops that, while they themselves not associated GM varieties, could replace other organic crops closely associated with GM type products (i.e., barley as differentiated feed replacement for corn).
- In summary, 76% of the respondents that had answered yes (16/21) to question 8a) would as an organization be willing to pay a premium for a guaranteed GM-free farm product. Refer to Appendix B for a quantitative assessment of responses for question 8.b).

9. If your organization purchased GM-free commodities/inputs, would it feel more comfortable purchasing these inputs from a GM-free zone, rather than from dispersed producers who individually supply GM-free product?

- Muted yes. Protocols more important than geographic regions for most companies.
  - Could be a factor in securing markets that are most conscious about GM products.
    - Perceived reduction in risk of cross-contamination amongst GM / non-GM crops.
    - Reduce transaction costs by enabling reliance on verification without testing.
    - Could provide logistical, verification and segregation benefits.
- Governance and implementation would be significant issues.
  - Would be challenging and complex to establish.
  - More theoretical than practical benefit from implementation and maintenance costs.
  - Not all producers would be equally committed. Some tempted to cheat.
    - Cheating would undermine system: in turn reflecting Brazilian situation.
  - Potential to expose governance structure and stakeholders to litigation nightmare.
- Benefits would be crop specific if focusing on non-GM alone.
    - Negligible (if any) benefit to vegetable producers especially.
- Unlikely to pay more for GM-free crops sourced from GM-free production zone.
  - Unless bundled with other attributes that consumers empathize with.
- How would a GM-free operate?
  - Not allowing any GM products on the island at all would negatively impact processing and bioproduct industry.
  - Promoting PEI products as GM-free could attract undesirable attention.
    - Plus added scrutiny to entire value chain.
    - Greater reliance upon entire chain to maintain integrity of products. Added costs.
- Respondents involved in the production or supply of organic products were most vocal about the added comfort that would be provided by purchasing from GM-free zone.
  - Though overall, viewed protocols as having greater weight than geographic borders.
- In summary, 48% (16/33) would feel more comfortable purchasing inputs from a GM-free zone. Refer to Appendix B for a quantitative assessment of responses for question 9.

10.a) Do you perceive any added value with respect to the fact that PEI would be an island producing crops in an environment guaranteed free of GM material?

- The biggest factor is who perceives any benefit and why.
  - Consumers:
    - Likely to view an island as just one factor in their purchasing decision.
      - ✓ Not the overriding factor or the sought product attribute when purchasing.
      - ✓ Needs to be bundled with other factors that can increase value. For example, credence factors like “Anne of Green Gables” or “clean and green”.
    - Factors related to viewing a GM-free island as a positive point of differentiation.
    - ✓ Adds value, though for most consumers insufficient for paying a premium.
    - ✓ More likely to pay premium if tied to other product attributes.
    - ✓ The organic sector would be the most obvious beneficiary of a GM-free zone.
    - ✓ Negative connotations surround the GM / non-GM issue limits value.
    - ✓ The further the distance from production to retail, the greater interest in zones.
  - Retailers:
    - Retailers worldwide are extremely wary about becoming involved in the GM debate.
      - ✓ Prefer to let others make the decisions and take the flack.

- ✓ Link non-GM with organic rather than pushing non-GM debate per se.
- Act only as guardians by responding to consumer wishes or legislative decisions.
  - ✓ Incredibly fearful of exposing themselves to consumer / industry backlash.
- Would lessen exposure to risk by increasing surety of non-GM accreditation.
  - ✓ Improved verification and traceability systems.
- Generally, the further the geographic distance between production and retailers' procurement / physical operations, the greater the perceived benefit.
- Manufacturers and distributors:
  - Likely to perceive greatest overall benefit.
  - Reduce transaction costs by minimizing tests for presence of GM material.
    - ✓ Though not likely to result in willingness to pay premiums.
    - ✓ Potential cost savings could be undermined by increased segregation costs.
  - Minimize business risk by increasing dependability upon crop being GM-free.
  - Traceability is a major concern for an increasing number of manufacturers.
    - ✓ Particularly those serving markets where social norms closely relate to food.
  - The further between production and procurement, the greater perceived benefit.
  - Assist them to differentiate in the marketplace if interested in such a strategy.
  - What value-adding infrastructure exists that can allow processing on the island without relying on external parties that could harm products' integrity?
- Trends:
  - Reasonable and growing segment of consumers open to benefits offered by GM crops, such as reduced chemical usage or health-related attributes.
    - ✓ Naturemark GM potatoes successfully trial marketed in the Maritimes by Sobey's during the mid 1990's. Onus: less spray = environmental protection.
    - ✓ Nexera canola (use in producing Natreon oil) example of GM crop gaining acceptance in the marketplace by addressing consumer health concerns.

- In summary, 67% of respondents (22/33) indicated there would perceived added value from the fact that PEI would be an island producing crops in an environment guaranteed free of GM material. Refer to Appendix B for a quantitative assessment of responses for question 10.a).

10.b) Do you perceive other attributes related to PEI that makes it desirable as a supplier of GM-free farm products?

- Need to highlight and develop 'credence' factors such as:
  - Clean and green unspoiled environment.
  - Undeveloped and natural.
  - History (fiction or fact).
    - For example, Anne of Green Gables known internationally. Particularly in Japan.
  - Similar value system to Southern Italy (uncomplicated, unpolluted, traditional rural).
- Marketing and promotions that link consumers with farmers and show clear provenance.
  - Important for securing a premium from certain segment of the consumer market.
- Part of Canada.
  - A country that is highly regarded in the environmentally sensitive production of food.
  - Part of Canada yet isolated by water: underscores 'pristine' image.

10.c) Could PEI supply the amount of <u>GM-free</u> product that you would require?

Note that a statistics table was used to illustrate PEI's crop and livestock production capabilities.

Refer to Appendix A (questionnaire) to view the table provided.

- Organic feed crops most commonly referred to by respondents.
  - Reasonably large and rapidly growing market: particularly for corn, soy, barley.
  - Demand growing in the US, Europe (especially UK, Germany, Netherlands), Asia.
  - Estimated that PEI could supply organic feed requirements of 2-3 UK supermarkets.
- Smaller independent companies supplying 'niche' markets most interested.
  - Particularly those supplying organically grown crops commonly associated with GM.
- Opportunities undoubtedly exist, though greatest hurdles will be:
  - Lack of value-adding infrastructure.
  - Cost effective and reliable logistics.
    - Weather could affect reliability of logistics.
      - ✓ Particularly important for highly perishable crops.
  - Quality differentiation, assurance and consistency concerns due to poor weather.
    - Could compete with GM-free zones located in more temperate climate, for example islands located off of west coast of British Columbia.
    - ✓ Closer to Asia, longer production season, likely produce higher value crops.

10.d) What specific traceability requirements would be required for you to purchase <u>non-GM</u> inputs?

- Overall: base on systems developed for organic industry.
  - Do not go 'overboard'. Be effective not burdensome.
  - ISO-based system could provide ability to trace back to parental lines through chain.
  - Do not develop separate system solely for non-GM crops.
- Certification.
  - Non-GM / organic seed.
  - Batch labeling linked to detailed production / handling / processing records.
    - Including plot, spray diaries, storage and shipping arrangements.
  - Independent auditing and scientific analysis to ensure lack of GM material.
    - Greater scrutiny for first three years of a growers' contract. Then random.
- Segregation.
  - Separate handling facilities and equipment for non-GM crops.
    - Could be more demanding than if accommodating organic foodstuffs.
  - Segregated batch handling / processing / logistical arrangement for organic crops.
    - Transport and handling affidavits.
  - Segregation audit according to customers' wishes.
- Legislation.
  - Laws prohibiting GM crop production on PEI.

11. Are there other differentiation strategies that you would suggest for PEI?

- Organics.
  - Particularly corn, soy, barley, meat, berries, potatoes.
- Protocols versus regions.
  - Production protocols far more effective than production regions.
  - Less costly and more easily monitored.
  - Likely more effective.
  - Establishing and maintaining regulatory protocols for a region could be horrendous.

    - Establishing region arguably more about social/political issues than business soundness.
- Place onus on Genetically Engineered (GE) rather than Genetic Modification (GM).
    - Impossible to be GM-free production region. Could be GE-free production region.
- Value-adding opportunities.
    - Don't focus solely on commodities / unprocessed crops.
    - Adopt 'clustering' approach to stimulate innovations and develop capabilities.
- Link to credence factors.
    - Climate and unspoiled environment.
    - History and tourism.
    - Need to establish and maintain product/system integrity.
        - "Trustworthiness"

12. If you are interested in PEI's production potential, can we provide your contact information to our client in Prince Edward Island?

- 15 of the 33 respondents said that their contact details could be made public.
    - Respondents that expressed particular interest in exploring PEI's potential included:
        - David Hendricks, Hendrick Seeds, Ontario
        - Jim Taub, Favored Grain, Illinois
        - Mary-Howell Martens, Lakeview Organic Grain, New York State
        - Richard Hind, Waitrose and "Hindsight" Relationship Development, UK
        - Carlo Leifert, Nafferton Ecological Farming Group, UK

3.3 Interview Summary and Conclusions

The following discussion points are the common themes that emerged from the interview process. Specifically, the highlights refer to the drivers and issues surrounding the establishment of a non-GM production zone from the perspective of the consumer, retailer, processor/distributor, producer and life science/input supplier. Section 3.3.2 concludes with what the interview results suggest for Prince Edward Island.

3.3.1 Drivers and Issues Surrounding the Establishment of a Non-GM Production Zone

Consumers

- Consumers are driving the GM debate and resistance (partly influenced by media and interest groups).
    - Particularly in Northern Europe. To a lesser degree in Japan.
        - Europe: political interests are an additional in-direct driver.
        - Japan: powerful and vocal consumer cooperatives account for 1/3 of all retail trade.
    - Not driving establishment of GM-free zones:
        - Therefore limited opportunity to secure increased returns from the end market.
        - Need to bundle GM-free zone with other product attributes to secure premiums.
    - As with other food 'safety' issues:
        - Expect food to be safe. A prerequisite for gaining their business.
        - Will not pay extra for something that allows you to 'play ball' or 'get in the game'.
    - Searching for guidance on what foods to consume for health and well being.
        - Also searching for differentiated products that strengthen their links with agriculture.
    - Debate and resistance expected to diminish the longer GMOs are available.

    - Subject to no significant safety or integrity issues arising.
    - Improved traceability systems will also influence resistance to wane.
- Many consumers remain unsure what GM/GMO actually means.
    - Means different things to different countries and consumer demographics.
        - To some it means cheaper food. To others it means unsafe food.
    - Is a blurred concept that means little though raises concern among consumers.
        - Many consumers struggle to even understand what the term 'organic' means.
    - Would have to define production as transgenic or GE.
        - For many consumers this message would get lost in the 'noise'.
        - Would confuse many consumers and attract added (likely negative) attention.
        - Can market non-GE products in Canada. Though no perceived demand.
- Referring to GM/GMO exudes negative connotations, whatever the exact message.
    - Hence most consumers would prefer non-GM food if sold at the same price.
        - Need to focus on the positives in order to gain greatest benefit.
    - Use approaches that imply non-GM without actually stating such.
        - Organic is clearly the preferred option.
        - Organic and non-GM 'tags' closely entwined amongst interested consumers.

Retailers

- Secondary drivers (though hold equal primary driver place if located in Northern Europe) for establishing GM-free zones to:
    - Reduce transaction costs.
    - Manage market, strategic, financial, political risks.
    - Reduce exposure to possible legal challenges.
    - Ensure dependability and segregation of non-GM materials.
    - Improve traceability.
    - Use as differentiating factor (particularly for certain North American retailers)
        - However, not drivers of GM debate.
        - Respond to consumers: do not push issue because deemed strategically unsafe.
- Would not likely pay any premiums for sourcing from GM-free zones unless:
    - Linked to other factors that consumers viewed as positive differentiators.
        - Non-GM is deemed the basis for doing business in much of Europe.
        - Premiums not awarded for the 'right to compete'.
    - Relationships with suppliers more important than dedicated GM-free zones.
- Level of demand will vary according to specific products.
    - Fresh, minimal, pure products will receive the highest interest.
        - Organics would clearly command highest returns.
        - Feed for dedicated organic meat production increasing in demand.

Processors and Distributors

- Primary drivers (overall) for establishing GM-free zones to:
    - Ensure reliable supply of quality products if seeking to differentiate themselves.
    - Reduce traceability system and transaction costs.
    - Manage market, strategic, financial, political risks.
    - Take advantage of international market opportunities.
    - Ensure dependability and segregation of non-GM materials.
    - Improve effectiveness of traceability systems.
- Unless marketed with additional attributes, not valued by most retailers/consumers:
    - Therefore premiums likely to have a ceiling of 10-15% above regular products.

- Only demanded for products closely associated with GM (corn, soy, canola).
- Limited demand for non-GM products per se.
  - Relationships with producers more important than dedicated GM-free zones.
- Logistics an enormous issue for straight non-GM products.
  - Prohibitive costs of implementing integrity related will destroy premiums.
  - Immense reliance upon entire chains' effectiveness to protect product's integrity.

Producers

- Possess increasingly polarized views, which intensify debate.
  - Group that possess opinion that GM/GE is wrong or view market opportunities.
  - Want to manage risk or have less desire to invest efforts to differentiate.
  - Environmental concerns influence both camps.
- Reduced chemical usage vs. biodiversity. Technology seen as good or bad.
  - Farmers' perceived independence significant hurdle to establishing GM-free zones.
    - Those that work together collaboratively will be in the stronger position.
      - Producer group in 'clean and green' environment more compelling than zone.
      - Legal and governance risk far less than if establishing GM-free zone.
      - Greater accountability amongst group: strong unification and competitiveness.
    - Collaborate vertically and horizontally for greatest benefit.
    - Those that proactively manage relationships with customers will be ahead.
  - Brazilian government sought to establish itself as a non-GM production region as it mechanized its agricultural system.
    - Many farmers did not buy-into approach and sourced GM seed from Uruguay.
    - Producers that perceived GM crops to offer cost benefits undermined legislation.
      - Even though had established and profitable markets for non-GM products.
    - Only a diminishing segment of the northern areas now grow non-GM.
  - Non-GM 'per se' crops will expose producers to relying on integrity of entire chain.
    - Relying on science is not a good marketing approach.
    - Credence factors have greater sway in the consumer marketplace.

Life Science and Input Suppliers

- Monsanto initially developed GE technology to address loss of Roundup patent.
  - Hence rush to promote technology. Poorly marketed to consumers.
  - Greatest consumer resistance emanates from nations with closest social link to food or historical concerns regarding food safety issues.
- Distinct polarization of business strategies.
  - GE or non-GE.
  - Most crops not available in GM varieties, though tinged by consumer wariness.
- The range of GM/GE processes to breed crops will increase over time.
  - This could further confuse the GM/non-GM issue in consumers' minds.

3.3.2 What the Interview Results Mean for Prince Edward Island

- Establishing a GM-free zone along geographic lines will be difficult and risky.
  - Could be considered as taking a 'town hall' approach to address a business issue.
    - Any integrity system requires passionate supporters to establish and maintain.
    - ✓ Any system is only as good as users' commitment to its implementation.
    - Building consensus would likely take considerable time and financial resources.
    - ✓ Lack of buy-in undermines even straightforward strategic alliances.
    - Establishing and maintaining governance and monitoring system will be costly.
    - ✓ Who will be accountable to whom? How?
    - ✓ Bureaucracy could be immense, burdensome and drain resources.
  - Business strategies require methodical development and implementation.
    - ✓ Non-GM zones could be viewed as a 'push' strategy. Not market driven.
    - ✓ Success will rely upon executing market-driven protocols with precision.
    - ✓ Managing relationships within the alliance and the rest of chain will be crucial.
  - Could be significantly undermined from a number of quarters.
    - Media scrutiny: especially if integrity breaches occur.
      - ✓ Would impact PEI even if not PEI's fault. Issue could occur down the chain.
    - Intentional 'terrorism' by producers or stakeholders holding a grudge.
      - ✓ Brazil a good example of how geographic GM legislation can be undermined.
    - Legal challenges from industry stakeholders situated within or outside of PEI.
      - ✓ Citing: business impacts, suppressed innovation, integrity breaches, environment, etc.
    - Could prove to be a short term opportunity; long-term headache.
      - ✓ Have to address issue of providing compensation to disinterested producers.
      - ✓ Will GM material used by food manufacturers be allowed on the island?

- Marketing strategies.
  - Size of the PEI production area is a double-edged sword:
    - Small size offers opportunity to develop unique credence factors.
      - ✓ Discerning consumers drawn to environment-related credence factors.
      - ✓ Credence important in markets when social factors impact food consumption.
      - ✓ Often same markets concerned about GM. Demand organic and/or non-GM.
    - Limited volume of crops impact logistical cost-effectiveness and reliability.
      - ✓ Higher density and less perishable the crop, more cost effective the logistics.
    - One way of addressing is to focus on producing a small number of crops well.
      - ✓ Opportunity to enhance logistic efficiency, and management capability.
  - Relying upon physical or scientific resources may not be the most opportune strategy.
    - General opinion is to invest in management capability, not legislative restrictions.
      - ✓ Physical resources have limited value without skills to produce and market.
    - Chain relationships will be critical success factor for PEI differentiation strategy.
      - ✓ Inter-business relationships more important than solely regions or resources.
      - ✓ Long term relationships will reduce risks and secure consistent markets.
    - PEI could lack competitiveness compared to islands located in warmer climates.
      - ✓ BC islands: longer seasons, more opportunities, better access to Asia?
  - The greater distance from production to consumption, the more appealing a zone.
    - However only limited group of consumers pay premiums for non-GM per se.
      - ✓ That is if you can secure a premium at all if sole attribute is non-GM.

- ✓ Hence need to find more compelling value propositions than solely non-GM.
- ✓ Especially as all predictions are that resistance to GM per se will diminish.

▪ Traceability is increasingly important issue for many international consumers.
- ✓ Can provide access to almost as many markets as non-GM crops.
- ✓ Though won't get the level of premiums afforded to organics.

o Less risky ways to market than emphasizing GM-free attribute 'front and centre'.

▪ Organic implies non-GM without attracting attention through negative issues.
- ✓ PEI may be ideal for developing intensive organic production base.
- ✓ Result: effective crop rotations and close relationships between producers.
- ✓ Information / skill based innovation that would be difficult to replicate.
- ✓ Excellent way to leverage credence factors associated with PEI.
- ✓ Consumers empathize with organic more readily than non-GM. Positive label.
- ✓ Demand for organics growing[10] rapidly and not so country specific as Non-GM.

[10] A report by Padel *et al*. (2003) looked at the expected growth rates for the organic market within Europe until 2007. These growth rates are illustrated in the table below.

Expected Market Growth Rates Between 2002 and 2007 for the Total Organic Market and for Specified Categories in Selected European Countries (%)

	Denmark	Austria	Switzerland	United Kingdom	Germany	France
Total Organic Market	1.5	4.6	4.5	11.0	4.8	6.1
Convenience Products	3.3	8.4	7.0	8.8	7.3	10.0
Meat Products	1.7	3.2	8.0	12.3	3.1	10.0
Dairy Products	1.0	3.4	1.5	8.8	6.7	6.5
Fruit & Vegetables	4.0	5.7	5.0	8.3	7.1	5.0
Cereal Products	2.5	5.3	2.0	6.0	4.6	5.3

Source: Padel, Seymour and Foster, 2003

The United Kingdom is expected to have the highest growth rate among western European countries for the organic market, but this rate of 11% is below the 20-40% growth rates that had previously occurred in the United Kingdom.

Other important markets for organic products are in China, South Korea, Singapore, Hong Kong and Taiwan. Countries like Malaysia and India are expected to show growing markets for organics as organic farmers step up production in these countries.

In the United States, organic food and beverage sales currently represent only about 2 percent of overall grocery sales, while organic fruits and vegetables captured 4 percent of overall produce sales in 2002. (Produce Marketing Association, Organic Fresh Produce Industry 2003 report).

- ✓ Premiums for organic significantly greater across more crops than non-GM.
- Double use crops would spread risk and lessen exposure to market fluctuations.
  - ✓ I.e. Non-GM soybeans command premiums in food and certain feed markets.
- Integrate island economy. Use organic crops to raise PEI organic beef/veal/pork.
  - ✓ Significant opportunities for marketing organic meat to burgeoning markets.
  - ✓ Value adding and processing opportunities for organics to improve returns.
  - ✓ Semi / fully processed foods increase cost effectiveness of logistics.
  - ✓ Processing organic crops increases production efficiencies by providing markets for lesser quality products.
  - ✓ Main organic markets include Eastern US and Europe = logistic efficiencies.
- Opportunities to access lessons in organic production techniques developed overseas.
  - ✓ Look globally for organic production/marketing innovations. Adapt to situation.
  - ✓ Adapting to certified organic accreditation easier for a group than individuals.

- US organic producers growing more in scale than number. Shows opportunity for PEI to develop volumes and compete more effectively than if dispersed producers.

Agriculture Canada estimates organic retail sales will increase by 20 percent a year to Can 3.1 billion in 2005. Much of the growth stems from public unease about the impact of industrial farming on the environment and the health of the entire food chain, according to the Canadian Organic Growers, a national advocacy and education organization.

APPENDIX D: Respondent Contact Details

For those respondents willing to provide their information

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