

# **Assuring Production-Derived Quality in Canadian Food Markets**

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By

Brian G. Innes

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## *ABSTRACT*

Food quality attributes arising from farming methods are important to many Canadians. The credence nature of these quality attributes necessitates some form of quality assurance for accurate signalling to consumers. This thesis examines the appropriate role for private, third party, and government actors in credible quality assurance systems for production-derived attributes. Concurrently, it explores the nature of trust that Canadians put in various organizations for quality assurance.

In a nationwide survey, Canadian consumers obtained significant benefits from government verification of pesticide free and environmentally sustainable grains contained in pre-packaged sliced bread. The data was collected using a discrete choice experiment. Farmers, third party, and government organizations were similarly trusted for accurate information about farming methods. The dimensions of this trust varied across organizations. Government standards relating to environmental sustainability were perceived as most effective.

Results obtained using a latent class multinomial logit model showed that respondents who most valued production-derived food quality also received the greatest benefit from government verification and significant negative utility from supermarket or third party verification. In relative terms, the difference in utility between third party and government verification represents 141% of the value of the environmentally sustainable attribute and 87% of the pesticide free attribute. The results suggest that significant consumer benefit can be achieved if government were to take a leading role in quality assurance for production-derived quality.

## *ACKNOWLEDGMENTS*

*You don't get harmony when everybody sings the same note.*  
Doug Floyd

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## *1. INTRODUCTION*

### **1.1. Problem Statement**

Consumers are increasingly interested in food attributes that can be linked to the actions of producers, as witnessed by the increased demand for organic and natural food. An increasing awareness amongst Canadian consumers of the health, social, and environmental consequences of food choices means that consumer demand for production-derived attributes extends beyond organic. Some consumers now demand food that is produced in a wide variety of ways including environmentally sustainable and animal friendly. This type of quality attribute, like organic, is derived from the food production process. Production-derived quality is thus the term used in this thesis to embody food quality attributes resulting from practices at the primary level of production (i.e. farming).

To meet this need there has been an increasing presence of firms marketing food quality attributes derived from production methods. Smaller firms tend to market directly through local marketing channels like farmers' markets. Larger firms market their product primarily via multi-level agri-food supply chains and frequently reinforce production-derived quality claims with certification from retailers, processors, non-profit organizations, and other certification agencies. Despite this rapid expansion in the number and variety of production-derived claims, it is unclear how consumers perceive the credibility of these claims.

Government policy is generally thought to have a role in enhancing social welfare and correcting market failure, including situations of information asymmetry. It is unclear how Canadians perceive quality assurances coming from different types of organizations – i.e. if different types of organizations are equally trusted for accurate information. Markets

for credence<sup>1</sup> attributes usually rely upon some form of quality assurance to function effectively. Thus, it is beneficial for the functioning of market mechanisms and social welfare that quality assurance schemes are credible. Credible assurance schemes enable consumers to confidently purchase food produced in ways they desire. Given that firms have an incentive to maximize profits whereas government is concerned with social welfare more broadly, it is plausible that government organizations may be more trusted for effective quality assurance.

At the same time, agricultural policy in developed countries is expanding beyond farmer-oriented programs toward a holistic approach that benefits both the agricultural industry and society in general. Despite this favourable policy context for programs that have the potential to deliver gains to both society and the agricultural industry, to date there has been limited investigation regarding the appropriate role for government in the market for production-derived attributes in Canada.

A coordinated quality assurance system to support the market for production-derived attributes could address consumer desires for production-derived quality, mitigate credibility concerns, and satisfy government objectives for agricultural programming to serve the broader interests of society. This thesis will examine the appropriate role for private, third party, and government actors in credible quality assurance systems for production-derived attributes. Concurrently, it will examine the nature of trust that Canadians put in various organizations providing quality assurance.

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<sup>1</sup> Nelson (1970) defines goods as being comprised of two types of quality attributes, search that can be ascertained upon inspection, and experience that are only ascertained following consumption. Darby and Karni (1973) further define credence attributes as those whose quality cannot be identified even after consumption.

## 1.2. Background

Both the European Union and the United States support producer-oriented product differentiation via public quality labels and public certification respectively (European Commission, 2006, Agricultural Marketing Service, 2007). The EU supports official quality seals such as Protected Geographic Indications and Traditional Specialties Guaranteed, while the USDA supports the Process Verified Program. Both of these efforts can be seen as quality assurance systems. There has been limited government support for production-based product differentiation in Canada beyond the national organic standard introduced in 2006, though recent research priorities of Agriculture and Agri-food Canada signal increased interest (Zafiriou, 2007). Recently, efforts have been undertaken in Ontario and Quebec that focus on local production. These Canadian efforts, however, may do little to increase either the variety or profitability of “producer attributes” because of the universality of their standards and their inability to control the quantity of products that are marketed under their auspices. The organic standard, for example, is universal in its application to all products meeting the standard. The process and consequences of standardization are explored further in the next chapter.

While gross producer incomes may be higher because of the price premiums accompanying the organic standard, in the absence of a mechanism for producers to attain some degree of market/pricing power via product differentiation, producers will not be able to maintain higher net returns in the long-term<sup>2</sup>. This thesis defines universal standards as those that are constant across products and firms within a country. For example, the national organic standard delivers one type of production system that is reasonably well-

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<sup>2</sup> Minimum quality standards like the organic standard restrict quantity by allowing only those products that meet the standard to be certified, however this is not restrictive enough to prevent firms from entering the organic market until the point where super normal profits are eroded.

known to consumers and represents the same standard on all products using it. A universal standard applicable across products and firms provides an effective quality signal to consumers if appropriately managed. However it is conceivable that agricultural producers, food industry firms and heterogeneous consumers may obtain more utility from a variety of production systems/standards if they were credible – depending on the costs associated with the standards. If a variety of standards increases segregation costs for the conventional product, however, consumers purchasing the conventional product may lose (Fulton and Giannakas, 2004).

The recent success of the well-known international natural and organic food retailer Whole Foods Markets in entering the Canadian market suggests that the demand for production-derived quality extends beyond organic products. Multiple organizations, working with their own unique standards, are currently providing quality assurances for production-derived quality in Canada. Whole Foods Markets, along with firms and non-profit organizations such as Local Foods Plus and Food Alliance, have created their own standards to define production derived quality for a variety of foods. There has been little research regarding how these multiple standards and quality assurance systems affect the credibility of production-derived claims and consumer demand for production-derived attributes. It is unclear how consumers' trust in different types of organizations influences these organizations' abilities to signal production-derived quality.

### **1.3. Objective**

This thesis will examine the appropriate role for private, third party, and government actors in verifying production-derived quality. It will examine how consumer trust in an organization affects its ability to communicate production-derived attributes.

Moreover, it will determine if the type of organization assuring a particular production-derived attribute affects the utility gained by consumers from that attribute. The strength and nature of Canadian consumers' trust in government, food retailers, third party certifiers, farmers, supermarkets, and food processors is examined to determine how quality assurance from different types of organizations can influence the credibility of production-derived claims.

#### **1.4. Outline**

This thesis is structured as follows. First, chapter two lays out the theoretic groundwork necessary to investigate the problem at hand. Drawing on literature from psychology, business, economics and sociology, a working conceptual model is developed to contextualize the interrelationships of interest to the investigation. Second, chapter three explores the current market conditions for production attributes. Analysis of semi-structured interviews with various members of supply chains for production-derived quality reveals factors affecting quality assurance adoption. The nature of an organization's credibility and how their actions and composition affect their ability to contribute to a credible quality signal is explored. Third, chapter 4 outlines the methodology used for a Canadian consumer survey examining the trustworthiness of organizations in communicating production attributes. Chapter 5 reports the results of the consumer survey and outlines how the verifying organization affects consumer willingness to pay for production attributes. Chapter 6 concludes and provides policy implications.

## 2. *TRUST, QUALITY ASSURANCE, AND THE ROLE FOR GOVERNMENT*

### **2.1. Introduction**

Food markets sometimes have imperfect information between buyers and sellers. Taste and more intangible process attributes can be characterised as experience and credence attributes respectively. As a result, they are both impossible to accurately assess by examination at the time of purchase. Akerlof (1970) highlighted the need for some level of “quality assurance” in one-time purchases where quality could not be determined at purchase. Klein and Leffler (1981) elaborated further that reputation is key to reaching a market equilibrium with experience goods. Recent literature, including Caswell and Mojduszka (1996) and Antle (1995) emphasizes that inefficient outcomes arise in the presence of imperfect information when goods are comprised of credence attributes that cannot feasibly be known even after consumption.

Trusted and accurate labels or brands can mitigate the problems caused by information asymmetry at the point of purchase. A label or brand becomes a credible signal to transform credence attributes into search attributes when it is sufficiently trusted. Golan, Kuchler and Mitchell (2001) explore the economics of food labelling with specific reference to the criteria for a government’s choice of mandatory or voluntary labels. Underlying the effectiveness of a labelling scheme is the necessity for consumers to believe what the labels say. Firms must also ensure that their products are representative of label or brand claims if they are to be effective quality signals. Thus, trusted and effective quality assurance systems can be seen as an integral part of communicating credence attributes to consumers via labels or brands.

## 2.2. Related Work

Researchers have examined ways to increase the production of food using alternative farming methods (see Marrette 2005 for an overview). A significant amount of this research has been conducted based on the premise that allowing producers to capture rent from production-derived attributes will increase the production of food using alternative farming methods. This research addresses strategies for overcoming historical problems associated with agricultural marketing as outlined in Innes *et al.* (2007), namely:

- Most farms are too small to garner the economies of scale associated with marketing activities
- Individual farmers face direct competition from other farmers producing near perfect substitutes
- The production of any individual farm is unlikely to be sufficiently large to satisfy retailers' demands for consistency of supply and quality
- Costs of organization are high for geographically dispersed atomistic producers

Hayes *et al.* (2004) and Lence *et al.* (2007) have explored the production of differentiated foods by examining the welfare and market implications of various policies. Lence *et al.* examined how different policy options can enable production differentiated food products and how these policy options affect consumer and producer welfare. Hayes *et al.* focussed on the implications of European and American approaches to geographic differentiation for producer welfare. Other research by Marrette and Crespi (2003) and Marrette *et al.* (1999) has examined the potential for producers of high quality products to capture the benefits of production-derived quality attributes by forming a stable cartel. They conclude that social welfare may be enhanced by a cartel that accurately communicates quality and limits quantity if the costs of labelling are high. Hence, previous research suggests that there are policy options to encourage and enable production-derived quality.

Besides the challenges posed by the structure of agriculture, the structure of the agri-food system inhibits the market for production-derived quality. The increasing physical separation of producers and consumers brought about through the global trend of urbanization necessitates that food is distributed and sold through complex supply chains. Most developed country agri-food supply chains have significant market concentration at the processor and retail level that also may hinder the market for production attributes (OECD, 2006; Bosmans, *et al.* 2005). Though the research in this area is limited in scope, evidence from existing European quality schemes such as Label Rouge in France (European Commission, 2006<sup>a</sup>) suggests that even when quality assurance schemes for production attributes exist, retailer and processor market power can allow significant rent capture and limit the benefits to both consumers and producers. The extent that retailers and processors facilitate or hinder the market for production-derived quality is unclear and appears to be case dependent. Of most relevance is that all players in the supply chain must have an incentive to support production-derived quality – presumably through higher prices and margins – and that market power will allow rent capture. Although a policy goal of supporting agriculture by designing policies to ensure that producers receive the benefit of production-derived quality has been suggested by Hayes *et al.* (2004), the focus of this thesis will be on the potential role for policy to improve consumer and social welfare more generally.

Existing quality assurance schemes for production attributes such as the Geographic Indication system in the European Union and the collective marketing arrangements in the United States have largely sought to address the producer challenges outlined above. The European Commission states on its website that the goals of the program are to encourage



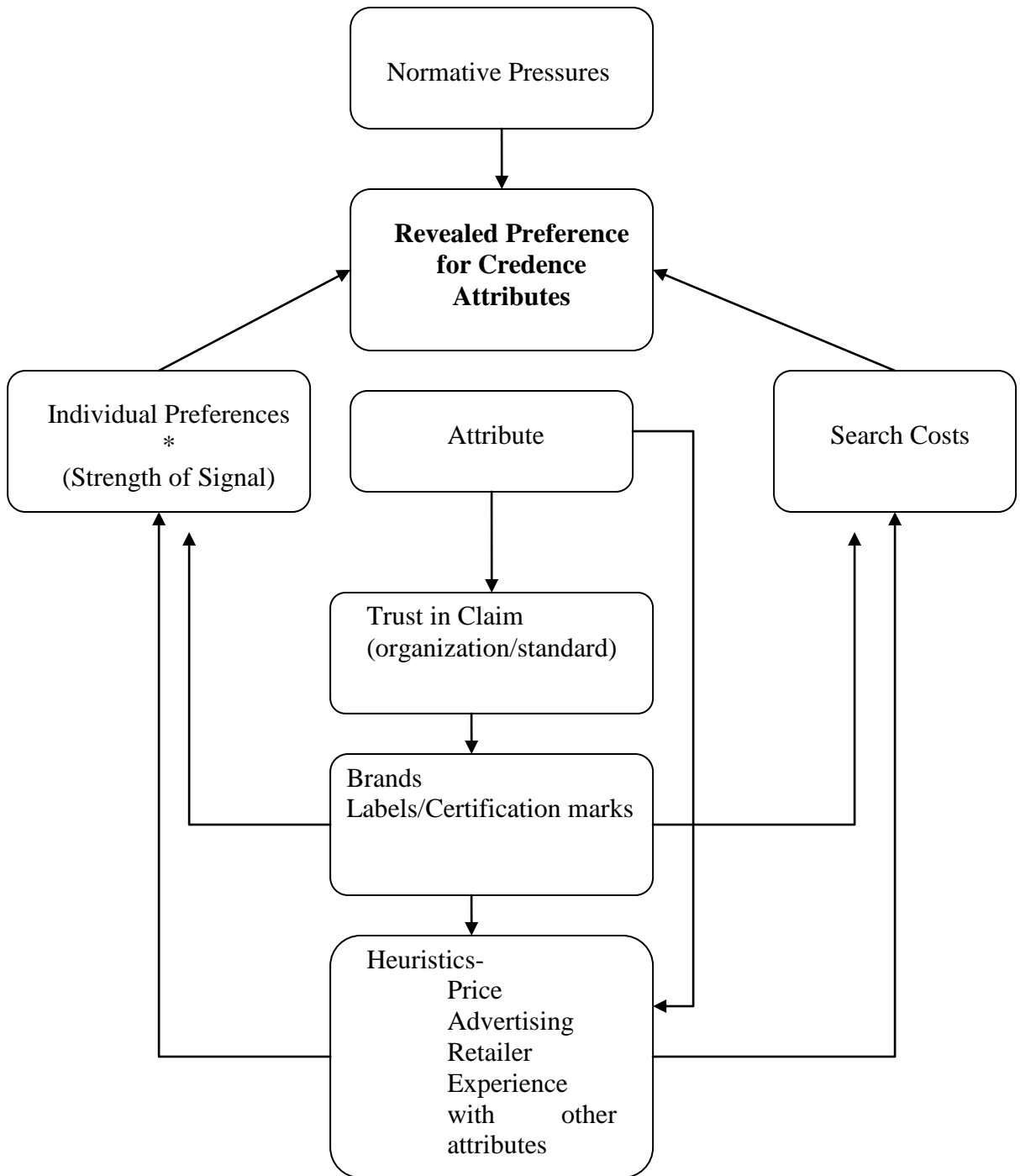
diverse agricultural production, protect names from misuse, and to help consumers by giving them information concerning the specific character of the products (European Commission, 2008). The background for the EU system, however, is largely focused on addressing a social political agenda that assists less advantageous agricultural regions. Whether quality assurance schemes can accomplish this goal remains unclear because of the mixed success reported in the current literature (Mattas and Tsakiridou, 2007).

It is evident that quality assurance systems have been explored on a practical level through policy initiatives in the EU and theoretically in the context of producer implications. The remainder of this literature review will focus on explaining the relevant background for an exploration of the role for government in quality assurance systems focusing on the consumer/firm interface.

### **2.3. Consumer Purchase Decision**

Preference for a good that maximizes a consumer's individual utility is only revealed imperfectly in a purchase decision. As outlined in Figure 2.1, a consumer's revealed preference for credence attributes is a combination of the normative pressures and discourse of society, the actual utility derived from the attribute as a function of the signal strength, minus the search costs imposed for the consumer to arrive at the purchase decision. Neoclassical micro-economics posits that consumers maximize their utility subject to a budget constraint. It also assumes independent consumers have perfect information that they can obtain without cost. The model outlined above, in contrast, includes normative pressures, or what one ought to do, and is guided by the psychology literature on decision theory, specifically Ajzen's (1991) Theory of Planned Behaviour. In it he emphasizes that behaviour is influenced by the impact of the outcome, the perceived

control, and normative pressures. From an economic perspective these can be seen respectively as expected utility, a budget constraint, and costs imposed as a result of cognitive dissonance by partaking in a decision/purchase that is at odds with what one ought to do or ought not to do. Ajzen's theory is important when considering how an organization's involvement in quality assurance would affect the market for production-derived quality as a respected organization would increase the normative pressure to value these attributes.



**Figure 2.1. Components of revealed utility for credence attributes**

Figure 2.1 provides a model where individual preference derived from the expected utility of consumption is a function of how strongly a particular attribute is signalled to the consumer. Unless credence or experience attributes are signalled, consumers will not be

aware of their presence. As will be discussed in a later section, the actual presence of an attribute may be communicated by either a trusted and credible claim or through a simplified heuristic such as price, advertising, or a retailer's reputation. The degree of credibility established by the trusted reputation of the organization assuring the attribute, combined with the rigour of the standard itself, both affect how strongly a certified label will signal the presence of a credence attribute. Search costs will be affected by both the strength and variability of signals possessed by products in the consumer's choice set. If the decision choice is complex, a consumer will more likely use a heuristic to determine the presence of the attribute rather than evaluating their trust in the organization or the credibility of the standard directly. A heuristic will lessen the search costs involved in making the purchase decision, and signal the presence of the attribute to the consumer. The intricacies of how an organization or standard becomes a trusted and credible signal, and when a heuristic would likely be used will be examined in the following sections on choice complexity and search costs. Figure 2.1 shows that the strength of the signal identifying a credence attribute affects the decision mechanism used by the consumer to make a purchase. Trust and credibility associated with a particular organization or standard will affect quality signal strength. Additionally, the relative signal strengths of products in the choice set affect consumer search costs.

#### **2.4. Search Costs**

Transaction cost economics emphasizes that price is not the only cost associated with a purchase; often search costs are involved before purchase. Stigler (1961) first shed light on costs incurred by a consumer when purchasing a good. Barzel (1982) further clarified that the expected benefit of purchasing a product is eroded by the effort required to

search for that product. Traditional microeconomic theory is based on the law of one price such that identical goods will obtain the same price. Search cost explains price heterogeneity, where the same good may sell for different prices in different stores if effort is required for consumers to obtain pricing information. Thus, the imperfect information about price, and subsequently the cost to achieve more perfect information, allows price heterogeneity for similar goods.

Applied to goods containing production-derived quality, a consumer's search costs entail not only determining price, but also determining the good's quality. Determining this quality thus relies upon the consumer interpreting the various signals that firms use to communicate quality that may include brands, price, advertising, labels, etc. The decision cost incurred in determining quality is affected by the strength of these signals that, in the case of labels or brands, is contingent upon the consumer belief in or understanding of the label claims.

Even if quality signals are credible, potentially high search costs can still exist. The price heterogeneity referred to above involved only one parameter that is easily compared and understood as it is measured numerically. Quality heterogeneity, even if the quality is credible, can entail high search costs because it consists of many parameters that are measured in different units – only some of which are numeric. Simplification of this range of quality via some form of standards is one way that consumer search costs can be reduced.

## **2.5. Standards**

Defined standards allow the classification of goods and services and serve various roles for consumers and producers. Most importantly, standards can reduce the transaction

costs incurred by consumers seeking to purchase goods with particular qualities. David (1987) typifies standards as broadly fitting into three categories, namely: minimum standards that prescribe minimum attribute levels for things such as safety and quality, reference standards that serve to define objects such as currencies, weights and measures, and finally compatibility standards that allow components from different manufacturers to interface effectively. Both minimum quality and reference standards are important when discussing food quality from production-derived attributes.

Minimum quality standards have traditionally been a way to reduce consumer confusion and more effectively signal product quality to consumers. Jones and Hudson (1996) argue that minimum standards truncate quality variance by eliminating those goods with quality lower than the minimum standard. The aggregate effect is that the lower quality variance results in reduced informational search costs for consumers that can potentially lead to welfare gains. Gardner (2003) further outlines the role that minimum quality standards play in the US and observes that they protect consumers from fraud, reward producers of high quality products and reduce the costs incurred by consumers to obtain information about a food's quality. The implementation of minimum quality standards does not necessarily imply that products will cluster around the minimum quality level. Indeed firms may differentiate their products based on the qualities in excess of a minimum standard in a variety of ways, as shown by Kirchhoff (2000) when she examines the provision of environmentally friendly practices. Minimum quality standards only serve to ensure that products below a certain standard are not considered the same as those products meeting the standard. One example of this type of standard is the soon-to-be-implemented Canadian National Standard for Organic Agriculture that will require all

products labelled as organic to be produced using methods specified in the standard. Firms may wish to use methods that go beyond the standard.

Reference standards serve to mitigate consumer transaction costs by reducing misunderstandings, clumsy explanations, and wasted time occurring with communication in the absence of common definitions. In the same way that a Canadian dollar has been defined to represent 100 cents, so too may a term like “pesticide free” wheat be collectively defined to facilitate easy communication. The definition of a standard like pesticide free would mean that all firms using the term pesticide free would be carrying out the same practices. Consumer search costs associated with determining what exactly pesticide free means could be reduced with a reference standard. Without a standard, firms could label wheat as pesticide free that used different practices such as: no pesticide when the crop was growing, no pesticides used at all, no detectable pesticide residue in the soil, or no pesticide used when the grain was stored. The process of defining a particular reference standard may arise through the natural evolution of language, collective action of private and/or public organizations, or public regulation.

Standards may be introduced by firms - individually or collectively – and/or by public organizations such as government. For qualities easily identified by the consumer, firms will have incentives to sort products into standardized lots congruent with Barzel’s (1982) orange example. Barzel explains how a grocer will have an incentive to sort oranges into standardized lots to prevent consumers from exerting effort that would detract from their willingness to pay. Consumers can determine the quality of goods in each standardized group and thus assign a value to the minimum standard based on the utility they derive from the quality level and reduced quality variability. A complete hierarchy of

quality standards is also known as grading. Both grades and minimum quality standards similarly reduce quality variance resulting in lower consumer search costs. While minimum quality standards truncate the quality distribution at the lower end, a grade limits the quality variance at both ends. Firms may be motivated to work collectively to establish standards to profit from an expanded market that is not impeded by search costs. Standards may also be implemented via public regulation to mitigate market failure and improve social welfare. Leland (1979) shows that when quality is unobservable, minimum quality standards can remedy the type of market failure highlighted by Akerlof (1970). Quality standards will only deliver the benefits outlined above when they are enforced.

For standards to be effective there must be processes in place to ensure that they are enforced. The orange example outlined above mostly involves characteristics easily determined by the consumer following consumption, such as the juiciness of the oranges. For credence goods, like the pesticide example, a standard implies there is a mechanism to ensure that the criteria represented by the standard were indeed followed. A standard pertaining to credence attributes thus signals some form of quality assurance that the product complies with the standard's defined criteria, whether this is a minimum standard or a reference standard. The standard becomes part of the means to prevent goods from being identified by the standardized claim without conforming to the standard's protocols when it is accompanied by appropriate monitoring and verification. In the absence of some form of quality assurance to ensure this conformity, adverse selection<sup>3</sup> will mean that only low quality products will be offered. Ultimately, this reduces the value of the standard once

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<sup>3</sup> Adverse selection means that only those firms producing product with quality lower than the standard will want to use it, for an illustration see Innes *et al.* (2007).



consumers begin to mistrust it<sup>4</sup>. The Canadian National Standard for Organic Agriculture and accompanying monitoring and enforcement is one example of how a defined national standard seeks to avoid consumer confusion and ensure that low (*i.e.* fake) quality products do not erode the value of the organic label (Weseen, 2006).

Reference and minimum quality standards can be seen to aid both the market collectively and firms individually. While the organic example improves the market efficiency in the long-term by reducing consumer confusion, the orange example may be a competitive strategy by the shopkeeper to differentiate her store from competitors- *i.e.* by enabling easier and quicker shopping. Creating universal reference standards like pesticide free wheat or minimum quality standards like the organic standard ultimately reduces consumer confusion and facilitates easy recognition of particular qualities through standardization. The collective benefit from reducing confusion that comes with a known and trusted standard creates a public asset that all producers meeting the criteria can use. In doing so, the standard eliminates the potential for a firm to obtain a competitive advantage from the standard's criteria as all firms meeting the standard are now producing similar quality goods.

In contrast, a private standard that is credible, unique to a firm, and well-known may provide an opportunity for a competitive advantage if it commands a price premium and the firm can control the quantity marketed under the standard. While a standard itself cannot be owned as intellectual property, it does permit a point of differentiation. Of course, any competitive advantage would have to outweigh the consumer search costs implicit with a standard used by only one firm. Though universal standards can reduce

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<sup>4</sup> Though an individual consumer may not know whether a specific credence attribute exists, actions like competitive reconnaissance, consumer watchdog groups, and media investigations could expose fraudulent activity over time and cause mistrust amongst consumers regarding a specific standard.

consumer confusion and search costs, they prevent producers from achieving a price above average cost for producing according to a recognized specification<sup>5</sup>. There is evidently a trade-off between the benefits of reduced confusion by a universal standard and the opportunity costs of creating a public good for firms already marketing similar type goods. Any system of standards will therefore have winners and losers. With production-derived attributes, universal standards may not be required to reduce confusion, just credible claims backed by a reputable agency. A lack of credibility for production-derived claims means that the uncertainty surrounding a product's quality will increase consumer search costs and make consumer choices more complex.

## **2.6. Choice Complexity**

Consider that there are similar goods with multiple claims having various levels of credibility. The cost in time and mental effort to discern which claim(s) to trust is similar to the cost entailed in physically finding the lowest price. In keeping with the spirit of Barzel (1982), the more complicated the purchase decision is because of competing claims, then the less a consumer will pay for a product containing particular production attributes. Uncertainty over the accuracy of product claims induced by multiple quality claims may not only increase search costs but may also delay or inhibit the purchase. Verbeke (2005) citing Cukierman (1980) outlines how uncertainty can cause consumers to seek more information and postpone the decision process. In cases of highly substitutable, low priced goods that are purchased repeatedly, however, Verbeke concludes that consumers are more likely not to purchase the product than to seek more information. His conclusions follow a consumer survey on a European beef traceability and labelling system. Applied to a

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<sup>5</sup> With free entry and exit

collection of product claims, his conclusions mean that instead of exerting effort to discover the trustworthiness of the potential products, consumers may simply not purchase the product and instead opt for the status quo. Though the specific effects are unclear, multiple production-derived claims with various levels of credibility are likely to reduce consumer willingness to pay and may even deter purchases entirely.

Much has been written on how choice complexity affects decision making (for a review see Thaler and Sunstein, 2008). Conventional economic theory generally assumes that consumer welfare increases with choice and that producers will continue to produce new varieties until the marginal benefit of doing so is eroded by the marginal cost of differentiation. In this paradigm, consumer search costs outlined above are not included and thus a paradigm including consumer transaction costs would arrive at an optimal number of products for both consumers and producers that is lower than the neoclassical approach.

Recent writings from Schwartz (2004) and Norwood (2006) challenge the conventional economic wisdom that more choice is welfare enhancing for consumers. Schwartz uses the psychology literature on decision choice to emphasize that too much choice can lead to decreased consumer utility because of the regret arising from a less than perfect choice and the impossibility of meeting expectations created by increased choice. More importantly, he reveals that too much choice may cause decision paralysis whereby no choice will be made in the presence of too many options. One study that Schwartz bases his conclusions on is by Iyengar and Lepper (2000) where consumers faced both a large and small variety of displayed jams. They found that thirty percent of consumers presented with the small variety of jams made a purchase, whereas only three percent of consumers presented with the large variety made a purchase. Thus the increased variety decreased the

likelihood of purchase. This is similar to the situation that Verbeke referred to earlier where excess choice, or complexity of choice, induces inaction. For most transactions, search costs are more likely to impede purchases rather than prevent them.

Faced with complex decisions, consumers must process information in an attempt to make a purchase decision. One tenet of transaction cost economics is that individuals are assumed to possess only bounded rationality and are only able to process a finite amount of information. To make a complex decision under uncertainty easier, consumers often rely on simplified criteria known as heuristics (Tversky and Kahneman, 1974). Verbeke (2005) refers to two theoretical models that explain how people make complex decisions; both are rooted in earlier work outlined by Slovic *et al.* (1977). First, Verbeke outlines Chaiken's (1980) heuristic systematic model that consists of two nodes; consumers first use the systematic node by synthesizing available information in a rational manner, followed by the heuristic node whereby consumers use simple decision rules or rules of thumb to arrive at a decision. Chaiken's model means that consumer preferences are only fully rational and reasoned when they are not complex.

Second, the Elaboration Likelihood Model of persuasion by Petty and Cacioppo (1986) suggests that individuals process information by both central and peripheral routes. Similar to Chaiken's model, the periphery route relates to low involvement decisions where external cues like a trustworthy information source permits simple inferences without resorting to a more complex process. The central route is thus used for systematic decisions where multiple criteria are assessed in a more complex and complete manner. Many external cues may be used as heuristics when consumers are faced with claims relating to

production attributes. External cues may be thought of as a signal to the consumer of the characteristic of a good.

## **2.7. Signalling**

Central to the discussion of decision-simplifying mechanisms is consumer use of cues or signals to determine the quality of a good prior to purchase. Production-derived attributes are often credence attributes that involve large information asymmetries; without some sort of signal consumers cannot determine the presence of these attributes. Accurately signalling product attributes – thereby turning credence attributes into search attributes – can allow consumers to purchase those attributes that maximize their utility; firms will subsequently be encouraged to produce these attributes.

The economics literature includes many examples of mechanisms for firms to signal specific experience and credence qualities to consumers. Warranties, money-back guarantees, insurance excesses, product standardization, investments in branding, advertising, sunk costs, and third party certification are all signalling approaches that firms may use (Riley, 2001). Specific theoretical contributions for signals as heuristics for experience attributes include the use of advertising (Nichols, 1998), price (Bagwell and Riorden, 1991) and reputation (Shapiro, 1982). While signalling is straightforward with repeat purchases of experience attributes where consumers discover the accuracy of the signal by experiencing the quality upon consumption, credence attributes are more difficult to accurately signal because consumers may never discover if the purchased attribute actually was present. The definition of a credence attribute implies that the cost to discover it is prohibitive for the individual purchaser, though investigations by consumer watchdog

groups, the media, and competitive espionage may reveal if a firm's credence signals are accurate.

The interesting element of signalling credence attributes is that it is always somewhat incomplete. Cole and Harris (2003) advance the idea that firms can essentially signal credence attributes most effectively through third party certification and reputation. They refer to McCluskey's (2000) game theoretic approach to organic certification that highlights how the difference in production costs, the profit in producing a high quality good, and the discount rate all affect the likelihood that firms will attempt to cheat the certification system by marketing low quality products as high quality products. A similar approach may be applied to both the certifier and auditor to determine if they will have sufficient incentives to accurately signal credence attributes. Reputation as a means to accurately signal credence attributes is similar to experience attributes. By investing significantly in sunk costs like advertising, infrastructure, and branding exercises based on accurately supplying credence attributes, a firm will naturally have an incentive to reduce the risk of eroding these assets by providing the credence attributes claimed. Retailers like Whole Foods<sup>6</sup> specializing in production-derived attributes have a much higher incentive to deliver on these attributes than retailers who have made no sunk investments in their reputations to provide these credence attributes. Thus both third party certification and reputation can provide accurate signals for credence attributes if firm incentives are sufficient and there exists a risk of exposing false claims.

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<sup>6</sup> Whole Foods Markets is the world's largest retailer of natural and organic foods with stores in North America and the United Kingdom. They have invested heavily into formulating production standards for a wide range of food and differentiate themselves based on the production derived quality of the food they sell. Their reputation that has accumulated through marketing and customer experiences depends on consumers believing that their products are indeed natural and organic.

Another example of how firms may signal credence attributes is modelled by Grolleau and Caswell (2006) who argue that product performance consistent with purveyor's claims relating to search and experience attributes leads to consumer confidence in additional credence claims made by those same sellers. There has been no empirical evidence to support their model and it is unclear whether accurate claims of search and experience attributes can mitigate information asymmetry in the case of production-derived attributes.

## **2.8. Trust and Credibility**

Signalling a credence attribute using a brand/label requires the consumer to trust that it accurately represents the good's characteristics. In the case of brands, credibility is established via the consumer's brand experience, leading to the accumulation of brand equity (Keller, 1993). Consumers must be both exposed to what the brand represents and have positive experiences to see it as a credible signal representing credence attributes, similar to the model of Grolleau and Caswell (2006). Relying on a quality assurance system to establish the credibility of credence claims similarly depends on consumer awareness of the underlying standards and consumer trust in the organization making the certification. A quality assurance system only becomes a credible mechanism to transform credence attributes into search attributes when it is adequately trusted. Establishing consumer trust in the credibility of a production claim can thus be seen as necessary for consumers to purchase production-derived attributes.

In general terms, Rousseau *et al.* (1998) define trust as "the intention to accept vulnerability based upon the behaviour of positive expectations of the intentions of or behaviour of another" (p. 395). In the case of production-derived credence attributes, trust

means that the consumer expects the purveyor of the product to accurately represent the product and accepts the vulnerability that they do not. Poortinga and Pidgeon (2003) review past research relating to the dimensionality of trust and distil that empirical studies generally reveal two key dimensions relating to trust in risk management. They highlight that both trustworthiness and competence are key in evaluating citizens' trust in institutions. Trustworthiness reflects emotional/affective beliefs about institutional behaviour and motivations, whereas competence represents perceptions pertaining to the ability of the organization to do its job. Trustworthiness includes such elements as openness, reliability, integrity, credibility, fairness, and caring. Metlay (1999), in his study on the US Department of Energy, finds that all of these elements reveal one general factor that he terms "affective elements" that relate to how people perceive the institution. Not all research, however, arrives at the same two-dimensional view of trust. Frewer *et al.* (1996), for example, conclude that trust in information sources for food related hazards is linked to perceptions of accuracy, knowledge and concern with public welfare. Though the empirical studies do not always produce two distinct factors congruent with trustworthiness and competence, the underlying constructs appear to be similar and support the idea that individuals trust organizations whose motivations appear most similar to their own and those organizations whose capacities appear most competent.

Trust related to specific organizations as information providers on food related risks has been examined in the literature. In a UK study, Frewer *et al.* (1996) examine consumer trust in different organizations in response to several food-related risks including pesticide residue. Their study evaluates distrust in supermarkets compared to the food industry for information related to pesticide residues and genetic engineering, among others. They find



that respondents have significantly more distrust in supermarkets as an information source than in the food industry, though they do not define food industry. The survey was undertaken in the United Kingdom in 1995 and thus may not be directly applicable to Canada today. They conclude that industry was only moderately trusted as they are expected to be more apt to provide information to protect their own interests than out of concern for public welfare. The ability for government to be a trusted organization to provide information – i.e. signal credence attributes – thus partly depends upon how closely aligned the motivations of governments are with the public welfare.

Another study examining who the public trusts in relation to genetically modified food was carried out in the US by Lang and Hallman (2005). Using a four dimensional trust construct they find that consumer and environmental advocacy organizations obtain high trust scores ahead of farmers, the federal government, grocery stores, and industry respectively. Recent research commissioned by Agriculture and Agri-food Canada (Ipsos Reid, 2006) suggests that Canadians place a high degree of trust in the federal government as an information source. Anecdotally, this would be consistent with the characterization of Canadians' holding the general view that the government is a benevolent organization whose interests closely align with its citizens.

Consumers' trust in organizations is important as it is directly related to the credibility associated with the organization's activities. The credibility of credence claims resulting from a quality assurance system is thus established by the creation of trust in the system itself and trust in the organization behind the system. The credibility associated with an information source also has significant impacts on an individual's decision process. A highly credible source can act as an information cue or heuristic to simplify a decision

process (Trumbo and McComas, 2003). Thus, the involvement of a more credible and trusted institution – government instead of private – can simplify the decision process for consumers who possess bounded rationality by avoiding potential decision paralysis or sorting costs. The USDA Process Verified program is one such example where a seal from a trusted organization signals to consumers that firms have followed their own private production standards. Trust, or rather the degree of trust that consumers have in organizations and their processes, is critical for a quality assurance system to effectively signal producer-derived attributes; consumers need to trust product/brand claims to be willing to pay for the respective attributes and more trusted institutions can mitigate consumer search costs.

## **2.9. The Role for Government**

Approaching policy challenges – i.e. what is the role for government in quality assurance systems – from an economic perspective inevitably raises the questions of what market failures are occurring and subsequently the most efficient solutions to address them. Cole and Harris (2003) outline the typical causes of market failure including public goods, externalities, imperfect competition, and asymmetric information. The economic rationale to involve government in a quality assurance system for credence attributes relates to both imperfect competition and asymmetric information. Imperfect competition allows firms to charge prices higher than average cost that can reduce social welfare. Asymmetric information means that consumers are not able to determine the exact characteristics of a good, resulting in a sub-optimal consumption bundle that may reduce or eliminate the market for certain goods whose quality is difficult to ascertain.

Government involvement in the market for credence attributes may reduce the impacts of adverse selection by reducing information asymmetries. Zago and Pick (2004), for example, discuss the role for government in relation to geographic indications, while Harris and Cole (2003) similarly discuss how government can aid the market for eco-labelled goods by providing an accurate measurement of environmental friendliness. Market intervention by government to correct distortions caused by asymmetric information can improve social welfare if the costs imposed are outweighed by benefits achieved.

Credence attributes, and the difficulty involved in determining their presence, can create large monitoring costs for firms in the supply chain. Conflicting incentives for different members of the supply chain may lead a firm to misrepresent the characteristics of a credence good to another firm. For example, a producer will have an incentive to market regular produce as organic produce to reduce the costs if they have little fear of being caught. For a firm to ensure goods they purchase actually contain the credence attributes they purport to necessitates monitoring the actions of a supplying firm to ensure accuracy. Credence attributes, by definition, are expensive to monitor/identify and in the case of production attributes necessitate a process-based quality assurance system. Transaction cost economics (Williamson, 1981) suggests that as the monitoring costs to assure quality increase, firms are more likely to increase their coordination so that incentives for each firm are more congruent.

As firms increase their coordination to the point of integration, the number of firms in a given market may decline to the point where the remaining firms will possess a degree of market power. Ménard and Valceschini (2005) discuss the relevance of transaction cost

economics to the emerging organizational structures in European supply chains. Transaction costs affect the organization of supply chains and this in turn can affect the ability of various players to capture rents. Vetter and Karantininis (2002) examine the implications of assuring credence attributes on the transaction costs of the firms involved. They note that the moral hazard implicit in credence attributes favours higher monitoring costs and thus a propensity for vertical integration when credence attributes are assured. Importantly, they identify that in cases where public certification of credence attributes is more trustworthy, social welfare may improve if public involvement mitigates the need for vertical integration. The authors highlight the relationship between transaction costs, vertical integration, society's trust in private versus public certification and the resulting social welfare. Extending their conclusions to production-derived quality, government may have a role in the market for production attributes to mitigate the effects of imperfect competition caused by high transaction costs.

Understanding the appropriate role for government in the market for credence attributes hinges not only on providing effective quality signals and mitigating imperfect competition, but also includes considering the ancillary effects on normative social pressures and consumer search costs. Previously, the potential for government involvement in a quality assurance system for producer-derived attributes has been discussed in relation to market efficiency to overcome problems of information asymmetry, sorting costs, and equity issues surrounding the distribution of rents. An additional role that governments play is in affecting the public discourse surrounding food quality and safety. Morris and Young (2000) cite Marsden and Arce (1995) and Marsden *et al.* (1997) when they conceptualize food quality as,

a fluid and socially constructed concept which is constantly created and recreated through the discourses and actions of key actors with in the agro-food system.(p. 104)

The European Union implemented mandatory organic standards in 1991, the U.S. did the same in 2002. Canada is currently phasing in a mandatory national organic standard to be fully implemented by late 2008. The definition of food quality above suggests that the relatively slow response of the Canadian Government to implement mandatory standards to contribute to the integrity of organic production could be affecting the way in which consumers conceptualize quality. Current government policy and communication touts all Canadian food as being of high quality because of regulations pertaining to food safety.<sup>7</sup> While food safety is endorsed as a quality by government, their apparent reluctance regarding production attributes may not encourage consumers to think of quality as including the way in which the food was produced.

Public discourse leads to a collective normative belief about what one ought or ought not to do/think. Recall from Figure 1 that these normative beliefs affect a consumer's revealed preference for a production-derived credence attribute. Government involvement in a quality assurance scheme can be viewed as an endorsement of producer-derived quality – an endorsement that presumably positively influences the normative view of production-derived quality given the high levels of trust outlined previously. Ajzen's model (1991) predicts that government involvement has the potential to affect consumers not only by mitigating problems caused by information asymmetry and imperfect competition but also

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<sup>7</sup> Government actions not only influence societal discourse, but also are influenced by interest groups and society in general. For example, interest groups such as pesticide companies may wish to discourage alternative production methods. Deciphering which action most drives the public discourse around food quality is difficult.

more broadly by affecting the demand for production attributes via influencing normative beliefs.

Potential mechanisms to alleviate credibility and complexity problems from a government perspective vary in degree of market interference. Given that labelling laws currently dictate that all claims must be accurate, claims lacking credibility could theoretically be eliminated by merely enforcing current laws. Without undertaking any new approaches, the simplest way to address credibility issues may be to increase enforcement activities to the point where the public begins to trust that existing laws are being followed. Further involvement could include defining standards, supporting private or third party certification via information campaigns that clarify a system of set standards, certification of products to a standard, accrediting certifiers, and finally undertaking the whole process from information dissemination to product certification. Costs - both opportunity and administrative - increase in proportion to the extent of government involvement. Benefits could also increase accordingly if consumers see government as more trusted than other market players, as previous research has suggested. Meat grading provides an example where government is heavily involved in the delivery of quality assurance.

#### **2.10. Grades: A Precedence of Government Involvement**

Formalized government grading systems exist for many agricultural products in both Canada and US. This provides an example of government involvement to mitigate information asymmetry and make it easier for consumers to identify quality in food markets. Dating to the 1920s, grading systems for beef and pork carcasses evolved to “be suitable as a basis of settlement to the producer and as a means of indicating meat quality to the consumer” (Maybee, 1955: p.6). In other words they mitigated the problem of

information asymmetry for meat quality – experience attributes in particular – and provided a consistent signal to make quality identification easier for consumer.

The rationale for government involvement in meat grading during the early 20<sup>th</sup> century is unclear. Distrust of meat packing companies by both producers and consumers referred to by Kinsman *et al.* (1994) may be part of the reason. General industry disarray, the challenges in exporting inconsistent quality bacon, and large number of processing plants referred to by the Maybee (1955) might also have led to government involvement to overcome collective action problems. Both sources frame the involvement of government arising at the bequest of producers or industry coalitions consisting of producers, processors, and retail/institutional customers. Government involvement arose from the demands of those involved for a coordinating body capable of bridging the demands of multiple stakeholders.

There are two important differences between the existing meat grading system and production-derived quality discussed in this thesis is the type of quality characteristics signaled. First, the quality characteristics signaled by the grading system were widely desired, *e.g.* tender beef, whereas interest in production-derived food quality is more limited and arguably not universal. Not everyone will value pesticide-free production for example. Second, given the revelation by Ferrier and Lamb (2007) that the grading system has effectively commoditized the meat trade and limited the provision of quality elements not included in the grading system, promoting the expansion of the federal grading systems to include production-derived quality seems counter to *raison d’etre* of production-derived food quality. It is clear however that government involvement in grading has created a simplified, trusted, and uniform quality signal for meat quality. In many ways, this

responds to the challenges outlined in this chapter, though defining and fixing a hierarchy of production-derived food quality is neither necessary nor desired. Thus, the simplicity that comes with grade induced commoditization is desired, but not at the expense of quality exclusivity for those attributes that will inevitably be excluded from a hierarchical grading systems.

## **2.11. Conclusions**

Government involvement in the market for production-derived attributes has the potential to influence three key areas affecting revealed consumer demand for these attributes, namely: normative social pressures, consumer search costs, and the strength of signals for these attributes. Stemming from these areas are two focal points where market inefficiencies may arise with production-derived attributes. The appropriate role for a particular organization to assure production-derived quality in Canada from an economic perspective must be evaluated in reference to these concerns. Both credibility and complexity emerge as focal points for potential market enhancement – defined as higher prices or a greater aggregate volume of production attributes sold.

Credibility relates to consumers' beliefs in the accuracy of attribute signalling exhibited through labels, point of purchase material, advertising claims and brand promise. If doubt exists as to whether a product actually contains the production attributes that it purports, then logically those who do not view the signal as credible will not be willing to pay for the respective attribute. Complexity involves both credibility of the product claims and the content of the claims themselves. Purchase decisions are made more complex if the choice set contains many options, there are small differences between products, and if information is incomplete or difficult to understand. The consumer's decision is thus



confounded if the credibility of production attributes is questionable. In addition, multiple standards created by multiple different actors make the purchase decision difficult.

Multiple mechanisms exist for a firm to mitigate both the credibility and complexity challenges. Branding and advertising that create a reputation, and third party certification all serve as mechanisms for private firms to signal production attributes more clearly. Individual firms have an incentive to improve the credibility of their products and also make the consumer's purchase decision as simple as possible as both will result in a higher demand for the firm's product. This can be achieved by catering to the simplified heuristic decision-making process of the consumer via a strong brand or reputation.

The challenge from a social perspective is that firms' motivations to differentiate their products via production attributes may confound the consumer with a variety of attribute bundles that are all just slightly different. The utility gained by consumers from a large variety of standards may also outweigh the disutility caused by choice complexity if all standards were equally credible. Creating universal reference or minimum quality standards used across firms and products can reduce consumer confusion although it hinders the product differentiation desired by firms. Thus potential gains from a social perspective may be reached via some form of coordination that allows for a variety of standards but ensures that they are consistently credible.

The credibility of a quality claim is dependent upon the credibility of both the quality assurance system and the organization making the claim. The amount of trust that people put in a particular organization is at least partially contingent on the type of organization it is. In Canada, where citizens generally have a benevolent and trusting view of government, it is reasonable to hypothesize that government may have a role in

coordinating quality assurance for production-derived attributes. Potential mechanisms to alleviate credibility and complexity problems from a government perspective vary in degree of market interference.

Assessing consumer trust in current labelling regimes and government seems a necessary point of departure. Thus the empirical portions of this thesis seek to determine if market impediments for production attributes exist because of either credibility or complexity issues and what role government can best play to improve market efficiency. Although issues such as market concentration, support of agriculture, and affecting the normative social value of production-derived attributes more generally have all been suggested as a consequence of government involvement in similar schemes, they will not be addressed by the empirical portion of this project.

The following section will explore the current market conditions for production-derived attributes to more fully understand how the concepts highlighted in the preceding review of the literature impact consumer choices. It will focus on the mechanisms that firms use to signal production-derived attributes, the importance of quality assurance systems, and the role for different organizations in the market for these attributes.

### *3. EXPLORING CURRENT MARKET CONDITIONS FOR PRODUCTION-DERIVED ATTRIBUTES -INTERVIEWS WITH INDUSTRY REPRESENTATIVES*

#### **3.1. Introduction**

This chapter reports on a series of semi-structured interviews with industry representatives in Canada and the US that were undertaken to better understand how consumers interpret signals identifying production attributes. The analysis of industry interviews assesses how prevalent the concepts explored in the previous chapter are in the current market. It reveals how firms interpret and describe the factors making a firm credible for quality assurance so as to inform the survey design in the following chapter.

Throughout the interviews it was evident that farming methods that differ from conventional methods are inevitably compared to the term organic - a word that has come to represent a certain set of agricultural practices. Whereas the term organic was at one time defined in reference to conventional foods, so too is the current evolution of farming methods frequently defined in reference to organic. One could take many points of departure from this, but for this thesis it suffices to note that an agreed upon standard has implications beyond quality assurance strategies and can have significant impacts on the perceptions of alternative farming methods.

This chapter explores the factors that drive and inhibit the standardization of different forms of alternative farming methods revealed through interviews with industry representatives currently selling, certifying, and distributing products from these methods. Firstly it elucidates the extent that both credibility and complexity impact, or have the potential to impact, the market for production attributes. Secondly, the interviews gauge

both the nature of what makes a firm's signal credible to consumers – the trustworthiness of it – and consequently participants' interpretation of how credible different types of organizations are – i.e. private, third-party, and government. The interviews were meant to be qualitative in nature, and thus the themes are more important than, for example, how the respondents ranked the credibility of particular organizational types.

### **3.2. Methods**

Semi-structured interviews were conducted with industry representatives to explore the concepts examined in the literature review and gain a more complete understanding of current marketplace conditions for production-derived attributes. Format and technique for the interviews and analysis were based on the work by Arksey and Knight (1999). A semi-structured interview format allowed consistency in questions across interviewees. This format assisted analysis and permitted follow-up questions to explore participants' responses more thoroughly.

Participants were selected from internet searches based on their employment with firms that are currently engaged in the market for production-derived attributes apart from organic. Firms dealing only with organic methods were avoided so as to explore the market environment for production-derived quality in the absence of legislated standards, certification, and labelling. The sample included four agricultural producers, two certifiers and a distributor. Three participants were from Canada and four were from the United States. A total of eleven potential respondents were contacted though only seven agreed to participate; the others did not respond to repeated requests. Participants represented firms ranging in product, size and scope; a complete description of the participants can be found in Appendix A. Although the focus of this thesis is on the role for government in Canadian

quality assurance, interview candidates were both American and Canadian. This was done for two reasons: the market for production attributes is more prevalent and further developed in the US, and factors affecting signalling and consumers are presumed to be similar in each country.

The open ended questions used for the interviews were devised from the themes explored in the literature review and focused on the process of communicating production-derived attributes and the credibility of quality assurance undertaken by different types of organizations. Questions were adapted slightly to suit the type of firm that a participant represented (i.e. producer, certifier, or distributor). A sample list of questions can be found in Appendix B.

Prior to contacting participants, approval from the University of Saskatchewan Behavioural Research Ethics Board was obtained on March 11, 2008. Participants were first contacted by e-mail and invited to participate in the research study. The questions for the interview and an information sheet outlining their rights as a participant were attached to the e-mail. Interviews took between 20 and 40 minutes and were carried out over the telephone, with the exception of Melanie Boldt from Pine View Farms whom the researcher was able to visit personally. All interviews were recorded electronically and subsequently transcribed.

Following participants' approval of the written transcripts, interviews were analyzed and coded by the researcher to identify common themes. Themes reflected the focus areas of communication and credibility and were selected based upon the literature review and common themes that arose across the interviews. The major themes are discussed in the subsequent pages and included, brand, reputation, desire for information, standard based

confusion, and proprietary standards, to name a few. One hundred forty one passages of interest on the written transcripts were highlighted, assigned a theme and inputted into an Excel spreadsheet to assist in analysis.

### **3.3. Motivations Driving Demand for Alternative Farming Methods**

Consumer utility attained from the presence of production-derived attributes ultimately motivates firms to supply these attributes. While the focus of the interviews was not on the characteristics of consumers interested in production-derived attributes *per se*, several consistent themes emerged that frame the discussion of quality assurance generally. Uniqueness, desire for information, and health were all key interests driving the demand for products from alternative farming methods.

First, consumer interest in alternative production methods seemed to be primarily motivated by the uniqueness and prestige associated with these products. This concept was referred to by four of seven interviewees and suggests that both consumers and retailers place more value in certification and production-derived attributes because they are chic or unique. Christoph Weder from Prairie Heritage Beef, that produces naturally raised beef, expressed this desire to provide a luxury product by saying, “we want to be a Cadillac program”. The Cadillac brand represents both a chic and elite status limited to those who can afford it. In line with this idea of offering a cutting edge product, he outlined how the focus of their program has changed over time to reflect changing consumer trends. In the past they promoted their meat as being free of antibiotics or hormones whereas now they highlight attributes like environmental stewardship and fair trade in agriculture. For Weder, the changes ensured that their product was unique and met current consumer tastes.

Similarly, Rod MacRae of Local Food Plus in Toronto, a non-profit organization that certifies local and sustainable agriculture, identified that public institutions like universities value the “cachet” that “adds value to the student experience” by reinforcing that students are attending an innovative institution. Clearly institutions also want to be seen as being consistent with current trends and differentiated from their competitors. From the retailer’s perspective this desire to be different was reflected in the desire for unique point of sale materials to communicate what sustainability represents. Roberta Anderson from Food Alliance, a non-profit organization from Oregon certifying sustainability, stressed how retailers wanted information that they could customize rather than generic material that their competitors would also use. For all four of the interviewees that touched on this theme, certifying alternative farming methods was an important component of uniqueness and appearing chic.

The second demand driver for alternative farming methods was less prevalent than the concept of uniqueness. Health consciousness figures prominently in the current discourse surrounding food but was not focused on in the interviews. Tracy Miedema from Stahlbush Island Farms, a natural and organic farm and processor, notably described their customers as, “owners of their health ... that take control of their health through the foods they eat”. Evidently, concern about health is linked to but was not shown to be a major demand driver of foods from alternative farming methods in this sample.

Lastly, consumer interest in knowing more about their food was a common characteristic that supported efforts to produce food using alternative farming methods. This theme coded five times over the interviews and was mentioned by four of seven participants. John Raiche from United Natural Foods, the largest wholesaler of natural and

organic foods in the United States, put it succinctly by saying, “they want to know about where their food comes from and how it is produced”. This same sentiment was similarly expressed by the other three respondents. Noticeably, participants acknowledged that obtaining this information was not costless and that consumers interested in knowing more about how their food was produced were willing to make extra efforts to obtain this information. For producers and certifiers selling to customers far away this meant that they would need to access a website or be able to contact them via telephone, while for producers selling primarily into the local market this quite often meant visiting the farm.

Efforts required to obtain information about a product from alternative farming methods or to obtain the product itself can be considered akin to consumer search costs outlined in the literature review. The theme of search costs coded eight times over all of the interviews and was mentioned by four participants. Melanie Boldt from Pine View Farms, a farm marketing natural meat in the greater Saskatoon area, said that coming to the farm is for those consumers who are “prepared to take the extra step.” From this statement and the frequency that search costs coded, it is evident that consumers must care enough – i.e. be willing to expend enough energy searching for the product and information about it – to purchase food from alternative farming methods. While some consumers may value the trip to the farm as part of the production-derived quality experience, the costs involved with frequent trips required to purchase a staple food would likely overwhelm this benefit over time. Given the theoretical framework outlined in the first chapter, the prevalence of search costs suggests that more consumers would be interested in purchasing this type of food if the search costs were reduced.



The motivations for consumers to be interested in alternative farming methods are important as they have implications for the long-term costs and benefits of universal standards and certification in general. This will be discussed in more detail at the end of the chapter. Given that the *raison d'être* for alternative agricultural practices for consumers, retailers, and certifiers can be encapsulated by the themes uniqueness, health and desire for information, the next question revolves around motivations for supply chain members to endorse quality assurance programs for such attributes.

### **3.4. Drivers of Quality Assurance, Certification and Standards**

Consistent with expectations, the forces fostering an organized system of quality assurance based on elements of standards, certification, and coordination follow from the those influencing consumer interest in food from alternative farming methods. Competitive motivations of firms wishing to be seen as innovative and chic were one aspect that supported quality assurance initiatives in the interviews. Broader market level concerns to mitigate credibility problems<sup>8</sup> and prohibitive search costs were also important in driving elements of quality assurance. Whereas firms are driven to satisfy consumer demand for unique, healthy and informed food choices they turn to quality assurance systems to enable them to deliver these attributes while concurrently positioning themselves as market leaders.

Quality assurance may be viewed in a hierarchical framework where standards and protocols lead to certification and finally to universal standards within countries and harmonization across countries. In other words, delivering attributes to consumers means that firms must first define these attributes internally, provide some proof they actually

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<sup>8</sup> It is unclear if consumers who value production-derived quality for their chic/unique qualities would be concerned if the attributes were not actually present.

exist, and then align them with similar practices of other firms to buttress the meaningfulness of the definition in the minds of consumers. While this seemingly linear process is logical, the motivation to standardize is also likely to be negatively influenced by the desire of firms to uphold a chic image and maintain a unique competitive advantage over other firms. Put simply, quality assurance undertaken by firms must balance consumer desires for uniqueness while maintaining sufficient credibility to maintain consumer confidence.

It was evident throughout the interviews that firms will undertake various forms of quality assurance that advance their interests. First, firms may see their own system of quality assurance as a competitive advantage if it is superior to existing external programs. Raiche from United Natural Foods refers to one supplier who said, “I’m going to go out and develop my own logo because my requirements are more stringent than TransFair<sup>9</sup>”. Second, producers may be driven to keep up with the market as Raiche stated, “retailers are telling us that it is very important to understand how products are produced and what manufacturers stand for, because that does impact what brands they are putting on their shelves”. Third, firms may also be driven by the desire to stay ahead of consumer demand when they see a rising desire for more credibility in the future (Food Alliance, Prairie Heritage Beef). Weder of Prairie Heritage Beef noted specifically that third party certification was a competitive advantage in ensuring access to retail marketing channels, a theme echoed by Miedema (Stahlbush Island Farms) and Raiche (United Natural Foods). The firms interviewed generally referred to quality assurance systems as minimum quality levels upon which to add their own specific quality attributes, providing further evidence of their desire to differentiate their products from those of their competitors.

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<sup>9</sup> TransFair is an international certifier of fairly traded products

The motivations for firms to adopt quality assurance mechanisms that were exhibited in the interviews are consistent with those revealed in the literature review. Proactive implementation to stave off government regulation to prevent negative externalities associated with unsafe food as outlined by Hobbs *et al.* (2002), however, was not evident. It is plausible that the negative externalities arising from incredible labels for production-derived quality are not of great concern to government and market actors do not see a strong likelihood of government intervention in these markets in the near future. MacRae (Local Food Plus) lent support to this idea when he emphasized that governments are not interested in such regulation if they can collaborate with industry partners like non-profit organizations that have similar goals. It could also be that firms could gain a competitive advantage by pre-empting regulation and establishing their own standards. McCluskey (2006) shows in her examination of the increasing prevalence of public/private cooperation for food safety and quality assurance systems that firms may gain a competitive advantage in this situation. She shows that firms may obtain a competitive advantage by pre-empting regulation and establishing their own standards. It is not surprising that firms implement varying degrees of quality assurance that advance their competitive position in the marketplace, but it is notable that this competitive positioning includes mitigating search costs for their consumers.

Heuristics that serve to simplify the consumer's purchase decision were identified through the industry interviews as one way that certification seals improve the communication of production attributes. Anderson of Food Alliance confirmed this hypothesis while outlining the benefits of Food Alliance certification. She said that the, "consumer is looking for cues they have made a good choice" and that "a certification seal

accomplishes that.” Anderson went on to say that consumers do not understand the differences between competing products, and implied that a certification seal, even if they do not know what is behind it, will serve as a quality signal. Research by Sawyer *et al.* (2007) on consumer preferences for organic standards similarly revealed that consumers’ preferences can differ between standards and the criteria that compose them. They found that consumers often preferred their domestic standard but rated the criteria from another country’s standard higher.

For Anderson, certification under a harmonized standard provided a benefit to firms because it simplified the communication of a quality attribute. It is evident from her comments that a certification seal may not be communicating a quality attribute specifically but may be seen as communicating quality or values more generally. It may not be necessary that consumers understand what a certification seal represents for it to signal quality if the seal is promoted as broadly representing high quality or their personal values. Either interpretation can be seen as way to mitigate the search cost for a consumer to purchase a food with production-derived quality.

Certification that involved a universal standard was also a means to reduce the transaction costs for a food distributor. Raiche from United Natural Foods showed his preference for harmonization and certification by saying, "we don't communicate natural, there is no definition, no certification, and no watchdogs." He went on to say that, “organic is pretty easy, there's a certification process, it's pretty black and white.” Thus for Raiche, and United Natural Foods in their role as a food distributor handling approximately 40 000 products, there was great value in the simplicity of a universal standard with certification. Whereas certification reduced search costs for consumers in the minds of the certification

agency, it seemed to reduce the costs of complexity and risk of products of dubious quality in the mind of a distributor.

The interviews showed that different levels of quality assurance have different motivators. Minimum quality standards emerged as the basis for product differentiation, whether they were internally generated or obtained from an external source. Universal minimum quality standards – used across products and firms – were shown to be an additional benefit to firms seeking credibility and looking to further differentiate themselves from their competitors who do not produce to these standards. It is reasonable to propose that firms with credible and longstanding reputations would have less need for certification to communicate credence attributes, though this was not evident in the limited sample of participants. Lastly, evidence in the interviews supported the simplifying effect of certification to mitigate transaction costs associated with consumer search costs and food distribution. Certification was thus a tool to reduce consumer and distributor transaction costs.

### **3.5. Communication Tools**

The credence nature of quality attributes originating from on-farm production methods means that firms must communicate the presence of these attributes to reduce the information asymmetry between producers and consumers. Whereas the discussion has previously focussed on the motivations for firms to adopt quality assurance mechanisms from the point of view of competitive advantage, this section will concentrate on the broader concept of communicating alternative farming methods to consumers.

Information present at the point of purchase was clearly the most important conduit to communicate production attributes highlighted by respondents. The use of certification

marks, while key to mitigating information asymmetry in an economic framework, was mentioned by only three participants (Stahlbush Island Farms, Local Food Plus, and Shepherds Grain). Packaging, labels, and point of sale materials were more common responses and were included in the two most important communication mechanisms by six of seven respondents. Point of sale materials were preferred by participants but can be used in limited situations; many retailers limit or do not allow point of sale material in their stores, and opportunities for food service placement are limited (Stahlbush Island Farms, Pine Valley Farms, Food Alliance, Shepherds Grain). When certification seals are present at the point of purchase, Local Food Plus highlighted their efforts to train retail personnel about the production methods relevant to the certification seals used on the products they sell. Certification marks arising from quality assurance mechanisms are one way to signal credence qualities, though the interviews made it evident that it is one of a suite of options that firms use.

Presumably any packaging or labelling will include the brand of the company marketing it and a symbol of the certification if it is used. While some production methods may be described on the packaging, space limitations dictate that many cannot be described. Synthesizing all of the participants' responses reveals that the primary moment of communication is at the point of purchase. Packaging and labels, complemented by brands and certification seals, are the most important communication tools for firms during the product/consumer interface. Underlying the ability of packaging and labels to communicate production derived quality is the use of brands and certification seals as quality cues that can signal reputation and past experiences. The notion that brands and

certification seals communicate production-derived attributes is perhaps implied when participants state the importance of packages and labels<sup>10</sup>.

Advertising and public relations were also mentioned as important in communicating alternative production methods. Any promotion must be understood in the context that it may not communicate that a particular chicken breast has come from a naturally raised chicken, for example, but that a particular brand or certification represents a certain set of production methods or values. Thus certification or branding is required to cue the consumer to recall past promotion, but firms may not see these as communication tools in the same way that economists see them as signals to communicate quality. Similar to the importance of packaging and labelling, brands and certification seals seem implicit when firms discuss the importance of advertising and public relations.

Building a firm's brand or image was evident throughout the interviews and was coded ten times from five participants. MacRae said that Local Food Plus is "putting a lot more energy into brand recognition." Both Food Alliance and Stahlbush Island Farms referred to the need for a certification agency – and other firms using the certification – to align with the values and reputation of a firm using a particular certification. Miedema of Stahlbush Island Farms referred to it as co-branding with the certification agency. Anderson of Food Alliance mentioned a similar co-branding effect between firms using the same certification. She said it was important for other firms using the certification to have good reputations and similar values. Clearly a firm would want to ensure that a certification mark added credibility to their products and thus the challenges of free-riding and adverse selection intrinsic to co-branding are important in this regard (Innes *et al.* 2007).

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<sup>10</sup> Kosher or Halal foods are one example of symbols serving as heuristics for different production and processing methods. In many ways, the credibility issues examined throughout this thesis are analogous to those faced by Kosher and Halal foods.

Certification seals may be seen as co-brands that are used by many firms. As such they can represent not only the actual production methods but also the firm's values.

In the interviews it was evident that brand image can be important in determining the credibility of product claims. Raiche of United Natural Foods implied that firms that are perceived to have values congruent with their customers are better able to communicate production-derived claims. He said that communicating a company's values would be more effective than establishing a certification if the firm was promoting unique production methods. For Raiche the main value to certification was when multiple firms used the same certification. This can be interpreted as a buttressing effect referred to earlier, where a particular standard or certification gains credibility in proportion with the amount of people using the certification in a process akin to how Keller (1993) sees the accumulation of brand equity. Thus, while a certification seal or certifying organization can be seen as a brand itself, the interviews highlighted that a brand communicating a company's values can also accurately signal the presence of production-derived attributes.

Use of the Internet as a direct communication link between consumers and other members of the agri-food supply chain including producers, food manufacturers and food processors was pervasive across the interviews and was mentioned by all participants. It was consistently referred to as the third or fourth mechanism for communication and was seen as a means to provide more information to the most interested consumers. Websites were referred to as places where consumers, who had likely already purchased the products, could go to find out more information about the goals, protocols, and values of the company producing the food. Raiche of United Natural Foods viewed using the Internet for a direct communication tool as representative of the broader trend of food manufacturers



increasingly communicating directly with consumers rather than through members of the supply chain that handle the goods. The increasing ability for consumers to easily obtain information from food manufacturers and contact them directly is an important trend as it makes it easier for them to be more open and accountable – an important factor in determining credibility in the mind of the consumer.

### **3.6. Credibility**

*“Consumer information systems generally in this country are a mess.”*  
MacRae, Local Food Plus speaking about the Canadian market

In the model outlined in the literature review, the perceived quality of a good is hypothesized to be a function of the belief consumers have in the presence of credence attributes. If consumers do not believe a claim of production-derived quality they will not buy the product and the demand for such a product will fall. It was further hypothesized that many competing claims in the absence of a consistent means of quality assurance would reduce the credibility of the claims. Participants’ comments suggest that both of these credibility impacts are present in the market for production-derived quality.

One area exhibiting credibility erosion as a result of many similar claims was sustainability. The concept of sustainability usually encompasses three facets – economic, social, and environmental. Raiche of United Natural Foods said, “sustainability claims are being made everywhere, though they have varying degrees of accuracy.” He questioned the usefulness of the term and had little faith in the current certifications. Anderson echoed the spirit of Raiche’s concerns referring to “greenwashing<sup>11</sup>” that is causing consumers to question brand claims. Weder of Prairie Heritage Beef similarly

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<sup>11</sup> “Greenwashing” is a term referring to when many companies make claims about being environmentally friendly/sustainable without significantly changing their practices, disclosing what they mean by it, or having any sort of verification/proof.

observed the apparent lack of credibility with sustainability claims and suggested that certification had a role in mitigating them when he said, “there is a lot of scepticism out there about these things, and you need to have something to back it up.” Both Raiche and Weder alluded to the benefit of a quality assurance system to give sustainability claims credibility. An ideal system was referred by MacRae of Local Food Plus as one that firms can say “is rigorous, has standards, has inspections, and is the real deal.” Evidently, the reduced credibility of production-derived quality attributes caused by competing claims can be mitigated by quality assurance systems.

As the central question of this thesis is defining the role for government in assuring production-derived food quality, participants were asked what they saw as the most credible type of organization to deliver a quality assurance system. There was a dichotomy among respondents as to whether a government organization would be seen as credible. Three respondents said government would be the most credible organization while four said that third-party organizations would be most credible and placed government second or lower. Miedema from Stahlbush Island Farms based in Oregon said that the type of consumer interested in organic and natural food is particularly mistrusting of the government. The initial hypothesis that Canadians see government as more credible than Americans was not evident in the limited sample of participants.

Participants generally defined the credibility of quality assurance as being related to an organization’s ability to both create and enforce standards. Whilst only three participants saw government as the most credible, all acknowledged that government would be best to enforce a given standard. Raiche from United Natural Foods said it best; “when government comes up with policies, procedures and requirements, they are followed.”

Much of the mistrust in government mentioned by the three respondents was a result of perceived past incompetence in areas such as creating the USDA organic standard. Participants were disappointed that the final standard allowed highly industrial production methods and processed foods to be included in the standard. Participants also expressed disappointment in the composition of the final Canadian organic standard for similar reasons and suggested that government was incapable of creating an adequate result because it was subject to lobbying pressure. Weder of Prairie Heritage Beef said specifically, “government is often perceived as getting things approved because of lobby.” The lack of credibility for government was thus primarily reflective of activities in the political realm and was contrary to a general trust in the competence of government monitoring and enforcement.

### **3.7. Components of Credibility**

In addition to identifying which organizations would be most credible to deliver quality assurance, participants were also asked to explain why they ranked them in this way. Responses from this question were coded to identify the components of credibility occurring across respondents. Consistent with the work of Frewer *et al.* (1996) that looked at trust in various organizations for risk regulation and Frewer *et al.* (2005) that examined the credibility of different organizations in the context of animal welfare, the themes of interest, transparency, and competence emerged as important in determining the credibility of a particular organization. Credibility is assumed to be synonymous with someone placing trust in an organization to accurately communicate credence attributes.

### ***3.7.1. Interest***

The theme of interest was the most prevalent component of credibility expressed in the interviews. This theme referred to whether one party's interests were akin to those of the other party in a transaction, and coded 11 times from five respondents throughout the interviews. There was however, a noticeable disconnect between what participants said and what their comments actually implied. Participants often referred to independence as being a good thing because the other party would not gain financially from opportunistic behaviour in a transaction. They also expressed the idea that an organization having similar general interests like goals and values would be more credible. Thus the word independence was very important for respondents but the underlying principal was that greater alignment of interests more generally contributed to credibility. Participants described credibility as varying with the degree of alignment between the interests of parties in a transaction. By implication, if both parties gained and lost simultaneously there would be a higher level of credibility because their interests move in the same direction. When one party does not gain or lose if the other gains – otherwise known as independence – this can be interpreted as contributing to less credibility than if they were fully aligned. The lowest level of credibility is when the interests of the parties involved in the transaction diverge, i.e. where one party gains and the other loses in a process akin to a zero sum game.

Raiche from United Natural Foods stressed that formal certification is not always necessary for the credibility of production-derived claims. To him, the most important thing is for firms to communicate their values, and if these values were congruent with the other party's values there would be trust. Raiche refers to one way that United Natural Foods expresses their interest in advancing the alternative farming methods sector as a whole by

“strongly supporting industry organizations that work for the benefit of the entire industry.”

In this sense even though a firm could profit in the short-term by misrepresenting if a product is organic for example, by financially contributing to organizations that advance the whole industry they are signalling that their long-term interests are in-line with their transaction partners and they are less likely to cheat. Of course this type of action could be interpreted as an attempt to disguise their real motivations to profit from misrepresentation. The credence nature of these types of attributes means that no signal is ever perfect and it is likely that there will always be some degree of misrepresentation.

Independence was the most common word associated with credibility throughout the interviews. Participants referred to independence as not gaining financially from misrepresenting a product and expressed that it was important for both creating standards and communicating the attributes of the products. For Anderson of Food Alliance, standards used for certification should be developed by a wide range of stakeholders to be credible and ensure that they do not serve the interests of just one party. This process of standard formation was seen as most likely to produce standards that were congruent with interests of consumers and not formed to serve the interests of producers for example. Certification organizations that monitor and communicate these standards were seen as most credible when they were described as independent. Raiche of United Natural Foods put it best by saying “it is advantageous for a dispassionate, unconnected, third-party” to certify production-derived quality. Weder of Prairie Heritage Beef echoed this sentiment and further defined what type of third party certifier was best with reference to the presence of financial interest. “Not for profit is better,” they have “no interest.” They are “someone who doesn't have an economic vested interest.” Both participants clearly emphasized that

independence was important to establish credibility. Underlying Weder's comments however was the notion that a non-profit organization's interests will be to promote the methods behind their certification – something the consumer presumably values because they are purchasing the product. Thus, the appearance of being at least financially independent from the transaction is important, but having aligned interests is better still.

Participants routinely referred to a third party organization as independent; however these organizations clearly rely on the revenues from certification to cover costs and produce profits and thus have a vested interest in the certification process. It is important to note that a certification firm may have an incentive to certify as many products as possible to increase its revenues. The certification firm may also know that monitoring of its certification is incomplete and it could be less than diligent in its certification to maximize revenues. It is evident that independent third parties are not really independent when credence goods are involved and monitoring is imperfect, though this point was not raised by participants. Perceived values, motivations, and direct financial independence of the organization involved in assuring quality were the most important factors defining the interest component of credibility.

### ***3.7.2. Competence***

The second most prevalent theme related to credibility is competence; it coded six times throughout the interviews and was mentioned by three of the participants. Competence refers to knowledge, expertise, or ability shown in the area of production-derived food quality. The notion that demonstrated ability will influence the perceived credibility of an organization is similar to the model presented by Grolleau and Caswell (2006) in the literature review. In their model they conclude that the presence of search and

experience attributes consistent with relevant claims from an organization will provide an accurate signal for credence attributes. This was the essence of how participants saw competence as contributing to the credibility of an organization.

One way that participants saw competence as portraying credibility was the amount of effort organizations put into production-derived quality. Raiche of United Natural Foods expressed his confidence in standards created by Whole Foods because he was “not aware of another retailer who puts as much effort, time, and research into developing or publishing standards as Whole Foods does.” Weder of Prairie Heritage Beef similarly supported his own organization’s credibility in communicating production-derived quality when asked if consumers enquire about the credibility of their product claims. “All the time, how do you prove what you say you are doing? I say here's the paperwork.” For both Weder and Raiche, the amount of energy expended in the process of communicating and recording production-derived claims lends credibility to the organization.

The reputation and past competence of organizations was another signal for credibility that was highlighted in the interviews. Congruent with the idea behind Grolleau and Caswell’s (2006) work, this concept highlights that a firm that has performed well in the past is likely to perform similarly well in the future. Raiche from United Natural Foods expressed his confidence in firms that have performed well to communicate production-derived quality to their retail and food service customers. “We allow suppliers that we are comfortable with to explain their sustainability initiatives.” In other words, those who do not have a good reputation with the distributor are not permitted to communicate this type of production-derived quality. Presumably, the distributor sees the risk of these claims not being credible as too large given their lack of reputation. Participants’ responses evidently

showed that a firm's credibility is a function of the competence they have displayed both in the past generally, and the competence they display specifically in reference to the attribute being communicated.

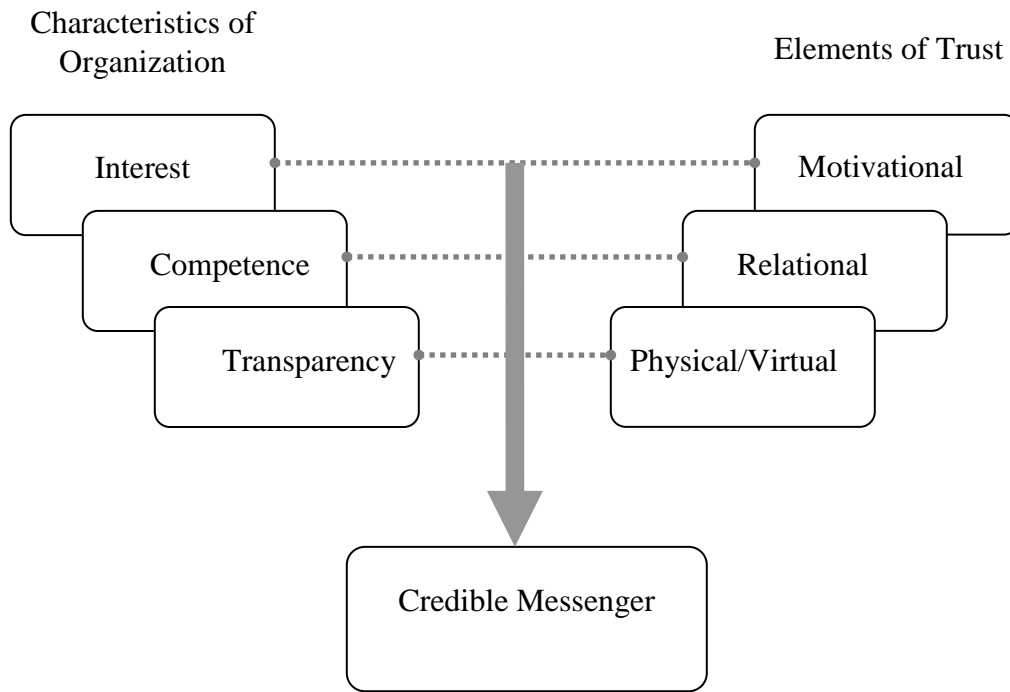
### ***3.7.3. Transparency***

Lastly, the theme of transparency was referred to four times by four of the participants. Being transparent meant giving consumers access to information pertaining to protocols and enforcement measures as well as being able to respond to questions and concerns arising from their claims. Participants emphasized that the Internet was an important component of this, as it coded seven times over the interviews and was mentioned by five participants. For Weder of Prairie Heritage Beef, being perceived as transparent was important. "We have an open and transparent system; we don't hide behind anybody." In this he expressed that his organization could be trusted as any of its actions could be scrutinised to ensure that they were in-line with customers' expectations. For example if consumers wanted to know what the animals were fed or the conditions of the pasture land they grazed on he could either provide them with the information or they could come to farm to see for themselves. Boldt of Pine Valley Farms made the same connection between transparency and confidence when she stated her "goal is to be transparent and authentic," and with this we will "instil confidence." Thus, the presence of transparency offers reassurance that a firm is not doing anything contrary to the interests of the other party and contributes to confidence in production derived claims.



### **3.8. Trust Equals Space - A General Theme**

A common thread throughout the interviews was that trust, and therefore the credibility of an organization, is proportional to the connectedness or space between two parties to a transaction. In one sense, this could be interpreted in a similar format to the concept of interest outlined above, where the space is defined as motivational in nature and the closer and more aligned those motivations are, the more trust exists. In another sense, this space can be relational in nature, where reputation and past competence contributes to trust, similar to the competence theme discussed above. Finally, this space can also be interpreted as physical or virtual space, where the closer and more accessible the two parties are to one another the more trust will exist in a similar fashion to the last theme of transparency. This last interpretation has important implications for the role of quality assurance systems in creating credibility for production-derived attributes. A pictorial representation of these relationships and their influence on the credibility of an organization communicating production-derived quality is show below in Figure 3.1.



**Figure 3.1 What makes an organization a credible messenger?**

The characteristics of an organization outlined in the literature review as interest, competence and transparency are shown on the left of the above figure to determine the credibility of a messenger. On the right of Figure 3.1, the spatial elements of trust referred to as motivational, relational, and physical/virtual are shown to correspond to characteristics of a credible organization. The less distance there is between the motivations of parties to a transaction, the more their interests align and the more credible they will see the other party. Similarly, the closer that past relations have been congruent with expectations, the more competent they will consider the other party<sup>12</sup>. Lastly, the closer two

<sup>12</sup> Competence may be difficult to assess for consumers with little knowledge of production practices. “Congruent with expectations” in this sense represents that all of a producer actions will represent their competence in specific production areas. The usual caveat concerning the imperfect signalling of credence attributes still applies.

parties are in physical/transparent space, the more transparent they will be to each other. The figure outlines how trust and credibility can be viewed as spatially related.

With the proliferation of the Internet, virtual space is becoming more prevalent and important than ever before. While Boldt of Pine Valley Farms mentioned that 80% of her customers have likely visited her farm, she acknowledged that “if you’re not on the web, you’re not anywhere.” For people to feel a connection with a farm, for example, it becomes important for them to understand where it is, both in physical and virtual space. Physical space is defined as their location on the earth and virtual space as their presence on the web via a web page, advertisement or place in the expanding game “Second Life<sup>13</sup>.” The theme of credibility linked to space coded six times across the interviews by three participants who were all farmers (Pine Valley Farms, Stahlbush Island Farms, Shepherds Grain). The importance of place for Pine Valley Farms and Shepherds Grain may not be surprising considering that they sell primarily into their local markets. For Stahlbush Island Farms, who sells across the continental United States, it may be more surprising that their image and credibility that is tied to their brand was very much linked to the physical place where the farm exists.

The Internet is changing how we define space. The interface between the virtual space of a company’s website and the physical space on a country road in Oregon for example is becoming blurred with the advent of Google Earth that enables relatively easy access to detailed satellite imagery. Where once the physical connection was a necessary part of creating credibility in the absence of a quality assurance system, the increasingly

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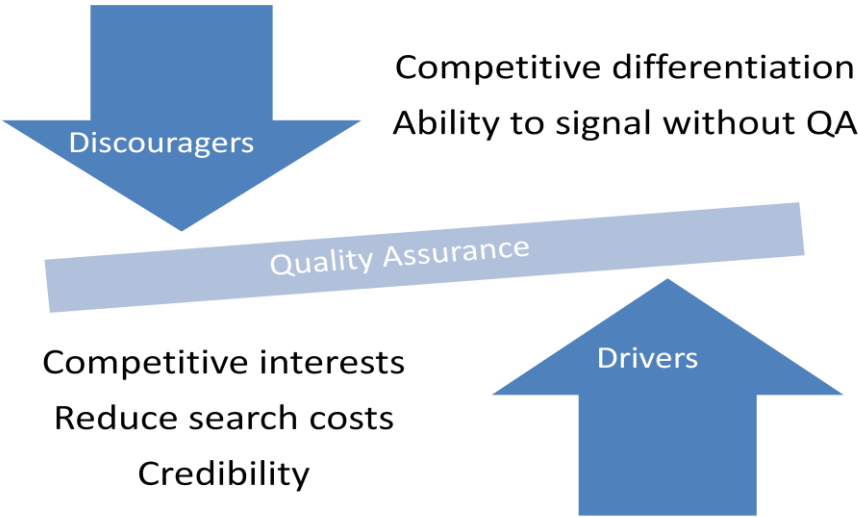
<sup>13</sup> Second Life is a 3-D virtual world on the Internet where users can socialize and connect. Since opening to the public in 2003, it has grown explosively and today is inhabited by millions of users from around the globe.

ubiquitous virtual space seems to be redefining how this sense of connection is formed. The Internet both reinforces locality when consumers know the physical location of the farm and provides a substitute for it when consumers are farther away. Consumers may feel a connection with a farm they can see and explore virtually in the same way that they can feel a connection by actually visiting the farm. Whether the distance between two parties is motivational, relational, physical or virtual, it was evident throughout the interviews that the smaller the distance the more trust existed between two parties and the more credible they were perceived to be.

### **3.9. Summary and Implications**

Results from the current chapter represent a small sample of firms, thus some care is necessary when generalizing to other firms. The themes are general in nature however, and the interviews do provide a good indication of how the factors explored in the literature review exist in reality. Sprouting from the model in the literature review and buttressed by the analysis of the interviews conducted in the current chapter, search costs and credibility concerns are important drivers for quality assurance systems. Figure 3.2 illustrates the factors driving firms to adopt/discouraging firms from adopting forms of quality assurance. Firms striving to advance their competitive interests, mitigating credibility problems, and/or reducing search costs were all important in driving the use of quality assurance systems. Undertaking quality assurance was described as positioning firms to be more competitive from both an image and practical perspective; it enhanced their reputation and made their products more credible. The interviews revealed that certification systems based on universal standards used across firms can provide a credible minimal quality level. Reducing consumer search costs by signalling quality more succinctly was also shown to

be a driver of quality assurance. Firms are likely to use this credibility to promote production attributes in excess of those encompassed by a quality assurance system to differentiate their products in the marketplace.



**Figure 3.2 Factors influencing firms to adopt forms of quality assurance**

Consumers’ desires for unique and chic products, coupled with firms’ needs to be differentiated for competitive reasons were shown to discourage the adoption of quality assurance involving universal standards necessary for certification across firms and products. The value of certification was understood to increase with the amount of like-minded firms using it but this was also somewhat undesirable as it made a particular firm’s products less differentiated. The ability of firms to signal credence qualities without formal quality assurance also predictably discouraged the adoption of quality assurance. Firms who were large enough to create a strong reputation/brand, or small enough to develop personal relationships with their customers, saw less benefit in formal quality assurance systems for production attributes. The reputation and values of a firm communicated by a

brand may be an adequate and preferred quality signal in many cases where firms can communicate their values effectively, and prefer to remain differentiated from their competitors. These discouraging factors are important considerations when interpreting the potential benefit for government involvement in quality assurance systems. They signal that the benefits of credibility and reduced consumer search costs explored in the next chapter must be understood in the context of firms' motivations.

Based on the trust themes exhibited in the interviews, the role for quality assurance systems is increasingly prevalent the more motivational, relational, physical or virtual space exists between the parties of a transaction. For local producers able to establish relationships with their customers, a quality assurance system is likely unnecessary. The evolution of the Internet is making it easier for producers to form connections with consumers, though quality assurance systems are likely to play a role in communicating production-derived attributes to customers across a large geographic area.

Market impediments for production-derived attributes are becoming increasingly prevalent, as witnessed by the confusion surrounding sustainability claims. Transaction costs arising from credibility concerns and supply chain complexity inherent with multiple standards favour an evolution toward a system of quality assurance for production-derived attributes based on universal standards. Just as the organic industry eventually established universal standards in Canada<sup>14</sup>, it is likely that some form of universal standards will be forthcoming in response to prohibitive transaction costs for consumers and supply chain members.

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<sup>14</sup> Establishing a national organic standard was also motivated by Canadian organic producers losing access to the European Union market if one was not established.

Finally, the challenges and incentives identified above have important implications for the role of various organizations in assuring production-derived quality. Most notably, setting standards must be done to balance the concerns associated with excessive transaction costs and maintaining adequate product differentiation. Given the necessity for government to widely consult and satisfy a plethora of stakeholders, setting standards that are amenable to consumers and producers may be a difficult task. When it comes to verifying whether a particular standard has been followed, government's need and ability to represent the interests of everyone involved becomes an asset; it gives them credibility. Given participants' responses, an investigation into how consumers perceive different organizations could give insights into an organization's ability to administer a credible quality assurance system that reduces market confusion.

### **3.10. Issues for Further Examination**

The preceding two chapters highlight the role that quality assurance can play in increasing the credibility of production derived claims and that all types of organizations may not be equally suited for this role. Further examination of how consumers determine which organizations can give credible quality assurance – and what impact this has on purchase decisions – is now warranted. The components of credibility arising out of this chapter must now be evaluated in a larger consumer context to determine the extent that each influences the credibility of an organization. The following two chapters explore these concepts in more detail using a consumer survey.

## 4. CONSUMER SURVEY METHODOLOGY AND ESTIMATION METHODS

### 4.1. Introduction

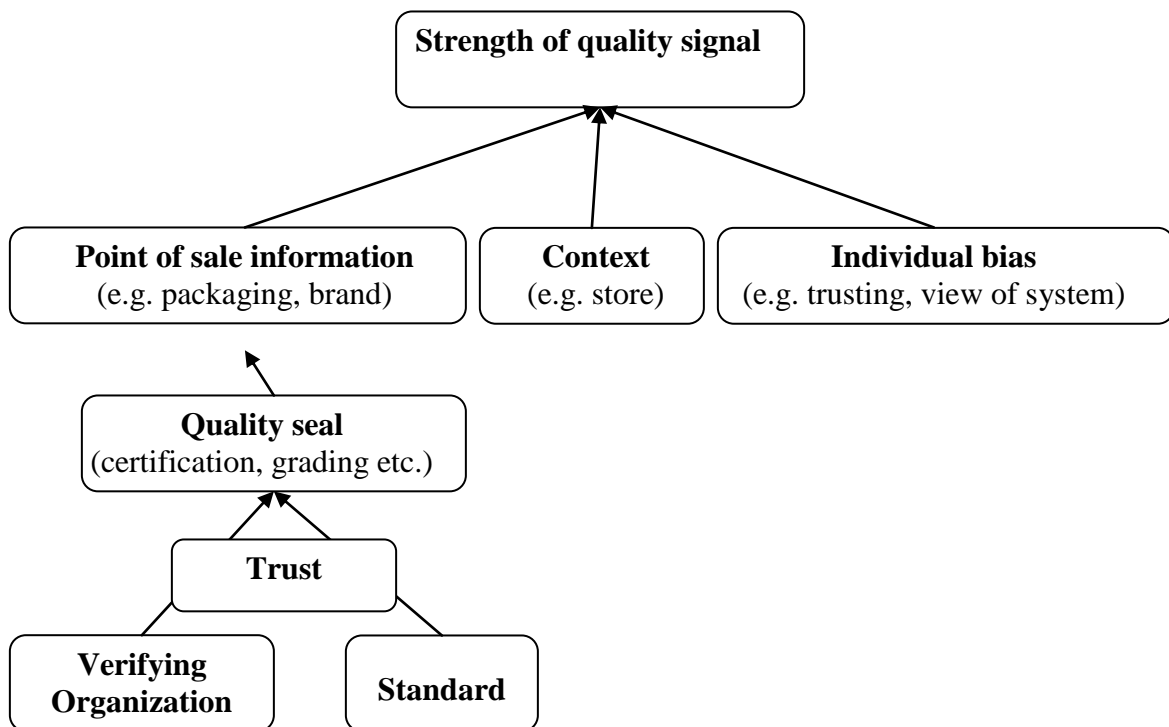
Emerging from the previous chapters is the need to examine both the nature of trust Canadians have in organizations to communicate production attributes and what effect this has on their willingness-to-pay (WTP) for these attributes. Theory predicts that verification organizations that are less trusted will result in lower WTP for the credence attributes they verify. Thus, if government is more trusted, its involvement can more easily signal production-derived quality via quality assurance. The trust literature and analysis presented in Chapter 3 imply that organizations that are perceived to be knowledgeable, transparent and accountable, and in-line with consumer interests will be most trusted. Information at the point-of-sale was the most important vehicle for firms to communicate production characteristics to consumers in the interviews. Certification seals/messages are only one component of this information and the significance of the verification agency has not been examined in Canada. This chapter outlines the methodology used to carry out and analyse a survey of Canadian consumers undertaken to explain how the type of organization verifying a quality signal affects the strength of preference for a quality attribute.

The survey was designed to evaluate four key questions. First, how important is point-of-sale information relative to other factors in signalling production-derived quality? Second, how important are quality seals relative to other point of sale information? Third, is willingness to pay affected by the verifying organization? Fourth, how does a consumer's level and nature of trust in a verifying organization relate to his/her willingness to pay for this verification?



## 4.2. Conceptual Model

The ability for a verifying organization to signal quality must be considered relative to quality signals. Classic examples of quality signals such as price, advertising, and brand equity are difficult to evaluate in a survey setting dealing with generic organization types. Therefore the survey was designed to incorporate factors mentioned in the interviews including information at the point-of-sale, store reputation, and an individual's bias regarding food quality and trust in general. Figure 4.1 depicts the verifying organization and trust relative to these other factors in affecting the strength of a quality signal.



**Figure 4.1 Factors affecting quality signals for production-derived quality**

The survey evaluates the role of the verifying organization and the origin of the standard as quality cues or information signals. The impact of a quality seal is shown above to be influenced by the verifying organization and standard. Figure 4.1 suggests that trust in

an organization to accurately communicate production methods and implement an effective standard is integral for a verifying organization or standard to signal quality. If an organization is not trusted, the model hypothesizes that neither its verification nor standard will serve as an effective quality signal. The survey explores several aspects of trust and the consequences for consumer utility and willingness-to-pay.

This chapter begins by outlining various empirical methods to estimate the utility consumers derive from a product's characteristics. It continues with an outline of the methods used in the survey for data collection and choice experiment design. An empirical model is presented and econometric models used to estimate the model's parameters are described.

### **4.3. Preference Elicitation Methods**

The means used to estimate the utility that consumers derive from goods has evolved over time. A multitude of methods and models have attempted to capture the determinants of consumer utility since Lancaster (1966) first hypothesised that the aggregate utility of a good is a function of its characteristics. Both stated and revealed preference elicitation methods are used widely. Stated preferences are those obtained when participants state their preference in exercises like surveys, while revealed preferences are those where consumers reveal their preferences via a decision at the time of purchase (Train, 2003). Stated preference methods allow researchers to examine hypothetical products and attributes combinations, while revealed preference methods require the products to exist.

From their roots in contingent valuation to conjoint and experimental auction methods, elicitation methods have evolved to more accurately assess consumer preferences.

The goal is to more accurately mimic the consumer purchase decision. Louviere (2006) cites Meyer *et. al* (1997) when describing an outcome such as a consumer purchase decision as being contingent on a number of factors as follows:

$$Y = f(X, Z, C, G, T), \text{ where} \quad (4.1)$$

Y=a vector of behavioural outcomes;  
X=a matrix of factors describing options/outcomes (the choice set);  
Z=a matrix of individual/group factors;  
C=a matrix of context/environmental factors;  
G=a matrix of geographical/spatial factors; and  
T=a matrix of time-varying factors.

The ability to accurately estimate a consumer's purchase decision (Y), thus depends upon how well  $f$  is specified. It also implies that it is beneficial to include as many components of variance in the stochastic utility component as possible (Cardell, 1997). Further, the ability to generalize from an experimental context to a real-world context depends upon the degree to which the context/environmental vectors are constant across empirical and real-world domains. It is important to understand the above equation as it highlights the advantages and limitations of preference elicitation methods.

Equation 4.1 means that the more closely an experiment mimics a real consumer purchase decision, the more accurately the resulting parameter estimates will reveal true components of utility. Beyond the usual social-demographic factors represented by Z, the transferability of experimental results will also hinge on the context (e.g. whether the experiment was carried out in the same environment as normal purchases are made) and the composition of the choice set itself (X). Discrete choice experiments (DCEs), where participants choose between alternatives comprised of different characteristics, are increasingly used to gauge consumer preferences.

Consumer purchase decisions are mimicked more closely in DCEs than in other methods like contingent valuation<sup>15</sup> and conjoint rank or ratings exercises<sup>16</sup>. They more closely represent the consumer's actual purchase decision context by presenting a discrete choice among different products with varying characteristics; in a real purchase decision a consumer usually chooses only one product. Including an option to not choose one of the alternatives and defer purchase is a further effort to mimic real-world decisions, while being consistent with economic theory that allows substitution (Louviere *et. al* 2000). Though consistent with economic theory and similar to a consumer purchase decision, stated preference DCE's where participants do not exchange real money for goods are still not as robust as revealed preference data.

All preference elicitation methods that do not involve participants exchanging real money when they make a choice are subject to hypothetical bias (see Alfnes and Rickertsen 2002 for a review). Experimental auctions methods stemming from Shogren *et al.* (1994) and used more recently by e.g. Hobbs et al (2006) require that participants exchange real money for their choices and are thus less prone to upward bias of WTP estimates. Carlsson and Martinsson (2001) and Lusk et al (2008) are two examples of attempts to make DCEs incentive compatible by randomly selecting one choice set as a binding purchase<sup>17</sup>. Incentive compatible experimental auctions and DCEs are limited however to available products with existing product characteristics. Further, they are more labour intensive

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<sup>15</sup> Contingent valuation exercises originated in the environmental economics literature. Valuations are generally comparative and typically involve either yes/no questions or questions such as "How much more would you be willing to pay for pesticide free wheat compared to regular bread?"

<sup>16</sup> Conjoint ranking or ratings exercises involve participants rating or ranking products comprised of various attribute combinations.

<sup>17</sup> Both studies were carried out in an experimental market setting where the money participants received for participating was reduced according to the cost of a randomly selected choice.

relative to other survey methods as they are most feasibly carried out in-person; consequently they tend to have smaller sample sizes with less geographic diversity.

The current research assesses the role for government in a Canadian context. Given the attributes of interest are of an experimental nature and not easily found in current products, the higher sampling costs of incentive compatible methods and the need for a diverse and geographically representative sample, DCE methods were deemed to be more practical. It is acknowledged that using a DCE comes with certain limitations, however its ability to model a consumer's purchase decision, be consistent with economic theory, examine exploratory attributes, and to be applied to larger sample sizes make it the best choice for this thesis.

#### **4.4. Related Examples of Discrete Choice Experiments**

Increasingly, discrete choice experiments are being used in applied economics in numerous contexts, one of which is to determine the WTP for specific attributes. Examples of DCEs dealing specifically with eco-labelling<sup>18</sup> of credence characteristics include Blend and Ravenswaay (1999), Nilsson *et.al.* (2005), Pardoe (2008), Wessels *et. al.* (1999) and Loureiro *et al* (2001). Both Pardoe and Wessels *et. al.* include the certification agency as an attribute.

Both DCEs examining the effect of the certification agency were based on samples of American consumers. Wessels *et. al.* (1999) find no significant WTP effects for eco-labelled seafood in their US sample of consumers for any of the organizations they used, including the World Wildlife Fund, Marine Stewardship Council, and the National Marine

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<sup>18</sup> Eco-labelling identifies that a product has satisfied certain environmental conditions during its production. See "eco-label *noun.*" Environment in this sense refers to the conditions of production involving the interaction of the human and natural worlds.

Fisheries Service (a US government agency). They note that focus groups carried out prior to the experiment indicated that the US Department of Agriculture was seen as a respected certifying agency though it was not included in the experiment as wild fisheries are not under its mandate. Pardoe (2008) similarly indicated that there were no significant effects for certification agency in preliminary results looking at eggs and apples with specific production attributes in the US. Pardoe included government, third party, and “not specified” as the options for the certification agency attribute. He was surprised by the result and indicated that it might have been a result of the way the choice experiment was presented to consumers; it was not well described and it was the last attribute listed. Both studies imply that in the United States there is not a large impact associated with the certification agency on the willingness to pay for the examined credence attributes, however their applicability to Canada is unclear. The following describes how the current study was designed to determine the impact of the verification agency in Canada.

#### **4.5. Survey Design**

An on-line survey format following the Tailored Design Method outlined in Dillman (2000) was used to gather data for the current research. Internet use by individuals has been steadily rising in Canada; 73.2 percent of all residents over the age of 18 had access to the Internet in 2007 (Statistics Canada). Internet surveys are known to be prone to sampling biases against older, less wealthy and less educated individuals (Andrews *et. al.* 2003). However, the continued growth of the Internet makes this less of a concern in the present investigation. In addition, the methodological advantages allowing efficient sampling of a geographically diverse group of participants also supports the use of an Internet-based survey for the current study.

The survey consisted of four main sections and can be found in Appendix C. First, characteristics about participants, their shopping habits, and how various factors affected their view of food quality were examined using five point Likert and discrete visual analog scales<sup>19</sup>. This section served to reveal individual characteristics and position process labels and verifying organization in the context of other quality cues. Second, a choice experiment asked participants to choose between three loaves of bread described by different attributes; participants could also choose not purchase any of the loaves of bread. The choice experiment is explained below. This section was designed to evaluate the utility derived from each attribute. Third, several questions assessed both the components of trust and trust in the organizations from the choice experiment. Lastly, socio-demographic questions were included to position the sample within the Canadian population.

Early versions of the survey were pre-tested in person or over the telephone using focus groups totalling fifteen people in Saskatoon and Ontario. A refined paper version of the survey was then administered to 20 randomly selected shoppers at the Confederation Mall in Saskatoon. People from a range of socio-demographic groups were deliberately sought to ensure that questions were easily understood. Lastly, minor modifications were made before the survey was transposed on-line and pre-tested on 20 randomly selected volunteers at the University of Saskatchewan. In all, the survey was pre-tested on 55 people to ensure it was easily understood, functional, and capable of answering the research questions. The administration of the final survey is outlined in Chapter 5.

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<sup>19</sup> Likert scales are those using a five or seven point scale with the categories: strongly disagree, disagree,... etc whereas discrete visual analogue scale is the generic term for “likert type” scales that seek to measure the strength of a respondents opinion: e.g. unimportant, slightly important, moderately important, ...etc.

#### ***4.5.1. Choice Experiment Attribute Selection***

As mentioned, respondents were asked to choose between a series of product profiles describing the attributes of pre-packaged sliced bread as part of the DCE. Given the reputation of producers from the Canadian Prairie Provinces for producing high quality bread wheat and the continuing prevalence of wheat as a crop of major economic significance<sup>20</sup>, examining how the verification of alternative wheat farming methods impacts their credibility should be of interest to those involved in Western Canadian agriculture. Following the work of Hu *et al* (2005) who used bread as a product for a choice experiment, pre-packaged sliced bread was chosen as a product for the choice experiment as it is relevant to Western Canadian agriculture and consumed by most Canadians. In addition, bread is a staple food that respondents are likely to be familiar with and it allowed the exploration of several production-derived quality attributes.

Each respondent was presented with eight choice sets, each comprised of four alternatives. Three of the alternatives were product profiles for pre-packaged loaf bread comprised of different attributes combinations, while the fourth was defined as “I would not purchase any of these products.” The attributes and levels used are described in Table 4.1.

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<sup>20</sup> For example, spring wheat – the most commonly used grain for bread flour – was harvested from 30% of Saskatchewan farmland in 2006 and produced a crop with a value of \$1.21 billion (Saskatchewan Agriculture and Food, 2008).



**Table 4.1 Attributes and levels included in the choice experiment**

<b>Attribute</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
<b>Verifying Organization</b>	Government	Third Party	Supermarket	Farmer	Bakery
<b>Pesticide Free</b>	Yes	No			
<b>Environmentally Sustainable</b>	Yes	No			
<b>Price</b>	\$1.99	\$2.99	\$3.99	\$4.99	

The production-derived quality attributes pesticide free, and environmentally sustainable were selected to evaluate the importance of these attributes to Canadian consumers. Levels for the verifying organization attribute were selected to encompass a range of organization types that verify production-derived attributes. Verifying organizations included government, third party, bakery, farmer, and supermarket. Price was also included as an attribute to evaluate the tradeoffs participants make between attributes and facilitate willingness-to-pay calculations.

The choice of the pesticide free and environmentally sustainable attributes was based on an assessment of the current trends in the marketplace and past research studies. There is increasing attention being given these attributes in particular and their importance in the organic standard more generally. Pesticides are increasingly seen as undesirable, as witnessed by the recent bans on cosmetic pesticides for lawn care in Ontario and Quebec (Benzie, 2008; Block, 2006). Similarly, the environmental footprint of products, companies and individuals in general is increasingly prevalent in the public discourse, as witnessed by attention towards climate change and pollution in general.

Magnusson and Cranfield (2005) have previously examined the demand for pesticide free<sup>21</sup> grain products in Canada. Whole wheat and multigrain bread ranked as the third and fourth products most likely to be bought in pesticide free form, slightly behind pasta and breakfast cereal. Their survey sampled Canadian consumers from Toronto, Winnipeg, and Vancouver in 2000 using a contingent valuation method to evaluate the characteristics of consumers most likely to be interested in pesticide free products. Research by the Canadian Federation of Agriculture (2007) that surveyed Canadian perceptions about domestic production suggested that growing practices were the number two concern of Canadians when purchasing grain products, behind freshness. When asked about specific concerns, in grain production, 72% of respondents were somewhat or very worried about pesticide use.

Research in Northern California by Onozaka *et. al* (2006) examined willingness-to-pay for the components of organic produce that included pesticide free, genetically modified organism free, and environmentally sustainable. They found that consumers who did not buy organic produce regularly had significantly higher willingness-to-pay for the pesticide free attribute compared to the environmentally friendly attribute. In addition, information from the industry interviews conducted for this thesis reinforced the relevance of these attributes. For example, the certification agencies Food Alliance in Portland, Oregon and Local Food Plus in Toronto, Ontario both certify food as sustainable – a significant portion of this standard is comprised of environmental criteria. Shepherds Grain, an interview participant, also markets their bread wheat flour as being environmentally sustainable.

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<sup>21</sup> Magnusson and Cranfield based their study on “Pesticide Free Production” that specified farming practises absent of pesticides while the crop was growing.

Quality assurance frequently involves multiple types of organizations to create standards, monitor production, certify suppliers, accredit certifiers and coordinate the system; however, these distinctions are unlikely to be understood by the average consumer. As such, the levels for the verification organization were selected to broadly represent the type of organization that consumers would most associate with a given production-derived claim. The types of verification organization were selected to represent a range of plausible options.

Several levels of the verifying organization attribute are currently used or proposed in Canada including third party verification for animal welfare standards by the British Columbia Society for the Prevention of Cruelty to Animals and farmer verification by the Canadian Federation of Agriculture for their proposed green label program. Whole Foods Markets, a specialized natural and organic supermarket, although they use private certifiers, have established their own production standards and frequently include in-store messaging about the farming methods used to produce their products. In doing so they have become the messenger communicating how their products were produced and consumers are likely to rely on them to ensure that their products were produced according to the label. Consequently, the supermarket level was included to represent when a food retailer is the organization most associated with a production claim. Bakery verification is included as an attribute to represent when the production attribute is assured solely through the reputation of the brand of bread. Lastly, consistent with the focus of this thesis, government verification is included to probe the impact of government verification of these attributes. The United States Department of Agriculture Process Verified program outlined in Chapter 2 is one example of government verification. As with the other levels for the verifying

organization, the organization attribute was designed to capture the type of organization most associated with a production claim.

The price attribute levels were selected to represent a range of values corresponding to the retail price of a pre-packaged loaf of bread plus a premium of approximately 50 cents for the additional attributes included<sup>22</sup> (i.e. at least one of environmentally sustainable or pesticide free). A survey of three stores in Saskatoon revealed that pre-packaged sliced bread ranged from \$1.39 to \$4.49. One dollar increments were used as levels to simplify the task of respondents. The large variation in bread prices resulting from factors that are not assessed in the current choice experiment means that the included prices primarily force participants to trade off attributes with monetary value. As such, the resulting WTP estimates should be interpreted as relative and not absolute, consistent with Louviere *et al* (2000) who emphasize that choice models are best interpreted as difference in attribute models.

#### **4.5.2. Choice Experiment Design**

The choice experiment used a D-optimal design obtained using the Macro codes for SAS software designed by Kuhfeld (2005) (see also Kuhfeld and Tobias, 2005). Researchers that have utilized this technique for choice experiments involving food include Carlsson *et. al.* (2003), Liljenstolpe (2008), and Loureiro and Umberger (2007). D-optimal designs maximize the determinant of the variance-covariance matrix, otherwise known as the Fisher information matrix of the model to be estimated (Hensher *et. al* 2005). D-optimal designs contrast with better known orthogonal designs that make attributes statistically

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<sup>22</sup> Actual premiums for the included attributes are unknown as few of the combinations are currently available in the marketplace. Therefore \$0.50 represents an approximation for the monitoring and enforcement costs involved in verification as well as the additional production costs associated with these farming methods.

independent. Attributes in D-optimal designs are nearly balanced, nearly orthogonal and designed to yield the maximum amount of information from a choice experiment.

The design process started with a full factorial design for four attributes; one attribute had five levels, one had four, and two had two levels each, as described in the previous section. The full factorial design contained 80 different product profiles and was designed to estimate all main effects and the interactions between the verifying organization and the pesticide-free/environmentally sustainable attributes. To obtain choice profiles that were sensible, the macro was programmed to include choice profiles where at least one of the attributes pesticide free or environmentally sustainable was included; it would not make sense for there to be a verifying organization if there were no attributes to verify. Using a modified Fedorov algorithm, the %ChoicEff macro built the design into 32 choice sets, each comprised of three choice profiles. These choice sets were then assigned to four blocks for four different versions of the survey, such that the attributes and block were uncorrelated<sup>23</sup>. This was done as it would be too onerous for one person to assess all 32 choice sets. The final design is included in Appendix D.

The DCE created by the above design allows the value that each respondent assigns to each level of the attributes to be elicited. Value can be expressed in monetary terms but is usually modelled in terms of utility by economists. The following section presents an empirical framework to interpret the results of the DCE.

#### **4.6. Modelling Framework for the Discrete Choice Experiment**

Choice behaviour is frequently modelled using a random utility maximization framework as outlined in Chapter 2. This is shown below in equation 4.1 where  $U_{iq}$  is the

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<sup>23</sup> The SAS Macro MktBlock assigns the choice sets to blocks in an iterative fashion to ensure that each block maintains a balance of attribute levels (see Kuhfeld (2005) for more detail)

utility gained from the  $i$ th alternative by individual  $q$ . Utility is partitioned into two components, where  $V$  represents a systematic component varying with the attributes and  $\varepsilon$  represents a random unobserved component.

$$U_{iq} = V_{iq} + \varepsilon_{iq} \quad (4.1)$$

Individual  $q$  chooses alternative  $i$  that maximizes his or her utility from a choice set  $J=1, \dots, j$ . This can be represented as in Louviere *et al* (2000) as:

$$U_{iq} > U_{jq} \text{ for all } j \neq i \quad (4.2)$$

Substituting (4.1) into (4.2) gives:

$$(V_{iq} + \varepsilon_{iq}) > (V_{jq} + \varepsilon_{jq}) \quad (4.3)$$

And given that the individual will choose alternative  $i$  with probability  $P_{iq}$  if:

$$P(U_{iq}) > P(U_{jq}) \text{ for all } j \neq i \quad (4.4)$$

Yielding:

$$P_{iq} = P[(\varepsilon_{jq} - \varepsilon_{iq}) < (V_{iq} - V_{jq})] \quad \text{for all } j \neq i \quad (4.5)$$

In other words, 4.5 is a random utility model where the probability of an individual choosing an alternative equals the probability that the difference between the random utility of alternative  $j$  and  $i$  is less than the difference between the systematic utility levels of alternatives  $j$  and  $i$ . We do not know the actual distribution of  $\varepsilon_{qi} - \varepsilon_{qj}$  across the population but assume that it is related to choice probability.

In the context of the current investigation we can define a random utility model as,

$$U_{iqt} = \alpha_{iq} + \beta_{qz} \mathcal{X}_{iqt} + \varepsilon_{iqt} \quad (4.6)$$

$$\text{and } \beta_{qz} = \beta_q + \delta_q' z_q \quad (4.7)$$

where  $X_{iqt}$  is a vector including credence quality attributes and the verifying organization, and  $z_q$  is a vector of an individual's socio-demographic and psychographic characteristics that includes trust in the verifying organization. The alternative specific intercept  $\alpha_{iq}$  captures an intrinsic preference for the alternative and  $\delta_z'z_q$  captures systematic preference heterogeneity as a function of an individual's characteristics.  $B_{qz}$  is thus a parameter vector of an individual's utility gained from the attributes of the choice experiment - some of this utility is associated with specified socio-demographic characteristics ( $z_q$ ). This model will be used to elicit the impact of individual characteristics on a consumer's WTP for specific attributes in the DCE. Parameter estimation was carried out using the econometric models described in the next section.

#### **4.7. Discrete Choice Models**

Preferences for the attributes of the choice experiment are expected to be heterogeneous across the sample. A variety of models were used to accurately assess how – and by how much – preferences range across individuals in the sample. Using multiple methods allows a range of estimates to be compared, thereby allowing the reader to see the impact of assumptions made during model selection. All models in this thesis were estimated using NLOGIT 4.0.1 from Econometric Software (2007).

##### ***4.7.1. Multinomial Logit Model***

The multinomial logit (MNL) model is widely regarded as the base estimation model for discrete choice experiments (Train 2003, Hensher *et. al* 2005, Louviere *et al* 2000). It is a closed form model that can be estimated without the use of computer simulation methods, though its assumptions can be restrictive in practice. The MNL model

assumes the error term is independently and identically distributed Gumbel (Train 2003). This means that the error term does not vary systematically across alternatives and is identically distributed across participants – i.e. consumers are homogeneous as all heterogeneity is captured by the specified variables ( $\beta_q = \beta$ ). The cumulative distribution and the assumption of independent error terms imply we can write the MNL choice probability as:

$$P_{qi} = \frac{e^{\alpha_{qi} + \beta_{qz} \chi_{qi}}}{\sum_j e^{\alpha_{qj} + \beta_{qz} \chi_{qj}}} \quad (4.7)$$

where all variables are as before and  $P_{qi}$  is the probability of choosing alternative  $i$  for individual  $q$ .

The conditional multinomial logit probability takes a closed form between 0 and 1. The unconditional probability is derived by summing over all participants and choices. A dummy variable  $y_{qj}$  takes a value of 1 for the chosen alternative and 0 for the non-chosen alternatives. This gives the log-likelihood as:

$$LL(\alpha_{qj}, \beta_{qz}) = \sum_{q=1}^Q \sum_{j=1}^J y_{qj} \ln P_{qj} \quad (4.8)$$

The coefficients  $\beta_{qz}$ , and  $\alpha_{qj}$  are estimable from the first order condition of the log-likelihood function. As discussed, the logit choice probability is derived by assuming independence and a distribution of the error terms in the utility function. This results in two consequences: the MNL model overestimates the joint probability of close substitutes because of the independence of irrelevant alternatives property (see Luce 1959), and it does not allow for random taste variation as the unknown utility terms are assumed to be independently and identically distributed. In practice this means that these models often do



not produce the best results though they provide a robust comparative benchmark for other models capable of handling heterogeneity.

Individual heterogeneity is difficult to capture in MNL models as an individual's characteristics are invariant across alternatives. This means that the effects of an individual's characteristics are not identifiable in the probability of choosing a particular product over the alternatives in the choice set. Some researchers, including Adamowicz *et al.* (1997), have attempted to capture individual heterogeneity by interacting individual specific variables with attributes that vary across the alternatives in a given choice set. In labelled or branded choice experiments where an alternative is always identified as a given type of product<sup>24</sup> this may also be accomplished by interacting individual characteristics with an alternative specific constant for each labelled alternative. These methods are limited, however, as they require *a priori* selection of individual characteristics and involve a limited inclusion of individual specific variables. Additionally, interpreting the coefficients of the interacted variables in the current context is only mildly informative.

Although the MNL model is convenient, the restrictions imposed by the model are often untenable both theoretically and practically. Consumers are widely regarded to have heterogeneous preferences that are rarely fully captured by the included parameters. Two types of modelling approaches are used to account for individual preference heterogeneity: the random parameter and latent class multinomial logit models.

#### ***4.7.2. Random Parameters Logit***

Empirical discrete choice research increasingly uses random parameter logit models for utility estimation. The Random Parameters Logit (RPL) model, sometimes called mixed

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<sup>24</sup> e.g. alternatives in all choice sets may be labelled (organic, conventional and environmentally friendly) as compared to unlabelled (A,B, and C)

logit, is used because it is more realistic than the MNL; it relaxes both the i.i.d. and IIA restrictions and assumes heterogeneity among individuals in a sample (for a derivation of the model see Ben-Akiva and Lerman 1984; Revelt and Train 1999). Thus  $\beta_{qz}$  is allowed to be different from  $\beta$ , thereby accounting for unobserved taste variation. One cannot observe enough replications to observe  $\beta_{qz}$  however and instead distributional assumptions are made about each coefficient to obtain an expected value across the sample<sup>25</sup>. Distributional assumptions of the parameters can have significant impacts on the estimates and standard errors. Thus while the RPL model is sufficiently flexible to account for a range of heterogeneity, the specificity of distributional assumptions for individual preferences make it difficult to accurately determine the correct specification of a parameter's heterogeneity.

Using the RPL model, parameters in the choice experiment are assumed to be individual specific. Taste is assumed to vary randomly across the population according to a continuous distributional function,  $f(B)$ . The choice probability  $P_{qi}$  is defined as the integral of conditional choice probability  $L_{qi}(B_q)$  over all possible values of  $B$  along the  $f(B)$  distribution (see Greene, 2007):

$$P_{qi} = \int_{\beta} L_{qi}(\beta_{qz}) f(\beta) d\beta - \text{where} - L_{qi}(\beta_{qz}) = \frac{\exp(\alpha_{qi} + \beta_{qz})}{\sum_{j \in C} \exp(\alpha_{qj} + \beta'_{qz})} \quad (4.9)$$

In order to retrieve individual-level parameters, Bayes theorem is used and the following integral is estimated by simulated maximum likelihood using 100 Halton draws.

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<sup>25</sup> Distributions commonly specified include normal, lognormal and triangular; see Greene (2007) for more detail.

$$E(\beta_q) = \frac{\int_{\beta_q} \beta_q P_{qi} f(\beta_q) d\beta_q}{\int_{\beta_q} P_{qi} f(d\beta_q)} \quad (4.10)$$

To account for the source of individual heterogeneity, the means of the parameter distributions ( $\beta_{kq}$ ) are allowed to vary with observed individual characteristics ( $z_q$ ) according to the following:

$$\beta_{kq} = \beta_k + \delta_k' z_q + \sigma_k v_{kq} \quad (4.11)$$

Where  $\beta_k$  is the population mean,  $v_{kq}$  is the individual specific heterogeneity, with mean zero and standard deviation one, and  $\sigma_k$  is the standard deviation of the distribution of  $\beta_{kq}$ s around  $\beta_k$ . The parameter  $\delta_k$  represents the amount that an individual's characteristics affect the mean of a random parameter. Thus, with the RPL model preference heterogeneity is assumed and accommodated by the model. The effects of observed sources of preference heterogeneity are estimated by the model thereby illuminating some factors influencing an individual's parameters. For more detail see Hensher *et.al.* (2005) or Greene and Hensher (2003).

Despite the ability for a RPL model to partly capture the source of preference heterogeneity, it is difficult to include enough parameters to accurately specify all reasons for individual parameters to vary. As a consequence, estimates contain unexplained heterogeneity that when reported as a mean for the population may mask important variations in preference across the population. Estimates for the RPL model are presented in Chapter 5. The latent class multinomial logit model is a model that incorporates unobserved preference heterogeneity into the estimation procedure.

### 4.7.3. Latent Class Multinomial Logit Model

Unlike the RPL model where random parameters follow a continuous joint distribution ( $f(B)$  in equation 4.9) the latent class multinomial logit model (LCML) is approximated by a discrete distribution (see Boxall and Adamowicz 2002, and Greene and Hensher 2003). In this way classes with different tastes are endogenously estimated from the data. In effect, the population is divided into  $F$  different classes ( $F=1, \dots, f$ ) and  $\beta$  is class specific ( $\beta_f$ ). Using a random utility function as in equation 4.6 for an individual  $q$ , belonging to class  $f$  choosing alternative  $i$  is defined as:

$$U_{qif} = \alpha_{qif} + \beta_f' \chi_{qi} + \varepsilon_{qif} \quad (4.12)$$

Latent class models are assumed to be heterogeneous between classes and homogeneous within classes. Thus the LCML model for a given class is similar to the MNL model presented in equation (4.8):

$$P_{iq|F} = \frac{\exp(\beta_F' \chi_{iq})}{\sum_{j=1}^J \exp(\beta_F' \chi_{jq})} \quad F=1, \dots, f \quad (4.13)$$

The parameters are estimated using maximum likelihood estimation where the number of classes,  $F$ , is given. Therefore,  $F$ , must be selected prior to estimation. Boxall and Adamowicz (2002), Greene and Hensher (2003), and Hu (2004) discuss the estimation criterion to select the number of classes. Results for the LCML model are presented in Chapter 5.

#### 4.8. Estimating Willingness to Pay

An individual's willingness-to-pay for an attribute is most often defined as the net income change equalling a change in quality or quantity of the attribute. Interpreting marginal willingness-to-pay from the utility function is thus straightforward. It is the marginal change in the price parameter required to keep utility constant following a marginal change in the quality parameter. This can be represented using the parameters from (4.8) as:

$$\text{WTP} = \frac{\beta_z}{-\beta_p} \quad (4.14)$$

Where  $\beta_z$  is the parameter estimate for the variable of interest and  $\beta_p$  is the parameter for price. In a MNL model where  $\beta_z$  and  $\beta_p$  are point estimates, WTP can be calculated directly, as specified in equation (4.14).

In a RPL model with the estimates resulting from draws from a specified distribution, the resulting WTP ratios constructed with a random parameter can be calculated in several ways. As described in Hensher *et. al.* (2005), WTP estimates can be calculated from the unconditional mean estimates for the population, or from the conditional individual parameter estimates that are conditional upon all information on each individual. Conditional WTP estimates for the population are then calculated as the average of individual conditional estimates.

Both conditional and unconditional estimates are given for the RPL model. Using conditional parameter estimates to construct WTP ratios results in a more realistic range of values representing a posterior distribution based on the revealed preferences of respondents. The unconditional estimates are presented primarily to illustrate confidence intervals for variable specific WTP. As the conditional estimates for the sample represent

an average constructed from the mean of each individual participant's conditional distribution, presenting a confidence interval based on the sample distribution is not appropriate. Thus the unconditional estimates from the RPL and LC models provide insight into the confidence of the estimates based on the standard error of the estimates. In this study, standard errors are calculated using the Delta method for non-linear models outlined in Greene (2002, pg 674) and Nilsson (2005). These estimates are presented in Chapter 5.

#### 4.9. Econometric Models to Evaluate Trust

An ordered choice model is used to evaluate how the components of trust explored in the survey influence an individual's level of trust in a particular organization. Respondents assigned each organization a rating on a five point scale to specify their level of trust in question 16 of the survey. Thus the data is of an ordered nature (1,2,3,4,5) and can be modelled according to the following choice specification from Greene (2007):

$$y_i^* = \beta' \chi_i + \varepsilon_i, \varepsilon \sim F(\varepsilon_i | \theta), E[\varepsilon_i | \chi_i] = 0, Var[\varepsilon_i | \chi_i] = 1 \quad (4.14)$$

where  $y_i^*$  = unobserved latent preference variable measuring the amount of trust individual  $i$  has in a particular organization for accurate information about farming methods

$\chi_i$  = a vector of explanatory variables describing an individual's propensity to trust, their perception of an organization's level of knowledge (question 17) and transparency (question 18), and degree that they perceive the organization to represent their best interests (question 19)

$\beta$  = a vector of parameters to be estimated and

$\varepsilon_i$  = a random error term (assumed to follow a standard normal distribution)

The discrete level of trust observed variable  $y_i$  is determined from the model as follows:

$$\begin{aligned}
 y_i &= 1 \text{ if } y_i \leq \mu_0, \text{ (not at all)} \\
 &= 2 \text{ if } \mu_0 \leq y_i \leq \mu_1 \text{ (very little)} \\
 &= 3 \text{ if } \mu_1 \leq y_i \leq \mu_2 \text{ (somewhat)} \\
 &= 4 \text{ if } \mu_2 \leq y_i \leq \mu_3 \text{ (very much)} \\
 &= 5 \text{ if } \mu_3 \leq y_i \leq \mu_4 \text{ (completely)}
 \end{aligned}
 \tag{4.15}$$

Where  $\mu$  represents thresholds to be estimated along with the parameter vector  $\beta$ . Estimates are obtained by maximum likelihood and the probabilities which enter the log likelihood function are:

$$\text{Prob}[y_i=j] = \text{Prob} [y_i \text{ is in the } j\text{th range}]
 \tag{4.16}$$

An ordered probit model was selected as the data is expected to be normally distributed. Further details on the model can be found in Greene (2002). Results of this analysis are presented in chapter 5.

#### **4.10. Summary**

This chapter outlined the methods used to carry out and analyse the Internet based consumer survey comprising the main empirical portion of the thesis. It was designed to elucidate how the organization verifying a production derived quality attribute affects consumer purchase decisions. Concurrently, it sought to assess how respondents' trust, and the nature of this trust, varied across different types of verifying organizations. Discrete choice models are used to evaluate the utility that respondents derived from various attributes in the choice experiment. Ordered probit estimation is used to evaluate the nature

of trust that respondents put in an organization. Results from these analyses are presented in the following chapter.



## 5. RESULTS OF THE CANADIAN CONSUMER SURVEY

### 5.1. Introduction

This chapter reports the results of the Canadian consumer survey administered on the Internet by Test Scoring and Questionnaire Services at the University of Alberta in June 2008. Five hundred and thirty six participants were recruited via e-mail by Leger Marketing in Edmonton from their on-line panel of Canadian consumers. Participants were asked to participate in the “food survey” only if they purchased pre-packaged sliced bread; this was done to sample only those consumers who are likely to know at what price they would substitute their normal bread for the hypothetical bread in the choice experiment. Respondents were assigned a unique identification code by the market research company to ensure anonymity and that each respondent completed the survey only once. After selecting participants’ data that appeared to represent valid responses, 120 respondents from each of the four blocks were retained for the final dataset resulting in a total sample size of 480<sup>26</sup>. Unless otherwise noted, all results presented in this section use this sample.

Results are organized as follows. First, the socio-demographic characteristics of the sample are described. Second, descriptive statistics on individual questions are presented to provide a snapshot of how respondents perceive farming methods in general. Third, the relative strengths of various quality cues are presented. Fourth, the level and determinants of trust for verification organizations are presented to show how consumers perceive

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<sup>26</sup> Respondents were removed primarily to ensure good quality data (i.e. they were removed if they did not buy bread from grains produced on the prairies -i.e. rice bread- or had an unreasonable number of don’t know/not sure responses). Following an initial sorting and selection, other participants were removed to ensure that the survey blocks retained equal numbers. These participants did not report their income, or their postal code. Not all respondents who did not report their income were removed as initial regressions found income to be an insignificant variable.

different types of organizations. Lastly, results from the discrete choice experiment are described to show the value that consumers assign to various attributes.

## **5.2. Results Interpretation**

This thesis focuses on food quality from farming methods, though it is important to place this investigation relative to the plethora of other types of food quality that interest consumers. To understand the importance of the information revealed in the following section, it is best considered in light of past studies looking at food quality more generally. Two recent studies by Ipsos-Reid (2006) and the Canadian Federation of Agriculture (2007) shed light on the relative importance of farming methods as a component of food quality for Canadians.

Ipsos-Reid (2006) reports that consumers consider factors influencing their food purchases in various tiers; nutritional value, safety, and taste ranked as the top three components respectively, followed by factors such as environmentally responsible production and country of origin. Price followed all of these factors. The CFA reports consumers' *top of mind* concerns with grain and grain products specifically; they found that price, freshness, and healthfulness were sequentially the most important factors driving purchases of grain products. These approximations represent averages across the general population and do not account for segments of consumers with strong preferences. The Ipsos Reid survey, for example, finds that 16% of Canadians are concerned natural food buyers seeking premium quality foods coming from natural/organic production methods – and they are willing to pay premium for these methods. Thus, the results presented in this thesis aim to elucidate not only the effects across the sample, but the magnitude of these

effects among those most interested in food quality arising from alternative farming methods.

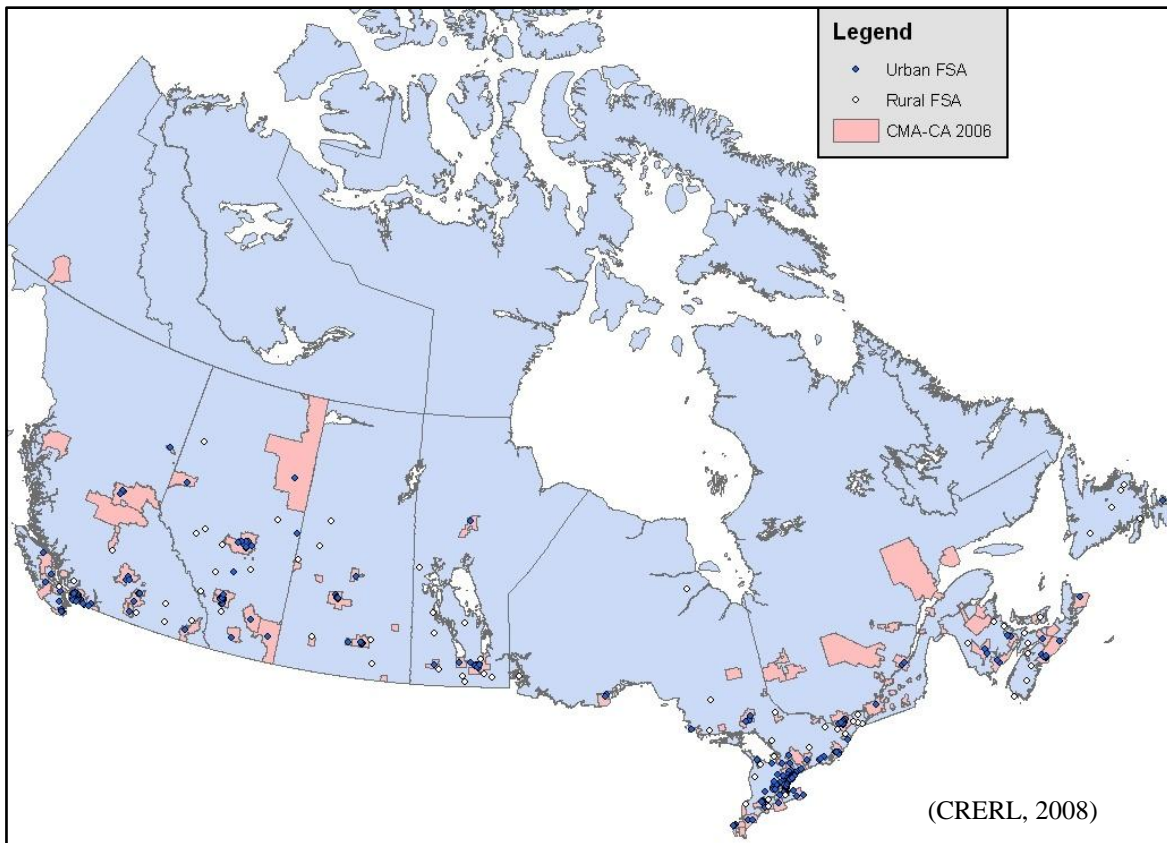
### **5.3. Sample Characteristics**

Participants in the survey sample are reasonably well distributed geographically across the country with the exception of very few respondents from Quebec, as shown in Figure 5.1. This is expected as the survey was only available in English and the majority of Quebecois speak French. Logistical and practical challenges prevented the survey from being administered in French. Thus the results of the survey should be interpreted to be representative of English speaking Canadians only. The sample is also representative of the number of Canadians living in a rural/urban setting, with 81% coming from a forward sortation area<sup>27</sup> contained by a census metropolitan area or census agglomeration<sup>28</sup>; 80% of Canadians live in urban areas (Statistics Canada, 2008<sup>a</sup>). This is depicted visually in Figure 5.1 with white dots representing respondents from a rural forward sortation area and blue dots representing those from an urban forward sortation area.

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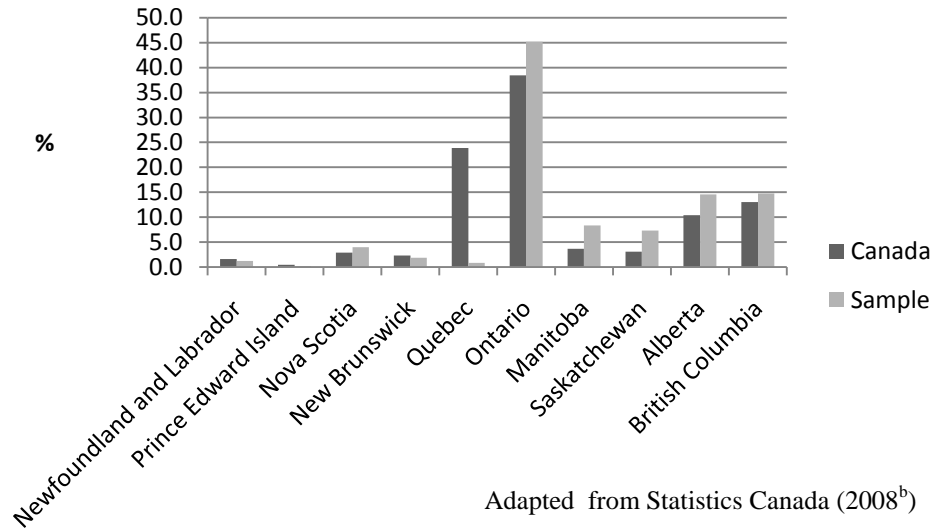
<sup>27</sup> An area defined by the first three letters of a respondent's postal code (n=468)

<sup>28</sup> A census metropolitan area and a census agglomeration are defined by Statistics Canada as consisting of one or more adjacent municipalities situated around a major urban core. To form a census metropolitan area, the urban core must have a population of at least 100,000. To form a census agglomeration, the urban core must have a population of at least 10,000.



**Figure 5.1 Visual representation of the distribution of survey respondents**

In addition to being well distributed across the country, respondents are also distributed similarly to the Canadian population. Figure 5.2 shows the percentage breakdown of the sample by province relative to the Canadian population. The figure shows that Quebec is predictably underrepresented while the other provinces are consequently overrepresented. Upon inspection it appears however that the sample maintains a reasonable distribution between provinces in proportion to their share of the national population. There were no respondents from Yukon, Northwest or Nunavut Territories; however this is not a serious concern as their combined population represents only 0.32 % of the Canadian population (Statistics Canada, 2008<sup>b</sup>).



**Figure 5.2 Origin of respondents by province compared to the Canadian population**

Socio-demographic characteristics of respondents were collected and are presented in Table 5.1. The sample is representative of the Canadian population in age, household size, number of children in household and sex. As expected, the sample is slightly more educated than the Canadian population; Internet surveys are prone to attract more educated respondents (Andrews *et. al.* 2003).

**Table 5.31 Socio-demographic characteristics of respondents**

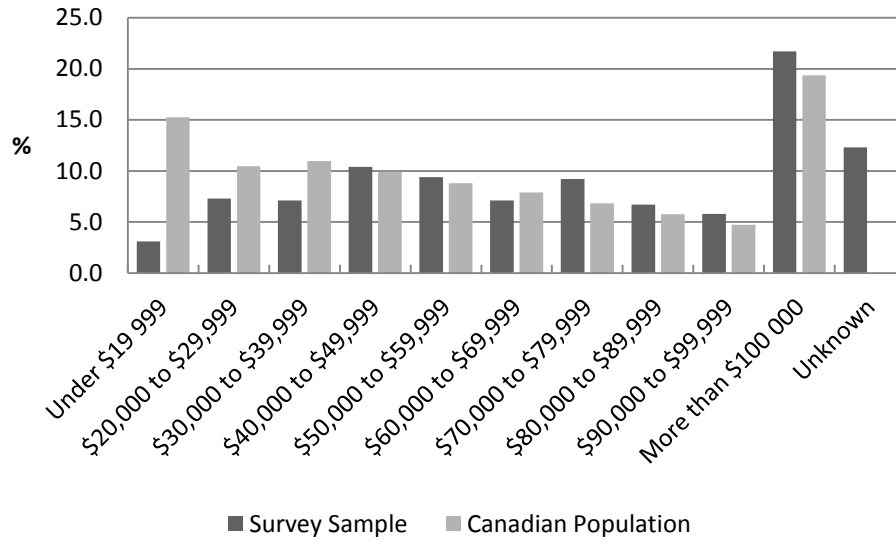
Characteristic	Sample Mean	Canadian Population
Age	47.2	45.7 <sup>1</sup>
Household Size	2.61	2.49
Number of Children in Household	0.56	0.55
Female (percent)	56.2	51.1 <sup>1</sup>
Education- (% in each class) <sup>2</sup>		
Less than High School	3.6	20.0
High School Graduate	39.2	36.7
University/College Graduate	45.4	36.0
Graduate School	11.8	7.1

<sup>1</sup>For Canadians between 19-80, the age range represented in the sample

<sup>2</sup>For Canadians 20+

(adapted from Statistics Canada, 2008<sup>b</sup>)

Lastly, the annual household income of respondents was similar to the Canadian population, as shown in Figure 5.3. As expected, the sample is slightly biased against those with lower incomes as shown most prominently by the categories on the left representing those making less than \$39 999 per year. Using a z test for proportions (Sirkin, 2006), the sample contains a significantly larger percentage of respondents with an annual household income less than \$39 999 and between \$70 000 and \$79 000 than the Canadian population. However, the remainder of the sample is reasonably representative of the Canadian population with respect to income as shown by the similar height of the remaining bars.



**Figure 5.3 Annual household income of respondents compared to the Canadian population**

(adapted from Statistics Canada, 2008<sup>b</sup>)

Overall, the evidence presented above suggests that the sample has similar socio-demographic characteristics to English-speaking Canadians. It is notably slightly more educated and has a slightly higher income level. A random sample of 480 respondents accurately represents the responses of English-speaking Canadians given the same survey within 4.5% of the population mean, 95% of the time according to Louviere *et.al.* (2000)<sup>29</sup>. While some bias may exist because respondents are members of a consumer panel, there is no *a priori* expectation for the direction of this bias in the current study. Thus the oversampling of high income and highly educated participants notwithstanding, the current sample is a reasonable approximation of a random sample of Canadians.

#### 5.4. Providing Context to Evaluate Production-Derived Quality Verification

Initial survey questions assessed participants' priorities when purchasing food and their perceptions and knowledge about farming practices. The following descriptive

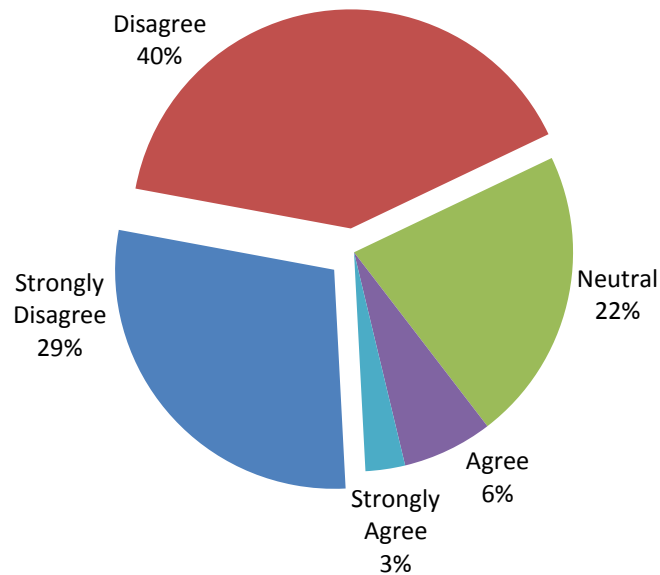
<sup>29</sup> Given a true population mean of 0.5, representative of no *a priori* expectations

statistics serve to determine the percentage of consumers likely to be interested in alternative farming methods. They provide a point of departure to evaluate the effect of different verifying organizations for alternative farming methods. All questions were presented as statements to which respondents could state their level of agreement on a five point Likert scale.

#### ***5.4.1. Perceptions about Farming Methods***

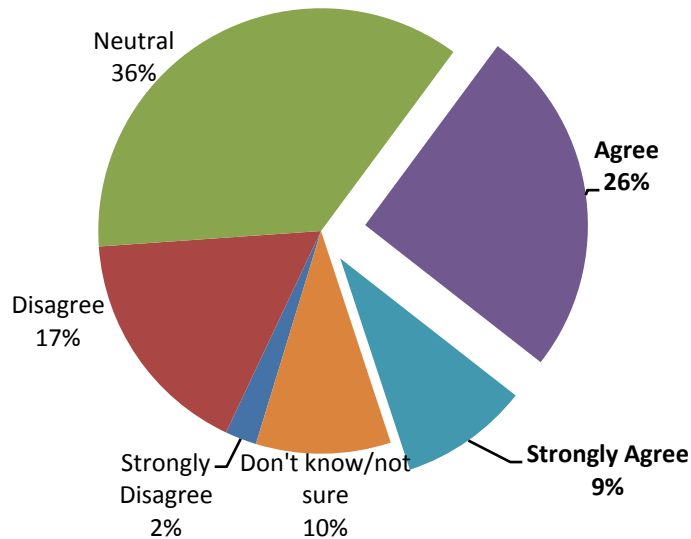
Consumers caring about the farming methods used to produce their food can be considered as a necessary condition for them to purchase foods containing attributes coming from alternative farming methods. Figure 5.4 reports the responses to a statement regarding respondents' interest in farming methods. Respondents disagreeing with the statement represent 69% of the sample. Further, 29% of respondents strongly disagreed with this statement suggesting that they are keenly interested in how their food is produced. This means that at most, 70% of the sample would be interested in purchasing food from alternative farming methods, and of these 30% are most likely to be interested. From these results it is evident that a significant number of people are interested in the farming methods used to produce their foods, though the reasons why they see them as important are not revealed.





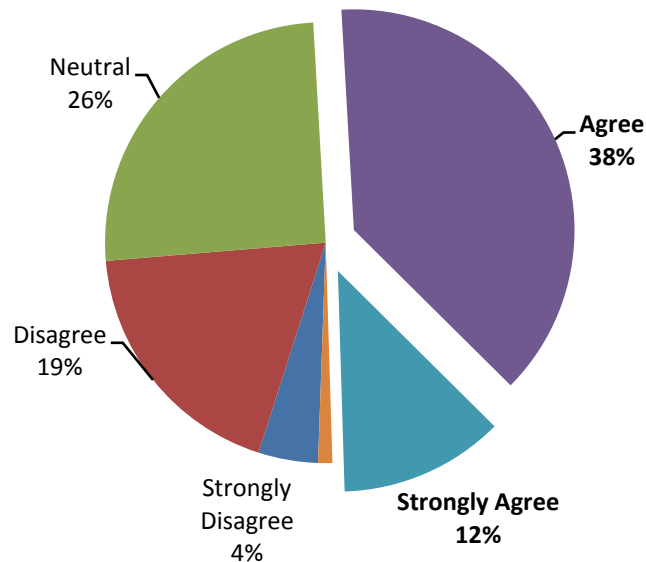
**Figure 5.4 Responses to question 4a, “I don’t care about the farming methods used to produce my food”**

Possible explanations for why people see farming methods as important include their impact on the environment and human health. Both are increasingly prevalent in public discourse and were included as attributes in the choice experiment. To gauge how respondents viewed the environmental impact of current farming methods, they were asked to agree or disagree with the statement “current farming methods are harmful to the environment.” As shown below in Figure 5.5, 35% of respondents either agreed or strongly agreed with this statement. While a considerable number of people were either neutral or not sure (35%), the amount of people agreeing with the statement shows that, when prompted, some people clearly see current agricultural methods as unsustainable environmentally. Participants agreeing outnumbered those disagreeing with the statement by more than two to one, reinforcing the relevance of the environmentally sustainable attribute in the choice experiment.



**Figure 5.5 Responses to question 4c, “Current farming methods are harmful to the environment”**

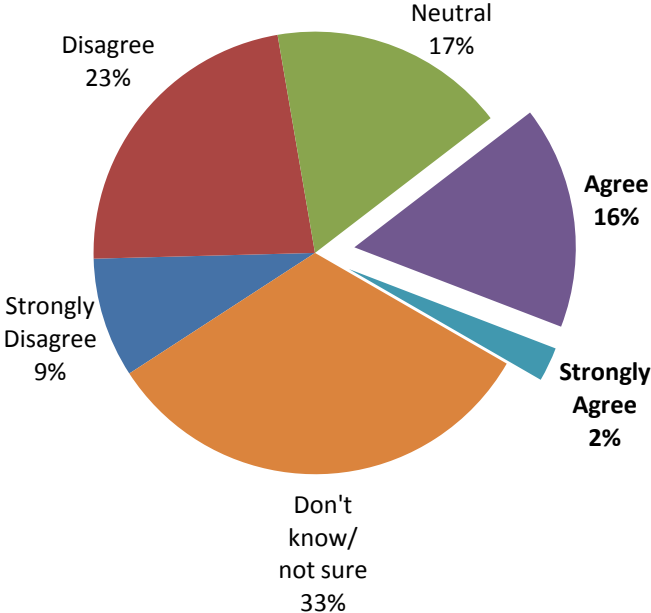
The other production-derived attribute in the choice experiment was that the grains in the bread were produced without the use of chemical pesticides. To gauge the importance of this attribute vis-à-vis human health in food purchases, respondents were asked to state the degree to which they agreed with the statement, “I consider the human health effects caused by pesticide use when I purchase food.” Figure 5.6 illustrates below that 50% of respondents claim they think about the human health effects of pesticide use when purchasing food – more than twice the number of those who disagree/strongly disagree with the statement, though it is not clear if these concerns are based on knowledge of current farming methods.



**Figure 5.6 Responses to question 5a, “I consider the human health effects caused by pesticide use when I purchase food”**

Canadian consumers are widely regarded to have limited knowledge about agricultural production (Ipsos Reid, 2006; CFA, 2007). Pesticide application is regulated by the provinces in Canada. As such it was difficult to gauge respondents’ knowledge of current farming methods by asking questions relating to pesticide application requirements across a national sample. Instead, respondents were asked to state the strength of their agreement with the statement: “farmers are permitted to apply pesticide to grains as many times as they need to.” Those agreeing with this statement correctly identified that there are no restrictions on the number of times that farmers can apply pesticides according to the guidelines printed on the label of each chemical. As expected, only 18% of respondents correctly answered the question, with the majority (50%) unsure or neutral as shown below in Figure 5.7. This implies that although half of participants considered the health effects of pesticide use, only one fifth of them were knowledgeable about current pesticide regulation. It is unclear whether respondents who consider the health effects of pesticide use while making purchase decisions do so because they are unaware of how pesticide use is

regulated or believe that farmers apply them liberally at their leisure. In any case, it appears that few people correctly understand pesticide regulation in Canada.

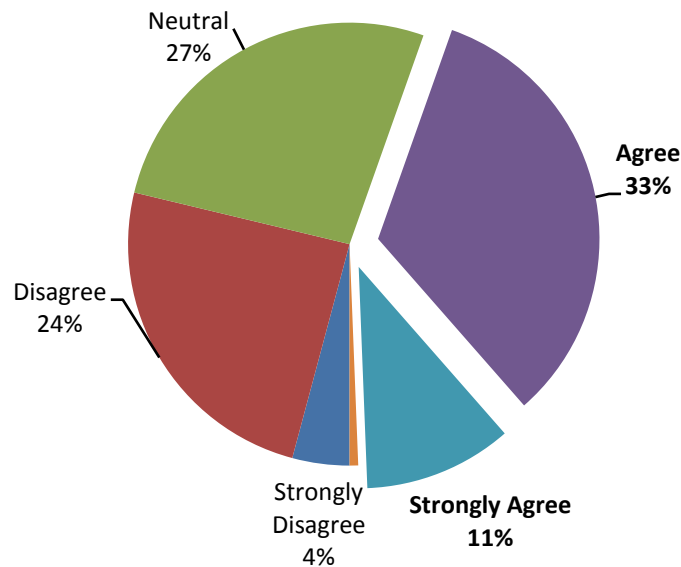


**Figure 5.7 Responses to question 4e, “Farmers are permitted to apply pesticide to grains as many times as they need to.”**

**5.4.2. Relevance of Process Labels**

The preceding results underscore that a segment of the population is interested in credence quality characteristics coming from farming methods. Information on food labels is frequently used to alleviate information asymmetry inherent with credence attributes. To determine the usefulness of these labels, it is necessary to know whether consumers actually notice them. People can be interested in these attributes but if they do not notice the primary tool to communicate these attributes, consumers will be less likely to purchase products containing these attributes. Thus, respondents were asked to rate their strength of agreement with the statement:”I pay attention to labels describing how food was produced

and traded when I purchase food.” The results to this question are show below in Figure 5.8.



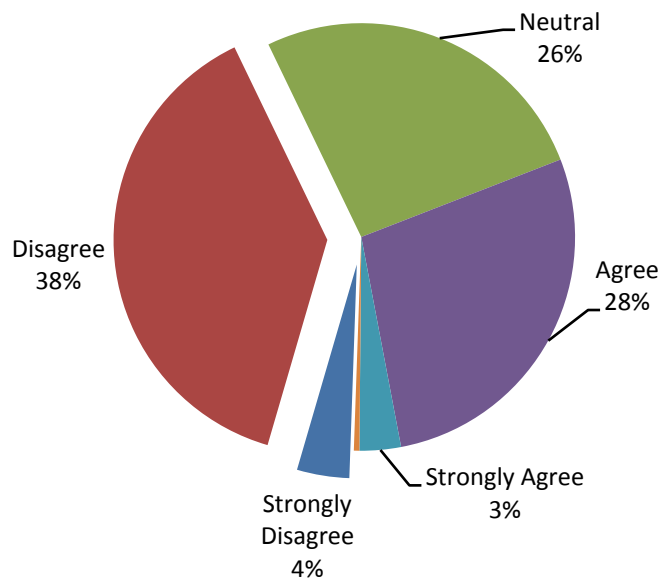
**Figure 5.8 Responses to question 5c, “I pay attention to labels describing how food was produced and traded when I purchase food.”**

Figure 5.8 shows that 44% of respondents agree/strongly agree that they notice food labels describing how their food was produced or traded. The sub-sample of respondents who care about how their food is produced revealed a similar percentage (38.5%). It is unclear how accurately these results represent respondent behaviour in real market scenarios – *i.e.* do these people really notice these labels. Given the relative infancy of process labels on the market, respondents were also asked to state their strength of agreement with the statement: “I regularly read nutritional labels on the food I purchase.” Supporting the results presented in Figure 5.8, 75% of respondents either agreed/strongly agreed with this statement. This suggests that labels identifying process characteristics from

alternative farming methods may be a reasonably effective way to alleviate information asymmetry if people believe the information they read.

### 5.4.3. Do People Trust Labels?

As highlighted in the theoretical framework in Chapter 2 and again in Chapter 4, labels will only be effective at alleviating information asymmetry if they are trusted by consumers. To assess the level of trust that consumers have in food labels, respondents were asked to state the extent they agreed with the following statement: "I always believe information on food labels." The responses to this question are shown below in Figure 5.9.



**Figure 5.9 Responses to question 4d, "I always believe information on food labels"**

Figure 5.9 shows that a significant number of people do not trust that the information on food labels is always accurate: the number of respondents who disagree/strongly disagree (42%) is higher than those who agree/strongly agree (31%). To examine if those interested in production-derived characteristics differ in their likelihood to trust food labels, responses to this question were also examined for the subsample of

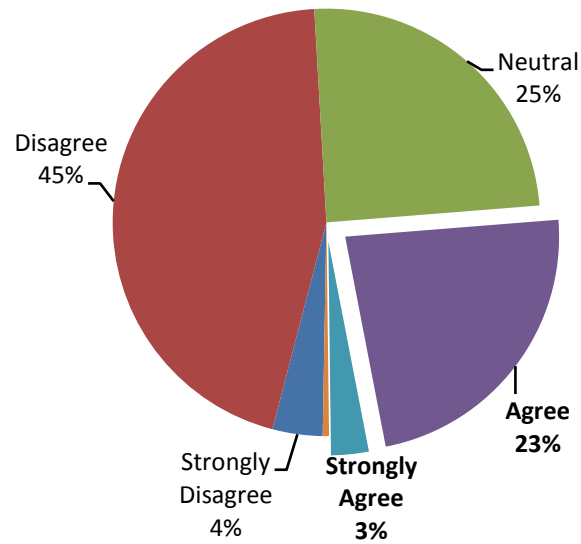
respondents who notice labels describing how their food was produced or traded. Similar results were found, with 40% of the subsample disagreeing/strongly disagreeing with the statement compared to 25% who were in agreement/strongly in agreement. Given that current federal regulations prohibit false or misleading information<sup>30</sup>, it is clear that for credence attributes to be successfully communicated, a more stringent and better communicated system of quality verification is needed than current labelling enforcement. A Canadian example of this type of quality monitoring and verification is organic products whereby they are certified and labelled according to a specific standard. A harmonized National Standard for Organic Production Systems was introduced in 2006 but will not be mandatory until fully implemented in December 2008. As such, at the time of the survey organic food products were frequently labelled and certified to a standard, though the standard was not uniform across certifiers.

#### ***5.4.4. Evidence from Organic***

To gauge the ability of a quality assurance system to increase consumer confidence in labels, respondents were asked if they avoid purchasing organic products because they didn't believe they were organic. Responses to this question are presented below in Figure 5.10.

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<sup>30</sup> The federal Consumer Packaging and Labelling Act 7(1) states that no one may sell, import, or advertise “any pre-packaged product that has applied to it a label that contains any false or misleading representation relating to or that may reasonably be regarded as relating to that product”



**Figure 5.10 Responses to question 5f, “I avoid purchasing organic products because I question if they are organic.”**

As shown above, 26% of respondents indicated they have avoided organic products because they didn't believe they were organic. Evidently there is a considerable amount of distrust in labels even if they are likely to be accompanied by a quality assurance system. It is unclear what percentage of potential purchases has been affected by consumers not believing that products were indeed organic; those respondents who disagree may not ever purchase organic. These results indicate that even when a quality assurance system is endorsed by government and operated by third party organizations, a significant amount of distrust in the presence of credence attributes will continue to exist. The extent that trust in organic labelling can be improved with consistent standards, recognized logos and mandatory certification will be clear following the implementation of the new National Standard for Organic Production Systems in late 2008. As outlined in Chapter 2, a consistent label and standard should serve as a more accurate quality signal; more visible government endorsement of this farming method via the national standard is likely to

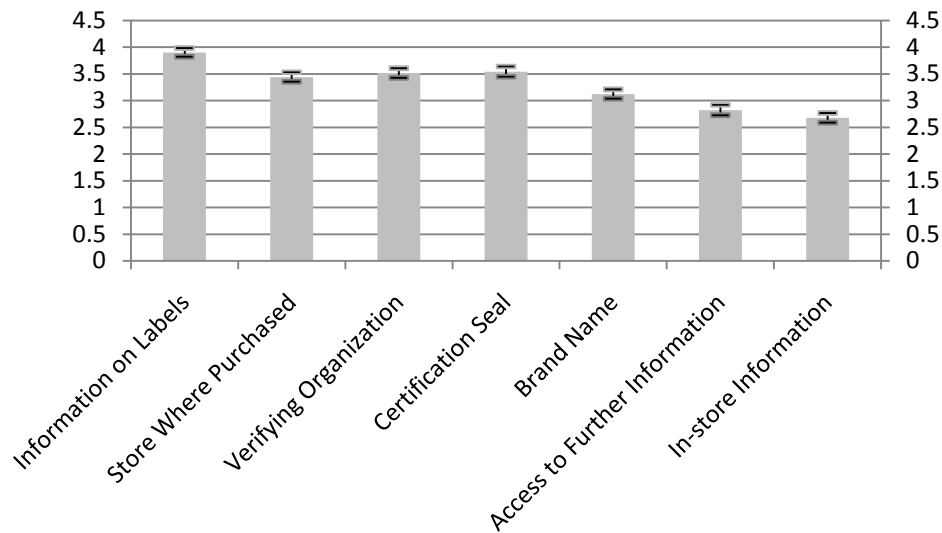


change the normative views of society towards organic farming more generally. Further if consumers know that all products labelled as organic must be certified, they are more likely to believe organic labels.

The descriptive statistics outlined above provide a preliminary indication that a sizable portion of respondents are interested in the farming methods used to produce their food and that pesticide use is of concern to consumers. A significant portion of respondents also viewed current farming methods as harmful to the environment. The results indicate that labels may be an effective means to communicate production-derived quality, though achieving a high level of trust may be difficult. Evidence from the current organic market suggests that this persists even when the labels are accompanied by a quality assurance program that is not mandatory, easily recognized or conforming to a common standard. The following section looks at the importance of labels to signal product quality relative to other potential signals.

### **5.5. Signaling Product Quality**

Following Figure 4.1 that outlined various factors affecting the strength of a quality signal for production-derived attributes, labels are just one way that firms may signal credence characteristics. Chapter 2 examined research demonstrating that brand, reputation and certification can be effective quality cues for credence attributes. Interviews in Chapter 3 highlighted the importance of information available at the point of purchase in communicating production-derived quality. Results presented below in Figure 5.11 attempt to capture the relative importance of these various quality signals. The figure shows how important each quality signal was to respondents' confidence in the quality of a food product.



where 1=unimportant and 5=extremely important

**Figure 5.11 Mean importance ratings of food quality signals with 95 percent confidence intervals<sup>31</sup>**

Figure 5.11 shows that the information on the label is the most important of these factors in providing respondents with confidence in the quality of their food. Next in importance were the store where the product was purchased, verifying organization, and certification seals, which were all statistically equal quality cues. These results are congruent with those of the interviews that concluded labels are the most important way that food quality can be communicated. It is also evident from the above figure that the organization behind a certification is just as important as the presence of a seal signifying the certification. This clarifies conflicting messages from the interviews regarding consumer interest in the certification organization and affirms that the verifying organization is an important quality signal. Given that results presented previously showed a significant number of people distrust labels, the importance of verifying organization

<sup>31</sup> Confidence intervals, shown as the black horizontal lines, represent the interval that the mean value for all samples of the population will fall into 95% of the time. In other words, we are 95% confident that the population mean falls within this interval.

means that it may be a quality signal in its own right, and/or it may influence the truthfulness of labels in the minds of consumers.

The results presented in Figure 5.11 also show that a brand name, access to further information, or information at in-store displays are not as important as other factors in signalling food quality to consumers. While specific brands may signal quality to consumers because of their reputation, brand names *per se* were not as important as the other factors. The relatively low importance of access to further information is also consistent with the industry interview results. Interviewees consistently stated that further information on websites was less important than other quality cues such as labels. Combining the evidence presented in section 5.4 with that in the current section means that consumers notice labels describing how food products were produced and traded, and perceive the verifying organization and certification seal as similarly important in signaling quality. Evidence in section 5.4 also highlighted that there was a significant amount of distrust in food labels and organic certification, though the influence of the organization associated with this information/certification has not been examined. The following section explores how respondents view various organizations as sources of information about farming methods.

## **5.6. Exploring Perceptions of Verification Organizations**

Recalling the model presented in Figure 4.1, consumers' trust in an organization associated with a quality assurance system is expected to impact consumer confidence in the quality attribute. To explore how Canadians view organizations that may be involved in quality assurance systems for farming methods, respondents were asked several questions

relating to standard efficacy, trust to provide accurate information, and the nature of trust across various organizations.

The results presented are representative of the nature of an organizational type, rather than a specific organization – *i.e.* it assesses supermarkets generally rather than Sobeys or Whole Foods Market for example. As such, the results should be interpreted as an average across all organizations within a specified type. Individual organizations presumably can alter how they are perceived over time by developing their reputation/image. The effort required to build an organization’s reputation and the amount that a specific organization’s reputation will differ from other organizations of similar type is difficult to assess. As such, the following provides a snapshot of current consumer perceptions towards types of organizations generally to inform the discussion about their role in quality assurance for production-derived quality.

#### ***5.6.1. Perceived Efficacy of an Environmentally Sustainable Standard***

As mentioned in Chapter 3, there has been increased consumer interest in products produced in an environmentally sustainable way. However, there are many different organizations certifying such claims according to various standards. The survey revealed how effective respondents would perceive a standard to be if it was created by various types of organizations. Respondents were asked: “How effective would an environmentally sustainable standard created by the following organizations be?” The mean values for respondents<sup>32</sup> are presented in Table 5.2.

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<sup>32</sup> n ranges from 464 to 469 as some respondents answered “don’t know/not sure”

**Table 5.62 Mean values representing an organization’s ability to create an effective environmentally sustainable standard**

Mean values (sd) by organization type					
Values with different superscripts are significantly different (P≤0.05)					
	Government	Third Party	Processor	Farmer	Supermarket
How effective would an environmentally sustainable standard be that was created by... <sup>1</sup>	3.29 <sup>a</sup> (0.95)	3.14 <sup>b</sup> (1.02)	2.62 <sup>d</sup> (0.93)	2.93 <sup>c</sup> (0.99)	2.35 <sup>e</sup> (0.92)

<sup>1</sup>Evaluated using a five point visual analogue scale where 1=ineffective, 2=slightly effective, 3=moderately effective, 4=very effective, and 5=extremely effective.

Results presented in the above table show that respondents clearly delineated the ability of various organization types to create an effective standard; all values are significantly different from each other. Respondents saw government as the organization that would create the most effective standard. Third party organizations were ranked second. Recalling the discussion in Chapters 2 and 3, the confidence that respondents expressed in government may relate to the extensive consultation that governments frequently engage in prior to policy making. Governments’ broad objective to maximize social welfare rather than maximizing profit means they should represent the interests of a broad group of stakeholders – including consumer interests. The other types of organizations included in the question have no such operational requirement, and as such, respondents may not perceive standards they have created as being in the interest of consumers, or the environment. For example, they may serve the interests of the organization, but in reality be ineffectual – e.g. an organization may have an environmentally sustainable standard that necessitates recycling, though it does not

encompass the amount of paper used. The high confidence in government to set an effective standard is congruent with the findings of Cranfield *et. al.* (2007) who found that a sample of Ontario consumers had a significantly higher preference for organic standards set by a government agency compared to a farmer controlled standard or those of other private organizations.

Perhaps most informative from the above results is that a standard created by a supermarket was perceived as being least effective. Considering that Whole Foods Markets, the large natural and organic products retailer, has invested considerable energy into standard creation, the results suggest that people may view these standards as inherently ineffectual. The more Whole Foods Markets establishes a credible reputation to differentiate itself from other food retailers, the less this would apply. The ability and ease for a particular food retailer to develop a credible reputation is important in determining the role different organizations best play in quality assurance for production-derived attributes. The following section will explore how Canadians trust various organization types for accurate information about farming methods.

### ***5.6.2. Trust and the Nature of Trust in Organizations***

Similar to the perception that some types of organizations will create more effective standards, is the perception that some types of organizations will make more truthful claims about farming methods. To evaluate how different types of organizations were perceived by Canadians, participants were queried about the level and nature of trust that they put in various organizations to provide accurate information about farming methods. Based on the industry interviews in Chapter 3 and previous research presented in Chapter 2 (Frewer *et al.* 2005), respondents were asked to evaluate three factors hypothesized to influence their trust

in an organization to provide information about farming methods. These included an organization's knowledge, transparency and accountability, and the extent that they represented the respondents' best interests. Table 5.3 shows the mean values for respondents' ratings to these questions.

**Table 5.3 Perceived ability of organization type to provide “accurate information about farming methods”**

Mean values (sd) by organization type <sup>3</sup>					
Values with different superscripts are significantly different (P≤0.05)					
Questions preceded by, “To what extent...”	Government	Third Party	Processor	Farmer	Supermarket
Do you <b>Trust...</b> <sup>1</sup>	3.16 <sup>a</sup> (0.891)	3.28 <sup>a</sup> (0.875)	2.65 <sup>b</sup> (0.835)	3.13 <sup>a</sup> (0.878)	2.57 <sup>b</sup> (0.827)
Are they <b>Knowledgeable</b> ... <sup>1</sup>	3.19 <sup>b</sup> (0.905)	3.08 <sup>b</sup> (0.856)	2.89 <sup>c</sup> (0.795)	4.19 <sup>a</sup> (0.787)	2.37 <sup>d</sup> (0.834)
Are they <b>Transparent and Accountable...</b> <sup>1</sup>	2.85 <sup>b</sup> (0.956)	3.06 <sup>a</sup> (0.931)	2.54 <sup>c</sup> (0.842)	3.18 <sup>a</sup> (0.951)	2.38 <sup>d</sup> (0.881)
Do they act according to your <b>Best Interests...</b> <sup>2</sup>	3.23 <sup>a</sup> (0.894)	3.34 <sup>a</sup> (0.837)	2.79 <sup>b</sup> (0.830)	3.33 <sup>a</sup> (0.862)	2.72 <sup>b</sup> (0.898)

<sup>1</sup>Evaluated using a five point visual analogue scale where 1=not at all, 2=very little, 3=somewhat, 4=very much, and 5=completely.

<sup>2</sup>Evaluated using a five point visual analogue scale where 1=never, 2=rarely, 3=sometimes, 4=usually, and 5=always.

<sup>3</sup>Participants answering “don’t know/not sure” were excluded from the above calculations. Thus the number of respondents ranges from 446 to 479 out of the sample (n=480).

Table 5.3 shows respondents placed similar amounts of trust in government, third party, and farmers to provide accurate information about farming methods. Food processors and supermarkets were similarly less trusted. Farmer organizations ranked the highest, with ratings for all categories being the highest, or statistically equal to the highest ratings. Also



of interest in the above table is that government and third party organizations received similar rankings across the categories with respondents revealing no clear preference between them. From this evidence, it appears that labels associated with government or third party verifications would be similarly trusted – the results of the discrete choice experiment will provide further evidence. Similar to Table 5.2, food processors and supermarkets were ranked lower than other organizations, implying that in order to obtain similar levels of public trust, individual supermarket and food processing companies must proactively develop positive reputations. The above results imply that there is not one type of organization that is best suited to verify production-derived quality. Indeed, farmer, government, and third party organizations are perceived similarly by respondents.

These results can be compared to those found by Frewer *et al.* (2005) when they used similarly constructed questions to evaluate the role for different organizations in animal welfare regulation in the Netherlands. They found respondents consistently ranked farmers highest across all trust factors, followed sequentially by government and supermarkets. It is unclear why respondents ranked farmers higher in their study on animal welfare, though it is possible that farmers are more trusted in the Netherlands, or farmers are more trusted on matters of animal husbandry than farming methods generally. A notable departure from Frewer *et al.*(2005), however, is that the current sample shows government and farmers to similarly represent respondents' best interests in providing accurate information about farming methods, while their results showed government scored lowest on this indicator. This provides evidence for the anecdotal assumption that Canadians broadly speaking see government as a benevolent institution.

While the results in Table 5.3 provide an indication of how Canadians perceive the actions of organizations and the extent they trust these organizations for accurate information, they do not explain why respondents trust these organizations. To elucidate how each of the hypothesized components of trust affects the likelihood of a respondent to trust an organization, the results were analysed in an ordered choice framework using the approach explained in section 4.9.

### ***5.6.3. Explaining Respondents' Trust in Organizations***

Understanding why consumers trust organizations for accurate information will help indicate how difficult this trust is to attain and the robustness of consumer trust to negative events. Using the data from the questions described in Table 5.3, an ordered probit analysis was performed to identify how the extent to which an organization is knowledgeable, transparent and accountable, and acts in consumers' best interests relates to consumer trust in that organization for accurate information about farming methods. Separate regressions for the five organizations reveal the importance of each factor to a respondent's degree of trust in a particular organization. This allows a comparison of the relative importance of each trust component to the perceived trustworthiness of each generic organization across all organizational types.

The dependant variables for the five regressions represent the degree of trust respondents put in various organizations for accurate information about farming methods and were treated as ordinal data from 0-4 (0=not at all,1=very little,...4=completely). Independent variables are the responses to the questions assessing each organization's knowledge, transparency, and best interests as outlined in the previous table (1,2...5 as described in Table 5.3). Responses to these questions were treated as continuous and

assumed to be linear. For example, the difference between a “not at all” response and a “very little” response is assumed to be the same as the difference between the response “very little” and the response “somewhat”. A composite variable measuring the trusting nature of respondents was also included as an independent variable to control for naturally trusting individuals. This variable was constructed by principle component analysis using the software SPSS (2007); the questions and weighting used to construct this variable are included in Appendix E.

Regression results for the model are included in Appendix F and show that all models are reasonably good fits with pseudo  $R^2$  ranging from 0.239 to 0.335. All parameters are significant and of the expected sign with the exception of the composite trust variable for third party organizations, which unexpectedly is negative. As the ordered probit model is a nonlinear model, the parameters are most appropriately interpreted as marginal effects. The marginal effects for each of the hypothesized trust factors are presented in Table 5.4 and represent the change in probability of selecting a given level of trust by increasing one from the mean for each independent variable. Numbers representing the greatest positive changes in selecting a given level of trust are bold for clarity. The larger the value, the more the associated factor influences a respondent’s propensity to trust an organization

**Table 5.4 Marginal effects on the probability of selecting a given level of trust**

Change in Probability of Selecting Level of Trust						Mean
	Not at All (0)	Very Little (1)	Somewhat (2)	Very Much (3)	Completely (4)	
<b>Government</b>						
Knowledge	-0.005	-0.106	-0.1409	<b>0.2431</b>	0.009	3.192
Transparent and	-0.003	-0.050	-0.0668	<b>0.1153</b>	0.0042	2.854
Accountable						
Best Interest	-0.003	-0.059	-0.0785	<b>0.1354</b>	0.005	3.231
<b>Third Party</b>						
Knowledge	-0.005	-0.069	-0.174	<b>0.235</b>	0.013	3.077
Transparent and	-0.003	-0.047	-0.118	<b>0.160</b>	0.009	3.052
Accountable						
Best Interest	-0.004	-0.053	-0.133	<b>0.180</b>	0.010	3.329
<b>Processor</b>						
Knowledge	-0.015	-0.083	<b>0.072</b>	0.025	0.001 <sup>**</sup>	2.887
Transparent and	-0.025	-0.132	<b>0.116</b>	0.040	0.002	2.558
Accountable						
Best Interest	-0.043	-0.231	<b>0.201</b>	0.069	0.003	2.790
<b>Farmer</b>						
Knowledge	-0.003 <sup>*</sup>	-0.029 <sup>**</sup>	-0.020 <sup>*</sup>	0.048 <sup>**</sup>	0.004 <sup>*</sup>	4.190
Transparent and	-0.011	-0.125	-0.085	<b>0.206</b>	0.015	3.175
Accountable						
Best Interest	-0.008	-0.093	-0.063	<b>0.153</b>	0.012	3.327
<b>Supermarket</b>						
Knowledge	-0.025	-0.230	<b>0.228</b>	0.027	0.000 <sup>**</sup>	2.375
Transparent and	-0.019	-0.172	<b>0.170</b>	0.020	0.000 <sup>**</sup>	2.413
Accountable						
Best Interest	-0.022	-0.199	<b>0.197</b>	0.023	0.000 <sup>**</sup>	2.721

<sup>\*</sup>, <sup>\*\*</sup>, denote significance at the 10 percent and 5 percent levels respectively. All other values are significant at the 1% level.

From the above table, the examined factors of trust are evidently not of equal importance to respondents' perceptions of an organization as a trustworthy information source for farming methods. Perceived knowledge is more important in predicting respondents' trust for government, third party organizations, and supermarkets than, for example, food processors or farmers. This means, for example, that if a supermarket is perceived to be knowledgeable about farming methods, it is more likely to be trusted than a supermarket that does not exhibit this knowledge. Similarly, respondents perceiving government or third party organizations to be more knowledgeable are more likely to express a higher level of trust in these organizations. The results provide an indication of how sensitive respondents' trust ratings of an organization are to changes in their perceptions of an organization's competencies.

The largest values in Table 5.4 indicate factors that most influence a respondent's propensity to trust an organization. As such they represent an opportunity for an individual organization of a specified type to increase the amount of trust that consumers put in them by altering how these facets of their organizations are perceived. For example, the relatively high values of "best interest" for processor and supermarket imply that if a food retailer can build a reputation for acting in the best interests of its customers, then it will be a more trusted information source. To some extent, this is echoed in the marketplace as demonstrated by Whole Foods Markets as it emphasizes that it values the health, happiness, and wellbeing of its customers and has built its brand image around being a source of "natural", "organic", and "whole" foods (Whole Foods Markets, 2008). This is also reminiscent of comments made by John Raiche (United Natural Foods) in Chapter 3 about how the best way to be a credible information source is for an organization to

communicate its values to the customer rather than create a quality assurance scheme. The above results suggest that food processors, in particular, become more trusted when they are perceived to represent consumers' best interests.

While Table 5.4 provides an indication of the sensitivity of respondents' trust in an organization according to the explored factors, it does not reveal how sensitive/robust these factors themselves are to outside shocks. To fully understand how much effort is required for specific organizations to attain equal levels of consumer trust would require a much more complex data collection exercise to encapsulate various events that build or deteriorate trust. The data presented above serve primarily to suggest areas that have the greatest impact on consumer trust in an organization to provide accurate information about farming methods. Trust in government and third party organizations is likely to be most affected by consumers' perception of their knowledge. Trust in farmers is likely most affected by their perceived transparency and accountability. Trust in a food processor is likely most affected by the extent they are seen to represent consumers' best interests.

Having explored how respondents perceive different types of organizations to create and accurately communicate effective standards, the following section examines how these perceptions affect a simulated purchase decision. It focuses on the results of the discrete choice experiment that reveals respondent willingness to pay for quality verification from various organizations.

### **5.7. Choice Experiment Results**

The results of the choice experiment provide insight into how respondents value attributes when making a discrete choice among products. Multinomial logit models have traditionally been used to model discrete choice; however as discussed in Chapter 4 they do

not easily accommodate preference heterogeneity. Consumer preferences are widely regarded to be heterogeneous, though the form of this heterogeneity is often unknown. To show the effect of this heterogeneity on the parameter estimates, results from Random Parameter Logit (RPL) and Latent Class Multinomial Logit (LCML) models are presented in this section. Comparing these estimates allows the reader to assess the impact of assumptions made during the modelling process on the results. Variables used in the choice models are described in Table 5.5. Additionally, socio demographic and psychographic variables that significantly explained sources of preference heterogeneity are also described in Table 5.5.

**Table 5.5 Variable descriptions for the discrete choice analysis**

<b>Choice Variable</b>	<b>Code</b>	<b>Description</b>
Environmentally Sustainable	SUS	Dummy =1 if grains were produced in an environmentally sustainable manner
Pesticide Free	PES	Dummy=1 if grains were produced without the use of chemical pesticides
Government Verified	GOV	Effects coded dummy=1 if grains were verified by government to contain at least one of SUS or PES
Farmer Verified	FAR	Effects coded dummy=1 if grains were verified by the farmer or a farm organization to contain at least one of SUS or PES
Third Party Verified	THI	Effects coded dummy=1 if grains were verified by a third party to contain at least one of SUS or PES
Supermarket Verified	SUP	Effects coded dummy=1 if grains were verified by the supermarket to contain at least one of SUS or PES
Bakery Verified		Included in regressions by effects coding the organization attribute. Can be calculated as (-GOV)+(-FAR) + (-THI) + (-SUP)
Price	PRI	Continuous variable ranging from 1.99 to 4.99
No Choice Constant	ASCD	Alternative specific constant for option D (I would not purchase any of these products)
<b>Individual Specific Variable</b>	<b>Mean</b>	<b>Description</b>
Trust in Government	0.35	Dummy =1 if respondents chose “very much” or “completely” when asked if they trust government for accurate information about farming methods.
Trust in Government Standard	0.43	Dummy=1 if respondents chose “very effective” or “moderately effective” when asked how effective an environmentally sustainable standard created by government would be
Alternative Friendly	0	Composite variable created by principal component analysis representing a respondent’s interest in production-derived attributes (composition presented in Appendix G- Min -3.6, Max 2.1)
Age	0.51	Dummy=1 if respondents are older than the sample mean (>47)
Ontario	0.45	Dummy=1 if respondents reside in Ontario



### ***5.7.1. Multinomial Logit and Random Parameters Logit Results***

Results for the multinomial logit and random parameters logit (RPL) estimation are presented in Table 5.6 using the estimation methodology outlined in chapter 4 (sections 4.7.1 and 4.7.2). Train (2003) suggests that the part worth utilities from the multinomial logit model can be regarded as an approximation to the population averages. The Hausman and McFadden test (1984) was performed on the multinomial model and the necessary IID assumption on the error terms was violated. As expected, this means that respondents have heterogeneous preferences and the RPL or LCML models that accommodate heterogeneity are more appropriate. Further, as shown by the decreased log likelihood and increased pseudo  $R^2$  in Table 5.6, the RPL model is a better fit for the data.

**Table 5.6 Regression results for multinomial logit and random parameter logit models**

Variable	Multinomial Logit		Random Parameters Logit	
	Coefficient	(standard error)	Coefficient	(standard error)
SUS	0.944***	0.055	1.382***	0.140
PES	1.190***	0.055	1.598***	0.134
GOV	0.514***	0.049	0.330***	0.087
FAR	0.002	0.045	0.237**	0.113
THI	-0.037	0.045	0.028	0.090
SUP	-0.387***	0.053	-0.774***	0.116
PRI	-0.775***	0.023	-1.060***	0.036
ASCD	-1.888***	0.098	-2.666***	0.131
<i>Derived standard deviations of parameter distributions<sup>33</sup></i>				
SUS			1.136***	0.082
PES			1.601***	0.102
GOV			0.644***	0.088
FAR			0.759***	0.088
THI			0.871***	0.083
SUP			0.348***	0.123
Log-likelihood function	-4098.094		- 3713.017	
Pseudo R <sup>2</sup>	0.1922		0.3025	

\*, \*\*, \*\*\* denote significance at the 10 percent, 5 percent, and 1 percent levels respectively

The results presented in Table 5.6 show that all coefficients are of the expected signs and all except the effects coded variable for third party verification are significant at the 1% level for both models. The RPL model fits the data relatively well with a pseudo R<sup>2</sup> of 0.3025. Louviere *et.al.* (2000) report that R<sup>2</sup> values between 0.2 to 0.4 represent acceptable fits for choice models. Derived standard deviations of parameter estimates representing the spread of the random parameters are significant at the 1% level for all variables in the RPL model confirming that respondent’s preferences are heterogeneous.

<sup>33</sup> This represents the spread of the random parameter estimates based on normal distributions.

The negative and significant coefficient for ASCD is consistent with expectations. Following Hu (2004), who discusses the various approaches in the literature, ASCD represents the utility a respondent associates with not purchasing any of the loaves described.

To capture the source of respondent's preference heterogeneity, the RPL model was specified to include variables representing individual-specific characteristics; only those that had consistently significant effects and/or significantly improved the model fit as determined by the log likelihood test (Green, 2006) were retained. Individual specific variables were selected using an iterative process outlined by Darby *et al.* (2006) where one variable was added, and the fit of the model was evaluated with and without each variable. These variables included trust in government, belief in government standard, alternative friendly, residing in Ontario and age. Only respondents from Ontario showed preferences that differed significantly and thus variables representing the other regions were not included in the final estimations. Other variables that were explored are detailed later in Table 5.8. According to equation (4.11) on page 82, the results presented in Table 5.7 show the effect of these individual specific variables on the means of the estimated random parameters. Combinations that were not significant were treated as fixed parameters following Hensher *et al.* (2005).

**Table 5.7 Parameter matrix for heterogeneity in mean RPL parameter estimates**

	Trust in Government	Belief in Government Standard	Alternative Friendly	Age	Ontario
SUS	NS	NS	0.140 <sup>**</sup>	-0.449 <sup>***</sup>	0.297 <sup>**</sup>
PES	NS	NS	0.556 <sup>***</sup>	NS	0.287 <sup>*</sup>
GOV	0.487 <sup>***</sup>	0.408 <sup>***</sup>	0.398 <sup>***</sup>	NS	NS
FAR	NS	NS	NS	-0.303 <sup>**</sup>	-0.251 <sup>**</sup>
THI	NS	NS	0.148 <sup>**</sup>	NS	NS
SUP	NS	NS	-0.334 <sup>***</sup>	0.322 <sup>***</sup>	0.307 <sup>**</sup>

NS=not significant

<sup>\*</sup> <sup>\*\*</sup> <sup>\*\*\*</sup> denote significance at the 10 percent, 5 percent, and 1 percent level respectively

Positive and significant numbers for the combination of the GOV variable, representing government, and the trust in government and belief in government standard are interesting. They indicate that respondents trusting in government, and believing that a government standard will be efficacious receive positive utility of a similar magnitude from having production-derived attributes verified by government. This result provides support for the theoretical model outlined in Figure 4.1 that the value of a quality assurance system is a function of both consumer trust in the verification and composition of the standard – and in this case nearly equally so.

The values in the alternative friendly column provide an indication of how respondents who are most likely to be interested in production-derived quality value the attributes. As expected, respondents with high values for this variable derive more utility from the environmentally sustainable and pesticide-free attributes. Also of interest is that these respondents who are most likely to purchase production-derived attributes attained significantly more utility from government verification, and less from supermarket

verification. This result signals that the benefits of government involvement in quality verification are largest for those interested in this type of food quality. As such, WTP estimates for the sample average will underestimate the value of government verification for consumers most likely to purchase food containing production-derived quality.

The results in the age column indicate that older respondents derived less utility from the environmentally sustainable and farmer verified attributes. Older respondents also obtained more utility from the SUP variable representing supermarket verification. These results suggest that older Canadians are less interested in environmental sustainability and have slightly different perceptions about the credibility of farmer and supermarket organizations than younger Canadians.

Lastly, the positive and significant estimates for the pesticide free and environmentally sustainable attributes for respondents from Ontario show significant regional differences across Canada. Respondents were grouped into region including Quebec and the Maritimes, Ontario, the Prairie Provinces of Manitoba, Saskatchewan and Alberta, and British Columbia; a dummy variable was assigned to each region. Only residents of Ontario had significantly different preferences, the other regional variables were consequently not included. Evidently, farmer verification is less valued in Ontario whilst supermarket verification is more valued. Given Ontario's urban concentration, it is possible that consumers feel less connected with farmers than residents of other provinces.

Initial attempts were made to specify a number of socio-demographic characteristics expected to capture preference heterogeneity. The four characteristics presented above were selected using an iterative approach as they revealed the most significant and meaningful results and significantly improved the model fit. Other individual characteristics that were

explored are shown in Table 5.8. Overall, the table shows that socio-demographic characteristics are not very effective in explaining preference heterogeneity. Darby *et al.* (2006) find similar results when examining consumer preference for local and organic strawberries in Ohio. This suggests that values intrinsic to individuals are more likely to explain consumer preference for production-derived quality and quality verification organization than socio-demographic characteristics.

**Table 5.8 Explored effects of socio-demographic characteristics on mean parameter estimates for random parameters logit model<sup>1</sup>**

	Female	Income <sup>2</sup>	Children	Activist <sup>3</sup>	Farmer <sup>4</sup>	Post - secondary Education <sup>5</sup>	Primary Shopper	Rural
Sustainable	NS	NS	NS	NS	NS	NS	NS	NS
Pesticide	NS	NS	NS	NS	NS	NS	NS	NS
Org1	NS	NS	NS	NS	NS	NS	NS	NS
Org2	NS	NS	NS	NS	+	NS	NS	NS
Org3	NS	NS	NS	NS	NS	+	NS	NS
Org4	NS	-	NS	NS	NS	NS	NS	NS

+ denotes a positive effect on the parameter  
 - denotes a negative effect  
 NS=not significant (P>0.05)

<sup>1</sup>Evaluated using an iterative process where the individual characteristics of interest were inserted into the model and then removed

<sup>2</sup>Income greater than the sample mean (60 000)

<sup>3</sup>Involved or donated money to an animal welfare organization, environmental action group, community shared agriculture, or health related organization

<sup>4</sup>Respondent or family member has worked in a job related to agriculture or certification

<sup>5</sup>At least a university or college education

### 5.7.2. Random Parameter Logit Willingness to Pay

Choice models are non-linear and thus the parameter estimates are best interpreted in relation to estimates from the other attributes in the experiment. To provide a tactile way of interpreting the parameter estimates, they can be converted into willingness to pay estimates based on the process outlined in Chapter 4 (section 4.8). Shown below in Table

5.9 are two approaches to calculate WTP for attribute estimates from RPL models as outlined in Hensher *et al.* (2005). The unconditional values on the left are simulated from the RPL estimates presented in Table 5.6, whereas the conditional estimates on the right are the average of individual willingness to pay estimates. Each individual's willingness to pay estimate for a given parameter is a ratio of the estimated mean of the individual's estimated distribution. This is all conditional on the revealed information for each individual including past choices, the alternatives in a choice set, and individual specific characteristics (see Greene, 2007).

**Table 5.9 Willingness-to-pay estimates from the random parameters logit model**

	(\$ per loaf)					
	Unconditional-Sample		Conditional- from Individual Means			
	WTP	95% C. I.	Mean WTP	S.D.	Min	Max
Sustainable	1.29	(1.04-1.55)	1.24	0.78	3.28	-1.04
Pesticide Free	1.49	(1.24-1.73)	1.63	1.28	4.83	-1.74
Government	0.30	(0.15-0.46)	0.65	0.64	2.29	-1.07
Farmer	0.22	(0.00-0.42)	-0.05	0.44	1.32	-1.26
Supermarket	-0.73	-(0.95-0.52)	-0.43	0.39	0.60	-1.75
Bakery	0.17		-0.16	0.87	2.26	-2.87

The above table shows that making estimates conditional upon all information available affects WTP estimates, most notably for government, farmer, and bakery verification. Hensher *et al.* (2005) emphasize the most appropriate method is determined by the most plausible results. Both methods produce plausible results as shown above; the valuations for sustainable and pesticide-free are in-line with the premiums charged for organic bread. It is important to note that the unconditional WTP estimates above reflect the parameter estimates in Table 5.6 and do not include the estimates in Table 5.7. Thus,

they represent the preferences of a respondent who doesn't trust government, doesn't believe a government standard will be effective, is not likely to be interested in food quality from production methods, is less than 47 years old and does not live in Ontario. The conditional estimates include this information. Given this and that the conditional estimates are calculated utilizing information about taste preferences revealed through respondents' choices, they are conceptually more appealing than the unconditional estimates. The magnitude of these estimates will be discussed later in reference to the latent class multinomial logit estimates.

As discussed in Chapter 4, specifying the source of parameter heterogeneity in a RPL model is limited as it relies upon variables chosen by the analyst *a priori*. Thus it only permits the analyst to assess how preferences vary according to the variables specified. As shown in Table 5.8, preference heterogeneity in the current sample is only partially explained by the observed socio-demographic characteristics. Underlying values likely to further explain preference heterogeneity are difficult to assess *a priori*. To reveal the effect of latent unobserved consumer characteristics on parameter estimates, a latent class multinomial model was estimated.

### ***5.7.3. Latent Class Multinomial Logit Results***

Using a latent class multinomial (LCML) model allows preferences to be heterogeneous across the sample by estimating model classes in which individuals have homogeneous preferences. Nilsson (2005), Hu (2004), and Liljenstolpe (2008) have found these models to work well when estimating consumer willingness to pay for credence attributes in food products. As highlighted in Chapter 4 (section 4.7.3), the number of classes in a LCML model is specified exogenously by the analyst. Models with various



class sizes were estimated and compared using the information presented in Table 5.10. The five class model was selected as it had the lowest log likelihood, AIC, and BIC and the highest pseudo R<sup>2</sup>. The NLOGIT software estimates models with a maximum of five classes; however, given the small improvement from a 4 class model to a 5 class model as shown below, additional classes are likely to improve the model fit only marginally.

**Table 5.10 Comparing latent class multinomial logit models**

	2 Class	3 Class	4 Class	5 Class
Log Likelihood	-3800.619	-3568.483	-3484.010	-3415.636
Pseudo R <sup>2</sup>	0.2860	0.3297	0.3455	0.3583
AIC <sup>34</sup>	1.98834	1.87222	1.83282	1.80217
BIC <sup>35</sup>	2.01603	1.91447	1.88981	1.87355

Results for the latent class multinomial logit model with five classes are included in Table 5.11. The LCML model is a significantly better fit than the multinomial logit model presented in Table 5.6 as indicated by a log likelihood of -3415; the multinomial logit model had a log likelihood of -4098. No robust statistical test exists to compare the fits of the RPL and LCML models and thus Greene and Hensher (2003) emphasize that model choice is context specific.

<sup>34</sup> Akaike information criterion where k is number of parameters and n is number of observations=

$$\log\left(\frac{e'e}{n}\right) + \frac{2k}{n}$$

<sup>35</sup> Bayesian information criterion=  $\log\left(\frac{e'e}{n}\right) + \frac{k \log n}{n}$

**Table 5.11 Latent class multinomial logit model results**

	<i>Concerned Shoppers</i>	<i>Independent Verification Seekers</i>	<i>Defer to Farmers</i>	<i>Label Believers</i>	<i>Not Interested</i>
PES	2.035*** (0.166)	1.599*** (0.154)	0.483*** (0.123)	2.084*** (0.079)	-0.626 (0.208)
SUS	1.258*** (0.146)	1.237*** (0.138)	0.344** (0.160)	1.329*** (0.076)	0.253*** (0.227)
PRI	-0.198*** (0.057)	-0.510*** (0.057)	-1.212*** (0.066)	-0.920*** (0.034)	-3.567 (0.224)
GOV	1.018*** (0.116)	2.194*** (0.130)	-0.476*** (0.172)	0.059 (0.068)	0.295*** (0.260)
FAR	0.169 (0.130)	-0.534*** (0.143)	1.474*** (0.105)	-0.313*** (0.064)	1.419 (0.231)
THI	-0.753*** (0.178)	1.702*** (0.114)	-0.585*** (0.143)	0.162*** (0.062)	-0.430** (0.209)
SUP	-0.705*** (0.140)	-2.178*** (0.265)	-0.822*** (0.152)	0.203*** (0.071)	0.140 (0.201)
ASCD	-0.357 (0.363)	1.485*** (0.258)	-1.902*** (0.260)	-3.315*** (0.186)	-13.474*** (0.789)
Class Probabilities	0.220	0.120	0.123	0.352	0.186
Pseudo R <sup>2</sup>	0.358				
Log Likelihood	-3415				
* , ** , *** denote significance at the 10 percent, 5 percent, and 1 percent level respectively					

As with the RPL model, the LCML model is non linear and the estimates are best interpreted relative to other parameters in the model. Willingness-to-pay estimates for each variable measured in dollars per loaf of bread were calculated according to equation (4.14) and are presented in Table 5.12. Classes were named to facilitate comprehension of how preferences differ between classes but do not represent specific individuals *per se*.

**Table 5.12 Willingness to pay estimates for random parameters logit and latent class multinomial logit model (\$ per loaf)**

	Random Parameters Logit	Latent Class Multinomial Logit				
Class		1	2	3	4	5
	(Conditional Mean <sup>2</sup> )	Concerned Shopper	Independent Verification Seeker	Label Believer	Defer to Farmer	Not Interested
Pesticide	1.24***	10.26***	3.13***	2.27***	0.40***	-0.18***
Sustainable	1.63***	6.34***	2.42***	1.45***	0.28**	0.07
Government	0.65***	5.13***	4.30***	0.06***	-0.39***	0.08***
Farmer	-0.05***	0.85	-1.05***	-0.34	1.22***	0.40
Third Party	0.00	-3.80***	3.34***	0.18***	-0.48***	-0.12***
Supermarket	-0.43***	-3.55***	-4.27***	0.22***	-0.68***	0.04**
Bakery <sup>1</sup>	-0.16	1.37	-2.32	-0.12	0.34	-0.40
Average Class Probability		0.220	0.120	0.352	0.123	0.186

<sup>1</sup>as the estimate for bakery= -org1-org2-org3-org4, significance is not applicable.

\*, \*\*, \*\*\* denote significance at the 10 percent, 5 percent, and 1 percent level respectively for the attribute parameter in the WTP ratio

<sup>2</sup>From Table 5.9.

Recalling the discussion in Chapter 4, choice models are best interpreted as difference in attribute models. Given this, the results presented above provide an indication of how Canadian consumers value credence production-derived attributes and the verification of these attributes relative to each other. As such, willingness-to-pay values are most informative when considered relative to each other and not in absolute monetary terms.

By comparing the RPL estimates with the LCML estimates in the above table, it is evident that significant preference heterogeneity is masked by the mean WTP values from

the RPL model. Most interesting, those most willing to pay for the pesticide free and environmentally sustainable attributes had their utility affected most by verifying organization attributes. The *concerned shopper* and *independent verification seeker* classes show sizeable and significant valuations for government, third party and supermarket verification. For both classes, willingness-to-pay for government quality verification is positive, while it is negative for supermarket verification. The utility associated with supermarket verification is negative for all classes except the *label believer* class. Given the low likelihood of having an effective standard shown in Table 5.2, and the low trust scores revealed in Table 5.3, it is plausible that respondents see supermarket verification as less credible. Farmer verification in contrast was valued differently by the various groups. Evidently some respondents see farmers as much more credible than others.

The *label believer* class has the largest average class probability of 0.352, meaning that the largest percentage of respondents is in line with the estimates for this class. As shown by the small magnitude of WTP for the verification organizations and the positive and significant values for pesticide free and environmentally sustainable attributes, respondents in this class are unconcerned about who verifies the presence of the production-derived quality. Given the relatively small magnitude of the WTP for the environmentally sustainable and pesticide free attributes of the *label believer* class compared to the *independent verification seeker* and *concerned shopper* classes those respondents in the latter two classes have much stronger preferences. Further, given the positive hypothetical bias expected in this type of experiment, it is likely that the *concerned shopper* and *independent verification seeker* classes represent those respondents who would actually be willing to pay a significant amount in a true market situation.

Summing the two average class probabilities for the *concerned shopper* and *independent verification seeker* classes together gives a 34% probability that respondents are members of these classes. Willingness-to-pay estimates for all attributes in the choice experiment are quite large for these two classes, extremely so for the *concerned shoppers*. By extension, this indicates that a sizeable number of Canadian consumers have strong preferences for production derived food quality and type of verifying organization.

While government and supermarket verification were seen similarly by both the *concerned shopper* and *independent verification seeker* classes, third party verification was valued negatively by the *concerned shopper* class and positively by the *independent verification seeker* class. This shows that those respondents who are most willing to pay for credence attributes will gain a great deal moving from the Canadian status quo of third party verification to government verification. In relative terms, this improvement resulting from the difference in the third party and government WTPs represents 141% of the value of the environmentally sustainable attribute and 87% of the pesticide free attribute. This means that moving from third party verification to government verification gives consumers in this class nearly the same utility as the attributes themselves. Moreover, the independent verification seeker class values the government and third party verification attributes greater than either of the production-derived attributes. This signals that verification is very important to consumers interested in the pesticide free or environmentally sustainable attributes, and government verification is especially important for those who most value these attributes. This is consistent with results of the RPL model revealed in Table 5.7.

Willingness-to-pay estimates from the current study are comparable to those previously reported in the literature. Two recent studies employing choice experiments in the UK provide interesting comparisons. Balacombe *et al.* (2007) estimated that consumers were willing to pay 90% more for a food basket produced without pesticides and Chalak *et al.* (2008) report consumers would pay 180% more for bread produced without pesticides. The results in Table 5.11 report willingness to pay for pesticide-free bread of 65% of the value of the average loaf of bread <sup>36</sup> for the RPL model versus 412% for the *concerned shopper class* of the LCML model. Thus the current results show that, on average, respondents in the current sample were willing-to-pay less for pesticide free bread than those in the UK research. Onozaka *et al.* (2006) however show much smaller WTP for production attributes using a DCE for their sample of Californians. They reveal that their sample was willing to pay 10 to 34% more for produce that was produced without pesticides and 5 to 34% more for produce from environmentally sustainable farming methods. Thus the average results revealed by the RPL model in the current study are reasonably well aligned with those of past research.

## 5.8. Conclusions

Results presented in this chapter suggest that one third of Canadians value bread containing grains produced using environmentally sustainable and/or pesticide free methods. Government verification of these attributes was most valued by respondents who obtained the most utility from these attributes. It is unclear why government verification is most valued, as questions probing respondents' trust in organizations showed no significant difference in the ratings between government, third party, or farmer organizations.

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<sup>36</sup> The average price of bread purchased by respondents was \$2.49.

Government organizations were, however, viewed as being the most capable of producing a meaningful environmentally sustainable standard, and as such the preference for government verification may partly reflect the expectation that if the product was government verified, it would be verified to a government standard.

As trust in government verification is not found to coincide with willingness-to-pay for government verification, it is unlikely that respondents see this verification as more credible *per se*. It is possible that the value associated with government verification stems from a perception that the verification is credible based on factors not examined in the current study. It is also possible that respondents interpret government verification as a quality signal itself, and not as a means to identify if a production-derived attribute is truly present. In this way people may think that if government is involved, it signals the validity of the quality attribute in general. This fits the framework outlined in Chapter 2 where governments can influence the discourse that defines food quality in the minds of consumers and act as a heuristic to signal quality.

Respondents' significant negative willingness-to-pay for both supermarket and third party verification is of concern given current market trends. Supermarket and third party verification are the two most prominent forms of quality assurance systems for production-derived quality in Canada. Generically, supermarkets are not seen as trusted information sources or able to create effective environmentally sustainable standards and thus the negative utility they endow upon respondents is not surprising. The negative willingness to pay associated with third party verification for the *concerned shopper* segment however is more difficult to explain.

Across the sample respondents saw third party organizations as equally trustworthy and nearly as capable of creating an effective environmentally sustainable standard. It is unclear how respondents who have the most negative willingness-to-pay for third party organizations perceive these organizations' abilities to create effective standards or accurately communicate how food was produced. Future research could explore how consumers understand the term third party and explore more thoroughly what makes third party organizations credible. Overall the results show that respondents most interested in the production-derived attributes that were examined in this study would gain significantly by moving from the current status quo to a system of government verification.



## *6. SUMMARY AND CONCLUSIONS*

### **6.1. Introduction**

This sixth and final chapter encapsulates and contextualizes the previous chapters. Research findings resulting from the theoretical framework, the supply chain interviews, and the consumer survey are summarized to provide the reader with an overview of the main conclusions. Policy implications arising from these conclusions are explored. Limitations arising from the research methodology are discussed to explain the applicability of the conclusions. Opportunities for future research spawned by this thesis are highlighted followed by brief final conclusions.

### **6.2. Summary of Research Findings**

Understanding the role for government, third party, and private organizations in assuring production-derived food quality necessitates understanding how the involvement of these organizations can affect the market for production-derived quality. The literature explored in Chapter 2 highlighted how quality signalling, consumer search costs, and normative beliefs are all important areas in which the type of assuring organization can affect the demand for production-derived quality attributes. From an economic perspective, government intervention is only warranted when there is market failure. This can arise with production-derived attributes because of information asymmetry between buyers and sellers – consumers may not know what methods were used to produce their food.

More effective quality signalling reduces information asymmetry. Effective quality signalling and reduced consumer search costs can improve market function by allowing consumer choices to more accurately reflect true preferences. If government is perceived as

more credible than other organizations, government involvement in quality assurance systems for production-derived quality attributes will increase label credibility and make consumer decisions simpler. Normative beliefs about what constitutes food quality are affected by the actions of those involved in public discourse. A credible organization will be trusted to communicate accurate information. Past research has identified that an organization's knowledge, accountability, and extent that they represent a person's interests are indicative of their trustworthiness.

Standards play a role in simplifying a consumer's purchase decision and form the basis for quality assurance systems. They act to define levels of quality and reduce the variance of quality across products. Consistent, reliable, and recognized standards most effectively signal quality to consumers and make choices easier. By their nature however, standards reduce product differentiation that is important to firms.

The concepts outlined above were explored in Chapter 3 through interviews with supply chain members who currently market foods containing production-derived quality attributes. Throughout the interviews it was evident that firms are driven toward more stringent quality assurance systems to attain claim credibility, reduce consumer search costs, and competitively position themselves relative to their competitors. They were discouraged from more stringent quality assurance systems to maintain competitive differentiation or if they were able to signal quality attributes effectively without the use of a quality assurance system. The analysis highlighted that there are advantages and disadvantages for firms to become involved in quality assurance systems. Understanding these implications is important to comprehend who will gain, and who will lose from policy options involving quality assurance.

Elements of an organization enabling it to signal quality to consumers were revealed in the interviews to be related to spatial elements of trust. The themes defining a trustworthy party arising from Chapter 2 including interest, competence/knowledge, and transparency, were discussed in the interviews. Participants' responses relating to these elements can be characterised as spatial elements of trust, namely: motivational, relational and physical/virtual. Parties that are spatially closer will have more trust in each other. The spatial framework arising out of the interviews is informative for determining what organizations will naturally be highly trusted and thus not require quality assurance systems for accurate quality signalling. It means that farmers and other supply chain members who have personal relationships with customers are unlikely to need formalized quality assurance systems to accurately communicate production-derived quality.

Lastly, Chapter 5 reported the results of a Canadian consumer survey exploring the concepts examined in earlier chapters. The survey focussed on the effects of verifying organization type on consumer choices for bread with environmentally sustainable and pesticide-free attributes. Government, third party, and farmer organizations were equally more trusted for accurate information about farming methods compared to supermarkets or food processors. Respondents' trust in an organization type was revealed to be affected differently by the organization's perceived knowledge, transparency, and the extent that the organization aligned with consumer interests. Trust in government and third party organizations is likely to be most affected by consumers' perception of their knowledge. Trust in farmers is likely most affected by their perceived transparency and accountability. Trust in a food processor is likely most affected by the extent they appear to represent

consumers' best interests. The results provide an indication of how a specific organization of the generic type could be perceived as more or less trusted.

When asked which type of organization would create the most effective environmental standard, respondents ranked government the highest followed by third party, farmer, processor, and supermarket organizations respectively. While the frameworks outlined in Chapters 2 and 3 suggested that consumers would attain more utility from a trusted and valid quality assurance system, these results were only partially supported by the results of the discrete choice experiment. Results from the random parameters logit model for the discrete choice experiment revealed that, on average, respondents received the most utility from government verification. Respondents trusting government and believing government would create an effective standard only accounted for part of the utility derived from government verification; the origin of the remaining utility was not revealed.

Results from the latent class multinomial logit model revealed that those respondents who most valued the production-derived attributes pesticide free and environmentally sustainable, also most valued the verification attribute generally and government verification specifically. Most importantly, respondents exhibiting the highest willingness to pay for the production-derived attributes obtained significant negative utility from supermarket and third party verification – currently the most prevalent quality assurance systems in the marketplace. Moving from the status quo of supermarket or third party verification to government verification would give these respondents an amount of utility similar to what they obtained from the production-derived attributes themselves.

As discussed in Chapter 5, an individual firm's reputation will impact the credibility of their quality assurance. This explains why a supermarket like Whole Foods Markets may have a successful quality assurance system that consumers see as credible. Consumer perceptions of different types of organizations more generally revealed in Chapter 5 would, for example, apply more directly to a coalition of supermarkets undertaking a common quality assurance system. Given firms' desires to pursue quality assurance for competitive reasons and the negative utility garnered by a generic supermarket verification system, it seems unlikely that a successful quality assurance system could develop as a result of industry cooperation. It is far more likely that in the absence of government coordination, individual firms and third party organizations will further develop their own systems of quality assurance. Such a fragmented system has inherent drawbacks highlighted in Chapter 2, specifically increased choice complexity and potentially reduced credibility as a result. More research would clarify the extent that multiple quality assurance systems contribute to market failure.

### **6.3. Policy Implications**

Government intervention in a market should be motivated by the potential to increase social welfare. Market failure due to information asymmetry or imperfect competition is one example of how social welfare may be diminished without government involvement in quality assurance for production-derived quality. For government involvement to increase social welfare, the benefits from reduced market failure must outweigh the costs of intervention. These costs include not only implementation and monitoring costs but also opportunity costs resulting from reduced private sector innovation. The quantitative results of this thesis highlight the benefits of government involvement in quality assurance.

Opportunity costs were explored qualitatively in Chapter 3 arguing that firm motivations to innovate could be hampered by government involvement in standard formation or quality verification. Thus policy implications drawn from this thesis are based primarily on potential benefits and should be interpreted with the caveat that an assessment of the costs would also be necessary.

Results from the consumer survey show significant opportunity for consumer benefit if government was involved in quality verification for production-derived food quality. The survey concentrated on organizations that verify quality, as opposed to their specific roles in a quality assurance system – *i.e.* standard setting, accreditation, certifying, monitoring, enforcement, or coordination. Thus it is beyond the scope of this investigation to recommend specific roles for government in quality verification, though several areas for welfare improvement may be inferred by combining the conclusions of Chapters 2, 3 and 5.

### ***6.3.1. Clear Language for Production-derived Quality***

To mitigate problems caused by credibility and complexity concerns, Chapters 2 and 3 highlighted the benefits of clearly understood reference standards. While third party and farmer organizations were revealed to be equally trusted in the consumer survey, the interviews also revealed that firms have an incentive to use standards comprised of criteria that are different from their competitors. This means that similar sounding standards may represent different things, thereby increasing consumer confusion and implying reduced demand for these attributes<sup>37</sup>. A potentially beneficial role for government policy is to act as a coordinating force to ensure that common language is used to define common criteria comprising various standards. For example, if firms use the phrase “no pesticides were used

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<sup>37</sup> The implementation of mandatory labelling of meat grades was in response to the same situation in meat eating quality (see Government of Canada, 1976).

during crop production,” it would always represent that no fungicides, herbicides, or insecticides were used that would affect the environment where the crop was grown. Given past research (Ipsos Reid, 2006) showing that consumers often turn to government for such information, providing clear, trusted and coordinated communication defining the language used for production-derived quality seems to be an area where government could significantly improve consumer welfare.

### **6.3.2.     *Standard Accuracy***

Respondents perceived that government standards were likely to be effective. This suggests that part of the benefit from government involvement may come from standards that are not only clear but meaningful. Forming standards that are amenable to consumers and firms, however, was identified in the interviews to be a difficult task given firms’ desires for differentiation<sup>38</sup>. A compromise that would address both consumer desires for accurate standards and firm desires for differentiated standards could include government policy that ensured practices behind a standard were consistent with the message of the standard. For example, government could ensure that practices represented by an environmentally sustainable standard were not harmful to the environment. This is similar to the recommendation for government to provide metrics to measure the environmental friendliness of a product made by Harris and Cole (2003). More effective enforcement of the current federal law dictating that all information on labels must not be misleading would be an appropriate policy response, provided the benefits outweighed the costs.

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<sup>38</sup> The original formation of national grades for live pork in 1921 provides one example where producers, processors, and government officials worked together to achieve a workable system (Maybee, 1955).

### 6.3.3. *Quality Verification*

Lastly, results from the survey highlighted that there is a sizeable positive utility for consumers most interested in production derived quality for government verification. Further, no estimated models showed that consumers attain negative utility from government verification. This suggests that Canadian consumers would attain significantly more utility if there was government verification of production-derived food quality. As specified earlier, this thesis did not examine specific roles for particular organizations (*e.g.* standard setting, certification, enforcement, *etc.*), as such the results only imply that government take a more active and visible role. For the benefits shown in the survey results, government would need to be clearly associated with the verification mechanism.

Quality assurance policies that have the potential for the greatest benefit can be inferred from this thesis. As discussed in Chapters 2 and 3, policies supporting a variety of clearly defined standards are most beneficial for firms involved with production-derived quality. Combined with the results presented in Chapter 5 showing significant positive utility associated with government amongst Canadian consumers, government policies similar to those of the EU and the US involving a wide variety of standards would be most beneficial.

A quality assurance system similar to the USDA Process Verified system would combine the benefits of a credible and recognized government seal with a diverse set of standards. If government ensured that these standards were truthful (*i.e.* environmentally sustainable products were not harmful to the environment) and credible (the standard was followed) then both consumers and firms would achieve the greatest benefit. Further,



coordinated verification may increase verification efficiency by reducing duplication in cases where supply chain members sell to multiple customers with different standards.

An open question requiring more investigation is whether government itself should perform the certification or just coordinate, monitor, and manage the system. Given the similar role that meat grading serves to mitigate complexity and communicate quality, history suggests that government may best take an extensive role in the organization and function of the system. In addition, the increased normative pressure to value attributes such as environmentally sustainable contingent with extensive government involvement could produce positive externalities for society. Past research predicts that private firms will always have an incentive to cheat with credence goods suggesting that government certification would be better, though empirical studies relating to production-derived quality have yet to be completed. A final caveat is that government involvement that was inflexible or lethargic would be unwelcomed by proactive firms like those interviewed in Chapter 3. An effective quality assurance system would therefore need to be credible, simple, timely, and flexible enough to allow firms to differentiate their products.

#### **6.4. Limitations of the Research**

Practical limitations of this project confined its scope. The online survey was undertaken only in English to respondents recruited by a market research company. Though the sample was broadly representative of English-speaking Canadians, it was not random and thus some care needs to be applied when extrapolating the results to the Canadian population.

The discrete choice experiment investigated the impact of the verifying organization on consumer decisions for one product containing two production-derived attributes. It is

unclear how consumers would respond if presented with different types of products or a greater variety of attributes. Including more tangible attributes that consumers are more familiar with may result in consumers making more realistic tradeoffs in the discrete choice experiment and produce more accurate willingness-to-pay estimates. Further, the online survey may be less realistic than an experiment carried out in the grocery store, as substitute goods and a budget constraint are more prevalent in a normal shopping environment. As a result of the survey methodology, the willingness-to-pay estimates presented in this thesis should be regarded as optimistic values for Canadian consumers, and should be interpreted as relative rather than absolute values.

Trust was conceptualized and assessed in this thesis according to these criteria: knowledge, transparency, and best interest. It was evident in the discrete choice experiment that this construct imperfectly captured the determinants of respondents' trust in organizations and their willingness-to-pay for quality verification from these organizations. Consequently, the results were unable to determine exactly why respondents valued government verification and only reveal that trust in an organization does not correspond exactly to value attained from an organization's quality verification.

The necessity of defining the verifying organization attribute to represent a generic organization also did not allow the impact of individual firm reputations to be explored. For example, it is difficult to confidently extrapolate the supermarket verification results to Whole Foods Market. Results for the government attribute are less prone to this variation than the other categories that involve many more firms with individual reputations.

Lastly, this research concentrated primarily on the consumer benefits to quality verifications. To define the appropriate role for government in assurance of production-

derived quality, quantifying both the costs and benefits of different levels of involvement is necessary.

### **6.5. Areas for Further Research**

As touched upon in the previous section, an important area for future research is the specific role that government should play in quality assurance of production attributes. Discerning the impact on consumer decisions of government certification versus government monitoring, for example, would help to clarify the possible benefits from government involvement. Further, to make effective specific policy recommendations, a complete welfare analysis encompassing costs and benefits of different options should be performed. *In situ* research assessing how consumers actually react to different types of labels in a real market situation would be an essential component of this.

Understanding the importance of universal standards and certification in reducing search costs and improving credibility emerges as another area for further study. The interviews highlighted the dual nature of universal standards to both add credibility and diminish product differentiation. To explore this concept properly would require understanding how consumers react to different numbers of standards with varying familiarity. The results of this type of investigation would more accurately inform the type of quality assurance system to best serve the market for production-derived attributes. Looking at the intricacies of how standard formation affects search costs and competitive behaviour will be an interesting subject for future research.

Lastly, more research examining why consumers associate positive or negative values with verification by various organizations would illuminate the challenge faced in assuring production-derived quality. Exploring more encompassing dimensions of trust and

deference would help to understand why some consumers associate a positive value with third party verification and others associated a negative value with it. More specifically, examining why consumers trust specific organizations and how this trust changes over time will elucidate the effectiveness of organizations for quality assurance. While trust and ability to create effective standards partly explained the results, a more complete explanation is warranted.

## **6.6. Conclusions**

This thesis has outlined the factors that must be considered in determining the role for government in assuring production-derived food quality. The results indicate that there are benefits to be gained by government involvement in this market. A more detailed examination of the costs and benefits of specific roles for organizations will aid policy recommendations. Respondents trusting government to give accurate information increased the utility that they derived from quality verification by government. While the ability to create an effective standard and being trusted for accurate information about farming methods positively affected the utility that consumers derived from an organization's verification, they only explained a portion of it. Different types of organizations are not equally valued for quality verification though the source of this value is only partially revealed.

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## 8. APPENDICES

### A- List of Interview Participants

- FA- Anderson, Roberta. (2008) Business Development Manager – Food Alliance, Portland, OR. Interview April 22, 2008.
- PVF - Boldt, Melanie. (2008) Owner/Marketing Director, Pine View Farms, Osler Saskatchewan. Interview, April 7, 2008.
- SG – Fleming, Fred. (2008) Partner- Shepherds Grain and Farmer- Lazy YJ Farms, Harrington, WA. Interview, May 22, 2008.
- LFP- MacRae, Rod. (2008) Local Food Plus, Toronto, ON. Interview April 21, 2008.
- SIF- Miedema, Tracey. (2008) National Sales and Marketing Manager – Stahlbush Island Farms, Corvallis OR. Interview March 27, 2008.
- UNF- Raiche, John. (2008) Vice President of Marketing – United Natural Foods, Dayville CT. Interview, April 10, 2008.
- PHB- Weder, Christoph. (2008) Prairie Heritage Beef, AB. Interview, April 15, 2008.

Food Alliance is a non-profit organization that operates a comprehensive third-party certification program for sustainably produced food. They create their own standards and certify products marketed across North America through both food service and retail channels.

Pine View Farms raises and markets meat according to its own all natural protocol and sells it primarily to the local Saskatoon market.

Shepherds Grain is an alliance of 28 family farmers that grows wheat certified as sustainable by Food Alliance. They market flour locally through distributors in the states of Washington and Oregon through retail and food service channels.

Local Food Plus a non-profit organization that fosters local and sustainable food systems by certifying farmers and processors and linking them with local retail and food service consumers. They create their own standards and contract 3rd party agencies to carryout the inspections.

Stahlbush Island Farms grows, processes, and markets organic and sustainable fruits and vegetables across the United States through retail and food service channels. They have their own brands of products and use Food Alliance Certification.

United Natural Foods is the largest publicly traded wholesale distributor to the natural and organic foods industry in the U.S.A.. Carrying more than 40,000 products, the company supplies over 17,000 customers nationwide and services a wide variety of retail formats, including super natural chains, independent natural products retailers and conventional supermarkets.

Prairie Heritage Beef is a partnership of eco-committed ranch families that work together to sustainably produce and market beef. They market their beef through food service and retail outlets in Vancouver and on Vancouver Island.

## **B- Interview Questions**

### **Assuring Quality from On-farm Production Methods** *Questions for Industry Representatives*

1. Tell me about who your customers are. What makes production processes important to them?
2. What type of on-farm production processes are you currently communicating to your customers? ie, natural, sustainable, local, organic
  - a) How do you define these processes? (standard, protocol, internal/external)
3. How do you want your firm or brand to be viewed by your customers? What activities do you undertake to support the development of this reputation?
4. Describe the ways in which you currently communicate the on-farm production methods used for your products? (advertising, labels, certification marks, point of sale material)
  - a) Have you tried other ways, if so what has worked and what hasn't?
  - b) If you use third party certification, why did you choose this particular certifier?
  - c) Have you had any customer enquiries regarding the certifier, production standards, or requests relating to the credibility of the product claims? If so, please describe the nature of the concerns, and actions taken to address them.
5. How do the standards that you use to define quality from on-farm production methods compare to those of your competitors? (higher, same, lower)
  - a) Are any of these criteria unique to your organization, or do other organizations use them as well?
  - b) How are your customers impacted by having your criteria the same / similar /different than your competitors?
6. What organization would your customers see as the most credible to communicate production attributes? (private, third party, government... ) Briefly describe why you feel they would rank them in this way.
  - a) What types of third-party certifiers are best? (industry associations, interest groups, producers,...)
7. How has your current approach to marketing production attributes evolved?
  - b) Has your communication strategy changed? What has worked in the past, what hasn't, and why?

## C- Consumer Survey

### Food Choices Survey

Thank you for taking part in this research about the choices you make when purchasing food. This research is part of a university student's thesis that will assist in the development of food labelling guidelines for farming methods. Your participation is greatly appreciated.

The researchers are interested in what you think; there are no "right" or "wrong" answers. Before you take the survey there are a few things you should know:

- All responses to this survey will be anonymous and we will not record your name or identify you in any way with your answers.
- You are not required to answer any question you do not want to. If you want to stop taking the survey simply close your browser.
- The survey consists of 22 pages and should take about 15 minutes.
- At the end of each page, you will find a "Pause" button. You may use this button to save any responses that you have made so that you may continue at a later time.
- Completing the survey means you agree to participate in this research.
- You may print this screen by selecting the print option in your browser.

Data from this survey will be stored by the professor supervising the research for at least five years after the study is finished. This study has been approved by the Behavioural Research Ethics Board at the University of Saskatchewan and the ALES Research Ethics Board at the University of Alberta. If you have questions about your rights as a research participant, please contact the University of Saskatchewan Research Ethics office at (306) 966-2084. If you have any further questions, please do not hesitate to contact us at: brian.innes@usask.ca, jill.hobbs@usask.ca, or ellen.goddard@ualberta.ca. You can also write to us at:

Dr. Jill E. Hobbs (supervisor)  
University of Saskatchewan  
Department of Bioresource Policy,  
Business & Economics  
51 Campus Dr. Saskatoon,  
S7N 5A8  
Telephone- (306) 966-2445

Dr. Ellen Goddard  
University of Alberta  
Rural Economy  
515 General Services Building  
T6G 2H1  
Telephone (780) 492-4596

Thank you for your time and valuable contribution to this study. A \$4 donation will be made to the Edmonton or Saskatoon food bank on your behalf when you complete this survey.

Your password was included in the e-mail message that invited you to participate in this survey. You may want to copy and paste it from there in order to enter it accurately.

Please enter your password:

Reset

Login



### 1. How often do you normally buy your food for home consumption at the following types of stores?

	Never	Sometimes	Often	Don't know / not sure
Grocery store (such as Extra Foods, Safeway, Sobeys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discount type store (such as Wal-Mart or Costco)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specialty food stores (such as butcher shops, bakeries, health food, boutique food store)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmers' markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other please specify?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="text"/>				

2. How important are the following in giving you confidence in the quality of food you purchase? Please indicate this on the scale provided.

	Unimportant	Slightly Important	Moderately Important	Very Important	Extremely Important	Don't know / not sure
Store where purchased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of information on labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organization verifying quality- i.e. certifying/grading organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to further information listed on labels i.e. a website address,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand name	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product information at in-store displays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Certification seals- i.e. Canada Grade A, Organic, Fair Trade, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other please specify? <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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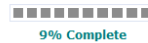
3. In the last month, how often have you purchased food that was natural, organic, sustainable or free-range? Select only one.

- Never
  1-3 times
  More than 3 times
  Don't know / not sure

4. Below is a list of statements relating to different ideas about food production. For each, please indicate how much you agree or disagree on the scale provided.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know / not sure
I don't care about the farming methods used to produce my food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consider myself very health conscious.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current farming methods are harmful to the environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always believe information on food labels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmers are permitted to apply pesticide to grains as many times as they need to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I value things grown in harmony with nature.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am a very trusting person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

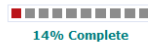
[Reset](#) [Back](#) [Next](#) [Pause](#)



5. Below is a list of statements relating to your grocery shopping habits. For each, please indicate how much you agree or disagree on the scale provided.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know / not sure
I consider the human health effects caused by pesticide use when I purchase food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I regularly read nutritional labels on the food I purchase.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I pay attention to labels describing how food was produced and traded when I purchase food. (e.g. environmentally sustainable, fair trade, animal friendly etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't consider the environmental impact of the food products I purchase.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price is the most important factor when I buy food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid purchasing organic products because I question if they are organic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


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6. How much do you normally pay for a loaf of pre-packaged slice bread? Please select the option closest to your purchase price. If you don't know or are not sure, please select the "don't know/not sure" option.

- \$0.99
- \$1.49
- \$1.99
- \$2.49
- \$2.99
- \$3.49
- \$3.99
- \$4.49
- Don't know/not sure

  
18% Complete

### Purchase Simulation

Please Read Carefully.

Imagine that you are planning to purchase a loaf of pre-packaged bread in the supermarket and all of the bread presented is of the same kind that you normally purchase (i.e. white, whole wheat or multigrain). All loaves are fresh and well presented (i.e. no damaged slices) Over the next several screens you will be presented with descriptions of loaves of bread made with grains that were produced and verified in slightly different ways. Different organizations have verified that the grain used to make the bread was produced using environmentally sustainable and/or pesticide free farming methods. The bread will also have different prices.

**Verifying Organization** means the type of organization verifying the grain ingredients of the bread were produced in a way that was environmentally sustainable and/or without chemical pesticides. To be verified means an inspector visits the farm to see whether the farmer meets the requirements. In the following questions you will be presented with 5 different verifying organizations:

- **Government** (such as a federal or provincial agricultural, health, or environmental ministry or agency)
- **Independent 3<sup>rd</sup> Party** who is not selling food (e.g. a certifying company, or non-profit organization)
- **Bakery** (such as the brand of bread or the company that bakes the bread)
- **Farmer** (such as an individual farm or group of farmers who grows the grains)
- **Supermarket** (that bakes the bread in-store and/or sells it under its own brand name)

**Environmentally Sustainable** means that producing the grain contained in this bread did not negatively affect the environment. This production method was considerably better for the environment than conventional farming methods and ensured that the air, soil, wildlife, and water were not harmed in the production of the grain contained in the bread.


**Pesticide Free** means the grains contained in the bread were not exposed to chemical pesticides. Chemical pesticides are used by farmers to control weeds, insects, and disease in grains.

**Price** is the retail price for a loaf of pre-package sliced bread that you would normally buy. The bread represented in the following questions will have 4 different prices:

\$1.99, \$2.99, \$3.99, \$4.99

I have read this information

- Yes

  
23% Complete

## EXAMPLE

You will see descriptions of bread as shown in the following chart.

Features	A	B	C	D
Organization Verifying	Farmer Verified	Government Verified	Bakery Verified	I would not purchase any of these products
Pesticide Free	✓			
Environmentally Sustainable		✓	✓	
Price	\$3.99	\$3.99	\$4.99	

For example,

- Option A is bread that contains grains verified by the farmer who grew them to be produced without pesticides for \$3.99.
- Option B is bread that contains grains verified by a government agency to be produced using environmentally sustainable methods for \$3.99.
- Option C is bread that contains grains verified by the company/brand that bakes the bread to be produced using environmentally sustainable methods for \$4.99.
- Option D is to be selected when you would not buy Options A, B or C.

In the eight descriptions that follow, you will be asked to choose one option each time.

I would choose...

Option A  Option B  Option C  Option D

In this example Option C was chosen.

7. Below are descriptions of loaves of bread. During a shopping trip to the grocery store where you purchase bread, if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Supermarket Verified	3 <sup>rd</sup> Party Verified	Bakery Verified	I would not purchase any of these products
Pesticide Free			✓	
Environmentally Sustainable	✓	✓		
Price	\$2.99	\$4.99	\$3.99	

I would choose...

Option A  Option B  Option C  Option D

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32% Complete

8. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Government Verified	Farmer Verified	Supermarket Verified	I would not purchase any of these products
Pesticide Free	✓	✓		
Environmentally Sustainable			✓	
Price	\$2.99	\$1.99	\$4.99	

I would choose... Option A Option B Option C Option D

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Pause



36% Complete

9. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Supermarket Verified	Farmer Verified	Government Verified	I would not purchase any of these products
Pesticide Free	✓	✓	✓	
Environmentally Sustainable	✓	✓		
Price	\$4.99	\$2.99	\$1.99	

I would choose Option A Option B Option C Option D

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Pause



41% Complete

10. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Government Verified	Government Verified	Bakery Verified	I would not purchase any of these products
Pesticide Free	✓	✓	✓	
Environmentally Sustainable	✓		✓	
Price	\$4.99	\$3.99	\$1.99	

I would choose

Option A       Option B       Option C       Option D

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45% Complete

11. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Bakery Verified	3 <sup>rd</sup> Party Verified	Farmer Verified	I would not purchase any of these products
Pesticide Free	✓	✓		
Environmentally Sustainable	✓	✓	✓	
Price	\$4.99	\$3.99	\$2.99	

I would choose

Option A       Option B       Option C       Option D

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50% Complete

12. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	3 <sup>rd</sup> Party Verified	Supermarket Verified	3 <sup>rd</sup> Party Verified	I would not purchase any of these products
Pesticide Free		✓	✓	
Environmentally Sustainable	✓	✓	✓	
Price	\$3.99	\$4.99	\$1.99	

I would choose      **Option A**      **Option B**      **Option C**      **Option D**

55% Complete

13. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

[For more information on features, click here](#)

Features	A	B	C	D
Organization verifying	Farmer Verified	Farmer Verified	Bakery Verified	I would not purchase any of these products
Pesticide Free	✓		✓	
Environmentally Sustainable	✓	✓		
Price	\$3.99	\$1.99	\$2.99	

I would choose...      **Option A**      **Option B**      **Option C**      **Option D**

59% Complete

14. Again, consider carefully if the following options were the only ones available and you could choose only one, which option would you purchase? All loaves are fresh and well presented. If you would not purchase any of these, please select option D.

For more information on features, click here

Features	A	B	C	D
Organization verifying	Bakery Verified	3 <sup>rd</sup> Party Verified	3 <sup>rd</sup> Party Verified	I would not purchase any of these products
Pesticide Free		✓	✓	
Environmentally Sustainable	✓		✓	
Price	\$1.99	\$3.99	\$2.99	

I would choose...      Option A      Option B      Option C      Option D

64% Complete

15. How effective would an environmentally sustainable standard created by the following organizations be? i.e. Would the standard actually improve the environment? The term standard means a set of rules that determines how food must be produced. Please indicate this on the scale provided.

	Ineffective	Slightly Effective	Moderately Effective	Very Effective	Extremely Effective	Don't know / not sure
Government (e.g. a federal or provincial agricultural, health, or environmental ministry or agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent 3rd Party (e.g. a certifying company, or non-profit organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Processor (e.g. a well-known company or brand name for food)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer (e.g. an individual farm or group of farmers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

68% Complete

16. How much do you trust the following types of organizations for accurate information about farming methods? Please indicate this on the scale provided.

	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know / not sure
Government (e.g. a federal or provincial agricultural, health, or environmental ministry or agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent 3rd Party who is not selling food (e.g. a certifying company, or non-profit organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Processor (e.g. a well-known company or brand name for food)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer (e.g. an individual farm or group of farmers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

73% Complete

17. To what extent do you think the following types of organizations are **knowledgeable** about farming methods? Please indicate this on the scale provided.

	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know / not sure
Government (e.g. a federal or provincial agricultural, health, or environmental ministry or agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent 3rd Party who is not selling food (e.g. a certifying company, or non-profit organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Processor (e.g. a well-known company or brand name for food)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer (e.g. an individual farm or group of farmers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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18. To what extent do you think the following types of organizations are **transparent and accountable** when providing information about farming methods? i.e. Is it easy to get information from them? Do they respond to concerns? Please indicate this on the scale provided.

	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know / not sure
Government (e.g. a federal or provincial agricultural, health, or environmental ministry or agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent 3rd Party (e.g. a private enterprise, or non-profit organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Processors (e.g. a recognized company)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer (e.g. an individual farm or group of farmers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

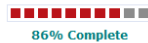
Reset Back Next Pause



19. To what extent do you think that the following types of organizations **act according to your best interests** when providing information about farming methods? Please indicate this on the scale provided.

	Never	Rarely	Sometimes	Usually	Always	Don't know / not sure
Government (e.g. a federal or provincial agricultural, health, or environmental ministry or agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent 3rd Party who is not selling food (e.g. a certifying company, or non-profit organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Processor (e.g. a well-known company or brand name for food)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer (e.g. an individual farm or group of farmers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supermarket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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The following questions are designed to tell us a little about you. This information will only be used to report comparisons among groups of people. Your identity will not be linked to your responses in any way.

20. Are you a male or female? (Check one)

- Male
- Female

21. What is your age? (Enter number)

22. What was the highest level of education you completed? (Check one)

- Some Grade School
- Some High School
- High School Graduate
- Some University/College
- University/College Graduate
- Graduate School

23. Enter the first three digits of your postal code?

24. Which of the following categories best describes your role in the grocery shopping for your household?

- Primary shopper
- Share the shopping
- Someone else is the primary shopper

25. How many people live in your household including yourself? (Enter number)

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26. How many people in your household are under the age of 18 years? (Enter number)

27. Have you been involved or donated funds to any of the following types of organizations? (Check all that apply)

- Animal welfare organization
- Farm organization
- Environmental action group
- Community Shared Agriculture
- Health related organization e.g. Heart and Stroke Foundation
- None of the above

28. Do you or anyone in your immediate family, work or have worked in a job related to agriculture or certification? i.e. farmer, food inspector, farm supply retailer, certification agent (Check one)

- Yes
- No
- Not Sure

29. For comparison purposes only, which one of the following best describes your annual household income level before taxes?

- under \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$59,999
- \$60,000 - \$69,999
- \$70,000 - \$79,999
- \$80,000 - \$89,999
- \$90,000 - \$99,999
- more than \$100,000
- I prefer to not answer

30. Is there anything else you would like to add?



### D- Discrete Choice Experiment Design

Alternative Attribute	1			2			3		
	Org	Pest	Price	Org	Pest	Price	Org	Pest	Price
Block									
Set									
1	govt	no	2.99	fmr	yes	4.99	bakery	yes	1.99
2	fmr	yes	4.99	supermkt	yes	3.99	thrd pty	yes	2.99
3	thrd pty	yes	4.99	supermkt	yes	3.99	supermkt	no	2.99
4	thrd pty	no	3.99	govt	yes	4.99	thrd pty	yes	1.99
5	thrd pty	yes	4.99	fmr	no	1.99	fmr	yes	2.99
6	govt	yes	3.99	thrd pty	yes	4.99	fmr	yes	1.99
7	bakery	no	3.99	thrd pty	no	2.99	govt	yes	4.99
8	supermkt	yes	2.99	bakery	yes	3.99	bakery	no	1.99
2	supermkt	no	2.99	thrd pty	no	4.99	bakery	yes	3.99
3	govt	yes	2.99	fmr	yes	1.99	supermkt	no	4.99
4	supermkt	yes	4.99	fmr	yes	2.99	govt	yes	1.99
5	govt	yes	4.99	govt	yes	3.99	bakery	yes	1.99
6	bakery	yes	4.99	thrd pty	yes	3.99	fmr	no	2.99
7	thrd pty	no	3.99	supermkt	yes	4.99	thrd pty	yes	1.99
8	fmr	yes	3.99	fmr	no	2.99	bakery	yes	2.99
3	bakery	no	1.99	thrd pty	yes	3.99	thrd pty	yes	2.99
1	bakery	yes	3.99	bakery	yes	4.99	thrd pty	yes	1.99
2	govt	yes	4.99	thrd pty	yes	3.99	bakery	yes	2.99
3	thrd pty	no	2.99	govt	no	3.99	fmr	no	4.99
4	supermkt	yes	2.99	fmr	yes	1.99	govt	no	4.99
5	supermkt	yes	4.99	govt	yes	1.99	supermkt	yes	3.99
6	supermkt	no	4.99	fmr	yes	1.99	bakery	no	2.99
7	fmr	no	2.99	bakery	yes	3.99	supermkt	yes	1.99
8	govt	yes	1.99	bakery	no	2.99	fmr	no	3.99
4	govt	no	4.99	thrd pty	yes	2.99	fmr	yes	3.99
2	bakery	yes	4.99	supermkt	yes	1.99	fmr	yes	2.99
3	supermkt	yes	2.99	fmr	no	3.99	supermkt	no	1.99
4	thrd pty	no	1.99	fmr	yes	4.99	fmr	yes	2.99
5	supermkt	no	3.99	bakery	yes	2.99	thrd pty	no	4.99
6	supermkt	yes	1.99	govt	no	2.99	bakery	no	4.99
7	thrd pty	yes	3.99	govt	yes	2.99	govt	no	1.99
8	fmr	yes	4.99	bakery	yes	1.99	govt	yes	3.99

## E- Construction of Composite Variable itrust in Ordered Probit Models

Component Matrix for itrust variable in ordered probit regressions

	Component	Question
	1	
Q4_4	.785	I always believe information on food labels
Q4_7	.785	I am a very trusting person

Extraction Method: Principal Component Analysis.

Total Variance Explained for itrust factor

Comp onent	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Variance	of Cumulative %	Total	% Variance	of Cumulative %
1	1.234	61.676	61.676	1.234	61.676	61.676
2	.766	38.324	100.000			

Extraction Method: Principal Component Analysis.

### Factor Analysis using Principal Component Analysis

Factor analysis generally attempts to identify underlying variables that explain variation in a set of variables. It facilitates data reduction by identifying a small number of factors that explain most of the variance. Principal component analysis is a factor extraction method used to form uncorrelated linear combinations of variables. The first component has maximum variance followed by successive components that explain smaller portions of the variance. All components are uncorrelated with another. Components with Eigenvalues less than one are excluded as they represent less variation than one of the included variables.

## F - Ordered Probit Regression Results for Components of Trust

*Dependant variable=how much do you trust each organization for accurate information about farming methods?*

*Coded as 0= not at all, 1=very little, 2=somewhat, 3=very much, 4=completely*

	Variable	Coefficient	Standard Error
Government	Constant	-2.189	0.257
	Knowledge	0.795	0.080
	Transparent	0.377	0.078
	Interest	0.443	0.084
	iTrust	0.160	0.054
	Pseudo R <sup>2</sup>		0.327
Third Party	Constant	-2.265	0.268
	Knowledge	0.664	0.085
	Transparent	0.451	0.083
	Interest	0.508	0.097
	iTrust	-0.147	0.053
	Pseudo R <sup>2</sup>		0.299
Processor	Constant	-1.885	0.248
	Knowledge	0.259	0.076
	Transparent	0.417	0.079
	Interest	0.725	0.084
	iTrust	0.141	0.054
	Pseudo R <sup>2</sup>		0.239
Farmer	Constant	-1.977	0.328
	Knowledge	0.157**	0.075
	Transparent	0.680	0.073
	Interest	0.507	0.075
	iTrust	0.130**	0.052
	Pseudo R <sup>2</sup>		0.241
Supermarket	Constant	-2.142	0.213
	Knowledge	0.661	0.085
	Transparent	0.493	0.086
	Interest	0.570	0.083
	iTrust	0.163	0.056
	Pseudo R <sup>2</sup>		0.335

All coefficients are significant at the 1% level unless denoted \*\* representing significance at the 5% level.

### G- Composition of Interest Variable in DCE Regressions

Component Matrix for interest variable used in DCE regressions to express a respondent interest in food products from alternative farming methods.

	Component	Question
Q3	.615	In the last month, how often have you purchased food that was natural, organic, sustainable, or free-range?
Q4_1	-.696	I don't care about the farming methods used to produce my food.
Q4_2	.545	I consider myself very health conscious.
Q4_3	.547	Current farming methods are harmful to the environment
Q4_6	.700	I value things grown in harmony with nature.
Q5_1	.766	I consider the human health effects caused by pesticide use when I purchase food.
Q5_3	.814	I pay attention to labels describing how food was produced and traded when I purchase food.
Q5_4	-.783	I don't consider the environmental impact of the food products I purchase.
Q5_5	-.469	Price is the most important factor when I buy food.

Extraction Method: Principal Component Analysis.

#### Total Variance Explained for Interest Factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.029	44.772	44.772	4.029	44.772	44.772
2	.928	10.313	55.085			
3	.818	9.084	64.168			
4	.764	8.492	72.660			
5	.652	7.246	79.906			
6	.590	6.559	86.465			
7	.517	5.742	92.207			
8	.363	4.036	96.243			
9	.338	3.757	100.000			

Extraction Method: Principal Component Analysis.

## 9. VITA

Following a childhood that included growing up on a dairy farm in southern Ontario and a successful competitive figure skating career, Brian obtained his BSc AGR (Honours) at the University of Guelph. His undergraduate thesis focussed on consumer perception of alternative chicken production; an article is forthcoming in *Agribusiness*. He has since worked across Canada as a representative of the Government of Canada and enjoyed studying, working, and travelling abroad. The inspiration for this thesis came as a result of these international experiences, most notably his time working on a farm in Auvergne, France. Brian is currently part of the Canadian Parliamentary Internship Programme that involves working for elected members from both sides of the House of Commons and participating in several comparative study tours to other governments.