Canadian Consumer Valuation of Farm Animal Welfare and Quality Verification: The Case of Pork

A Thesis Submitted to the College of
Graduate Studies and Research
In Partial Fulfillment of the Requirements
For the Degree of Master of Science
In the Department of Bioresource Policy, Business, and Economics
University of Saskatchewan
Saskatoon

By

Adrian D. Uzea

Permission to Use

In presenting this thesis in partial fulfilment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

Requests for permission to copy or to make other use of material in this thesis in whole or part should be addressed to:

Head of the Department of Bioresource Policy, Business and Economics

University of Saskatchewan

Saskatoon, Saskatchewan

S7N 5A8

Abstract

There is increasing pressure from animal rights organizations (AROs) on restaurant chains, food retailers, and meat processors to implement more stringent farm animal welfare (FAW) requirements for their suppliers. In the United States (US), AROs have recently initiated successful ballots to phase out confinement practices in several states. In Canada AROs have been pressuring both public and private sector stakeholders to improve FAW. Are FAW issues, however, paramount in the minds of Canadian consumers? Is the demand for more stringent FAW protocols primarily determined by a subset of consumers with very strong preferences or does it signal a more fundamental underlying change in consumer and societal preferences? Given the credence nature of FAW, who do consumers trust (i.e., government vs. private industry vs. independent third-parties) in the market place for the provision of FAW quality assurances? What are the determinants of trust in these organizations for providing accurate information about animal welfare?

In order to answer these questions, a stated preference consumer survey encompassing FAW issues specific to the Canadian pork sector was tested on two samples of consumers in summer 2008, namely: a general population sample (GP) across Canada and a sample of AROs members. Consumers participated in a purchase experiment where they had to choose between pork chops characterized by combinations of different levels of FAW attributes (i.e., housing system, gestation stalls, and use of antibiotics), quality verifying organization, and price. Multinomial Logit and Latent Class Logit models were used to analyse the survey data.

Surprisingly, "outdoor system" does not seem to resonate well with Canadians, as both the GP sample and the members of the AROs discounted this attribute. As expected, the AROs members have much stronger preferences for the other FAW attributes than have consumers in the GP sample. Nevertheless, significant heterogeneity exists within consumer preferences. Five classes of consumers were identified in the GP sample with respect to their preferences for FAW. At one end of the spectrum are the "FAW sensitive" consumers (12.3%) that have higher willingness-to-pay (WTP) for FAW, while at the other end of the spectrum "price conscious" consumers (18.3%) do not exhibit any WTP for FAW. The other three classes (69.4%) comprise respondents with mixed perceptions regarding FAW. Government and third-party verification of FAW quality assurances had the strongest influence on consumers' preferences in both samples. As well, scientific experts in FAW along with the above two organizations are the most credible in providing information about the welfare of pigs. The extent to which these organizations are knowledgeable about the welfare of pigs is the most important factor enhancing consumers' trust. Results from this study suggest that there are potential marketing opportunities for pork chops sourced from pigs raised on farms where sows are kept in groups, and where credible quality assurances can be established, that private industry could consider. As well, the results suggest that consumers would derive benefits from the government taking a more active role with respect to validating FAW quality assurances.

Acknowledgements

Table of Contents

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Problem Statement

As society becomes more affluent, food is increasingly differentiating by a growing array of quality attributes, from nutrition, to food safety, to convenience, to ethical and process attributes that relate to the way in which the food is produced. Animal welfare (AW), and farm animal welfare (FAW) in particular, is a process attribute that has been garnering increased attention in recent years. In a well functioning market, if consumers value livestock and poultry products with FAW attributes more than the conventional products (i.e., by paying a price premium that outweighs the costs of supplying these products to the market), then, the sellers have an incentive to market livestock and poultry products produced in an FAW enhancing system and advertise them as such. Sellers would signal these attributes to the consumer with a label or advertisement, thus providing the information without any need for the government involvement. From the consumers' perspective, however, FAW is a credence attribute: consumers cannot determine through inspection at the point of purchase nor experience after consumption, whether on-farm production methods enhanced AW. For example, when the consumer sees a package of pork chops without antibiotics or a carton of free-range eggs in the grocery store, he/she cannot determine whether sellers have sourced these products from farms where pigs have not been administered antibiotics for subtherapeutic purposes or hens were free to roam. Since consumers cannot assess whether the livestock or poultry product incorporates the FAW attributes advertised by the sellers, the latter have an opportunity to supply false information to consumers. This is a classic case of information asymmetry.

There are two potential reasons that could impede the sellers' communication of appropriate information to consumers. First, the higher is the price premium that consumers are willing to pay for FAW products, the higher are incentives for sellers to supply false information to consumers. If sellers can convince consumers that livestock and poultry products were produced on farms using higher FAW standards, then the sellers can market them for higher prices without paying the higher production costs. Secondly, while sellers have a motivation to inform consumers about desirable qualities of the livestock and poultry products they sell, they do not have an incentive to advertise undesirable qualities (Golan et al., 2001). The government might intervene in regulating quality claims in foods markets if it cannot rely on the sellers to communicate quality information accurately to consumers. In order to assess whether there is an interest for firms in disclosing desired information about FAW, one should take into account consumers' initial perceptions regarding current livestock and poultry production practices and whether there are verifying organizations on the market to provide credible FAW quality assurances to consumers (Mitchell, 2001).

In addition to the individual benefit that consumers with stronger preferences for FAW may obtain purchasing livestock and poultry products with FAW attributes, they may also obtain a derived utility. For instance, they may also get welfare from free-range livestock and poultry products purchased by other consumers, because in their mind, all of those farm animals experience increased welfare as well as the ones that produced their product (Bennet and Larson, 1996; Bennet and Blaney, 2003; McInerney, 2004). To the extent that these views are representative for society, and if the benefits of intervention outweigh the costs, there is a rationale for the government to intervene in the market in order to address the market failure. In

2

reality, government awareness of the preferences of society regarding AW may be imperfect. It is difficult for policy makers to measure the level of AW that the public considers appropriate, since it usually does not have any benchmark i.e. market for friendly products with varying levels of AW.

Governments may try to measure the costs and benefits of alternative FAW regulations with surveys. A first component of these studies is the quantification and measurement of the benefits from the changes in FAW. That is, to define a set of indicators that either have to measure improved health, reduced stress or food intake. Research is required to determine which farm production practices fit these indicators better (Mitchell, 2001). After the level of a change in AW has been set, the government has to elicit consumers' opinions on the changes in FAW. In other words, the objective is to determine how much its citizens benefit from such changes. In parallel, the government may seek input from groups with different preferences for FAW, groups that usually communicate the strength of those preferences via lobbying. For instance, governments can consult with groups of private enterprises (i.e., retailers, restaurant chains and meat processors), farm animal producers groups, and animal rights organizations. Even though consumers who have no or weak preferences for FAW are also affected by legislation, they usually do not form a group to communicate their opinions since the effect of FAW on the individual consumer is too small to stir them (Mitchell, 2001).

There are two possible outcomes that may arise on the market. If the majority of consumers are indifferent between conventionally produced and 'animal friendly' products (i.e., livestock and poultry products with AW attributes), but policy is responsive to lobbyist pressure from a subset

of consumers with strong preferences, there is a risk of 'over-regulating' the provision of AW. On the other hand, if the more vocal consumer minority in fact represent a latent preference for higher AW standards and more credible labelling, then the market may be under-providing this quality attribute. Given these outcomes, one may wonder whether the demand for more stringent FAW protocols is driven primarily by a subset of consumers with very strong preferences, or does it signal an underlying change in consumer and societal preferences?

It is very likely that consumers are heterogeneous in their preferences, values and attitudes, and, therefore in their expectations for food products. These beliefs change with increasing incomes (Blandford, 2006). Moreover, while attempting to reduce the information asymmetry between producers and consumers, the policy makers are confronted with another dilemma – i.e., the extent to which they should get involved in provision of FAW quality assurances to the consumers. In this respect, can the government rely on the sellers to communicate the information on FAW quality of livestock and poultry products to consumers? Should the government undertake specific activities including: standard setting (i.e., defining industry practices that improve FAW), and certification and verification services (through an assessment and audit process) or should it pass a part of these responsibilities to the private sector. As well, who do consumers really trust to provide credible quality assurances with respect to FAW and what are the main drivers explaining this trust? Previous research in the Canadian context suggested that the government, either federal or provincial, is viewed as the most trusted source of information regarding food safety and quality (AAFC, 2006). In a similar vein, research shows that the government, either provincial or a federal agency, are preferred by Canadians to monitor an organic standard, while a private agency was less preferred (Cranfield et al., 2007).

Thus, it is timely to examine how Canadians view these issues with respect to FAW quality assurances.

1.2 Background Information

Increases in livestock productivity have been made possible through the use of animal confinement systems, scientific feed selection, and productivity-enhancing pharmaceuticals (Blandford, 2006). All of these improvements have facilitated a supply of affordable meat to consumers, but some contend this is a trade-off that has led to the deterioration of the conditions in which animals are raised (Lusk et al., 2007). The efforts of animal rights activists have created a new awareness of FAW that has encouraged changes in public policy and industry standards in some jurisdictions (Lusk et al., 2007, p.1).

Most developed countries have regulations related to humane animal treatment. For example, the Humane Methods of Slaughter act was adopted in the US in the 1960, though the law lacked an enforcement mechanism (Jones, 2008). In a similar vein, in the 1970s the European Economic Community (EEC) enacted regulations related to the slaughter and transportation of animals. Outside the EEC, Switzerland became the first country in the world to ban (with a ten year phase in period) a production method (i.e., conventional cage in egg production) on the farm in 1981 (Trewin, 2002). Moreover, Sweden adopted the "Feeding Stuffs Act" in 1985 which prohibited the use of antibiotics as growth promoters in pig production" (Liljenstolpe, 2008a, p.18). As well, the Animal Welfare act adopted in 1988 specified that animals had to lie and move freely and to express their behaviour (e.g., pigs must be kept in loose housing and fixation is allowed only on temporary basis) (Liljenstolpe, 2008a, p.16-17). More recently, in the United States

(US), there are signs of increasing interest in FAW issues. Responding to pressure from US animal rights organizations (AROs) such as the Humane Society of United States (HSUS) and People for the Ethical Treatment of Animals (PETA), several US restaurant chains such as McDonald's, Burger King and Wendy's have, starting in 2000, began developing their own animal welfare guidelines and programs (Brown and Hollingsworth, 2005). Moreover, in January 2007 several large players in the meat industry (e.g., Smithfield Foods Inc. and Maple Leaf Foods Inc.) announced that they will require their suppliers to phase out the confinement of sows in gestation crates over the next decade (HSUS, 2007). Following the same pattern, in February 2008 in a letter sent to the HSUS, the California-based retailer Safeway indicated that buying decisions would give preference to livestock and poultry manufacturers in North America that use or switch to an AW friendly production systems (HSUS, 2008). More recently, in November 2008, California became the first US state that phased out battery cages for laying hens and joined several others that have already banned the use of gestation stalls and veal crates (AVMA, 2008a, 2008b).

These events may signal the beginnings of an interaction between animal rights organizations and food retailers, but are these issues paramount in the minds of North American food consumers? The limited evidence available to date suggests that animal welfare may not currently be a *top-of-mind* issue for many consumers in North America, and yet we are seeing pressure from animal welfare groups for food retailers, processors and provincial legislators to adopt more stringent requirements for their suppliers.

1.3 Objectives

The primary objective of this thesis is to assess Canadian consumer's preferences for FAW attributes and quality verification provided by different stakeholders in Canada. In particular, the thesis aims to elicit and/or estimate 1) consumers' perception of the current status of FAW in Canada, 2) consumers' willingness-to-pay (WTP) for alternative livestock production methods (i.e., pig farming methods), 3) consumers' WTP for FAW quality assurances provided by different stakeholders involved in the Canadian Pork sector (i.e., government, agricultural producers, producer associations, downstream food firms, or a third-party enterprise), 4) whether declared trust in verifying organizations relates to WTP for the assurances provided for FAW attributes, and 5) whether the Canadian consumers are heterogeneous, that is the extent to which Canadians comprise multiple groups of consumers, and the strength of preferences of each group. In order to achieve these goals, a conceptual framework is developed to model welfare outcomes under different scenarios of mandatory vs. voluntary FAW standards, then a stated preference consumer survey is tested on two samples of pork consumers, namely: a general population sample across Canada and a sample of animal rights organizations members who were expected to have stronger preferences for AW. The analysis of the survey data permits an assessment of consumer preferences for specific FAW attributes and quality assurances under mandatory and voluntary private sector verifications.

1.4 Thesis Organization

Following the introduction, the thesis is divided into six chapters. Chapter 2 presents an overview of FAW by defining the concept of AW and summarising legislative approaches to AW in the EU, Australia, US and Canada. The chapter also discusses the roles of other

stakeholders in addressing market deficiencies. Where applicable, to describe in more detail these mechanisms, examples highlighting Canadian and US stakeholders' activities in this respect are provided. Chapter 3 represents the theoretical part of the thesis. Using the pork sector as a case study, it presents a social welfare analysis of the market for AW friendly pork products under six different scenarios. In particular, these scenarios are differentiated with respect to the strength of consumer preferences for FAW products, the existence of voluntary standards versus mandatory standards, and the credibility of third-party certification. While Chapters 2 and 3 are the descriptive part of the thesis, Chapters 4 and 5 outline the empirical part of the thesis. Chapter 4 encompasses a review of consumer studies in the area of FAW, the data collection, and the design methods used in the stated preference consumer survey (i.e., choice experiment). In addition, Chapter 4 presents the econometric models used to estimate the utility consumers derive from FAW attributes and quality verification. Chapter 5 presents the results of the consumer survey, outlining consumer valuations of different pig welfare attributes and various organizations in providing quality verification with respect to AW standards of these attributes. Chapter 6 discusses the conclusions and implications of this study as well as suggestions for future research.

CHAPTER 2: DEFINING AND LEGISLATING FARM ANIMAL WELFARE, THE ROLE OF THE GOVERNMENT AND PRIVATE INDUSTRY IN DELIVERING QUALITY ASSURANCES TO CONSUMERS

This chapter starts with a literature review of the previous research that looked at consumers' perceptions of FAW in the US and Canada. Then, it continues with a background discussion on the definition of food products quality (e.g., livestock and poultry products) and its relation with FAW. As well, it touches briefly on the definition of FAW. Moreover, it summarizes the specific mechanisms (i.e., legislation, codes of practice and labelling schemes) to address market deficiencies for FAW products. In the first instance, it presents a review of the most important laws regulating the treatment of farm animals in a number of countries, including the EU, the US, Australia and Canada. In the second instance, it analyzes the motivation of the stakeholders in the livestock and poultry supply chain to adopt codes of practice and labelling schemes in providing FAW quality assurances. Where applicable, to describe in more detail the later two mechanisms, examples highlighting Canadian and US stakeholders' activities in this respect are provided.

2.1 Importance of Farm Animal Welfare among Consumers

Awareness about FAW has increased in the last two decades in the minds of the food consumers worldwide. Among these, European consumers were among the first in the world to express concerns regarding FAW. Studies by Hughes (1995) and Fearne and Lavelle (1996) revealed an increasing concern and awareness of FAW issues by British consumers of livestock and poultry products. For instance, the first study reports that 60% of the respondents believed that it was very important for the food industry to make sure animals are treated humanely and the second

study reveals that among the factors taken into consideration when purchasing eggs, the AW concern was the seventh ranked, being mentioned by 32% of the consumers in the sample (CWS Retail, 1995 cited in Hughes, 1995; Mintel, 1991 cited in Fearne and Lavelle, 1996). In another study conducted in the UK, Bennet (1997) finds that 41% of the respondents were very concerned about the possibility of farm animals being mistreated, whilst 45% stated that they were somewhat concerned.[1] As well, 61% of the respondents stated that they avoided purchasing livestock products because of their concerns about the welfare of farm animals (Bennet, 1997).

Another body of works that elicited consumer perceptions of FAW consisted of major surveys undertaken across EU countries. This first comparative study found that a majority of European consumers express some concern about AW but at the same time they experience obstacles in purchasing products that address their concerns.[2] For instance, 85% of the German respondents said that they are either slightly or somewhat concerned about the impact of husbandry practices on animals (Kohler, 2001). Moreover, concerns about animal farming systems have been declared by 33% of the Italian respondents as the main reason for a reduction in consumption of meat or animal products (Miele and Parisi, 2001).

A second comparative study conducted in seven EU countries revealed that the proportion of respondents considering that the issue of FAW is an important or a very important consideration ranged between 65% to 87%, placing France at the bottom and Italy at the top (Kjaernes and

---

[1] Bennett, (1997) conducted a survey on a sample of 2000 people in the UK that sought to measure consumers'

[2] "This study was an EU-funded project "Consumer Concerns about AW and the Impact on Food Choice" (CT98-3678) undertaken in five European countries (Italy, UK, Ireland, France, and Germany) from 1998 to 2001. The study investigated the nature and level of consumer concerns both within and amongst the study countries. The project employed both qualitative and quantitative methods" (Harper and Henson, 2001, p.5).

Lavik, 2007).[3] In a similar vein, a 2005 Eurobarometer survey revealed that, on average, 43% of the respondents in the EU stated that they consider AW most of the time or some of the time when purchasing meat (EC, 2005).[4] In parallel, the same survey revealed that 74% of the EU respondents stated that they can influence the welfare and protection of farmed animals for the better through their purchasing behaviour (EC, 2005).

More recently, the 2007 Eurobarometer survey revealed that consumers in the EU place a considerable importance on FAW; for example, the average respondent rated the importance of the welfare of farm animals being protected at almost 8 out of 10 on a maximum scale of 10 (EC, 2007a).[5] While these surveys revealed high level of concerns about AW among EU consumers, by contrast, another body of work using focus groups (Harper and Henson, 2001) reported a lower level of concern. The focus groups conducted in these studies revealed that the EU consumers seemed to care about AW to some extent, although price and product appearance or health and food safety concerns were the main drivers for livestock and poultry products purchases.

---

[3] "The survey was carried out on a sample of 1500 respondents in each of the seven countries – i.e., France, the UK, Hungary, Italy, the Netherlands, Norway, and Sweden – in September 2005. This study is part of the Welfare Quality research project which has been financed by the European Commission" (Kjaernnaes and Lavik, 2007, p.9).

[4] "The EU Special Eurobarometer 229/Wave1 "Attitudes of Consumers towards the Welfare of Farmed Animals" was conducted on a sample of 24,708 EU citizens across 25 European countries between February and March 2005. The survey covered issues such as knowledge of farming conditions, purchasing behaviour and perceptions of legislation related to AW" (EC, 2005, p.2).

[5] "The EU Special Eurobarometer 229/Wave 2 "Attitudes of Consumers towards the Welfare of Farmed Animals" was conducted on a sample of 29,152 EU citizens across 25 EU countries and 4 accession and candidate countries between September and October 2005. The survey examined the following themes in turn: the importance of FAW in the public mind, knowledge of AW, perceptions of national AW standards, the impact of higher AW standards on producers, consumer shopping habits and labelling" (EC, 2005, p.7).

In Australia, Coleman and Hay (2004) find that Australian respondents consider AW to be an important issue and, although it does not strongly influence the purchasing of animal products, it is associated with a willingness to engage in community behaviours such as donating to animal welfare groups, or writing to newspapers. Another Australian study reported that 71% of the respondents agreed that FAW is an important consideration for them (Coleman et al., 2005 cited in Coleman, 2007).

In the US, from a sample of 801 respondents in New Jersey, Murray (2003) found strong support for the idea that the state should regulate the treatment of farm animals (i.e., 76% of the respondents agreed with this statement). As well, 65% of the respondents stated that humane treatment of farm animals is an important consideration to them. Lusk et al. (2007) elicited the opinion of US consumers with respect to FAW, finding that it was ranked relatively low compared to other social issues, i.e., human poverty, the US health system, and food safety. Yet, 75% of the respondents stated that they either agreed or strongly agreed with a state law that would require farmers to treat animals more humanely (Lusk et al., 2007). In a similar vein, Tonsor (2008a) finds, from a sample of 255 respondents in Michigan, that 68% would support a referendum banning the use of lactation crates by Michigan pork producers. From another sample of consumers across the US, the same author finds that 70% would support a law that would require farmers to confine calves raised for veal, egg-laying hens, and pregnant pigs only in ways that allow these animals to lie down, stand up, fully extend their limbs, and turn around freely (Tonsor, 2008b).

In 2006 Agriculture and Agri-Food Canada (AAFC) commissioned Ipsos-Reid to conduct market research regarding Canadian consumer perceptions, attitudes and behaviours with respect to food safety and food quality (AAFC, 2006). FAW was addressed indirectly. The survey suggested that FAW was not a major issue for most consumers; it was rated as important by less than 3% of respondents. When it came to the importance of different food attributes in the decision-making process, "knowing that animals were treated humanely", was only the eighth most important attribute (AAFC, 2006). Opinions of Canadian consumers related to AW issues pertaining to pork production in Canada have also been evaluated through Ipsos-Reid polls conducted in 1999, 2002 and 2004 (Lawrence, 2007). For example, the 2004 survey showed that among the issues related to hog production, AW was ranked fourth, after production issues and environmental concerns (Jones, 2006).[6] Another Canadian study conducted on a sample of 1028 respondents from across Canada found that 73% of the respondents consider that FAW is an important consideration to them (CCFA, 2005).

In conclusion, the studies presented in this section signalled an increasing consumer concern about FAW worldwide. As for Canada, the limited evidence available to date suggests that AW may not currently be a *top-of-mind* issue for many Canadians, and yet we are seeing pressure from animal welfare groups for food retailers and processors to adopt more stringent requirements of their suppliers. Although the thesis does not attempt to define what it is meant by FAW, the next section will outline the main approaches used in defining this concept. Then, the thesis will proceed with a discussion of where the consumers interact with FAW, that is, as a purchaser of livestock and poultry products in the market place.

---

[6] Jones (2006) - Q3 "When thinking about hog farming, what thoughts or topics come to mind?" Answers were counted as total mentions over a sample of 1601 consumers.

2.2 Definition of Farm Animal Welfare

Recently in the media and through other information sources there has been a host of different representations of specific farm production practices pertaining to animal welfare. For instance, stalls (i.e., for gestation or farrowing) are a popular choice in pig farming as they allow closer monitoring of sows' health, enable the sows to be fed/watered while facing no competition from the other sows, and protect newborn piglets from being crushed when a sow lies down unexpectedly (Saskatchewan Pork Development Board, n.d.; BC SPCA, 2008). However, it is also argued that stalls may not provide enough room for sows to move and may deprive them of the ability to express important natural behaviours, such as roaming, rooting, and interacting with other animals (BC SPCA, 2008). As this example shows, a specific production technology may have conflicting impacts on AW, and the interpretation of what is 'good' for an animal's well-being is not always straightforward.

Currently, there is no universally accepted definition of animal welfare. Some scientists take the approach that AW relates only to the physical wellbeing of the animal, while another approach holds that AW should be expanded to include what the animals feel. A general definition of AW relates to how well the animal is coping with a situation it is in. If an animal does not appear to be coping then its welfare is considered to be at risk (DPIA, 2004). At the same time, there is a widespread acceptance of the definition of the "Five Freedoms", as elucidated by the United Kingdom Farm Animal Welfare Council (FAWC, 1988). The Five Freedoms consist of: freedom from hunger and thirst (ready access to fresh water and diet), freedom from discomfort (provision of an appropriate environment), freedom from pain, injury or disease – prevention, freedom to express normal behaviour, and freedom from fear and distress (FAWC, 1988). Other

authors, such as Fraser and Weary (2004), have identified three main aspects of welfare: biological functioning, affective states (pain), and natural living.[7] Another approach employed in defining this concept and which relies on the previous definition of the "Five Freedoms" is to consider that animals are sentient beings and should be treated in such a way so that they do not suffer unnecessarily (EC, 2007b). A sentient animal is one that "has the capacity to have feelings and to experience suffering and pleasure" (MAFF, 2007, p.7). In this respect, Desire et al. (2002) provide a comprehensive review of the studies that analyzed the issue of whether animals used for farming purposes feel emotions. As well, these authors suggest that the "information on the cognitive abilities of the farm animals, which are available but scattered, could help understand their emotions" (Desire et al., 2002, p.165)

While the above approaches for defining FAW suggest an ideal environment in which animals can be raised, they are often not consistent with many conventional farming practices. For instance, production systems such as confinement in cages or battery stalls restrict the ability of animals to express their natural behaviour. Certain production practices, such as restriction of feed for laying hens to induce moulting, beak trimming and toe clipping to decrease injuries to confined poultry, castration methods and early tail docking for cattle and pigs, are also seen to be inconsistent with these definitions of FAW. The transportation of animals to slaughter plants can affect the welfare of animals depending on the length of time animals are transported, the duration of rest periods, the loading densities, and their handling at loading and unloading. Finally, the method of slaughter, particularly the use of different methods for stunning animals

---

[7] Biological functioning refers to the health and performance of animals under different production systems; affective states means pain, fear and distress displayed by animals under different systems; and natural living is the extent to which natural behaviours of animals can be accommodated by production systems (Fraser and Weary, 2004).

and their handling in slaughter plants, is an element of humane treatment. The general conclusion is that poor AW conditions impact the ability of animals to grow, reproduce and survive. Maintaining an adequate level of AW at any of the stages of the livestock chain (e.g., transportation or slaughter) reduces the stress of the farm animals which further improves their health (Faucitano, 1997; Lo Fo Wong et al., 2002; Belk et al., 2002; De Passillé and Rushen, 2005; Dalla Costa et al., 2007; Grandin, n.d.; EC, 2007b).

McInerney (2004) argues that although there is no formal way to measure or even rank FAW states, we do form images about what constitutes better, good or bad conditions. In this sense, he argues that, despite the animal scientists' definitions, FAW is in reality a subset of human welfare: the animals' preferences and well-being having relevance only to the extent they are important to us. Recognizing that FAW may be interpreted differently by different groups, the next section examines the role of quality signals for FAW.

2.3 The Relation between Food Quality and Farm Animal Welfare in the Market Place

Although quality may be defined as "the degree of excellence that a good possesses", the definition stating that "any of the features that make something what it is; characteristic element, attribute" is considered more appropriate when the notion of quality is explored in the economics and consumer studies literature (Webster's New World Dictionary cited in Noelke and Caswell, 2000, p.2). It is generally recognized that Lancaster's (1966) contribution in viewing a good as a bundle of attributes underpins many economic studies of product quality. When consumers want to buy a product, they need some signs to provide them the necessary information to assess the attributes that form the product's quality (Noelke and Caswell, 2000). However, when they are in

the real market place, consumers face information asymmetry since they may not have access to the necessary information to assess certain product attributes. Stigler (1961) first identified search attributes. Later on, Nelson (1970) gave a more detailed definition of search attributes considering them as those that consumers identify by inspecting the product prior to the purchase. Additionally he expanded his analysis to permit experience characteristics that can be only ascertained following consumption. Darby and Karni (1973) introduced the third category of attributes, namely credence attributes that cannot be evaluated by the buyer even after consumption.

For food products in particular, the multitude of search, experience and credence characteristics have been examined by Hooker and Caswell (1996) and Caswell et al. (1998) in a quality attribute space which further groups them into: food safety, nutrition, value, package attributes and process attributes. FAW falls in the last category, along with biotechnology, organic production, traceability and growth enhancers. Without more information, a consumer does not know even after consumption whether a package of animal friendly pork chops has been sourced from pigs treated humanely in production and transport or whether a carton of free-range eggs has been laid by hens not kept in battery cages.

In this respect, Olson and Jacoby (1972) extended the notion of product quality by introducing two terms: intrinsic and extrinsic cues. Consumers use cues to detect the attributes they want (Northen, 2000; Bredahl et al., 2000). For example, intrinsic cues such as color, odour, and size, are used to predict experience attributes such as tenderness and taste. Extrinsic indicators (e.g., certification stamp from a quality assurance scheme) are used to identify both process and

product attributes. For example, a certification stamp on a package of pork chops or on the carton of free-range eggs can signal the presence of FAW attributes in the livestock or poultry product.

Northen (2000) provides a comprehensive discussion of intrinsic and extrinsic quality ques. Bredahl et al. (2000) look at the link between food quality and attributes from a wider perspective by examining quality assurance (QA) schemes which are viewed as "providing a system for assuring and certifying desired product attributes by establishing production and processing standards that relate to the provision of these attributes, inspecting to ensure that standards are being observed, and providing an indicator of these attributes through a mark, label or certification" (Bredahl et al., 2000, p.90). In a similar vein, Early (1995) describes QA as "a strategic management function concerned with the establishment of policies, standards and systems for the maintenance of quality" (Early, 1995, cited in Walley et al., 1999, p.149). Generally, the QA are promoted by stakeholders, trade organisations and industry bodies, or are private systems (Manning et al., 2006).

Anon (1996a) considers that when applied to the farm, QA is sometimes referred to as "farm assurance" and covers animal health, welfare, and husbandry, through codes of practice (cited Walley et al., 1999, p.149). In a similar vein, the UK Farm Animal Welfare Council (FAWC) went a step further and considered QA as a 'generic term" and defined farm assurance as the application of quality assurance principles to the schemes at the farm levels and/or schemes that apply along the food chain, at market, in transit and up to the point of slaughter (FAWC, 2001, p.4).[8] In this respect, FAWC describes QA schemes as "schemes that aim to satisfy consumers

---

[8] "The Farm Animal Welfare Council (FAWC) was established in 1979. Its terms of reference are to keep under review the welfare of farm animals on agricultural land, at market, in transit and at the place of slaughter; and to

that stipulated standards relating to characteristics of a product are met during its production process" (FAWC, 2001, p.3). The challenges in defining FAW notwithstanding, society's growing interest in FAW and the information asymmetries which arise in the provision of the credible FAW assurances has lead to the adoption of specific signalling mechanisms, such as legislation, FAW assurance schemes (e.g., codes of practice implemented by producer organizations), and labelling programs. These mechanisms, as well as the role of different stakeholders in the provision of the credible FAW assurances are reviewed over the next sections with a particular emphasis on their applicability to the US and Canada.

2.4 The Role of the Stakeholders and the Mechanisms to Address Market Failures in the Provision of Farm Animal Welfare

The intervention of different stakeholders (e.g., government) in the provision of FAW is usually motivated by different market failures, including externalities and information problems (information asymmetry and incomplete information). An externality occurs when the action of a firm imposes uncompensated costs or benefits on an outside party (MacDonald, 2005). Appropriate conditions for raising farm animals provide private economic benefits to producers and some level of positive external benefits to people who care about AW status (McVittie et al., 2006). Some people can suffer a loss of utility by knowing the conditions in which animals are raised at the farm – i.e., members of AROs. The farm activities necessary to generate optimal private returns may typically not deliver the level of public good externality that is demanded by some members of society (McVittie et al., 2006). To the extent that these views are

---

advise Great Britain's Rural Affairs Ministers of any legislative or other changes that may be necessary" (FAWC, 2006, p.2).

representative for society, and if the benefits of intervention outweigh the costs, there is a rationale for the government to intervene in the market in order to address the market deficiency.

By simply tasting the meat, a consumer cannot determine whether the pork chops are from a pig grown on straw bedding in a free-range environment or from a pig housed in a barn on slatted floors. If consumers knew all relevant information about the FAW conditions associated with the production of free-range pork they could make fully informed choices and transmit these preferences to producers through price signals (MacDonald, 2005).

Mechanisms to address market failures for FAW products include legislation, codes of practice and labelling. Legislation is an instrument that the government uses in setting minimum mandatory AW standards. Legislation promulgated by the government aims to reflect government's assessment of the demands for minimum standards of FAW coming from society (DPIA, 2004).

Codes of practice act as guidelines for the procedures of livestock industries and provide information for other interested stakeholders, i.e., animal rights organizations (AROs), animal industry participants and the general public. Sometimes, private enterprises – i.e., farm industry organizations, processors, retailers – have their own FAW industry codes of practice, which are generally more stringent than the minimum required by legislation (DPIA, 2004). While it is important to be able to define industry practices that improve AW – i.e., standard setting – the certification and verification of these practices through an assessment and audit process cannot be neglected. Thus, the schemes can be either operated by the regulator (1st party), audited by the

purchaser (2nd party), or they can be independently certified using agreed protocols (3rd party) (Manning et al., 2006). It therefore becomes important to monitor livestock products along the supply chain – i.e., starting with production at the farm level, continuing through transport to and slaughter at the abattoir – to ensure that all supply chain members comply with the existing set of FAW codes of practice. This can provide a credible assurance to consumers that the "friendly" products marketed do indeed carry the desired FAW attributes.

Labels are additional mechanisms that help consumers make informed choices. Labels are an important tool for producers to achieve price premiums if there are a significant number of consumers who are willing to pay for FAW products (DPIA, 2004). Frewer et al. (2005) consider that consumers may make product choices based on knowledge about the production system itself, effective traceability of AW products through the food chain, and trust in product labels. In a similar vein, authors such as: Caswell and Mojduszka (1996), McCluskey (2000), Giannakas (2002), Jahn et al. (2003), and Christensen et al. (2003), stress the importance of a trusted certification in the context of labelling credence goods (e.g., organic, environmental goods, and AW). Credible labelling also requires the effective implementation of a farm monitoring system for FAW-oriented products by a credible investigator, independent of whether this is imposed voluntarily or through statutory requirement and involves a universally agreed definition of the FAW attribute (Crespi and Marrette, 2005). Thus, in the event of an ambiguous or a multitude of definitions, sellers (e.g., farmers, livestock and poultry processors, retailers) may have incentives to market the same product either as conventional product designed to the price-driven consumers, or as an animal friendly product meant for the animal welfare sensitive consumers. Thus the label or the logo used by the seller does not always match with the conditions under

which an animal has been raised, and so the issue of credibility is raised. For example, the Australian Consumer Association (ACA) signalled that consumers in Australia may be misled by some pork producers who market pork as having certain FAW attributes (e.g., free-range or free-range bred pork).[9]

Irrespective of the stakeholder responsible for setting and auditing the FAW standards and labels, the assurances that they provide to consumers have to be assessed through criteria that evaluate the meaningfulness of FAW claims. FAWC states that:

"credibility, transparency and traceability are the basic tenets of farm assurance" (FAWC, 2001, p.6) An assurance scheme needs to "declare its intention publicly in relation to its standards; have a system in place which is capable of achieving these standards; be seen to be achieving the standards that it has set itself by means of regular independent verification; and specify appropriate action in relation to non-compliance" (FAWC, 2001, p.6).

The following subsections summarize the role of different stakeholders, i.e., government, farmer industry groups, retailers and processors, third-party organizations, and animal rights groups, involved in providing consumers with appropriate FAW in the market place. The main legislative approaches to AW in developed countries will be analyzed. Where applicable, examples are provided that highlight the Canadian and US stakeholders' activities in this respect.

---

[9] "According to the Free Range Pork Farmers Association, the definition of 'free-range' is that the pigs should have the freedom to forage on the land, and not be hindered by cages, stalls, tethers or confined yards. The pigs should be able to, among other things, "graze on pasture during the day, experience sun, rain and wind, be free to express instinctive behaviour, be free from fear and distress, and be free from hormones, growth promotants and antibiotics". While free-range pork producers agree that free-range bred is a humane method of raising pigs, they think consumers are entitled to know the difference and know exactly what they are buying. Free-range bred piglets are born outdoors, to mothers that live in the open, but once weaned at about three weeks they are moved into sheds or shelters to be fattened up as they start their journey to your dinner plate" (ACA, 2007).

2.4.1 The Role of the Government

Society consists of heterogeneous individuals with various preferences and different levels of awareness about animal welfare. Government has the role of taking into account the preferences of all stakeholders and using them in the development of appropriate policies. The main goal of the government is expected to be the maximization of the well-being of the whole community (DPIA, 2004).

In order to deal with these types of informational failures, MacDonald (2005) considers that the government has three policy alternatives. The first alternative is mandatory FAW regulation which would require that producers comply with minimum standards. In order to assure producer compliance with these standards, the government's agencies – i.e., Canadian Food Inspection Agency (CFIA) – would have to ensure enforcement. The pitfall of government intervention through mandatory standards is that the costs associated with livestock production, as well as the costs associated with standard setting and enforcement, would be higher. In particular, these costs have to be incurred by all buyers irrespective of their preference for FAW products (this case is analyzed in Chapter 3). The following subsections will summarise the main legislative approaches to AW in developed countries.

2.4.1.1 Legislation Related To Farm Animal Welfare

Legislation related to AW may take the form of regulations prohibiting certain human behaviours towards animals, including farm animals, by disallowing them in the criminal law. This is called primary regulation and its main specificity is the fact that "enforcement of rights and liabilities may take place in the civil courts, for example, to obtain recompense from those who have liability (legal responsibility)" (FAWC, 2008, p.3). Such basic laws may then provide a basis for "secondary legislation and for rules and regulations enabling other policy instruments such as command and control" (FAWC, 2008, p.3). The second category of instruments consists of "rules that society must obey and they usually encompass the treatment of farm animals used in livestock and poultry production on the farm or during the transport (i.e., by specifying a minimum level of welfare). Compliance is usually monitored and enforced with penalties (i.e., financial or penal) for non-compliance" (FAWC, 2008, p.5).

National legislation related to FAW varies from one region of the world to another. For example, some of the FAW laws regulate the space per animal and methods for confining animals while others regulate animal slaughter or transportation. International AW initiatives are generated by the commercial disputes in the international trade of livestock and poultry products which are driven in turn by the differences in the FAW standards. For example, the 70th general session of the Office International Des Epizooties (OIE) adopted a recommendation committing the OIE to take the lead in AW worldwide (Horgan and Gavinelli, 2006).[10] The OIE's 167 member

---

[10] OIE's mission statement is "to provide international leadership in AW through the development of science based standards and guidelines, the provision of expert advice and the promotion of relevant education and research. The OIE will achieve this mission through: promotion of science-based understanding of AW, utilisation of appropriate expertise, consultation with all relevant stakeholders, recognition of regional and cultural dimensions, liaison with academic and research institutions, and the use of communication tools appropriate to all relevant audiences" (Bayvel, 2007).

countries have agreed that OIE should develop guiding principles and standards on AW to assist member states in bilateral negotiations (Horgan and Gavinelli, 2006). The OIE's achievements to date include the adoption in 2005 of the international guidelines related to animal transportation by sea and land or animal slaughter for human consumption (Bayvel, 2007). The objective of this section is to provide an overview of national legislative initiatives related to FAW in developed countries such as the EU, Australia, the US, and Canada.

2.4.1.1.1 Legislation in the European Union

The EU general Directorate for Health and Consumer Protection is responsible for AW legislative initiatives, with input from a scientific veterinary committee within the European Food Safety Authority, and public input from the Economic and Social committee.

In order to have a uniform FAW policy across all of its member states, the EU included a protocol on the welfare and protection of animals in the 1997 Treaty of Amsterdam. The Treaty asked the member states to pay full regard to the welfare requirements of animals when formulating and implementing policies related to agriculture and transport. As well, it contains a legally binding protocol recognizing that animals are sentient beings. More recently, in January 2006 the EC adopted the Community Action Plan for the protection and welfare of animals for the period 2006-2010. In this respect, these two EU legislative acts fall in the category of primary legislation serving as a basis for the directives on the welfare requirements of specific categories of farmed animals which are secondary policy instruments (i.e., command and control).

The first EU legislation on FAW was enacted in 1974 and was related to the slaughter and transportation of animals.[11] The EU's original slaughter legislation was replaced in 1993 to restrict the slaughter of animals outside slaughterhouses and to regulate the humane slaughter of farm animals. A 2005 regulation, related to transportation of animals, includes mandatory requirements for shorter transportation times for different species, i.e., 24 hours for pigs, as well as improved conditions for the animals during transport, i.e., permanent ventilation and access to water. In the case of live animal transport across the EU states, compliance with the transport regulation is verified by the local police who co-operate with the local veterinary authorities. In case of non-compliance, transporters risk having their authorisation withdrawn (EC, n.d.).[12]

Other EU regulations address the issue of confinement, affecting the welfare of calves, pigs, and laying hens. For instance, several minimum standards have been approved since 1988 – the Laying Hens Directive (88/166/EEC of March 7, 1988) and 1991 – Pig Protection Directive (91/630/EEC of November 19, 1991). Council Directive 98/58/EC of July 20, 1998 prohibited the use of individual pens for calves over eight weeks old, banned the use of tethers except in specific circumstances and included requirements for feed.[13] Producers are required to comply with these AW production standards.

---

[11] The main EU legislative actions were: 1974/1993 Stunning and killing, 1977/1995 Transport protection, transport time limit and densities, COUNCIL REGULATION (EC) No 1/2005 of December 22, 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97.

[12] Compliance means a check on whether animals have not been adequately watered or fed, or have not had their rest period, drivers carry the certificate attesting that they undergone specific training to handle the animals they are transporting and provide any necessary care, whether the transport is accompanied by a route plan, if animals are transported for more than eight hours (EC, n.d.).

[13] Council Directive 98/58/EC of July 20, 1998 concerning the protection of animals kept for farming purposes.

The EU subsequently pushed the FAW boundary even further in 1999 by putting in place a ban on conventional cages for laying hens to be phased-in over a number of years; the existing systems are being modified to comply with the more stringent standard.[14] In addition, the 1991 directive for minimum standards for the protection of pigs has been amended twice by directives 2001/88/EC and 2001/93/EC.[15] For dry sows, the new standard effectively bans the use of tethers for sows and gilts from 2006 and the use of sow stalls (except for the first four weeks of pregnancy) from 2013. Sows must be kept in groups from four weeks after serving until a week before the expected time of farrowing (Arey and Broke, 2006).

All the regulations outlined above have to be applied uniformly by the EU member states but the mechanism by which they get enacted across the member states differs. The national legislation of each member must at least conform to the European regulation or may specify more stringent requirements related to FAW. The EC's Food and Veterinary Office carries out audits in the member states to check the status of implementation (Horgan and Gavinelli, 2006). However, there are notable differences between the EU countries in this respect. For example, Sweden has stricter requirements for floor surface for weaned pigs, prohibit tail docking and teeth clipping, and limit weaning to piglets for at least four weeks. In the United Kingdom and Sweden, group housing for non-suckling sows is already required in all buildings (Bock and Van Huik, 2007). In

---

[14] Moynagh (2000, p.111) states "Legislation in force sets a minimum space for caged hens of 450 square centimeters or 70 square inches per hen. This minimum requirement increases to 500 square centimeters for existing cages. By 2003 the minimum space allowance increased to 550 square centimeters for such cages. By 2012 all existing cages must meet this 750 square centimeter cage requirement. Also, each cage must be enriched. An enriched cage will have facilities in the cage to allow the birds to express normal bird behaviour. For example, the birds will have the ability to stretch their wings".

[15] Arey and Broke (2006, p.67) - "These two new directives lay down the new minimum standards for the housing and management of pigs. Minimum general housing refer to all of the following: stocking densities, pen sizes, pigs' ability to see other pigs, keeping sows in groups, comfort and rest, construction, maintenance, cleaning, heating, ventilation, flooring, lighting, noise. Minimum general management standards refer to all of the following: inspection, treatment of sick or injured pigs, mutilations such as castration and tail docking, feeding and drinking, access to foraging material such as straw and mushroom compost, training of stockpersons".

general, Sweden and the UK tend to have stricter regulations for all farm animals covered by EU regulations (Bock and van Leeuwen, 2005)

2.4.1.1.2 Legislation in Australia

Australia's animal welfare strategy is based on an agreement among various stakeholders. The guidelines of the strategy relate to animals used for the production of food and fibre among other uses.[16] They were developed by the National Consultative Committee on Animal Welfare (NCCAW).[17] These guidelines are developed based on scientific expertise, and are suggested practices for the acceptable use and treatment of animals (MAFF, 2007). There are two common features of the EU and Australian's AW strategies. As with the EU approach, the Australia's strategy encompasses the care, uses and direct impact of human activity on all sentient species of animals (MAFF, 2007, p.7; EC, 2007b). Second, with particular reference to animals used for the production of food, it recognizes the strong link between AW and animal health and production (MAFF, 2007, p.3; EC, 2007b). The Australian Ministry of Agriculture, Fisheries and Forestry developed Model Codes of Practice for FAW in cooperation with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and with feedback from other stakeholders. Codes of practice for the welfare of the livestock on the farm have been developed and reviewed over time. For instance, the code on the welfare of pigs was reviewed for the third time in 2008 and is intended as a guide for all people responsible for the welfare of pigs under both intensive,

---

[16] Other uses covered in the guidelines of the Australian AW strategy are: animals used in research and teaching, companion and guide animals, animals used for recreation, entertainment and display, native and introduced wildlife and feral animals (MAFF, 2007).

[17] MAFF (2007) - NCCAW functions are to: assess and advise the Federal Government on the national implications of welfare issues affecting animals, advise on the effectiveness and appropriateness of national codes of practice, policies, guidelines and legislation to safeguard or further the welfare of animals and protect the national interest, liaise with other relevant bodies such as the Animal Welfare Working Group (which is a working group of the Animal Health Committee), and other functions that were required or conferred on the committee by the Minister.

deep litter and outdoor systems (MAFF, 2007). Other codes of practice that have been developed and reviewed concerned the welfare of livestock during transportation and at slaughtering establishments.

Unlike the EU, which enacts and enforces mandatory regulation regarding the FAW at all stages of the livestock chain, the similar Australian process encompasses just transportation and slaughter of livestock. In Australia, livestock transportation has to comply with the guidelines of the Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption that was approved by the Meat Standards Committee, a body comprising relevant Federal and State Government representatives, and harmonises standards for the production and transportation of meat and meat products. In turn, the responsibility of enforcing mandatory regulation and conducting FAW audits at slaughter establishments is divided between the Australian federal government and territory governments based on the destination of livestock products that is domestic consumption or export. The Australian (Federal) Government is responsible for the trade legislation and international agreements pertaining to the welfare of animals involved in the live animal export trade and animals processed at export registered slaughter establishments (MAFF, 2007). In addition, the Australian territory governments carry the responsibility for adoption and enforcement of the legislation for welfare (i.e., cruelty) of all animals including farm animals but the slaughter of livestock is regulated separately. For instance, in the state of Victoria, the relevant legislation includes the Prevention to Cruelty to Animals Act 1986, Domestic (Feral and Nuisance) Animals Act 1994, and Impounding Livestock Act 1994 (DPIA, 2004).

Other sectors like the egg industry have developed voluntary codes of practice, i.e., the Model Code of Practice for the Welfare of Animals – Domestic Poultry 4th Edition adopted in 2001. Based on this code, the Australian Egg Corporation (AECL) is the organization mandated to help egg producers determine if their layer cages comply with these new standards and to determine the number of hens that can be housed in their cages (AECL, 2008).[18] The 2001 standard specifies increasing the space allowance for hens in cages (i.e., from 450 cm^2 to 550 cm^2) as well as an economic life for cages of 20 years from the date the cages were commissioned.[19] These decisions have been endorsed by each State and Territory Government and are the basis for achieving improved hen welfare outcomes in Australia (AECL, 2008).

2.4.1.1.3 Legislation in the United States

The US federal legislation related to AW encompasses a number of laws. The US Animal Welfare Act (AWA) was the first Federal law protecting the welfare of laboratory animals. Since its inception in 1966, Amendments to the AWA enacted in 1970, 1976, 1985, 1990, and 2002 refined standards of care and extended coverage to animals in commerce, exhibition, teaching, testing, and research (Adams and Larson, 2007). All US states have an anti-cruelty statute, but both neither federal nor state legislation deal with FAW specifically.

---

[18] ACCC (2008) - The AECL is a producer owned company which integrates marketing, research and development and policy services for the benefit of all stakeholders. AECL is mainly funded through statutory levies collected under the Egg Industry Service Provision Act 2002 and Australian government funds for the purposes of research and development.

[19] AECL (2008) - Cages commissioned prior to January 1, 2001 have until January 1, 2008 to meet the 1995 standards and may be stocked with a minimum space allowance per bird of 450 cm^2 (3 or more fowls (< 2.4kg) per cage) for 20 years from the date they were commissioned or until January1, 2008, whichever is the later. Cages commissioned after January 1, 2001 must immediately comply with the 1995 standard and must be stocked at 550 cm^2.

The Humane Slaughter Act of 1958 is the Federal law regulating the transport and slaughter of livestock. However, while the original slaughter law required that all US slaughter plants selling meat to the federal government use humane methods, the law lacked an enforcement mechanism. This problem was addressed by an amendment to the Federal Meat Inspection Act enacted in 1978, which expanded coverage of the humane slaughter law to meat imported into the United States and provided a more effective enforcement mechanism.[20] The Humane Methods of Slaughter Act of 1978 gave federal inspectors the authority to stop slaughter operations to prevent inhumane practices. Regulations promulgated by the United States Department of Agriculture (USDA) under the Act included humane handling requirements, such as access to water and feed, adequate room for lying down, a prohibition on the use of pipes and metal objects, and limits on the use of electric prods to move animals (Federal Register, Vol. 44, November 30, 1979, p.68813 cited in Jones, 2008, p.22).

Currently, the Food Safety and Inspection Service is the agency within USDA responsible for ensuring compliance with the Humane Methods of Slaughter Act (USDA, 2001). While the focus of the US federal legislation has been mainly to regulate FAW during the transportation and at the slaughter, in 2004 the USDA placed a regulatory ban on slaughtering of downed (non-ambulatory) cattle for human food following the discovery of bovine spongiform encephalopathy (BSE, or "mad cow disease") in a US dairy cow (Federal Register, Vol. 69, No. 7, January 12, 2004, p.1862-1874 cited in Jones, 2008, p.26). Another interesting observation that emerges is the increase in the number of Federal level bills related to FAW in the recent years. For example, it is worth mentioning the Farm Animal Stewardship Purchasing Act (H.R. 5557), a pending bill

---

[20] For a review of the history of humane slaughter laws, see Leavitt ES (1990). Humane slaughter laws in *Animals and Their Legal Rights*, Animal Welfare Institute, (4th ed), p.52-65.

introduced in 2006 in the US Congress, requires that those firms supplying food to the Federal government for the military, federal prisons, school lunches, and other programs meet a basic set of modest welfare standards for farm animals (HSUS, 2006).[21]

In recent years there has been an increase in the state legislative activity at the state level related to FAW. Animal rights organizations (AROs) have recently initiated successful ballots to phase out confinement practices in several states. For example, under the pressure of the HSUS, Florida voters passed a ballot initiative in 2002 that amended the state constitution by prohibiting gestation stalls in hog production starting in 2008. In a similar vein, Arizona voters passed a ballot initiatives in 2006 to prohibit gestation stalls and veal crates by the end of 2012 (AVMA, 2008a).While gestation stalls have been prohibited by voter initiative in Arizona and Florida, by contrast, the legislature of Oregon became in July 2007 the first in the U.S to pass a ban on the use of veal crates and gestation stalls (NHF, 2007). Following the same pattern, in May 2008 Colorado's governor signed the Senate Bill 201 (S.B. 201) into a state law, making Colorado the second US state to ban the use of veal crates for calves, and the fourth state to ban gestation crates in breeding pigs (The PigSite, 2008). Shortly after, in November 2008, 63% of California voters cast ballots in favour of the "Standards for Confining Farm Animals" or "Proposition 2" which requires California producers to make major alterations to livestock housing systems by 2015. Specifically, this regulation specifies that egg-laying hens, veal calves, and pregnant sows

---

[21] The initial bill H.R. 5557 was reintroduced in the 2007 Congress on March 28, 2007 and was referred to the Committee on Oversight and Government Reform and to the Committee on Agriculture. On April 16, 2007, under a new code H.R. 1726, the Farm Animal Stewardship Purchasing was referred to the Subcommittee on Government Management, Organization, and Procurement, and on May 4, 2007 was referred to the Subcommittee on Livestock, Dairy, and Poultry (AVMA, n.d.).

must have enough room to lie down, stand, turn around, and fully extend their limbs. Thus, California became the first US state to ban battery cages (AVMA, 2008b).

A common feature of the above state-level initiatives is that they consist of laws that regulate the method for confining farm animals. In parallel, several US states have expressed a desire to provide state inspection of mobile slaughter units, which would allow niche producers to market their meat to customers across the state. For instance, the Montana State Legislature passed a law in 2005 authorizing state inspection of mobile slaughter. Some other states – including Wyoming, which currently has no federally inspected plants – are even pursuing the possibility of obtaining federal inspection status for their mobile slaughtering companies (Jones, 2008).

2.4.1.1.4 Legislation in Canada

The Canadian Federal Government protects AW through several federal laws. First, AW has been included in The Criminal Code of Canada, which prohibits anyone from wilfully causing animals to suffer from neglect, pain or injury. The S-203 bill, a recent enactment of the House of Commons, amends the Criminal Code to increase the maximum penalties for an animal cruelty offence (Parliament of Canada, 2008a).[22] Second, The Health of Animals Regulations Part XII defines conditions for the humane transportation of all animals in Canada by all modes of

---

[22] Parliament of Canada (2008, b) – The bill was passed by the Senate on November 27, 2007, was adopted in the House of Commons on April, 9 2008, and came into force in May, 2008. Sections 444 to 447 of the Criminal Code were replaced. For instance section 444 of the Criminal Code is replaced by the following: "444. (1) Every one commits an offence who wilfully: (*a*) kills, maims, wounds, poisons or injures cattle; or (*b*) places poison in such a position that it may easily be consumed by cattle. Everyone who commits an offence under subsection (1) is guilty of (*a*) an indictable offence and liable to imprisonment for a term of not more than five years; or (*b*) an offence punishable on summary conviction and liable to a fine not exceeding ten thousand dollars or to imprisonment for a term of not more than eighteen months or to both" Parliament of Canada (2008a, p.1).

transport (CFIA, 2008a).[23] The regulations are enforced by Canadian Food Inspection Agency (CFIA) officials who monitor compliance with the regulations through routine inspection at strategic locations (e.g., ports of entry, registered establishments, and auction markets) and by following up on reports of non-compliance (CFIA, 2007). Third, sections 61 to 80 of the Meat Inspection Regulations set standards for the humane handling and slaughter of food animals in federally inspected slaughter facilities. CFIA's inspectors, stationed at every federally registered slaughter establishment, monitor the handling and slaughter of food animals (CFIA, 2008a).

Finally, FAW was included in the Organic Production Systems — General Principles and Management Standards (CAN/CGSB-32.310), developed by the Canadian General Standards Board, which form the basis of Canada's Organic Products Regulations promulgated in December 2006 which came into force date of December 2008 (CG, 2006; CG, 2008).[24] The *Organic Products Regulations* define specific requirements for organic products to be labelled as organic or that bear the Canada Organic Logo (CFIA, 2009). The organic standard incorporates general guidelines about livestock and poultry feed, transport and handling, health care, living conditions, and stocking rates which are more stringent than the similar requirements included in the recommended codes of practice for all major farm species developed by Agriculture and

---

[23] CFIA (2008a) - These regulations prohibit overcrowding, transportation of incompatible animals in the same stall, transportation of animals unfit to travel. Also they specify appropriate conditions for loading and unloading of animals, adequate feeding and watering regimes, maximum transit times, minimum rest periods, bedding requirements, and states that animals that become compromised while in transit must not be transported beyond the closest area where they can receive proper medical care.

[24] "The Regulations form the basis for federal oversight of the organic production industry via the Canada Organic Regime (COR). The COR is based on a third-party service delivery model, wherein the Canadian Food Inspection Agency (CFIA) acts as the competent authority, providing oversight, administration and enforcement of the Regulations. The CFIA assesses and recognizes accreditation bodies to accredit certification bodies, and certification bodies, in turn, certify certain agricultural products as organic when the products comply with the pertinent organic standard" (CG, 2008).

Agri-Food Canada (AAFC) (CGSB, 2006).[25,26] Each province has its own legislation dealing with AW, which typically recognizes accepted humane practices. Provincial animal welfare legislation is enforced by either police officers or the Society for the Prevention of Cruelty to Animals officers (CFIA, 2008a).

Unlike organic production where minimum animal welfare standards were incorporated into the definition of 'organic', the Federal government in Canada employed a different approach with respect to conventional production. AAFC has been involved in the development of recommended codes of practice for all major farm species, covering all aspects of animal care and handling from breeding to slaughter, since the early 1980s. At the national level the codes represent voluntary guidelines and include various minimum standards for producers and others. Second, the Federal government alluded to FAW in the "Federal-Provincial-Territorial Framework Agreement on Agricultural and Agri-Food Policy for the 21st Century" which was signed in June 2000.[27] However, FAW is not referred to in the current "Growing Forward", the

---

[25] These codes were developed under the auspices of the Animal Welfare Coordinating Committee and were the result of co-operation between researchers, federal and provincial representatives, and nongovernmental organizations (NGO's), such as the Canadian Federation of Humane Societies and the Canadian Veterinary Medical Association.

[26] For example, the standard specifies increasing minimum space requirements for both indoor and outdoor space requirements for barns, pens, runs, and exercise areas. In addition, the organic standard specifies that "surgical procedures (e.g. tail docking, teeth trimming, beak trimming, castration, branding, ear tagging and dehorning) shall be performed by a competent persons at the youngest age possible (in most cases under two weeks) and be undertaken in a manner that minimizes pain, stress and suffering, with consideration to the use of anaesthetics and sedatives" (CGSB, 2006, p.13). As well, the operator of an organic livestock and poultry operation has "to establish and maintain animal living-conditions that accommodate the health and natural behaviour of all animals, including access to the outdoors, shade, shelter, rotational pasture, exercise areas, fresh air and natural daylight suitable to the species, its stage of production, the climate and the environment and sufficient space and freedom to lie down in full lateral recumbency, stand up, stretch their limbs and turn freely, and express normal patterns of behaviour" (CGSB, 2006, p.15).

[27] "In the national dialogue which was part of the process of developing the framework, a number of participants advocated the specific inclusion of farm animal welfare within the new policy architecture. In addition, evolving market demands and new developments in science and technology continue to prompt questions about the effectiveness of current methods of addressing farm animal welfare in Canada" (AAFC, 2007).

new Agricultural Policy Framework developed by AAFC in conjunction with the Provincial and Territorial governments and which was signed in July 2008 (AAFC, 2007; AAFC, 2008). The Federal government also became involved in the establishment of the National Farm Animal Care Council (NFACC). This organization was founded in 2005 with broad participation of stakeholders from the animal product industry. The main goal of NFACC is to provide a forum for coordination and collaboration among stakeholders regarding FAW issues, and to assume responsibility for ensuring the ongoing development of codes of practice. AAFC and CFIA are represented on NFACC, as are a number of producer associations, consumer organizations, and animal welfare organizations.[28] In addition to the development of recommended codes of practice, the NFACC has also defined an "Animal Care Assessment Model" (ACA) which is intended to provide guidance on AW, outline high level principles and is proposed as a credible approach to the establishment of verification programs (NFACC, 2008). Currently, the ACA model is not publicly available and therefore an assessment of its likely efficacy is not possible at the present time. A common feature of the second and the third initiative is that the Federal government employed rounds of consultations with the public and with the food processing industry during their development which may be considered a strength according to the credibility rules outlined at the beginning of this chapter.

Thus, we have summarized the main legislative actions related to FAW undertaken in some developed countries. The review revealed that the scope of the legislation related to FAW is different from one country to another. At one end of the spectrum there are countries such as

---

[28] Other members are: producer groups associations (i.e., the Canadian Pork Council, the Canadian Poultry and Egg Processors Council), processors' associations (i.e., the Canadian Meat Council), retailers' and food service associations (i.e., Canadian Council of Grocery Distributors), and animal rights organizations (i.e., Canadian Federation of Humane Societies) (NFACC, 2008).

Australia, US and Canada whose regulation encompasses FAW at some levels of the livestock supply chain, such as transportation and slaughter. At other end of the spectrum there are countries from the EU, whose regulation encompasses FAW at all levels of the livestock chain, including the welfare on the farm. Canada has not yet implemented yet a FAW policy similar to that of the EU. The release in the near future of the "Animal Care Assessment Model" (ACA), which is intended to provide guidance on AW in Canada, is a likely outcome. The next paragraphs will analyse other roles of the government in providing FAW assurances.

2.4.1 Role of the Government (Continued)

The second alternative is that of mandatory labelling of AW practices, which in theory would provide information about AW by requiring labelling of all livestock products sold to consumers. The "public good" nature of advertising would allow humane providers to benefit from the 'advertising' provided by the mandatory label attached to non-humane sellers (MacDonald, 2005). Again, an assessment of the relative costs and benefits of this approach would be necessary. At the same time, a regulator (i.e., government) has to keep in mind that for an uninformed public, a label may have little relevant information (Crespi and Marette, 2003). Teisl et al. (1999) consider that ethical and green characteristics necessitate not only some sort of certification but also a clear definition of the characteristic to persuade consumers (see the discussion around the labelling of free-range livestock and poultry products from Section 2.4). For example, an initiative by the Federal government in Canada, indirectly related to FAW has been the development of Canadian food labelling requirements and guidelines for method of production. The responsibility for food labelling regulation is shared between Health Canada and

the CFIA.[29] In particular, the CFIA Food Labelling Information Service consolidates and coordinates voluntary federal food label reviews. The CFIA has attempted to find an effective way to apply proposed guidelines for the use of methods of production claims – i.e., AW claims such as "free range", "freedom raised", "free run", antibiotic and hormone free claims – in the labelling and advertising of meat, poultry and fish products. Accordingly, the CFIA launched in 2005 a public consultation round on "Clarifying the Labelling Guidelines for Method of Production Claims on Meat, Poultry and Fish Products". These drew upon stakeholders' knowledge, concerns and opinions to identify key issues (CFIA, 2005). To date, it appears that the consultations have not produced a consensus of opinion on an appropriate way forward with respect to the application of Method of Production claims to AW.

The third policy alternative is government involvement in the provision of certification and accreditation services to producers. Government agencies would likely have to ensure compliance through enforcement. Government standard-setting and certification is not without risks, even if consumers view the information as credible. If product designs and relevant attributes are changing rapidly standards may need to be redesigned over time and alternative certifications may be desirable. MacDonald (2005) and Cole and Harris (2005) argue that government-set standards tend to be inflexible, and suggest that government standard-setting may not respond quickly to changing industry conditions. For instance, the U.S organic standard took eight years to develop, as did the US Federal Trade Commission's attempt to define

---

[29] CFIA (2008b) - Health Canada is responsible, under the Food and Drugs Act (FDA), for the establishment of policies and standards relating to the health, safety, and nutritional quality of food sold in Canada. The CFIA is responsible for the administration of food labelling policies related to misrepresentation and fraud with respect to food labelling, packaging and advertising, and the general agri-food and fish labelling provisions respecting grade, quality and composition specified in the Canada Agricultural Products Act, the Meat Inspection Act and the Fish Inspection Act.

"natural " in the 1970s (Ippolito, 2003, p.732). Thus, many private firms were seeking to differentiate themselves with "organic plus" or "biodynamic" labels which add extra attributes. This is not surprising given that the motivation behind labelling of organic products may be to differentiate one's product, not homogenize it (Cole and Harris, 2005, p.17).

In addition to these three alternatives, the government could intervene in addressing potential misinformation on AW issues. In developing preferences with respect to AW, the broader community relies on receiving truthful information. In some instances, more radical AROs may use emotional and graphic arguments in their campaigns. In the absence of other objective opinions, i.e., from independent AW scientists, the public could assume that conventional farming is totally detrimental to AW. If society perceives a standard of FAW to be too low, then it will demand what it perceives as a higher level regardless of the actual level of AW or suffering (DPIA, 2004).[30] In this situation, the livestock industry would have a strong incentive to respond with an alternative information campaign, although consumers may be left wondering who to believe.

Of course, government awareness of the preferences of society regarding AW may be imperfect. It is difficult for government to measure the level of AW that the public considers appropriate, since it usually does not have any benchmark, i.e., market for friendly products with varying levels of AW. Thus, governments may invest in strategies to identify society's preferences,

---

[30] For instance, members of society may demand that a certain practice, i.e. gestation stalls or battery cages, be phased out because they believe it to be cruel, when such a ban may not lead to higher standards of animal welfare (DPIA, 2004).

through consumer research, public consultations, etc. for the purposes of informed policymaking (DPIA, 2004).

The last type of information deficiency, incomplete information, occurs when the relevant information is not known by any of the stakeholders involved in an AW issue. For instance, one cannot identify a widely accepted definition of AW. Additionally, the stakeholders disagree as to how best to measure animal welfare.[31] This lack of agreement makes it difficult to measure AW and to formulate a widely agreed and scientifically sound definition of animal welfare. Good policy on AW relies on the quality of existing knowledge (DPIA, 2004).

If the Canadian Federal government's approaches to FAW are assessed through the 'credibility rules' outlined previously in the end of Section 2.4, it could be said that they are reasonably transparent since the complete guidelines, as well as information on how voluntary standards were developed, reviewed and verified are available to the public (with the exception of details on the ACA model). As well, the NFACC's activity is based on public input, since multiple stakeholders had the opportunity to comment on development and revision of program standards. The relevance of these activities is strengthened by the fact that standards were comprehensive, covering all aspects of animal care and handling from breeding to transportation and slaughter. While it was important to define industry practices that improve FAW, the certification and verification of these practices along the supply chain through an assessment and audit process

---

[31] While some groups use definitions based on physical measures of wellbeing such as fertility rates, output and growth, others believe the definition should incorporate the emotional wellbeing of the animal and take into account such factors as stress, fear and discomfort.

may be the key to maintaining consumer confidence. The appropriate role for government in Canada in certification and verification activities for animal welfare remains undefined.

In summary, governments have a role to represent the public interest and to contribute to the nation's economic welfare. The strength of the government is grounded in its ability to institute legislation and its power to publicly condemn certain outcomes. However, the danger that the government faces is making policy on the basis of non-representative opinions. Further, policymakers face the danger of instituting ineffective legislation and wasteful bureaucracy, i.e., in the case of mandatory certification when it is not required.

2.4.2 The Role of Farmers and Farmers' Industry Associations

Producers have more information on the production of livestock products than consumers and society in general. They also have a different interest in the adoption of production standards and farm animal welfare standards in particular. The factors that affect their individual decision-making include trade-offs between AW and profitability, level of concern for animal welfare regardless of profitability, level of understanding about welfare issues, management skills, incentives that may exist for higher AW standards (e.g., market advantage) and deterrents for poor AW (e.g., litigation) (DPIA, 2004).

Rising social pressure by consumers groups and AROs is forcing the livestock industry to re-examine its production practices. The campaigns of the AROs, such as HSUS or People for the Ethical Treatment of Animals (PETA), aim to eliminate certain production systems, e.g., battery cages, gestation stalls. A number of constraints might preclude farmers from changing their

production practices, including financial considerations, lack of understanding of the ethical preferences of consumers, insensitivity to welfare needs of livestock, and rejection of the welfare concerns of animal rights organizations, in other words, alternative views of what constitutes 'humane' treatment of animals (Meredith, 2000).

Potentially, externalities also provide incentives for the industry to develop industry codes of practice related to FAW: codes that aim to ensure good behaviour by all participants. An externality occurs when the actions of an individual producer influence society's perception of the industry as a whole, thus affecting the profitability of other producers (DPIA, 2004). According to Dotson (2007), livestock producers have four alternatives for addressing these issues. First, they can do nothing and just let activists define the FAW agenda for them. Producers who choose this route over time may be unable to find a market for their product. Second, producers can self-certify using self-endorsed programs and policies. This is the choice that many producers and livestock associations have made. For example, Burnbrae Farms Limited, a Canadian egg producer, uses its own certification for products such as eggs carrying FAW attributes (i.e., free run).[32,33] A number of examples of livestock and poultry associations that self-certify using endorsed programs also exist. In 2003 the US National Pork Board introduced a voluntary initiative called the Swine Welfare Assurance Program (SWAP).

---

[32] According to the firm, "Burnbrae Farms Limited is a family owned and operated company that has been producing eggs for over 50 years. With farms in Ontario, Quebec and Manitoba, Burnbrae Farms is one of Canada's leading egg producers and a thriving participant in its agribusiness industry. The company sells eggs and egg products to major grocery store chains, food service operations and large/bakery industrial customers throughout Canada" (Burnbrae Farms Limited website, 2008a).

[33] Burnbrae states that "Naturegg Free Run eggs are produced by hens that are free to roam in wide open concept barns equipped with nests and perches. Our hens are fed a multi-grain feed that is manufactured to our specifications and contains no medications or antibiotics. The eggs are laid in a clean nest, ensuring the cleanest possible product. A monitoring system is in place to ensure that only eggs produced by our free-run flocks are packed in free run cartons. Naturegg Free Run eggs are packed in 100% post-consumer recycled cartons that are recyclable where facilities exist" (Burnbrae Farms Limited website, 2008b).

Similarly, the Canadian Egg Marketing Agency and the Canadian Pork Council launched the Animal Care Program (ACP) and Animal Care Assessment (ACA) in 2002 and 2005, respectively. These programs set out the requirements for animal care for participating producers. More information on an example of codes of practice in Canada can be found in Appendix 1.

The common feature of the Canadian industry programs is that they are based on the recommended codes of practice released by AAFC in the 1980s and subsequently revised and updated by the two farmer industry organizations.[34,35] In addition, the two producer organizations sought input from other stakeholders involved in the development of these codes. The major difference between the two programs is that currently the CPC is focusing on promoting the implementation of the ACA program. In addition, the CPC program is a voluntary program for hog producers to evaluate and improve animal care practices on their farms and could be used as the basis for third-party audits (Ontario Pork Council, n.d.; CPC 2005).

Even though the initial aim was for a voluntary program, the ACP program implemented by the CEMA became an industry norm for egg producers. For example, after the release of the 2002 code, the recommended housing space in a cage was increased from 64 to 67 square inches and from 70 to 75 square inches for white leghorn adult hens and brown birds, respectively. In

---

[34] The old code for the raising of laying hens, released by AAFC in 1989, was the "Recommended code of practice for the care and handling of poultry from hatchery to processing plant". Its updated version released in 2003 under the auspices of the Canadian Agri-Food Research Council and the initiative of the CEMA is called "Recommended code of practice for the care and handling of pullets, layers and spent fowl" (CEMA, 2002 Annual Report).

[35] The old code for raising pigs, released by AAFC in 1984, was the "Recommended code of practice for the care and handling of pigs". Its revised and updated version, at the initiative of the CPC in 1993, is called "Recommended code of practice for the care and handling of farm animals: Pigs" (AAFC, 1993).

addition, controlled moulting by methods involving deprivation of feed was to be phased out by

2005 (CEMA, 2002). A recent development, in the direction of more stringent FAW standards

for the egg industry is the decision by the CEMA Board of Directors in November 2007 to make

compliance with cage density a requirement for a passing score on the ACP.[36] Second, the board

approved a cage density policy that went into effect on April 1, 2008 calling for producers with

older cages to house white and brown leghorns at 64 and 70 square inches per hen respectively;

for housing installed after 2003, white and brown leghorns must be housed at 67 and 75 square

inches (CEMA, 2008, p.25). As these examples show, the producer industry associations have

been able to self-regulate changes to FAW practices.

December 2007 saw a voluntary initiative by US pork producers in Colorado to phase in group

housing for pregnant sows on farms over a 10-year period (AASV, 2007). It is likely that

Colorado pork producers anticipated a worse scenario for their business in the form of a state law

adopted in May 2008 to ban the use of gestations stalls, in addition to veal crates for calves, and

therefore acted pre-emptively to introduce these measures on a voluntary basis (The PigSite,

2008).

The third choice for a livestock sector facing pressure from AROs and public opinion is that of

actively seeking government oversight and regulation. Sometimes the government may choose

not to act in verifying producers for their compliance with FAW standards and may leave this

responsibility to the industry, as previously discussed. The extent to which government

involvement in the verification process is needed may be addressed in public rounds of

---

[36] The board passed a motion to make 85% the passing grade for the ACP as of April 2008, and to increase it to 90% a year later. A passing score will depend on meeting the cage density requirements set out in the new policy (CEMA, 2008, p.25).

consultations with other stakeholders in the market. Regulatory oversight may be necessary in the case of low levels of trust by consumers in the ability of other stakeholders to deliver credible FAW assurances, and resulting market failures in the provision of optimal levels of FAW.

The fourth choice that individual producers and livestock associations have is third-party certification and verification, which is discussed further in Section 2.4.5. As an illustration, it is worth mentioning the cases of United Egg Producers (UEP) in the US and Aliments Breton Foods in Canada. The UEP, a trade association representing most US egg farmers, established animal welfare guidelines in 1999 and later introduced them as a voluntary program, i.e., the UEP Certified program audited by third-party organizations such as the USDA or Validus Services (UEP, 2008). Producers have several incentives to adhere to the relevant codes of practice established by an industry association, including protecting themselves against possible legislation breaches, making their production processes transparent for consumers, government and international markets, and minimizing the risk of disputes with welfare groups that affect producer income (DPIA, 2004). For example, the UEP and ISE America, a major New Jersey egg producer and one of the UEP's member companies, were recently sued by the animal rights group Compassion Over Killing (COK) regarding potential consumer fraud over the UEP's use of an old logo (UEP, 2008). However, the allegation by COK proved to be speculative since the UEP could offer as a defence its quality verification program audited by third-parties.

DuBreton, a 64-year-old family-run Canadian business specialized in hog farming and pork processing and located in Quebec, is the largest natural pork marketer in Canada and a major supplier in the US. The company claims to be "the first pork producer in North America that

received third-party certifications – i.e., Quality Assurance International, Humane Farm Animal Care, Agro-com – for its natural and organic pork" (Aliments Breton Foods Canada, 2008).[37]

Clearly, producers can use a combination of these four alternatives in responding to pressure for products with FAW assurances. For example, Burnbrae Farms uses a combination of self and third-party certifications in selling its free-run and organic eggs respectively (i.e., eggs that are laid by free run hens which are fed an organic multi-grain feed and contain no medications or antibiotics). Discerning the extent to which consumers trust producers' quality assurances under different forms of certification and verification is examined in Chapter 5.

2.4.3 The Role of Retailers, Restaurant Chains and Food Processors

Downstream food firms, i.e., major retailers, restaurant chains, food processors, have influenced the development of private FAW standards as an alternative to the mandate of FAW practices by regulators. These firms attempt to satisfy customers' needs as a means of increasing/protecting market share and revenues. With large scale, often global, operations these enterprises have been exposed to different trends in consumer attitudes, including campaigns by AROs. They have responded to increasing pressure from the public by advertising their policies on AW, setting up expert advisory bodies, and promoting adoption of higher standards by their suppliers of animal products. This approach characterizes the actions undertaken by some major restaurant chains

---

[37] According to the company, "Quality Assurance International provides independent, third party certification of organic food, from field to shelf. As well, DuBreton's products meet the Humane Farm Animal Care Program standards, which include nutritious diet without antibiotics, or hormones animals raised with shelter, resting areas, sufficient space and the ability to engage in natural behaviours. Agro-Com, an independent organization, is responsible for monitoring the application of protocols for pork raised without antibiotics on a vegetable grain diet" (Aliments Breton Foods Canada, 2008).

(i.e., McDonald's), meat processors (i.e., Maple Leaf Foods), or major food retailers (i.e., Safeway) (see Appendix 2).

Downstream food firms also tend to wield considerable market power with respect to the set of atomistic livestock producers that are their suppliers. This market power may be used to push producer groups to set voluntary industry standards incorporating stringent AW conditions (e.g., the ACP adopted by the egg industry in Canada).[38] If standards are not met, producers may be excluded from the market. The credibility of a retailer or processor's standard to guarantee specific FAW attributes depends on the process of enforcement and verification as well as on the overall reputation of the food retailer/processor with respect to other food quality attributes (e.g., food safety, quality consistency). These firms use a combination of self-inspection (e.g., Maple Leaf) and/or third-party audits (e.g., Safeway, Aliments Breton Foods) to verify quality.

Blandford (2006) considers that the response of private food enterprises to perceived threats to their brand image is a key driver of change in the development of standards used in the handling of animals in North America. The fact that some of these firms sell food directly to consumers offers them the benefit of point-of-purchase communication with consumers. This is a two-fold benefit, which can either help them to understand consumer preferences related to FAW or to educate the public in this respect. At the same time, the use of the Internet as a source of supplemental information is a strategy that allows these firms to achieve these benefits while

---

[38] According to CEMA (2004) "The retail and restaurant sectors are encouraging producer groups to develop common verification systems, such as the egg industry's Animal Care Program. Otherwise, individual retailers and restaurateurs may develop their own animal welfare purchasing specifications, thereby forcing producers to abide by different criteria depending on who they are supplying. Science-based animal care specifications provide assurances to consumers, retailers, restaurants and producers that market competitiveness is not driving animal care programs" (p.24).

increasing consumers' confidence in their brand. Firms can communicate specific actions, such as the establishment of private AW standards, monitoring of their suppliers, etc. For examples on the use of the Web as a source of supplemental information see Appendix 3 (i.e., Aliments Breton Foods).

In other cases, downstream food firms may not publicly advertise the actions undertaken to guarantee specific FAW attributes (i.e., free-run attribute for eggs under Loblaws' "President Choice" Label). Instead, these firms rely upon a simple labelling claim to inform consumers.[39] This approach needs to be consistent with the minimum legislative labelling requirements; the Canadian Food and Drugs Act prohibits the labelling or advertising of any food in a manner that is false, misleading or deceptive to consumers (CFIA, 2008b).[40]

The two main challenges these enterprises face in playing an important role in the FAW issue are their lack of expertise with respect to farming methods and their reluctance to become involved directly in monitoring farms' activities. Downstream firms faced increased transaction costs if they must monitor their suppliers. Negative publicity arising from episodes of poor welfare at any stage of the production process can be extremely detrimental to a firm's image and accumulated goodwill. Thus, the extent to which these firms will become involved in

---

[39] For example, "These Canada Grade A eggs are exclusively from free run hens. These hens live in an open concept, weather-sheltered barn environment, where they are free to roam, feed, roost, nest and perch (President's Choice Brand, Free-Run Eggs).

[40] Subsection 5(1) of the *Food and Drugs Act (FDA)* prohibits the labelling, packaging, treating, processing, selling or advertising of any food (at all levels of trade) in a manner that is false, misleading or deceptive to consumers or is likely to create an erroneous message regarding the character, value, quantity, composition, merit or safety of the product (CFIA, 2008b).

establishing and enforcing private AW standards depends on the strength of the market incentives for them to do so.

2.4.4 The Role of Third-Party Enterprises

In some cases farmer groups, retailers, restaurant chains and processors are able to obtain third-party certification for their production practices – that is, a respected outside organization provides information that is believable to buyers. A third-party offers certification and verification services (through an assessment and audit process) sometimes using industry standards as the basis for the certification process. There are some cases when these organizations provide a series of services including standard setting, e.g., defining industry practices that improve AW. The outside organization providing third-party services can take many forms, including consumer groups, producer associations, specialized third-party testing and certification organizations, national governments, and international organizations (MacDonald, 2005). In some countries, the government provides an accreditation program to lend credibility to private sector quality assurance programs; examples include the USDA Process Verification Program and USDA Quality System Assessment program. These are third-party certification systems developed by the USDA to ensure compliance with specified production and processing protocols. Canada does not have a similar program offered by the Federal government. In Canada, third-party certification services are offered by either private certification enterprises or by non-profit organizations. For instance, the SPCA Certified program, the WHS Certified program or the Certified Humane Raised and Handled are independent third-party certification systems offered by the British Columbia Society for

Prevention of Cruelty to Animals (BC SPCA) and The Winnipeg Humane Society (WHS) from

Canada, and Humane Farm Animal Care from the US, respectively (see Appendix 4).

There are a number of reasons why livestock producers pursue a third-party certification and

verification program in FAW (Dotson, 2007). First, the processor or retailer to which the

livestock producers market their product requires compliance. Second, livestock producers may

wish to capture additional margin or market share and to differentiate themselves in highly

competitive markets. This strategy characterizes the actions undertaken by the egg producer

Burnbrae Farms (i.e., organic eggs laid by free-run hens fed without antibiotics which are

assured by the third-party: Quality Assurance International and the pork producer Aliments

Breton Foods Canada. DuBreton differentiates its products by highlighting on the label certain

credence features, i.e., pork chops that have been sourced from pigs fed with natural grains and

without antibiotics (see Appendix 5). In addition, DuBreton emphasizes the fact that pork has

been produced in a program certified by third-party enterprises, i.e., Quality Assurance

International, Humane Farm Animal Care, Agro-Com. Third, producers want to identify and

correct any AW challenges before they become an issue of focus for AROs, i.e., the

aforementioned legal suit filed by the COK against the UEP.

As Dotson (2007) notes, some retailers are beginning to require third-party certification of their

suppliers. Companies with this experience indicate they recognize value in five areas: developing

and expanding market opportunities, building brand equity and reputation, the ability to manage

risks, and assurance that food meets their criteria for social responsibility. For example,

Safeway's overall commitment to AW includes an audit program conducted by a rotating team

of internal and independent auditors.[41] Applying the previous credibility rule to third-party certification and verification, it appears to be measurable, verifiable, and defendable. As regards to the trust criteria, the nature of the independent audit performed by third-party enterprises might enhance consumers' trust in a program. For example, in the US, those firms implementing quality programs on animal welfare can employ first, second, and third-party audits.[42] Neither the first nor the second party audit qualifies as an independent audit, thus leading to a conflict of interest and a possible weakening of consumer trust. Trust in third-party quality assurances is examined in the consumer analysis presented in Chapter 5.

2.4.4.1 The Influence of Animal Rights Organizations and Consumer Associations

Animal rights organizations (AROs) no longer rely solely on traditional legislative means to achieve their objectives. Rather than primarily lobbying for better laws or stricter enforcement of existing laws, they have also focused on the marketing chain, either through affecting consumer choice directly or forcing food firms to be proactive for fear of a negative consumer reaction (Whiting, 2005)[43].

---

[41] Safeway publicly released the names of the third-party audit firms approved for inspections of its suppliers (see Appendix 2.3)

[42] Swanson (2007) notes that the following types of audits are used in the US:
- First Party Audit: conducted by a designated employee or manager on site at a designated random frequency, recommended for identifying problems and areas for improvement: self study, preparation for a second or third party audit.
- Second Party Audit: conducted by a paid consultant or an affiliated industry organization - less frequent than the first party audit, provides outside expertise and evaluation preparation for third party audit.
- Third Party Audit: uses evaluation instrument, independence from party to be audited, auditor does not participate in problem solving or education of the producer: they are there to audit.

[43] For instance, People from Ethical Treatment of Animals organized campaigns to maximize the domino effect in the form of a request to increase the minimum cage size for laying hens in McDonald's supply chain which reportedly later triggered slightly larger minimum cage sizes in Burger King's supply chain (Whiting, 2005 after Mealey, 2002). A campaign organized by PETA and HSUS in 2007 contributed to the phase out of gestation stalls by Smithfield on January 25, 2008 followed by a similar movement by Maple Leaf Foods on January 31, 2008.

Though their scope is the protection of animals, AROs are differentiated with respect to the type of actions they employ in achieving this goal. Some AROs may not tolerate any level of suffering by an animal. They may disagree on principle with the use of animals for the production of meat, dairy products, eggs and fibres. These groups generally promote a complete end to the use of animals for economic activity. Other AROs have focused on attempting to improve the treatment or welfare of animals that are used for food production. In this respect, these AROs accept the role of animals in production agriculture as long as they do not suffer unnecessary. The disadvantages of AROs can be their failure to take into consideration the economic realities within which farm businesses operate and the subjective approach to FAW issues that may not be grounded in the scientific realities of animal behaviour and welfare. Nevertheless, AROs still represent a potentially important vehicle for communication and dialogue with respect to FAW issues. For example, AROs such as the Canadian Federation of Humane Societies (CFHS) was one of the organizations that provided input to the Farm Animal Welfare Consultation Workshop which was held in connection with the Federal-Provincial-Territorial Framework Agreement on Agricultural and Agri-Food Policy signed in 2002 (AAFC, 2007). In a similar vein, the CFHS began coordinating the process of drafting codes of practice for the major farm species in Canada in 1980 (AAFC, 1989; AAFC, 1993). Lastly, the CFHS is a founding member of the National Farm Animal Care Council (NFACC, 2008).

In order to become a potentially important vehicle for communication and dialogue with respect to FAW issues, AROs as well as consumers associations, such as the Consumers' Association of Canada and Consumers Union of United States may facilitate information dissemination to

consumers.[44,45] For example, the Consumers Union in the US has developed a website, GreenerChoices.org, that aims to inform consumers about environmentally-friendly products and practices. The 2006 meat, dairy, and eggs buying guide provides information on the meaning of "antibiotic free", "certified humane", and "free farmed" labels in the US market, the organizations administering the labels, and the criteria for the assessment of their reliability (GC, 2008b).

Thus, consumers associations may help consumers to make more informed choices in the market place and thus reduce information asymmetries. Moreover, these organizations may act as an interface between consumers and the other stakeholders (i.e., government and producers) by highlighting misperceptions regarding current labelling practice (i.e., the definition of the free-range poultry in the organic standard developed by the USDA) (GC, 2008b).

2.4.5 Conclusions

From the consumer's perspective farm animal welfare practices are credence attributes: the consumer cannot determine through inspection at the point of purchase or experience after consumption, whether the producers used production methods designed to enhance animal welfare. This chapter reviewed the main mechanisms – i.e., legislation, codes of practice and

---

[44] "The Consumers' Association of Canada (CAC), founded in 1947, is an independent, not-for-profit, volunteer-based, charitable organization. Our mandate is to inform and educate consumers on marketplace issues, to advocate for consumers with government and industry, and work with government and industry to solve marketplace problems. CAC focuses its work in the areas of food, health, trade, standards, financial services, communications industries and other marketplace issues as they emerge" (CAC, 2008).

[45] "Consumers Union, publisher of *Consumer Reports* and ConsumerReports.org, is an independent, non-profit testing and information organization that provides unbiased assessments and advice about products and services, personal finance, health and nutrition, and other issues affecting consumers. To maintain its independence and impartiality, Consumers Union accepts no commercial contributions, no outside advertising and no free test samples. Consumers Union relies solely on the sale of its information products and services, individual contributions, and foundation and government grants" (GC, 2008a).

labelling programs– that can address market deficiencies for FAW products, as well as the role of different stakeholders – i.e., government, farmer industry groups, retailers and processors, third-party organizations, and animal rights groups – in implementing these mechanisms. All of these mechanisms are aimed at providing appropriate levels of FAW in the Canadian market place and helping consumers to make more informed choices about the quality of the food they buy.

Governments can legislate minimum farm animal welfare standards. Legislation tries to reflect government's assessment of society's demands for minimum standards of FAW. Examples of legislation in Canada are the Health of Animals Regulations (i.e., Part XII defines conditions for the humane transportation of all animals in Canada by all modes of transport) and the Meat Inspection Regulations (i.e., sets standards for the humane handling and slaughter of food animals in federally inspected slaughter facilities). Apart from these two legislative acts and the mandatory requirements for AW for the organic livestock production, the Federal government has not taken any major steps toward setting minimum legislative requirements related to FAW, as has been the case of other countries, such as the EU (e.g., phasing out gestation stalls or prohibiting the use of subtherapeutic antibiotics in pork production) The lack of more proactive regulatory involvement may simply reflect the absence of a strong demand for FAW legislation by Canadians given satisfactory industry FAW strategies, or it may reflect a latent demand for legislative change among consumers that will emerge more gradually. Canadian consumer perceptions of the current status of FAW in Canada and the appropriate role for public sector in regulation and enforcement of FAW standards will be further investigated in Chapter 5.

Rather than legislative minimum standards, codes of practice (i.e., recommended codes of practice for all major farm species developed and released by the AAFC in the 1980s) are often a basis for the FAW strategies of livestock and poultry industries in Canada (i.e., the Animal Care Assessment implemented by the Canadian Pork Council and the Animal Care Program developed by CEMA) and provide information for the other interested stakeholders. In parallel, private enterprises – processors, retailers, restaurant chains and third-party organizations (i.e., the BC SPCA or the WHS) – have their own FAW industry codes of practice which are, in general, more stringent than the AAFC/producer groups codes of practice. In the absence of public standards and enforcement, the private sector needs to bear responsibility for setting and enforcing standards if there is a genuine demand for FAW products from consumers. The phasing in by CEMA of higher welfare standards for egg producers (i.e., voluntary adoption of increased space per hen in battery cages starting April 1, 2008) suggests that there may be an ongoing shift in responsibility for FAW from the public to the private sector in Canada. In this respect, the economic analysis presented in the next chapter (i.e., Chapter 3) will estimate the social welfare under different market outcomes, i.e., a mandatory standard for FAW and situations with voluntary standards with different assumptions with respect to the degree of consumers' trust in voluntary standards.

Labels are a final mechanism the agri-food industry and governments use to help consumers make informed choices. Canada does not currently have a government-sanctioned quality label or quality assurance process that would verify assurances to consumers that livestock and poultry products have been sourced from animals raised on farms using enhancing AW production methods. Is public accreditation of a quality label necessary? This chapter notes several

incidences of firms who already use labels and third-party verification to achieve market premiums – e.g., Aliment Breton Foods in the case of pork production or Burnbrae Farms in the case of egg production. Clearly there exists a subset of consumers who are willing to pay for FAW products. In this respect, Chapter 5 of the thesis will reveal the extent to which other Canadian consumers would switch to this market given increased availability of FAW products at different prices.

In addition to setting standards, certification and verification of these practices through an independent assessment and audit process is also important. Credible standard setting and product labelling also require the effective implementation of a supply chain monitoring system for FAW oriented products, independent of whether this is imposed voluntarily or through statutory requirement. Which type of certification would best deliver credible assurances – i.e., whether this has to be government or self certification by producer or third-party certification – is explored through the consumer research presented in Chapter 5.

CHAPTER 3: WELFARE ANALYSIS OF THE MARKET FOR ANIMAL FRIENDLY PRODUCTS IN CANADA: THE CASE OF PORK PRODUCTS IN CANADA

3.1 Introduction

In this chapter a social welfare analysis of the Canadian market for animal friendly pork is presented under different scenarios with respect to the strength of consumer preferences, the existence of voluntary standards versus mandatory standards, and the credibility of third-party certification. The Canadian pork sector is the focus of the analysis due to pressures on the production methods employed in the pork sector. Meat processors, retailers and restaurant chains (i.e., Smithfield, Maple Leaf, Safeway, McDonalds and Burger King) adopted policies that prohibit their suppliers from using a certain production method such as gestation stalls.

McInerney (2004) built a model that explains the commercial choice between AW and productivity. The underlying idea is that higher levels of AW and less intensive production systems together imply lower levels of livestock productivity and thus less profitable business for producers. In a similar vein, the changes witnessed by the pork sector discussed in Chapter 2 may have a significant impact on production efficiency as well as the prices that consumers pay for pork. Four components of an economic evaluation of adopting 'animal-friendly' production standards are of relevance, namely: the effects of AW standards on the supply of pork, demand and price for pork, the cost of adjustment in changing from one system to another, and the administrative costs of regulation. However, the following analysis considers only the first two components in detail. For simplicity, the adjustment and administrative costs of animal-friendly production standards, either voluntary or mandatory, are assumed constant.

Chapter 3 is organized as follows. Section 3.2 provides a literature review of the role of information asymmetry, credence goods labelling and standards in the agri-food sector. In particular, a number of authors have modelled heterogeneity in consumer preferences and in production systems. This literature informs the welfare analysis presented in Section 3.4. Section 3.3 provides an outline of the main assumptions of the theoretical model that concern both producers and consumers. It also presents a review of the previous consumer research that found evidence of consumers considering pork with FAW attributes of a superior quality and a positive WTP for such products. This new literature review supports the assumptions related to consumers from the theoretical model. In Section 3.4, graphical modelling is used to conduct a social welfare analysis of the Canadian market for animal friendly pork under six different scenarios with respect to the strength of consumer preferences and the existence of voluntary standards versus mandatory standards. The particularity of these scenarios is that they allow heterogeneous consumers to choose between different combinations of price and quality according to their preferences. Section 3.5 outlines the conclusions of the analysis.

3.2 Consumer Preferences and Quality Assurances for Credence Attributes: A Review of Key Literature

This section reviews a sampling of the literature on information asymmetry and the role of the private and public sectors in providing quality assurances for credence attributes such as food safety, animal welfare, organic, and genetically modified organisms (GMOs).

There is a body of theoretical work that uses a game theoretic or descriptive analysis approach to characterize the relationships between players in the markets for credence goods. This research

provides valuable insights into consumers' behaviour and the role of producers in providing quality assurances. Caswell (1998) outlines these market effects in the context of labelling foods that are produced with the use of biotechnology, organically grown, or use an animal welfare-friendly production process. She concludes that the market effects depend on consumer perceptions of credence attributes, the benefits and costs of labelling for companies, and the goals of government policy. McCluskey (2000) uses a game theoretic approach to analyze the relationships between producers/retailers and consumers and to highlight the information issues that are present in the market for quality differentiated products with asymmetric information (i.e., organic foods and AW). The author finds that repeated-purchase relationships and third-party monitoring are required for high quality credence goods to be available in the market. The author also addresses the role of distributors and retailers in providing information on organic food to consumers.

Golan et al. (2001) explore the economics of food labelling with specific reference to the government's criteria for choosing mandatory or voluntary labels. In this respect, they provide a comprehensive review on the meaning of the primary services (i.e., standard setting, testing, certification and enforcement) that third-parties (consumer groups, producer associations, private third-party entities, national government and international organizations) can offer to strengthen label claims and include them in a model (i.e., labelling tree) which illustrates the mix of service providers available to bolster the credibility of voluntary labelling claims. They stress the fact that the value of labelling service depends on the credibility and reputation of the entity providing the service.

Hobbs (2004) explores the role of food traceability systems in resolving information asymmetry related to food safety as well as food quality. She uses a model of ex-ante quality verification and ex-post traceability systems to demonstrate the different functions and incentives of a traceability system, and explores whether providing consumers with information about on-farm production methods enables them to make a more informed choice about the relative safety of a food product. Industry-wide quality assurance programs that incorporate animal welfare or environmentally friendly production guarantees are likely to be a more efficient means of reducing consumers' information asymmetry, assuming these schemes are credible.

Crespi and Marette (2005) provide an analysis of the economic issues that arise from eco-labelling (i.e., labelling of organic products) with a major focus on the implications of public involvement in this type of labelling. They stress the fact that if a label has broad consumer and industry support, the types of labels used by a firm or allowed by a regulator have impact not only on consumer and producer welfare, but also on the structure of the market itself. As well, the key issue for a successful program is the credibility of the label itself and this is the area where the government can play its most active role.

Another body of theoretical work employs mathematical modelling with the aim of understanding consumers' behaviour, private sector incentives and the public sector's role in establishing quality standards for products with credence attributes. Carriquiry et al. (2003) model the optimal degree of assurance in a processor's quality control system over the procurement of agricultural output when there is uncertainty about quality. Their model predicts that the optimal degree of assurance depends on the likelihood that the sought-after attribute is

discernable by consumers, the price premium paid for the attribute, the cost of quality control, and the damage caused by false certification. A number of privately-developed US quality assurance standards, such as T.G.I. Friday's, Angus Beef, Niman Ranch Farm, and those of fast-food chains are examined for the purpose of seeing how well the model's predictions are supported.

Carriquiry and Babcock (2007) develop a model of repeated purchases to explore how quality discoverability, market structure, the nature of reputations, market premiums, and discount factors drive firm choice regarding the stringency of quality assurance systems designed to gain consumer trust. The authors find that the protection of reputation is a key incentive for firms to invest in high quality goods and quality assurance systems.

Similarly, Roe and Sheldon (2007) use a model of vertical product differentiation to analyze the labelling of credence goods (i.e., organically-produced food, dolphin-safe tuna, free-range poultry, and GMOs). More specifically, they focus on the manner by which quality is communicated. Their results clearly indicate that firms prefer private labelling options. In addition, firms may hire private certifiers and may pay for mandated government labels when the government's quality benchmark substantially deviates from firms' private quality choices. The authors' analysis suggests that the average consumer prefers a mandatory discrete label with a high-quality standard, while poor consumers prefer a mandatory discrete label with a low quality standard.

A final body of theoretical work uses a combination of mathematical modeling and graphical analysis to derive the equilibrium and welfare arising from markets for credence goods. Bureau et al. (1998) study a no-labelling and a mandatory-labelling regime in the context of the EU versus the US beef hormone dispute. They start from the assumption that hormone-free beef is the high-quality product, while hormone-treated beef is the low-quality product. The authors assume two groups of producers (hormone-free and hormone-treated) that are homogeneous within each group; consumers are assumed to be heterogeneous in their preferences toward hormone-treated beef. In the initial market scenario, the EU farmers are forbidden from producing hormone-treated beef, while later they are allowed to produce hormone-treated beef. The authors do not conclude that introducing hormone-treated beef may reduce total welfare.

Giannakas (2002) develops a conceptual model (graphical analysis and mathematical modelling) of heterogeneous consumers that examines the consequences of mislabelling for consumer purchasing decision and welfare in the case of organic products. This model is a variant of the classical model of vertical product differentiation of Mussa and Rosen (1978) and it explicitly accounts for differences in consumer attitudes toward organic products. His analysis shows that while certification and labelling can mitigate the asymmetric information problems arising from the credence nature of organic food, correct supply-side market failures, and enhance consumer welfare, they are not sufficient for alleviating them completely. In reality, the market efficiency and consumer benefits from labelling of organic food vary with the level of product type misrepresentation (mislabelling in the food supply chain). In turn, consumer deception through mislabelling affects consumer trust in the labelling process and can have detrimental consequences for acceptance of organic products in the market place. The results of this study

have implications for markets with credence goods in general (i.e., "recyclable", "non-tested animals", "ecolabelled", and "non-GM" products).

In a similar vein, Giannakas and Fulton (2002) develop a conceptual model of heterogeneous consumers that examines the consumption effects (i.e., welfare and purchasing decision) of genetically modified products under alternative labelling regimes and segregation enforcement scenarios (i.e., no labelling, mandatory labelling under full compliance, and mandatory labelling when mislabelling of the type of product occurs). To capture the different attitudes toward GM, consumers are postulated to differ in the utility they derive from the consumption of GM products and therefore in their WTP for these products. The authors stress that consumer heterogeneity is critical in understanding how demand for both GM and non-GM products exists when labelling occurs. Their analysis shows that the extent of mislabelling is one of the factors affecting the relative welfare ranking of the "no labelling and "mandatory labelling'' regimes. In this respect, the authors find that the lower the level of trust in the labelling system, the greater the expectation that mislabelling occurs, the greater the consumer utility losses under mandatory labelling, and the greater the likelihood that an all-or-nothing choice between the two labelling regimes in terms of their welfare implications favours no labelling.

Similarly, in Gaisford et al. (2001), consumers are assumed to be heterogeneous in their preferences for genetically modified foods. There is information asymmetry between producers and consumers, in that producers are aware of the genetically modified properties of the product whereas consumers cannot distinguish GM from non-GM products even upon consumption of the good. Consumers are divided into two groups; the first group is indifferent in regards to

GM/non-GM foods; in the second group, consumers vary in the strength of their preferences for non-GM foods. With the introduction of GM imports there are positive price effects and negative adverse quality effects. Resulting welfare changes are dependent on the weight of these two effects. If the adverse quality effect outweighs the price effect, market demand will decrease as perceived quality declines. Different labelling and segregation scenarios are also explored with both separating and pooling equilibrium outcomes.

Moreover, Sedjo and Swallow (2002) use graphical analysis and present market implications (i.e., effects on price and quantity) of labelling wood products in the US under different scenarios with respect to the strength of consumer preferences and the existence of voluntary standards versus mandatory certification.[46] The authors conclude that certification is less likely to generate a price premium if the demand for certified woods is small relative to overall demand, if the costs of certification are significant, and if the amount of new demand created by certification is modest under a voluntary certification scheme.

Anania and Nistico (2004) present an analysis of producers' and consumers' decisions with respect to credence goods in three institutional scenarios that reflect different levels of credibility of the relevant regulation and, therefore, different levels of trust placed by consumers in the quality of the product. The situation of vertical product differentiation between "animal friendly" pork (FP) and conventional pork (CP) that we consider in our analysis – i.e., different slopes and intercepts for the CP and the FP demand curves – is grounded in Anania and Nistico's assumption that "consumers are willing to buy products of both qualities (i.e., FP and CP),

---

[46] Sedjo and Swallow (2002, p.273) state that their example "deals with an eco-label based on concerns for on-the-ground forest management consistent with sustainable forestry and ecosystem quality; that is, US producers with an appropriate "certified" management system would qualify their wood for a certified, ecolabelled product".

although they prefer the high quality to the low quality and are ready to pay a higher price for it"
(Anania and Nistico, 2004). Similarly, Hoehn and Deaton (2004) examine the case of certified
labelling for credence attributes using the concepts of pooled and separating equilibria. In this
analysis, they consider a high credence good called the credence product and a low credence
good called the conventional product. The demands for these products differ by a constant,
representing consumers' willingness-to-pay (WTP) for the credence characteristic, but the
demand curves have the same slope. In a similar fashion to the work by Anania and Nistico
(2004), third-party certified labelling vertically differentiates the two products and two separate
markets replace a single pooled market.

Finally, Babcock et al. (2002) use a graphical analysis to measure the welfare effects of adopting
animal welfare guidelines in the US egg industry. This decision creates a bifurcated market of
high-cost shell eggs and low-cost eggs that are processed. The major finding of the paper is that
the supply of graders would decrease in response to the increasing cost of welfare-friendly
technology and the market equilibrium price of the 'friendly' eggs would be higher.[47]
Consumers' benefit from egg consumption would decrease; any psychic benefit of consuming
eggs from animal friendly production practices is not accounted for. The impact on producers'
benefit from production remains ambiguous. Further, the restriction in the movement of low-cost
eggs into the in-shell market in periods of peak demand increases the price of in-shell eggs and
decreases the price of eggs destined for processing. The producers of in-shell eggs are the
winners in this case.

---

[47] "If the animal welfare guidelines are not adopted by producers of breakers, then the industry will have two types
of producers: high-cost producers of "graders" (in-shell eggs that have been graded) who follow welfare guidelines
and low-cost producers of breakers" (Babcock et al., 2002, p.1).

The main findings of this section are that we can expect consumers to be heterogeneous in their preferences, values and attitudes, and, therefore in their expectations for food products. As we could see in Chapter 2, from the consumer's perspective FAW practices are credence attributes: the consumer cannot determine through inspection at the point of purchase or experience after consumption, whether the producers used production methods designed to enhance animal welfare. Since consumers cannot assess whether the livestock product incorporates the FAW attributes advertised by the sellers, the latter have an opportunity to supply false information to consumers. This is a classic case of information asymmetry, a concept which has been emphasized in many of the papers mentioned in this chapter. Given that consumers are not able to assess the accuracy of the information provided by sellers, they may not trust these assurances. In other words, buyers will not react to accurate claims and the market will under-provide FAW. Thus, in order for the market to work properly, there is a need for credible quality assurance. The extent of mislabelling by sellers is one of the factors that influence the relative welfare ranking in different market scenarios of our analysis. Thus, the findings of this literature review inform the subsequent welfare analysis in the next section.

3.3 Assumptions of the Model

This section presents an economic welfare analysis of the implications of adopting 'animal-friendly' production standards for Canadian pork products. Outcomes for producers and consumers in the Canadian pork sector are modelled using graphical analysis in different market scenarios, i.e., under mandatory or voluntary production standards, and under different assumptions about consumer preferences (i.e., scenarios are differentiated with respect to the degree of consumers' trust). A graphical analysis for six potential situations is presented.

The analysis assumes that Canadian pork producers use one of two distinct production systems. The first group uses intensive production methods to obtain conventional pork, CP, while the second group uses production methods to obtain pork with animal-friendly attributes, FP. The FP methods are assumed to be characterized by: no growth promotants or antibiotics, lower densities for animals in the barns, no use of gestation crates, access to the outdoors, and continuous access to feed and water. FP production typically takes place on operations with smaller animal numbers. The CP methods are the antithesis of these FP protocols. As a result, there are assumed to be differences in productivity between the two methods, with those farms using CP methods having higher productivity. Thus, the CP producers have lower production costs than the FP producers. For the purpose of this analysis, both groups of producers are assumed to be price takers. FP producers are assumed to obtain the FP certification at no charge. Finally, it is assumed that FP producers never find it profitable to sell their products on the CP market.

In the model consumers are also divided into two groups according to their preferences for pork. The first group (A) includes consumers who are indifferent between CP and FP, while the second group (B) includes individuals who prefer FP to CP. It is assumed that group B consumers obtain increasing utility from knowing that animals are raised in humane conditions. Consumers from both groups are assumed to know the relative cost structure of CP and FP. This assumption is supported by empirical evidence – i.e., Lusk et al. (2007) and Hoogland et al. (2007) find that consumers in the US and the Netherlands, respectively, are aware of the fact that FP producers have higher production costs than CP producers and, therefore, need to charge higher prices for their products.[48]

---

[48] Lusk et al. (2007), in a national survey eliciting the opinion of US consumers about farm animal welfare, included several questions to ascertain whether individuals associated improvements in farm animal welfare with higher meat

In the first instance, consumers are assumed to have full information on the regulation of FP voluntary labelling and the extent to which any CP producers cheat by falsely labelling their products as FP. This assumption is later relaxed. Finally, it is assumed that the B group of consumers perceive FP as being of higher quality than CP, and therefore, are willing to pay a higher price for the FP than for the CP.[49] That is, vertical product differentiation between the two categories of pork products is assumed. The last assumption is based on the results of a number of consumer surveys which are summarized below in Subsections 3.3.1 and 3.3.2.

3.3.1 Studies with Empirical Evidence that Consumers Assess Animal Friendly Pork as Having a Superior Taste Relative to Conventional Pork

The assumption that some consumers may perceive FP as being of higher quality than the CP is based on the results of a number of consumer surveys. Studies in various countries have concluded that consumers perceive products incorporating animal-friendly attributes as being of higher quality than those produced using conventional methods. For instance, in Ireland focus group discussions revealed that "free range" eggs and "free range" chickens were perceived to taste better than their conventional counterparts (Cowan et al., 1998). Moreover, the majority of the Irish consumers surveyed (i.e., 77%) regarded "free range" as a positive indicator of food safety. Similarly, Miele and Parisi (1998) found that 73% of the customers surveyed at an Italian supermarket offering "free range" eggs thought that these eggs are better than the conventional

---

prices, and if so, whether they were willing to accept such price rises. The majority of consumers (i.e., 74%) believed that improvements in animal well-being would lead to higher meat prices. In a similar vein, Hoogland et al. (2007) obtained relatively high mean values (i.e., 1.42 on a scale ranging from -2, that is very cheap compared to similar products, to 2, that is very expensive compared to similar products) of respondents' beliefs about whether chicken fillet with a certified logo and details about AW standards of organic production is more expensive than similar products.

[49] It is also assumed that group B consumers obtain a higher utility from knowing that animals have been raised in friendly ways.

ones; 47% considered them better with respect to quality, while 21% did so with respect to freshness.

In an Australian study, Rolfe (1999) found that consumers were willing to pay a premium for "free range" eggs. Additionally, he found that forty percent of the respondents consume "free range" eggs because they believe these eggs are more natural and healthier than regular eggs.

In the United Kingdom, Harper and Makatouni (2002) investigate consumers' attitudes and behaviour in relation to two food trends – organic food and animal welfare. The authors find that consumers perceive products incorporating animal-friendly attributes as superior in the health benefits they provide relative to conventional products. In a study eliciting the opinion of Swiss consumers on the superiority of meat (i.e., sausages) with animal-friendly attributes, Badertscher (1997) found a strong agreement – i.e., 73% of consumers agreed with the statement that meat coming from animal-friendly production systems is of higher quality.[50]

Lusk et al. (2007) also examined how US consumers see the relationship between animal welfare and meat quality. In particular, they wanted to see if consumers perceive whether farms with higher standards of animal care will also produce safer meat. That is, people may indicate that they are concerned about animal welfare, not for the sake of the animal per se, but because they like better tasting, safer meat and perceive that farms with higher standards of animal care are more likely to produce meat with these qualities. This appears to have been the case as 53% of

---

[50] Statement: Products from animal-friendly production systems are of higher quality. N = 645. Scale with seven levels: 1 = I do not agree at all, 7 = I agree completely. Rejection = levels 1–3; neutral = level 4; agreement = levels 5–7. Source: Phan-Huy, A. S. and F. R. Badertscher Fawaz (2003) after Badertscher (1997), p.123.

respondents strongly agreed and 25% agreed with the statement "animals raised under higher standards of care will produce safer and better tasting meat."

Ophuis (1994) conducted sensory evaluation tests of "free range" and "regular" pork in the Netherlands. He concludes that consumers perceive pork identified as incorporating the "free range" attribute as having a better taste than "regular" pork. For example, the biggest differences between "free range" and "regular" pork occurred in the group of consumers that had prior experience with "free range" pork and participated in sensory tests under labelled conditions. This category of consumers assessed "free range" pork in comparison to "regular" pork as significantly more juicy, less bland and tough, more savoury and tender, less fat and dry, and more pleasant.

In a similar vein, Armah and Kennedy (2000) elicited the preference of consumers living in Arkansas for pasture-raised pork. They found that 65% of those consumers would prefer pasture-raised pork over conventional-produced pork. More specifically, 67% of the respondents considered pasture-raised pork leaner than conventional-produced pork, while 62% of them believed it to be healthier. Conner et al. (2008) elicit the preferences of consumers in Michigan for pasture-based animal products. The authors find that 76% of the consumers either strongly or somewhat agree that pasture-raised products are healthier for consumers than those from confinement operations.

Lastly, the 2007 Eurobarometer revealed that "the principal reasons for consumers to buy welfare-friendly food (i.e., free-range) largely involve the quality of the products. When asked to

pick up to three reasons why they may buy such products, over half (51%) cited the fact that they thought these were healthier than other products. A comparable figure (48%) said that the better quality of welfare-friendly products was a reason to choose these or 34% asserted that these products are tastier" (EC, 2007a, p.34).

3.3.2 Studies with Empirical Evidence of Consumers' Willingness-to-Pay a Price Premium for Animal Friendly Pork Relative to Conventional Pork

The assumption that consumers are willing to pay a higher price for FP pork (or free-range poultry products) compared to CP pork is based on the results of a number of consumer surveys in various countries that showed a clear WTP for FP among some consumers. These are summarized below.

In Canada, Goddard et al. (2007) evaluated the interest of consumers from Alberta and Ontario in different types of eggs, including Omega-3, organic, free run/range, vitamin enhanced and vegetarian. They made use of stated preference data from two surveys undertaken in two consecutive years (i.e., 2005 and 2006) and revealed preference data from an AC Nielson Homescan@ panel data set. Results suggested that consumers in Alberta are not willing to pay more for specialty eggs, and in fact had a negative WTP (i.e., at the mean of all variables) of $-1.76/per egg for free-range eggs relative to normal eggs in the frequency model (i.e., how often across a three year period households purchased each type of egg) and a positive but small WTP of $0.23/ per egg for free-range eggs relative to normal eggs in the choice model. By contrast, consumers in Ontario showed a significant WTP for free-range eggs in both models, namely:

$0.99/ per egg for free-range eggs relative to normal eggs in the frequency model and $1.63/ per egg for free-range eggs relative to normal eggs in the choice model.

In Sweden, Carlsson et al. (2005) employed stated preferences (i.e., a choice experiment) to evaluate consumers' attitudes and WTP for quality attributes (i.e., animal welfare) of food products (i.e., chicken, beef, pork, eggs). They found that consumers were willing to pay a 67% premium for pork sourced from pigs raised outdoors over pork sourced from pigs raised indoors. As well, consumers were willing to pay an 8% premium for pork sourced from pigs slaughtered in mobile abattoirs over pork sourced from pigs slaughtered in a slaughter house (Carlsson et al., 2005). Similarly, Liljenstople (2008b) investigated the demand for AW attributes among a sample of Swedish consumers when buying pork. She found a 32% premium for pork sourced from pigs raised outdoors and a 19% premium for pork sourced from pigs slaughtered in mobile abattoirs.

Lusk et al. (2006) estimated the WTP of US consumers for pork produced without subtherapeutic antibiotics. The authors conducted valuation experiments near the meat counter of a grocery store in Oklahoma. The results of the experiment suggested that consumers place substantial price premiums on pork produced without antibiotics (i.e., authors found a 76% premium for pork raised without antibiotics over pork raised with antibiotics).

Nilsson et al. (2006) also characterized the demand and the market potential of a credence certification program for fresh pork cuts in the US. More specifically, they derived consumers' WTP for conventional pork and pork certified for environment, animal welfare and antibiotic

use. The authors found that WTP for AW certification varied from a 7.5% to 52% premium, and that WTP for the no antibiotic use certification varied from 5.6% to 72% premium for the category of price conscious and the category of concerned shoppers respectively. Finally, Armah and Kennedy (2000) find that 59% of the consumers in their US study would pay more for pasture-raised pork over conventionally-produced pork.

These surveys suggest that consumers in various countries perceive products incorporating animal-friendly attributes as being of a higher quality than those produced using conventional methods. As well, these studies indicate that some consumers are willing to pay a premium for the former relative to the latter products. Other authors such as Becker (1999) suggests that while consumer behaviour and the marketing of food products favours "perceived" quality which may be qualitative (extrinsic), by contrast, food science places the emphasis on measurable quality (intrinsic) characteristics. For instance, authors such as Olsson et al. (2000), Gentry et al. (2002), and Dransfield et al. (2005) find that consumers were not able to discriminate in terms of taste and colour between pork sourced from finishing pigs raised in conventional (i.e., indoor slatted-floor buildings) vs. alternative production systems (i.e., indoor deep-bedded buildings, outdoor housing on dirt, or outdoor housing on alfalfa pasture). However, based on the review of consumer studies from Section 3.3.1, this thesis employs the "perceived" quality" approach, that is by considering FP of superior quality for some consumers.

3.4 Welfare Analysis

Six potential market situations are analyzed with respect to the total welfare that is generated in the market. In the first scenario, only conventional pork (CP) is produced and consumed in Canada. In the second scenario, voluntary standards for "animal friendly" pork (FP) production are developed and production of FP starts. In addition, some consumers develop a preference for and express a higher WTP for pork produced to FP standards. In order to allow these consumers to distinguish between CP and FP, the FP producers voluntarily decide to label their products. This scenario depicts the case when regulation is such that no CP producer cheats by falsely labelling his products as FP and, therefore, the voluntary label is fully credible.

In the third market outcome we relax the perfect information assumption. Consumers have little or no trust in the voluntary label because regulation (or lack of) is such that all CP producers can mislabel their products as FP; this case is equivalent to that when there is no labelling of FP. The relaxation of the perfect information assumption is still maintained in the fourth scenario. This time, however, consumers find the FP label relatively credible as stronger regulation of FP labelling is such that only a very small number of CP producers mislabel their products as FP.

In the fifth market outcome, a mandatory standard is imposed by the government, so that only FP can be produced and consumed. In this scenario it is assumed that Canada bans imports of foreign CP. This assumption is relaxed in the sixth scenario when the Canadian government implements and manages an official quality label that signals the animal-friendly attribute of the FP produced domestically. In this case consumers trust that the label accurately portrays the product.

74

For convenience, it is assumed that the Canadian pork sector is as competitive as the average foreign pork sector, so that Canada does not take part in international trade in any of the first five cases. The analysis of Cases 2, 3 and 4 draws upon the work by Anania and Nistico (2004) and Hoehn and Deaton (2004).

Case 1: Pooled Market Situation

Initially, only CP is produced and consumed in Canada. Consumers are assumed to have homogeneous preferences – no consumers with a preference for FP yet exist. Supply is given by S, while demand is given by D in Figure 3.1. The equilibrium price and quantity that prevail in the market are P_e and Q_e, respectively. The total welfare that is generated (i.e., area AEB) equals area AEP_e (i.e., consumer surplus) plus area P_eEB (i.e., producer surplus).
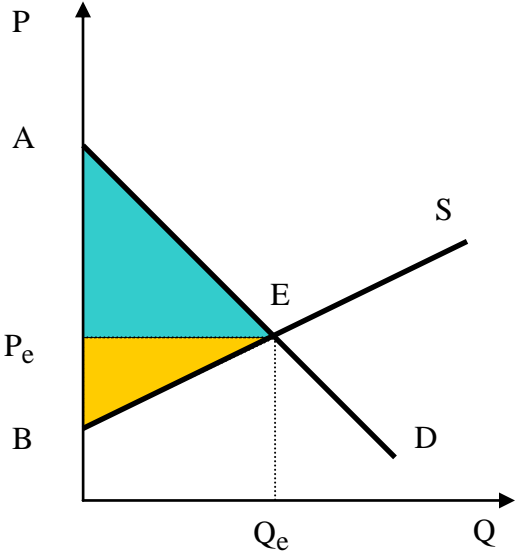
Figure 3.1: Market equilibrium when only conventional pork is produced and consumed

Case 2: Voluntary Label that Is Fully Credible

Some consumers are assumed to have developed a preference for and express a higher WTP for pork produced to FP standards. The two groups of consumers are thus formed. As well, some pork producers voluntarily switch their production method from CP to FP. The FP is produced according to voluntary standards, such as the Animal Care Assessment program implemented by the Canadian Pork Council, the SPCA Certified standard of BC SPCA or the WHS Certified standard of the Winnipeg Humane Society. The higher costs associated with FP production are reflected in S_f in Figure 3.2 where the CP market and the FP market are assumed to form separate markets. Assuming that FP production is not significant enough to cause an increase in the price of inputs for CP, the supply of CP is still given by S.

The FP producers voluntarily decide to label their products to allow the B consumers to identify which production method has been used. In this scenario, it is assumed that regulation is such that no CP producer cheats by falsely labelling his products as FP. Risking their reputation in the eyes of consumers is a primary reason that the CP producers refrain from falsely advertising their products as being FP. As a result, the B consumers fully trust the FP label and therefore reveal their maximum WTP for FP. Their demand is given by D_f in Figure 3.2. Demand for CP rotates inwards from D to D_c, as a result of some consumers switching from CP to FP.

In this case the CP and the FP can be treated as being two different goods with well separated markets. The equilibria in the two markets are depicted in Figure 3.2. The equilibrium price and quantity in the CP market – i.e., P_{c0} and Q_{c0}, decrease compared to their levels in the first

scenario. This is the result of the decrease in demand for CP, as some consumers switch from CP to FP. The FP market clears at P_{f0} and Q_{f0}. The price premium for the FP is given by $P_{f0} - P_{c0}$.
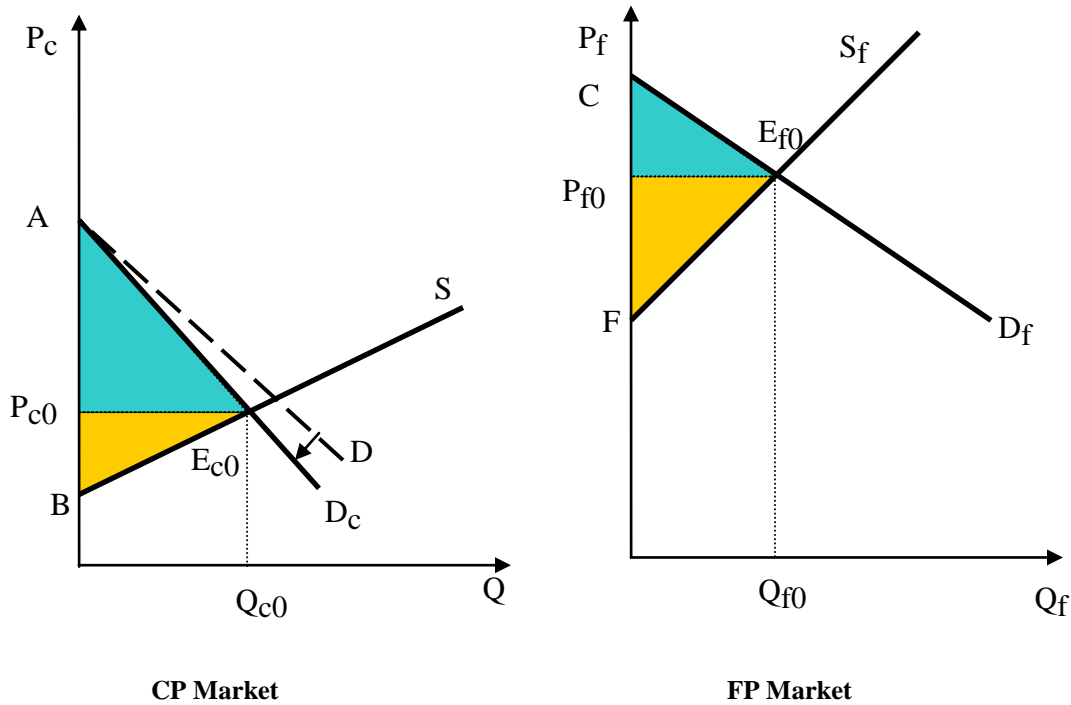
Figure 3.2: Market equilibria under voluntary labelling that is fully credible

The total welfare in this scenario is given by the sum of the welfare that is generated in each of the two markets. Specifically, the welfare that is generated in the CP market (i.e., area $AE_{c0}B$) equals group A consumers' surplus (i.e., area $AE_{c0}P_{c0}$) plus the CP producers' surplus (i.e., area $P_{c0}E_{c0}B$). The welfare that is generated in the FP market (i.e., area $CE_{f0}F$) equals the B consumers' surplus (i.e., area $CE_{f0}P_{f0}$) plus the FP producers' surplus (i.e., area $P_{f0}E_{f0}F$). This scenario hinges on the key assumption that labelling is credible and cheating is absent.

Case 3: Voluntary Labelling with No Trust

This scenario is the antithesis of the previous one – i.e., consumers have little or no trust in the voluntary label applied by the FP producers; this case is equivalent to that when there is no labelling of FP. The reason for the lack of trust is that all CP producers can, without legally abrogating a regulation, sell their CP products on the FP market. Risking their reputation in the eyes of consumers is no longer a sufficient deterrent for the CP producers to not mislead consumers. For this case the initial assumption of perfect information is relaxed so that consumers are no longer assumed to have full information on the regulation of FP voluntary labelling and the extent to which CP producers cheat by falsely labelling their products as FP. Uncertainty over quality exists. For instance, the CP producers know whether they kept the sows in gestation stalls or administered antibiotics and growth promotants, but consumers do not, and cannot discover this without incurring high costs.

The degree of information asymmetry between the CP producers and consumers is an essential characteristic of how well the market will work. This was first highlighted in Akerlof's (1970) seminal paper "The Market for Lemons". He showed that if producers cannot convince consumers prior to purchase that their products (i.e., used cars in Akerlof's paper or CP in our case) are of a higher quality, then high-quality cars (i.e., FP in this case) will not be able to command a price premium because consumers will assume, to protect themselves, that all products are "lemons". The consequence is that only lemons will be produced (i.e., CP this case) which is a loss to all consumers willing to pay for the high quality cars (i.e., FP in this case).

Following Anania and Nistico (2004), the supply in the FP market for prices below F coincides with that in the CP market when the voluntary label is fully credible, as no FP producer finds it profitable to produce, and the FP market is supplied by CP producers only (Figure 3.3). When the price exceeds F, both the FP and the CP producers are offering their products on the FP market. As a result, the supply of FP is given by the horizontal summation of S and S_f and is denoted by S_f' in Figure 3.3.
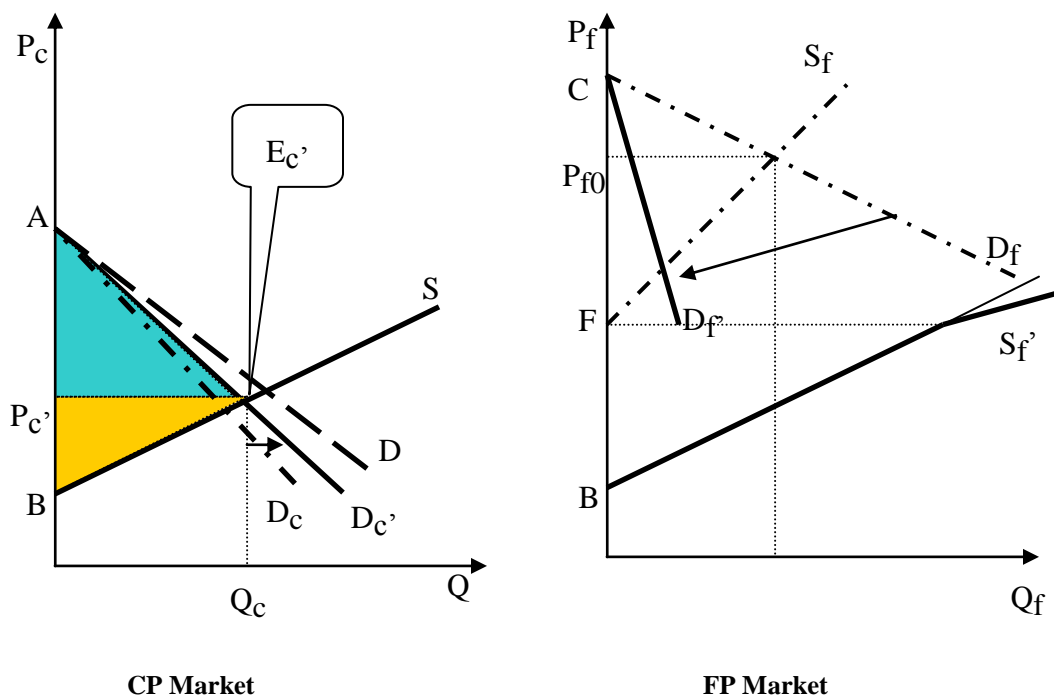
Figure 3.3: Market equilibria when consumers have little or no trust in the voluntary label

It is assumed that consumers are still willing to pay a premium for pork offered on the FP market as long as the price that is charged is greater than F, as they face a positive probability of buying FP. However, their WTP is much lower than in the case when they fully trust the label. This is captured by the clockwise inward rotation in the demand for FP-labelled pork from D_f to D_f'. Moreover, consumers are not willing to buy any product offered on the FP market at prices

below F, as they know that F is the minimum price that FP producers require to start producing FP, therefore, a product offered at a price below F can only be CP.

The outcomes on the two markets are represented in Figure 3.3. Competition between the FP and the CP producers on the FP market will make the CP producers offer their product at a price just below F, which is the minimum entry price for the FP producers. At this price, consumers will not buy any product they are offered as FP, since they know that at that price the product can only be CP. As a result, the FP market collapses and the CP producers have to sell their products on the CP market. In this case, the supply of CP is equal to the supply of CP under voluntary labelling that is fully credible – i.e., S in Figure 3.3. It is assumed that at least some of the B consumers (those who only weakly prefer FP and are now unable to buy FP at a higher price) join the A consumers, making the demand for CP expand with respect to that in the previous scenario – i.e., $D_{c'}$ in Figure 3.3.

The CP price and the quantity of CP that is marketed exceed those that emerge on the market when labelling of FP is fully credible because now no FP production can take place and CP is substituted for FP by some of the B consumers. The surplus that is earned by both the A and the B consumers who switch is given by area $AE_{c'}P_{c'}$ in Figure 3.3. The remaining B consumers, with stronger preferences, unable to buy FP at a higher price, exit the FP market and thus are not getting any surplus. They are worse off as the FP market collapses. The total consumer surplus in Case 3 is lower than that enjoyed by the consumers (both A and B) in Case 2. The CP producers earn surplus equal to area $P_{c'}E_{c'}B$ and are better off compared to the case of fully credible FP

80

labelling. Conversely, the FP producers are worse off, as they have to exit the FP market. The total welfare that is generated in the remaining CP market is given by area $AE_{c'}B$.

Case 4: Voluntary Labelling that Is Relatively Credible

In this scenario, it is assumed that regulation and enforcement of FP labelling is such that only a very small number of CP producers mislabel their products as FP, so that consumers find the FP label relatively credible. The initial assumption of perfect information is again relaxed. Following Anania and Nistico (2004), the supply of CP (i.e., $S_{c''}$ in Figure 3.4) decreases with the quantity of CP that is offered on the FP market. The total quantity of product that is offered on the FP market by both the FP and the CP producers is given by $S_{f'}$ in Figure 3.4. The large probability of buying a "true" FP on the FP market allows for a higher WTP for the FP, represented by $D_{f'}$ in Figure 3.4. The number of those consumers willing to buy FP at a higher price that switch to the CP market due to concerns over the credibility of FP labelling is smaller than was the case in the previous scenario, so that demand for CP is given by $D_{c''}$.
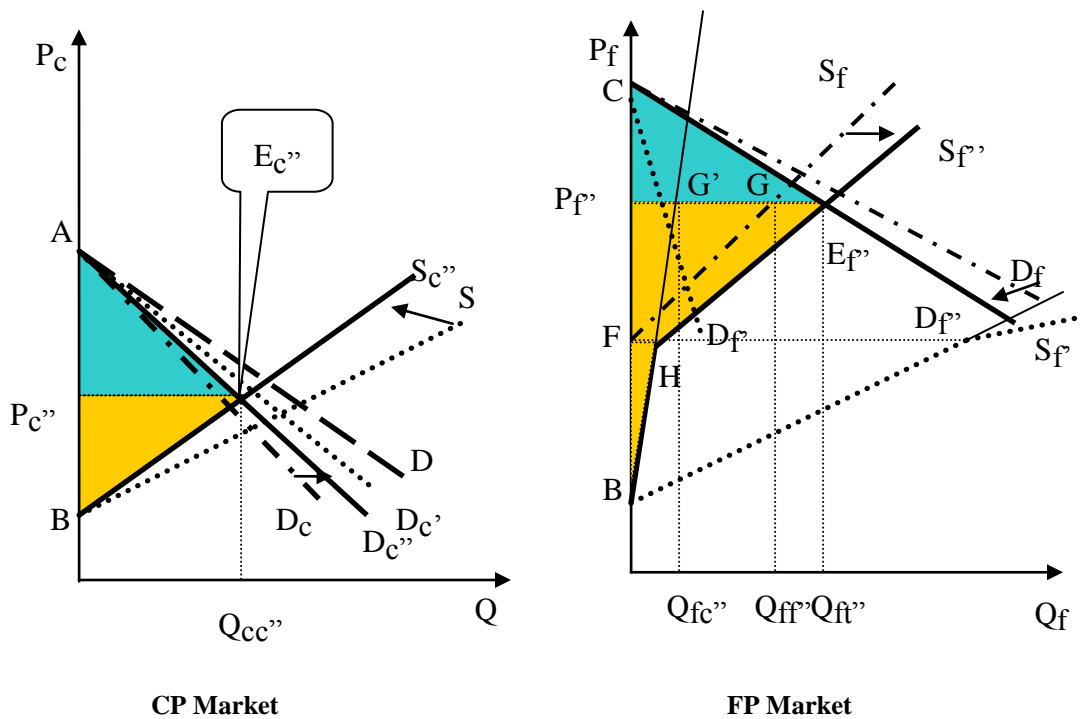
CP Market **FP Market**

Figure 3.4: Market equilibria under voluntary labelling that is relatively credible

The equilibrium price that emerges in the FP market is $P_{f'}$ (this price is lower than the equilibrium price of FP when the label is fully credible). At this price, the B consumers buy $Q_{ft''}$ units of FP-labelled pork, of which: $Q_{ff''}$ units are FP and $Q_{fc''}$ units are CP. Their surplus equals area $CE_{f'}P_{f''}$ – they may be better off or worse off compared to the both cases of a fully credible or little consumer trust in voluntary label depending upon which effect, either price or adverse quality effect is greater. The FP producers enjoy surplus equal to area $P_{f'}GF$ – they are worse off compared to the case of a fully credible voluntary label, but better off compared to the case of no or little consumer trust in the content of the label. The price that clears the CP market is $P_{c''}$ and the quantity of CP that is exchanged on the CP market at this price is $Q_{cc''}$. The surplus that consumers get from buying CP is equal to area $AE_{c''}P_{c''}$. They are worse off compared to both cases of a fully credible or little consumer trust in voluntary label as the price that they have to

82

pay for CP is higher price for CP ($P_{c"} > P_{c'} > P_{c'}$). CP producers earn surplus equal to area $P_{c"}E_{c"}B$ from sales of CP to the CP market and area $GE_{f'}HBF$ from sales of CP to the FP market. This scenario is the most advantageous (of the four scenarios considered so far) to CP producers.

Case 5: Mandatory Friendly Production Standard with Autarky

This scenario depicts a situation in which *all* domestic pork producers are required to adopt "friendly" production methods (i.e., intensive production methods are banned in Canada – such as the phased-in policy developed by the CEMA for the egg industry in Canada since 2003). There is a unique standard that domestic pork producers have to comply with. It is assumed that this mandatory standard is more stringent than the voluntary standards that FP producers use to assess the animal-friendliness of their production methods in Scenarios 2-4. As a result, the FP production costs increase under the mandatory standard – i.e., the supply of FP shifts from S_f to S_{fm} in Figure 3.5.

While some of the CP producers are expected to exit the market, most of them are assumed to switch to producing FP according to the mandatory standard. As a result, the domestic FP production increases (i.e., supply of FP rotates from S_{fm} to $S_{fm'}$ in Figure 3.5). In this scenario, it is assumed that imports of CP are not allowed. This is similar to the EU ban on the use of growth promotants in domestic beef production, which may be accompanied by a ban on imports of beef (a ban subsequently ruled illegal by the WTO disputes panel). In a similar vein, Norway can be considered a closed economy since it carries heavy import tariffs (i.e., tariff rates on agricultural production average about 38% for agricultural goods) (Murdoch 2005, OUSTR, 2006).

On the demand side, the A consumers are willing to buy FP when its price falls below A. Thus, the aggregate demand for FP, D_{fm}, is the horizontal summation of D_c and D_f.

CP Market   FP Market
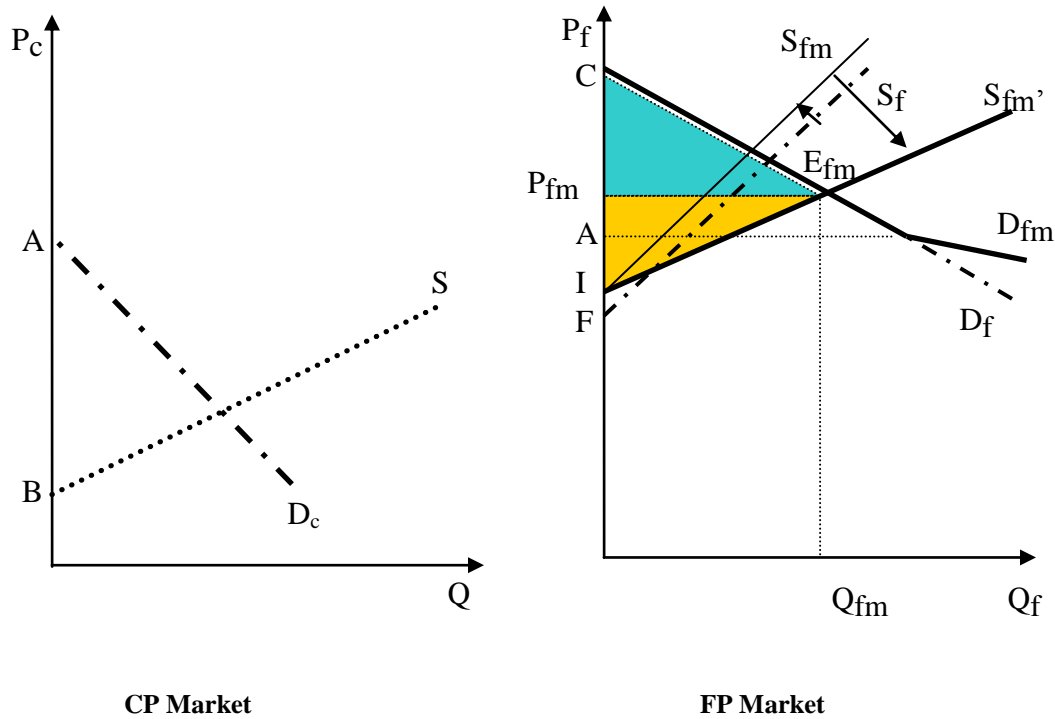
Figure 3.5: Market equilibrium under mandatory animal friendly pork standard and autarky

The equilibrium price of FP under the mandatory standard, P_{fm}, lies below the price of FP under voluntary labelling (both when the label is fully credible and when it is relatively credible). However, it is not low enough to allow the A consumers (who are indifferent between CP and FP) to substitute the CP for FP, so that the equilibrium quantity of FP that is marketed, Q_{fm}, goes only to the B consumers. In other words, group A consumers are forced out of the market for pork and look for other substitutes.[51]

---

[51] Swallow and Sedjo (2000) made a similar assumption when studied the US consumer preferences for ecological quality. They assumed that mandatory certification of the wood products causes an increase in their price and thus non-ecological consumers will substitute toward other goods.

Under this scenario, the B consumers enjoy surplus equal to area $CE_{fm}P_{fm}$. The economic surplus that accrues to the FP producers is given by area $P_{fm}E_{fm}I$. Thus, the total welfare that is generated in the pork market under the mandatory FP standard and no imports of CP is given by area $CE_{fm}I$ and is smaller than the total welfare under voluntary labelling (both when the label is fully credible and when it is relatively credible). The main reason for this outcome is the welfare loss suffered by the group A consumers and by CP producers. The group A consumers suffer from the absence of choice between the FP and the cheaper CP. As well, the CP producers lose as a result of this mandatory FP standard, as some of them have to incur additional costs to comply with the FP standard while others have to exit the market.

If a cheaper substitute for the FP were available, the group A consumers would prefer to switch to that substitute. One source of substitute would be imported CP. The assumption of autarky will be relaxed in the next section. Moreover, in order to allow group B consumers to distinguish between domestic FP and imported CP, and to ensure fair competition between domestic FP producers and foreign CP producers, the government is assumed to implement and manage an official quality label, which signals the animal-friendly attribute of the FP produced domestically. Implementing this label involves a cost, C, of management, enforcement and advertisement. This situation is specific to open-economy countries like Sweden (i.e., the Swedish Meats label is an example of a communication strategy which allows consumers to differentiate between Swedish and non-Swedish products) (Murdoch, 2005). This situation is analysed in Case 6.

Case 6: Mandatory Domestic Friendly Production Standard, Trade and Quality Signalling

For simplicity, we assume that foreign CP producers incur the same production costs as would Canadian CP producers in the previous scenarios (i.e., foreign supply of CP is given by S in Figure 3.6). Again, the supply of domestic FP is given by $S_{fm'}$. Since domestic consumers can distinguish between domestic FP and foreign CP, we are faced with two separate demands. Assuming that elasticity of demand for imported CP is equal to the elasticity of demand for domestic CP (i.e., if domestic CP was allowed), we have D_f and D_c defining the domestic demand for domestic FP and the domestic demand for foreign CP, respectively. The equilibrium prices are P_{fm} for the FP market and P_{c0} for the (imported) CP market. The quantity of FP that is produced domestically is given by Q_{fm}, while the quantity of CP that is imported is given by Q_{c0}.
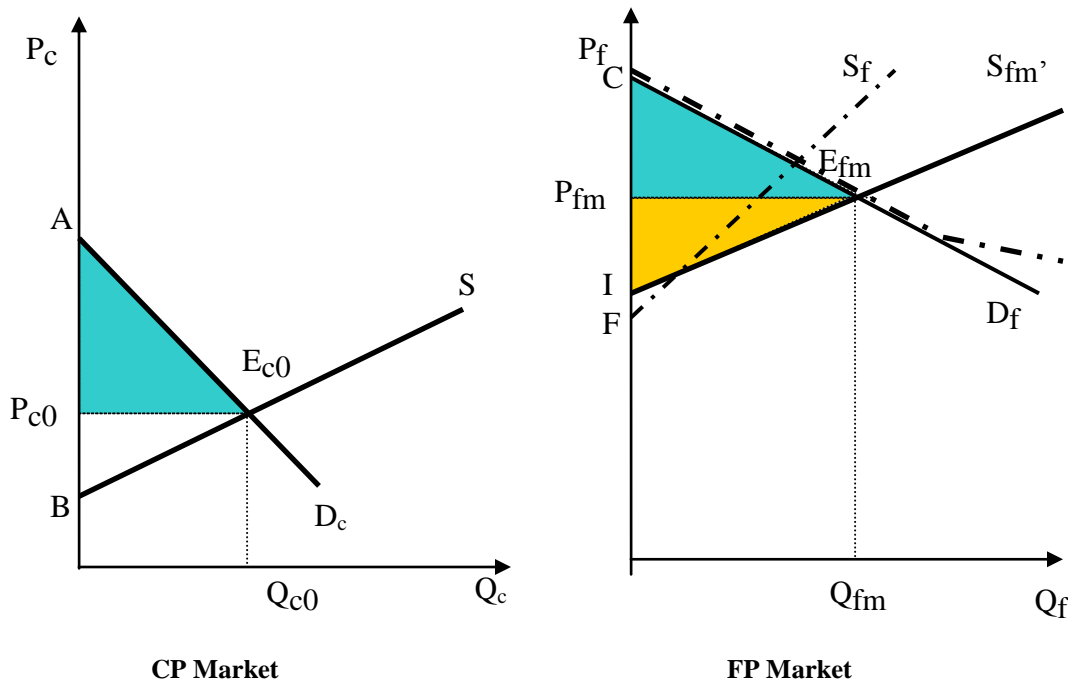
Figure 3.6: Market equilibria under mandatory animal friendly pork standard, trade and quality signalling

Total Canadian welfare equals the B consumers' surplus (i.e., area $CE_{fm}P_{fm}$) plus the A consumers' surplus (i.e., area $AE_{c0}P_{c0}$) plus the surplus of domestic FP producers (i.e., area

86

$P_{fm}E_{fm}I$) minus the cost of implementing and managing a label (i.e., C). The cost of the label is critical to determining whether this scenario is more favourable than the autarky case.

Table 3.1 summarizes the total welfare that is generated in the Canadian pork market in the six scenarios that have been analyzed and compares the welfare outcomes in each case to Case 2 (fully credible voluntary labelling). To recap, these findings were based on several assumptions. First, producers have been divided according to the production method used on the farm into two groups: CP and FP. Second, it was assumed that the CP producers have lower production costs than the FP producers. Third, both groups of producers were assumed to be price takers. Fourth, FP producers were assumed to obtain the FP certification at no charge. Fifth, it was assumed that FP producers never find it profitable to sell their products on the CP market. Sixth, autarky (i.e., Canada functioning as a closed economy) was assumed for the first five cases of the analysis but was relaxed in Case 6.

Finally, consumers were divided into two groups according to their preferences for pork. A first group, A, included consumers who are indifferent between the CP and the FP, while a second group B included individuals who prefer FP to CP. First, it was assumed that consumers from both groups know the relative cost structure of the CP and the FP. Second, in the first instance consumers were hypothesized to have full information on the regulation of FP voluntary labelling and the extent to which any CP producers cheat by falsely labelling their products as FP. In the second instance, this assumption was relaxed. Third, it was considered that the B consumers perceive the FP as being of higher quality than CP and, therefore, are willing to pay a

higher price for the FP than for the CP. Finally, the regulator's labelling and enforcement costs

for FP were not present in the analysis except for Case 6.

Table 3.1: The distribution of total welfare that is generated on the pork market under different scenarios

	Case 1: Only CP is produced and consumed	Case 2: Voluntary label that is fully credible (base scenario)	Case 3: Voluntary label in which consumers have no trust	Case 4: Voluntary label that is relatively credible	Case 5: Mandatory FP standard and autarky	Case 6: Mandatory FP standard, trade, and quality signalling
Producers of conventional pork (CP)	P_eEB (>>)	$P_{c0}E_{c0}B$	$P_c'E_c'B$ (>)	$P_{c''}E_{c''}B + GE_{f'}HBF$ (>>>)	0 (< loss in S* to some of the CP producers)	0 (< loss in S* to some of the CP producers)
Producers of friendly pork (FP)	0 (<< loss in S* to FP producers since they do not produce FP pork)	$P_{f0}E_{f0}F$	0 (<< loss in S* to FP producers since they do not produce FP pork)	$P_{f'}GF$ (>)	$P_{fm}E_{fm}I$ (<)	$P_{fm}E_{fm}I$ (<)
Group A consumers (indifferent between CP and FP)	AEP_e (< compared to the S* of group A and group B consumers in Case 2)	$AE_{c0}P_{c0}$	$AE_c'P_c'$ (<< compared to the S* of group A and group B consumers in Case 2)	$CE_{f'}P_{f'} + AE_{c''}P_{c''}$ (> compared to the S* by A and B consumers in Case 2)	0 (<<< - loss in S* to some of the A consumers)	$AE_{c0}P_{c0}$
Group B consumers (prefer FP to CP)		$CE_{f0}P_{f0}$			$CE_{fm}P_{fm}$ (>> compared to the S* of group B consumers in case 2 and 4 but either < or << compared to the total CS* in Case 2)	$CE_{fm}P_{fm}$
Total Canadian surplus	AEB (<)	$AE_{c0}B + CE_{f0}F$	$AE_c'B$ (<<)	$AE_{c''}B + CE_{f'}HB$ (>)	$CE_{fm}I$ (either < or <<)	$CE_{fm}I + AE_{c0}P_{c0} - C$ (either < or >, depends on C)

Notes: S*/CS* = surplus/consumer surplus; surplus evaluation scale compared to the base scenario: <<, <, base, >, >>, >>>. Government and enforcement labelling costs are present only in Case 6.

3.5 Conclusions

Based on these assumptions the analysis predicts that a situation of voluntary labelling that is relatively credible will maximize the welfare that accrues to all players on the Canadian pork market. In addition, this scenario allows heterogeneous consumers to choose between different combinations of price and quality according to their preferences. Finally, provided that the label is credible, the government does not have to incur the costs associated with perfect enforcement of voluntary FP labelling or with implementation and management of an official label that signals the animal-friendly attribute of the FP produced domestically under a mandatory FP standard. Understanding the factors that enhance or constrain the credibility of a voluntary quality label is critical to this welfare outcome and a key topic for the consumer analysis presented in Chapter 5. Also, key to determining the size of the relative welfare gains and losses is the extent to which consumer preference heterogeneity exists with respect to FAW (i.e., the existence of group A and group B consumers). Consumer preference research in a Canadian context is needed to identify the extent to which Canadians comprise the 'Group A' and 'Group B' consumers in this chapter, and the strength of preferences of each group. Thus, the price sensitivity of each group is also relevant. Thus, the analysis in Chapter 5 also examines whether Canadian consumers associate improvements in FAW with higher meat prices, and if so, are they willing to accept such price increases, taking into account the heterogeneity highlighted above?

From a policy and an industry marketing perspective it would be instructive to know which alternative pork production techniques (i.e., gestation stalls vs. sows kept in groups, the use of antibiotics, indoor vs. outdoor housing) Canadians perceive as being the most important for delivering higher levels of AW. Moreover, insights into consumers' valuation of alternative

90

methods of quality verification (i.e., by government, by farmers, producer associations, downstream food firms, or a third-party enterprise) will shed light on the extent to which voluntary (versus mandatory) quality assurances are credible.

Finally, the welfare analysis recognizes that there is likely to be heterogeneity in consumer preferences for FAW. If consumer with strong preferences (group B) are able to successfully lobby for mandatory FAW standards, the outcome will be Case 5 (under an assumption of autarky), which yields a loss in surplus to those consumers who are indifferent between conventional pork and pork raised under higher welfare standards. Thus, understanding and measuring the strength of consumer preferences for FAW, while accounting for heterogeneity is very important. The consumer analysis in Chapters 4 and 5 allows an assessment of the likely effect on "indifferent" consumers of successful lobbying for higher standards by the group B consumers.

The welfare analysis presented in this chapter forms the basis for further analysis of FAW quality verification in Canada and the appropriate role for public or private standards in delivering credible quality assurances. A consumer survey is used to quantify consumer preferences for FAW in Canada, including an assessment of the strength of preferences and the value placed on different forms of quality assurance. Chapter 4 outlines the consumer survey methodology and estimation method, while Chapter 5 presents the results of the analysis.

CHAPTER 4: SURVEY DESIGN AND ESTIMATION METHODS

4.1 Key Objectives

This chapter outlines the methodology used in the consumer survey that addresses farm animal welfare issues specific to the Canadian pork sector. Additionally, it describes the estimation methods used in the analysis of the survey data. The survey enables an in-depth assessment of consumers attitudes toward farm animal welfare (FAW) and the means by which FAW quality verification can be credibly signalled to consumers. Specifically, survey data enable an assessment of 1) consumers' perceptions of the current status of FAW in Canada, 2) consumers' willingness-to-pay (WTP) for alternative pig production methods, 3) consumers' WTP for FAW quality assurances provided by different stakeholders involved in the Canadian Pork sector (i.e., by government, by agricultural producers, producer associations, downstream food firms, or a third-party enterprise), 4) whether declared trust in verifying organizations relates to WTP for the assurances provided for FAW attributes, and 5) the extent to which different groups of consumers exist with different preferences for FAW measures. This chapter begins by positioning the examination of consumer preferences for FAW within a utility maximization framework. Following this, a review of consumer studies in the area of FAW that used stated preference method is presented. Then, the chapter outlines data collection and choice experiment design methods used in the survey. Lastly, the econometric models used to estimate the utility consumers derive from FAW attributes are described.

4.2. Farm Animal Welfare and Consumer Demand

Economic theory states that utility maximization (U) drives consumers' behaviour. This is expressed in the relationship $U = f(Z_1, Z_2, ..., Z_m)$ where the $[Z_i]$ are different goods in the consumption bundle, among which one can identify livestock and poultry products with welfare attributes $[Z_j]$ (McInerney, 2004).[52] The magnitude of the marginal utility, $\partial U/\partial Z_j$, shows the relative value placed on product Z_j, and hence the price that consumers would be prepared to pay to obtain it. Utility maximization also depends on the income constraint as well as the prices of the products to be purchased. The consumer's decision about how much livestock and poultry products with FAW to buy is reflected by his/her demand function, typically represented as:

$$Q_j^D = F\left(P_j, [P_o], I, T, S\right) \qquad (4.1)$$

Where Q_j^D, the quantity of commodity j that will be bought, is directly determined by the product's price (Pj), the prices of all other products in the consumption set $[P_0]$, the level of income (I), personal tastes and preferences (T), and a host of socio-economic 'positioning' factors (S) relating to culture, education, experience, social group, etc. (McInerney, 2004). In other words, consumer preferences for livestock and poultry products with FAW attributes are derived from ethical principles, personal values and feelings of concern for animals. McInerney (2004) draws two major conclusions from this assertion. First, he suggests that for some types of consumers, their response is very price inelastic when they see livestock and poultry products with FAW characteristics in the grocery stores.[53] Second, he implies that income elasticity of demand for the FAW quality attributes of these products is high.[54]

---

[52] McInerney (2004) points out that to the extent consumers with strong perceptions of FAW are representative of society at large, then a society's attitudes toward FAW and the value placed on it can be embedded within consumer demand.

[53] "This implies that there are no effective economic substitutes for the products that offer a clear welfare value – and the absence of substitutes is the major factor which leads to less response to price" (McInerney, 2004, p.14).

Lancaster (1966) proposed an alternative approach to modelling consumer demand, suggesting that a good is composed of intrinsic and extrinsic characteristics such as shape, colour, style, size, taste, comfort, ease of use, nutritive value, etc. Accordingly, these characteristics are the ones from which consumers obtain utility. In other, words, utility functions are defined not in terms of products consumed but by the characteristics [x_i] that give value in consumption, i.e., $U = f(x_1, x_2, x_3,..., x_n)$. In the context of credence goods, food product quality may include a range of attributes, such as food safety attributes, nutrition attributes, and process attributes like FAW environmental attributes. In turn, livestock and poultry products with higher levels of farm animal welfare may be characterized by a bundle of specific attributes. For example, free run eggs may be sourced from hens that have continuous access to the floor of the barn where they are free to roam, roost, nest, and perch.

 Drawing upon Lancaster's (1966) theory, various methods have tried to assess the determinants of consumer utility. Both stated and revealed preference elicitation methods have been used widely. Revealed preference data represent information on actual purchases by individuals and households which are tracked over time. In other words, revealed preference data reflect what consumers did in a situation that had economic consequences (Norwood and Lusk, 2008). Combined with demographic data provided by the household, if available, this information can provide input for econometric analysis of actual purchase decisions (Goddard et al., 2007). However, with this kind of analysis it is difficult to identify whether the actual purchase decision was driven by product availability at a particular store which may be different than that in another community or at another store. As well, we are unable to determine whether the purchase

---

[54] "As incomes rise, consumers may not necessarily buy substantially more cars/clothes/houses/holidays/ cameras/etc., but they certainly buy higher and higher quality versions of those goods" (McInerney, 2004, p.15).

was motivated by the FAW attribute or some other product attribute. The revealed preference method is limited because it can only capture preferences for AW products actually available on the market and it does not reveal the latent demand for higher FAW standards. Accordingly, to obtain this information, other methods are needed.

Stated preference data are those derived by research methods that "ask consumers, hypothetically, what they would do in a given situation. They are most often obtained from mail and phone surveys by asking hypothetical willingness-to-pay or purchase intentions" (Norwood and Lusk, 2008, p.354). Stated preference method allows researchers to examine hypothetical products and attributes combinations. A first advantage of stated preference data is that "consumers can be asked to evaluate any potential problem or situation – even products that have not actually been developed in situations that have never occurred" (Norwood and Lusk, 2008, p.354). Thus, they are frequently used in the environmental, marketing, and transportation literature to predict consumer choice by determining the relative importance of various attributes in consumers' choice processes (Adamowicz et al., 1997, 1998a; Louviere et al., 2000). This means that stated preference research is very flexible in the types of preferences that can be measured.

Thus, SP experiments can be used to assess consumer preferences for specific FAW attributes not widely available in the market. SP methods are particularly useful for evaluating the contribution of individual product attributes to overall consumer utility from product or to examine trade-offs between attributes (e.g., price vs. higher FAW or methods of assuring FAW). A second advantage of this approach is that stated preference data can be relatively easy to

obtain from a large number of consumers (Norwood and Lusk, 2008). The primary drawback to stated preference data is that they are hypothetical, since they are stated. That is, a consumer can give any answer and suffer no adverse consequences; hence, the answer may not truly represent his/her preferences. As well, consumers might answer questions in such a way as to try to benefit themselves later (Norwood and Lusk, 2008). For example, if they think that under-representing their WTP might lead to lower prices in the future.

4.3   Examples of Stated Preference Studies applied to Farm Animal Welfare

A growing body of literature uses SP methods to analyze the demand for FAW. Several SP studies found evidence that consumers are willing to pay for products produced in alternative production systems. As well, these studies derived estimates of consumer and producer surplus following regulations prohibiting certain practices in conventional farming.   There are three types of SP methods: contingent valuation method (CV), conjoint analysis, and discrete choice experiments (CE).

In a CV study, consumers may have to state their WTP for a policy change scenario regarding FAW standards.[55] In a CV survey, respondents are first asked whether they would be willing to pay a specified sum for improvements in the welfare of different species. In the case of a positive answer, respondents are provided with higher bids until they state their maximum WTP. In the opposite case, consecutively lower bids are proposed until a willingness-to-pay is identified (McInerney, 2004). For example, work by Bennet and Larson (1996), Bennett (1997), Rolfe

---

[55] For instance, one can think of a policy which improves the welfare of pigs by increasing the size of the pens and adding straw and rooting material. As well, a policy that improves the welfare of laying hens may consist of increases in space allowances per laying hen in battery cages combined with environmental enrichment of the cage consisting of the use of nests and perches.

(1999), Bennett and Blaney (2003) used CV to derive WTP for policy change scenarios with respect to the welfare of laying hens. In a similar vein, Burgess et al. (2004) use CV to derive WTP for improvements in the welfare of different farm species (i.e., laying hens, chickens, dairy cows, and pigs). Furthermore, Holloway et al. (1999) used this method to derive the WTP for different systems of pig production in the UK that are regarded as a bundle of animal welfare attributes. For instance, consumers may value an increase in the size of pens in which pigs are finished but they may not value the addition of straw and rooting material due to potential food safety risks.[56]

While CV allows researchers to derive consumers' WTP for the policy scenario regarded as a bundle of attributes, it does not allow researchers to derive willingness-to-pay for parts of the policy scenario (McInerney, 2004). Contingent valuation is also limited because it only provides information on consumers' WTP for one good or one characteristic of a good. As one may infer, firms are often interested in eliciting consumers' WTP for one attribute relative to others (Norwood and Lusk, 2008). Furthermore, the WTP estimates obtained from CV studies are derived as absolute values for the policy change scenario and therefore comparisons between similar studies are not accurate (Liljenstolpe, 2008a). In order to overcome these drawbacks of CV, different approaches have been employed in the literature.

A second SP method is conjoint analysis. Conjoint analysis refers to a technique where consumers either rate, rank or choose between products that are described by several attributes. Researchers can include attributes like price, package size, ingredients, production method

---

[56] This may be due to the risk of infection with intestinal parasites trapped in the mix of straw, manure, and urine.

among others. The objective is to establish the important attributes in the first instance and the number of levels of each attribute that are to be varied across the survey in the second instance (Lusk and Norwood, 2008). A number of authors have employed conjoint analysis in the context of FAW issues pertaining to the pig production. Den Ouden et al. (1997) used a conjoint analysis in order to evaluate pig welfare perceptions among a small sample of consumers and pig welfare experts. The investigation included 12 attributes concerning the farrowing, fattening, slaughtering and transportation stages of production.[57]

Though FAW issues were not the main focus of the study, Grunert (1997) used conjoint analysis to examine the attitudes of consumers in four different European countries: France, Germany, Spain, and the UK toward different intrinsic and extrinsic quality attributes of beef steak. Information about animal production (i.e., this meat is from animals bred and fed with due consideration for animal welfare and without artificial hormones and additives) was included among other attributes.[58] Alternative profiles that had to be rated were presented to subjects on cards and included not only descriptors of the meat characteristics but also pictures of the cut of meat. Results indicate that fat content and the place of purchase were the two most important factors influencing perceptions of meat quality. Surprisingly, the information about the country of origin and breeding and farming/ production practices were not found to be significantly related to quality perceptions.

---

[57] The authors quantify these results into an economic pork chain simulation model to measure the effects of different measures aimed at improving societal concerns, such as animal welfare or environmental pollution (Den Ouden et el., 1997).

[58] Factors that were examined in this study include the meat cut (i.e., steak, roast, cubed, and minced), color (i.e., light red, medium red, etc.), fat lumps (i.e., major, minor), fat rim (i.e., yes, no), marbling (i.e., high or low), fat content (i.e., high or low), price (i.e., low, medium, high), origin (i.e., no information, Denmark, Ireland, Scotland), information about animal production (i.e., no information or information about the animal welfare and hormone use), and the purchase locale (i.e., a local butcher or supermarkets) (Grunert, 1997).

In a similar vein, Meuwissen et al. (2005) use conjoint analysis to study the trade-offs that consumers in the Netherlands make between multiple pork-production attributes and their relation to consumer concerns. Initially, they ask consumers to assess four categories of attributes grouped under animal welfare, food safety, environment, origin of pork and choice in store.[59] Then, the authors also add the price and taste attributes to the conjoint analysis, which increased the number of the attributes to be evaluated at 24. While for the first assessment the attributes dealing with animal welfare and food safety are on average perceived as the most important for pork production, surprisingly, they prove to be the least important in the second assessment. The attributes of taste and price prove to be the most important overall.

Whereas Meuwissen et al. (2005) reported on general concerns about pork production and the overall ranking of the 24 attributes, Meuwissen et al. (2007) focuses on the results of the detailed assessment of the attribute levels (i.e., 62 attributes levels) and market segmentation.[60] In this respect, they identified six segments of pork consumers classified as ecologist, tradition minded, animal friends, health concerned, economists, and undecided.

---

[59] For the category of animal welfare, attributes such as space, medicines, living area and inside/outside housing were perceived to be the most important by the Dutch consumers (Meuwissen et al., 2005).

[60] The Conjoint analysis technique employed in these two papers consisted of three parts. The Dutch respondents were first asked to give self-explicated desirability ratings for the 22 production attributes. The desirability of the levels was rated per attribute on a scale from 0 (least desirable level) to 10 (most desirable level). In case of an attribute with only two levels, respondents had to select the level they liked most. After the self-explicated desirability ratings were given, respondents were asked to give self-explicated importance ratings, i.e., to rate the importance of the difference between the most and the least desirable level for each of the subsequent production attributes on a scale from 0 (not important at all) to 100 (very important). The midpoint of this scale (50) was labelled 'reasonably important'. In the third part of the CCA analysis, respondents continued with graded paired comparisons in which they had to indicate their preference for one partial pork profile description over another one on a scale from 1 (strong preference for the one profile) to 9 (strong preference for the other profile). These partial profiles were described for seven attributes: the two product attributes, price and taste, four of the most important production attributes and one moderately important production attribute (Meuwissen et al., 2007).

While the first two types of conjoint analysis ask consumers either rate or rank products that are described by several attributes, in reality, they do not reproduce the real shopping environment in which consumers have to choose between products or do not choose any as they do not carry the desired attributes. These issues are addressed by the choice based conjoint method described below.

A third body of literature on consumer demand for FAW, uses conjoint based choice method or discrete experiments (CE/CEs) method. In a choice experiment, respondents are presented with hypothetical choices comprised of bundles of production attributes and asked to declare which option they would choose. McInerney (2004) asserts that in contrast to the previous contingent valuation studies that elicited consumer WTP for a FAW regulation by a simple binary (yes/no) multi-attribute scenario – i.e., would you pay "x" amount of money to see battery cages or gestation stalls banned – the CE aims to derive the value attached to a range of characteristics of a possible FAW scenario – i.e., consumer WTP for a FAW scenario in which hens that are free to roam in wide open concept barns equipped with nests and perches or sows are free to move in wide pens with straw bedding. With this methodology, quality parameters used to describe choices made by respondents can be varied with relative ease. Underlying this idea is the hypothesis that consumers derive utility from consumption of the attributes embodied in a good, rather than deriving utility from the good itself" (Lusk et al., 2003). CEs have been found to accurately predict the likely success of new products in the marketplace.

As well, Adamowicz et al. (1998a), examining passive use values for a wildlife improvement program, found that the CE had several advantages over typical CV methods. First, the CE is

appealing because it is based on random utility theory (Ben-Akiva and Lerman, 1985). Second, CEs are more general than typical CV methods because they allow for multi attribute valuation and permit the measurement of trade-offs among numerous attributes. A third major advantage of the CEs is that they closely mimic consumers' typical shopping experiences – choosing one product from several competing options and the use of no-choice option which enhances the realism of the experiment (Lusk and Hudson, 2004). Finally, CEs can be used to estimate cross-price elasticities between new and existing products, a more difficult job with other techniques such as contingent valuation (Lusk and Hudson, 2004). Even though CE has major advantages, one of the primary issues surrounding the credibility of this elicitation technique is that of incentive compatibility. An elicitation mechanism is considered incentive-compatible "if an individual's dominant strategy is to truthfully reveal their preference for the good in question. A closely related issue is that of hypothetical bias: that individuals respond differently when responding to hypothetical questions than when confronted with real payment" (Lusk and Hudson, 2004, p.155). Hanemann (1991) provides a thorough discussion of the theoretical underpinnings of consumer WTP and one might consider a consumer's utility maximization problem subject to a budget constraint, where the level of a good's quality is fixed exogenously. In this respect, CE does not address this issue but experimental auctions do instead.[61]

Experimental auctions, however, require that the product with the attributes in question be available so that participants can bid on the product and an exchange of money for goods occurs

---

[61] "Experimental auctions are becoming a popular method of nonmarket valuation because of evidence that consumers respond differently in hypothetical and real environments. Experimental auctions are generally conducted in one of two ways. First, consumers can be provided with an endowed good (typically a pre-existing substitute) and then are asked to bid to exchange their endowed good for a novel good. Secondly, consumers can bid directly on several competing goods and a random drawing can be used to determine which good is binding so that demand for a single unit can be elicited" (Lusk and Hudson, 2004, p.157-158).

usually in the end of the auction experiment. This was not feasible for the present analysis regarding WTP for specific AW attributes. A CE was deemed the appropriate methodology.

Work by Carlsson et al. (2005), Lagerkvist et al. (2006), Carlsson et al. (2007a, 2007b), Liljenstolpe (2008a, 2008b) uses choice experiments to assess FAW issues specific to livestock and poultry production in Sweden. Specific FAW topics covered in these studies include: mobile abattoirs vs. transportation to slaughter house in the case of cattle' slaughter, or immunocastration vs. surgical castration vs. no castration in case of pork production, battery cages in egg production, or a combination of these. These authors use a Random Parameters Logit model in deriving consumers' WTP for FAW attributes. Other authors such as Nilsson (2005), Tonsor et al. (2008c), and Liljenstolpe (2008b) reveal heterogeneity in consumers' preferences with respect to FAW issues in the US and Swedish pork sectors using a Latent Class Logit model. The pig welfare attributes covered in these studies include: mobile abattoirs vs. transportation to slaughter plant, castration of piglets with anaesthesia vs. castration without anaesthesia, housing system, feed, mixing of pigs, straw bedding, antibiotics, and sows being kept in gestation stalls vs. being kept in groups in a pen.

Chapter 2 explained that FAW is a credence attribute. Consumers cannot distinguish through search or consumption whether livestock and poultry products indeed carry the FAW attributes advertised by the seller. FAW labelling programs and on-farm FAW production standards developed, certified and enforced by different stakeholders in the livestock and poultry supply chain may be mechanisms that address these information asymmetries and enhance the provision of credible FAW quality assurances (see the discussion in Subsections 2.4 and 3.2). In this vein,

a body of work (i.e., Wessells et al., 1999; Walley et al., 1999; Kontoleon and Yabe, 2003; and Nilsson, 2005) uses CE to reveal consumer demand for labelling and certification of various credence attributes of foods such as sustainability, genetic modification, FAW, and the use of antibiotics.

For instance, Wessells et al. (1999) use a choice experiment survey to investigate the potential acceptance and preferences for certified and uncertified seafood by US respondents. They do not find any significant coefficients for the organizations that certify seafood products as sustainable relative to the no certification situation.[62] In a similar vein, Kontoleon and Yabe (2003), using a sample of 300 respondents in the UK, examine choices resulting from the use of chicken feed that contained various levels of genetically modified content. They also include other attributes in the CE such as the living conditions of hens (i.e., free range vs. cage) and certification of both health standards and of the quality of eggs (i.e., the 'Lion Quality' mark on egg shells and egg boxes included vs. not being included). As with the study by Wessells et al. (1999), they obtain a negative consumer valuation and an insignificant parameter for the certification attribute.

Walley et al. (1999) use choice rank based conjoint analysis to assess preferences for quality assured minced beef hamburger by U.K respondents.[63] In contrast to the studies by Wessells et al. (1999) and Kontoleon and Yabe (2003), the paper concludes that quality assurance schemes exert an influence on the UK consumer decision process for mince beef and, in addition, it provides an indication as to its relative importance. Finally, Nilsson (2005) characterizes the

---

[62] The levels of certifying agency alternated between third-party certification (i.e., World Wildlife Fund and Marine Stewardship Council), certification by a US government agency (i.e., the National Marine Fisheries Service) and no certification.

[63] 120 consumers were interviewed in a series of street interviews carried out in various locations (cities, towns and villages) in the West Midlands (Wessells et al., 1999).

demand and market potential for fresh pork with credence attributes, such as environment, animal welfare and antibiotic use, produced under a certification program in the US. He derives consumers' WTP for each credence attribute and finds that consumers place the most value on bundled certification (i.e., environment and animal welfare and no antibiotic use). In addition, "no antibiotic use" was the most highly valued among the three individual assurances.

In conclusion, discrete choice experiments were deemed an appropriate stated preference technique for this study, with distinct advantages over contingent valuation and conjoint analysis asking consumers either to rate or to rank products. The SP analyses summarized in this section revealed a number of pig welfare attributes that seem to be valued by consumers. These studies provided mixed evidence regarding the impact of labelling and certification on the WTP for credence attributes. Most of these studies were conducted in Europe or in the US. It is therefore timely to assess Canadian consumer preferences for FAW. The next section describes the choice experiment design used in the present study.

4.4 Survey Design

An on-line Internet survey format was chosen to collect SP data and data on consumer characteristics using the "Tailored Design Method" detailed by Dillman (2000). This was aimed at maximizing response rate, minimizing item non-response rate and enhancing sample representativeness.[64] According to the Canadian Internet Use Survey conducted by Statistics Canada in 2007, almost three-quarters (73%), or 19.2 million Canadians aged 16 and older, went

---

[64] In order to maximize consumers' confidence in the survey, a consent form was included as the first page of the survey. Here, respondents were informed about: the purpose of the survey, their rights, and the fact that the survey complied with University of Saskatchewan procedures regarding to protection of their personal information (see Appendix 6 on page 226).

online for personal reasons in 2007 (Statistics Canada, 2008). Similar ranks of other online activities by home Internet users in Canada reveal that Internet use is widespread in Canada. In addition, it has been found that electronic survey responses are faster than postal surveys without a significant impact on the survey's response rate (Sheehan and Hoy, 1999; Sheehan and McMillan, 1999; Yun and Trumbo, 2000, cited in Andrews et al., 2003).

Clearly, this format has some limitations. For instance, Kehoe and Pitkow (1996) assert that respondents who participate in electronic surveys may be more experienced, more intense Internet users and have stronger Internet skills than those who do not participate (Kehoe and Pitkow, 1996, cited in Andrews et al., 2003). As well, the respondents may be predominantly male, younger, and from households with fairly high incomes (Sheehan & Hoy, 1999; Sohn, 2001, cited in Andrews et al., 2003). In general, one might expect respondents from internet based surveys to have higher education levels on average. These limitations notwithstanding, an internet-based survey was deemed the most effective method of data collection for the purposes of this study.

The survey consisted of four sections (see Appendix 6). First, characteristics about participants, their shopping habits, and how various factors affected their view of AW were examined using five point Likert and discrete visual analog scales.[65] For instance, this section included questions that were aimed at assessing consumers' perceptions of the current status of FAW in Canada, understanding consumer valuation of pork with FAW attributes, and identifying the appropriate

---

[65] Likert scales use a five or seven point scale with categories such as strongly disagree, disagree, ... etc. whereas discrete visual analogue scale is the correct term for "likert type" scales that seek to measure the strength of a respondents opinion: e.g., unimportant, slightly important, moderately important, etc.

role for public sector regulation or private sector enforcement of FAW standards. Another set of questions aimed at identifying specific forms of consumer activism and identifying the extent to which consumers are informed about FAW issues. Second, a choice experiment asked participants to choose between pork chops described by different attributes (i.e., FAW attributes, organization verifying and price). Participants repeated this purchase simulation eight times. The choice experiment is explained in the next section. This part of the survey aimed to assess the utility obtained by respondents from each attribute and provided data for an examination of WTP for animal welfare issues. Third, several questions assessed both the components of trust and trust in the verification organizations from the choice experiment. Fourth, socio-demographic questions were included. These data are used in positioning the sample within the Canadian population. The survey instrument and recruitment protocols received approval from the University of Saskatchewan Behavioural Research Ethics Board on May 20, 2008 and the University of Alberta Faculty of Agricultural, Life and Environmental Sciences Human Ethics Research Board on May 7, 2008.

Early paper versions of the survey were pre-tested in person on a group of 15 pork consumers in Saskatoon. Then, an improved paper version of the survey was administered to 22 randomly selected shoppers at the Lawson Heights Mall in Saskatoon at the end of May 2008. Lastly, minor modifications were made before the survey was transposed on-line and pre-tested on 15 randomly selected students at the University of Saskatchewan. The purpose of these steps was to ensure that the respondents easily understood the survey. Following the conceptual analysis in Chapter 3 that models two groups of consumers with different preferences for FAW (group A and group B), two samples of pork consumers were targeted, namely: a general population (GP)

106

sample across Canada and a sample of animal rights organizations (AROs) members who were expected to have stronger preferences for animal welfare.[66] This approach has been previously employed by Belcher et al. (2007) who examined consumer preferences for beef with environmental and food quality attributes by surveying two samples of consumers – i.e., a sample of members of an environmental group and a general population sample of consumers in Saskatchewan.

The Test Scoring and Questionnaire Services Department at the University of Alberta administered the survey through the Internet over a three-week period in July 2008. The sample of respondents who were members of AROs was recruited though messages posted on the main web pages of the organizations or distributed through electronic newsletters by AROs over a period of four weeks in July and August 2008.[67] Respondents in both samples were asked to participate in the survey only if they ate and bought pre-packaged boneless pork chops for themselves or anyone in their household. After they completed the survey, the respondents were informed that researchers will make a $4 donation on their behalf to Food Bank in Edmonton or Saskatoon. Descriptive statistics of the two samples are described in Chapter 5, the results chapter.

---

[66] Members from the following AROs were recruited for the ARO sample: the British Columbia Society for the Protection of Cruelty to Animals, the Winnipeg Humane Society, and the Canadian Coalition for Farm Animals.

[67] An example of the recruitment message for respondents from the AROs is provided in Appendix 7.

4.5 Choice Experiment Attribute Selection

In a choice experiment, respondents have to choose one alternative from a choice set, where each alternative is described by a number of attributes. In our particular case, respondents had to imagine a shopping experience at the grocery store where they were purchasing pre-packaged boneless pork chops. Then, they were provided with descriptions of different attributes that characterize pork chops, namely: FAW attributes, verifying organizations, and price. The attributes and levels are detailed in Table 4.1.

Table 4.1 Choice experiment attributes and their levels

Attribute	Levels
Pigs' Housing System	• Conventional Housing System • Hoop Housing System • Outdoor System
Gestation Stalls	• Gestation stalls are used • Group pens are used
Antibiotics	• Raised With the Use of Antibiotics • Raised Without the Use of Antibiotics
Organization Verifying	• Farmer • Processor • Supermarket; • Government • Independent Third-Party • None
Price	• $ 5.02/ lb or $ 11.07/ kg • $ 5.99/ lb or $ 13.21/ kg • $ 7.29/ lb or $ 16.08/ kg • $ 8.74/ lb or $ 19.26/ kg

The FAW attributes (i.e., housing system, gestation stalls, antibiotics) were selected following a review of consumer studies in the area of pig welfare, in-depth discussions with animal welfare scientists with expertise in hog production systems at the University of Saskatchewan, and a

review of recent media reports and announcements by Canadian food companies pertaining to animal welfare issues and proposed private animal welfare standards.[68]

Section 4.3 provided a summary of previous literature that had used SP approaches to examine consumer preferences for pig welfare. McInerney (2004) asserts that a challenge in applying SP method to an examination of FAW issues is the limited knowledge that most consumers have about farming methods. He argues that it is crucial in these circumstances that respondents to CV or CE surveys have an accurate view of the alternatives they are being asked to value or choose between. Yet they cannot be given an animal husbandry tutorial prior to delivering their responses, so there will be inconsistency of understanding between respondents and probably misperception (McInerney, 2004).[69] Therefore, respondents were provided with a few lines of explanatory text which described the physical environment experienced by pigs in each production system with both the advantages and the disadvantages in terms of the effects on the health of the pigs. Accompanying each description of the FAW attributes was a relevant picture.[70] Descriptions of the three FAW attributes – i.e., housing system (i.e., conventional vs.

---

[68] In general, these announcements contained proposals to require suppliers to phase-out the use of gestation stalls. For instance, in January 2007 Smithfield announced that they were going to eliminate gestation stalls within a ten year timeframe. A similar announcement was made by Maple Leaf Food shortly after that. In February 2008, Safeway "started an initiative to increase the amount of pork from North American Suppliers that are phasing out gestation stalls." As well, McDonalds is "currently working with its suppliers and experts in the area of alternatives to gestation stalls for sows" (HSUS, 2007, 2008; McDonald's Corporation, 2008).

[69] "It would be inaccurate to ask what people would pay for free range welfare standards or to see cage egg systems banned, for example, if the choices are presented as single issue welfare changes (relating to space and behavioural freedom, for example, without also presenting the disease, nutrition, social interaction, other environmental characteristics etc of the two systems)" (McInerney, 2004, p.41).

[70] Mennecke et al. (2007) and Darby et al. (2006) included in their choice sets pictures with beef steaks and strawberries, respectively. In a similar fashion, Holloway et al. (1999) uses sets of photographs to depict four different systems of pig production. In this particular case, each set of photographs showed dry sows, the place of birth for the sow and her litter, the penning system for weaned pigs and that for growing pigs.

hoop vs. outdoor), gestation stalls (vs. group pens), use of antibiotics – are provided in Appendix 6, in the section with the Purchase Simulation (after question 7).

The six levels for the "Verifying Organization" attribute encompass both public sector (government), private sector (farmers, processors, supermarkets) and third-party sources. A review of the FAW verification programs in Canada was provided in Chapter 2 and was the basis on which these attributes were chosen.

Levels for the price attribute were chosen based on an assessment of comparative market prices and interviews with industry representatives. For example, data on the average price of conventional boneless pork chops in different grocery stores in Saskatoon was gathered and represents the base price level. A representative price for pork chops with additional animal welfare attributes was based on the price of "antibiotics free" pork chops produced by the Quebec-based company Aliments Breton Foods. The highest price level was calculated as the average price for "naturally raised" boneless pork chops sold in Whole Foods' grocery stores in Vancouver and Toronto in 2008.

After reading the description of the attributes, respondents were presented with eight choice sets, each containing four profiles (i.e., alternatives) of which they had to choose one. Figure 4.1 provides an example of a choice set.

Figure 4.1: Example of a choice set

If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:
Pigs' Housing System   *Gestation stalls*   *Antibiotics*   *Organization verifying*   *Price*

Features	A	B	C	D
Pigs' Housing System	Outdoor	Hoop	Conventional	I would not buy any of these products.
Gestation Stalls	Group pens	Gestation stalls	Gestation stalls	
Antibiotics	Not used	Not used	Used	
Organization verifying	Third-Party verified	Government verified	None	
Price	$ 19.26/ kg (or $ 8.74/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	
I would choose…	☐	✔	☐	☐

The first three alternatives of each choice set represented pre-packaged boneless pork chops characterized by different levels of FAW, verifying organization, and price. The fourth alternative was defined as "I would not purchase any of these products". Adamowicz et al. (1998b) make the point that "one should design stated choice experiments to allow one to observe and model non-choice because it is such an element of market behavior" (Adamowicz et al., 1998b, p.23). In a similar vein, Dhar (1997) and Kontoleon and Yabe (2003) provide a comprehensive discussion on the inclusion and format of an opt-out option in the hypothetical choice sets presented to respondents.[71]

---

[71] Kontoleon and Yabe (2003, p.2) assert that "in cases where the analyst is examining demand behavior (such us recreational site choice, market purchases of alternative product brands etc.) the inclusion of some 'opt-out' option in the choice set is necessary if the estimated welfare estimates are to be consistent with demand theory".

The CE method tries to find the values attached to the pork chop attributes. In this way it can be determined how the WTP is derived from different components of perceived value and the trade-offs respondents are willing to make between the pork chops attributes. Inclusion of the price attribute in the CE implies that respondents have to make trade-offs between attributes with monetary value. However, effects estimated from a CE depend on the levels of attributes and different sets/ranges of levels may yield different results (see Louviere and Islam, 2004; Ohler et al., 2000). So strictly speaking, conclusions about attribute effects should be qualified to be "relative" not absolute, with stronger conclusions reserved for results that generalise across different levels and sets of attributes (Lancsar et al., 2007).

In a choice experiment, as the number of attributes as well as their levels increase, the complexity of the experimental design also increases. Louviere et al. (2000) consider that there are two problems associated with choice experiments, namely: (1) the size of the experimental design and (2) proper identification of relevant effects. For example, there are the simple, linear effects called the main effects. The main effects are typically the most important and enter regression equation as variables in themselves (Hudson, 2007).[72] The most straightforward experimental design is called the full factorial design, which incorporates every possible combination of the attributes (and different levels) in the choice sets. Thus, in this experiment the full factorial design contains 288 possible combinations (i.e., profiles) of FAW attributes, organization verifying and price in this study (3 x 2 x 2 x 6 x 4). The advantage of the full

---

[72] There are also other several types of relevant effects that can be estimated. For example, one may be interested in two-way interaction effects, which represent combinations of pairs of the main effects. In addition, there may be higher-order interaction effects, which are combinations of three or more of the independent variables (Hudson, 2007, p.211).

factorial design is that it can efficiently estimate main effects.[73] Given that it would be

impossible task for a respondent to assess so many profiles, there are methods to reduce the

number of profiles presented to each respondent while retaining the integrity of the choice set.

Fractional designs offer a way out of the large full factorial designs by taking advantage of the

ability to pull subsamples from factorial design. Such fractional factorial designs are less

powerful in identifying interaction effects, depending on the fractional factorial design chosen.

There are methods in statistical packages such as Statistical Analysis Software (SAS) that can be

used to establish a fractional factorial design with maximum design efficiency. In this

experiment, the Optex procedure in the SAS software and a linear D-optimal design procedure

were used to generate 32 orthogonal combinations.[74] These combinations were then assigned to

four blocks in four different versions of the survey such that the attributes and block were

uncorrelated.[75] Thus, each respondent had only to evaluate eight choice sets. This is done to

reduce choice set fatigue and make the choice experiment tractable to respondents.

To obtain profiles that are realistic, the choice profiles containing no "enhanced" FAW attributes

were never bundled with a certifying organization since there would be nothing to certify.

Carlsson et al. (2003) and Carlsson and Martinsson (2003) previously employed SAS macros to

design CEs in the environmental economics and health economics fields. As well, Hudson and

---

[73] "Efficiency refers to the econometric properties of the estimates. An efficient estimate is the one in which standard error of the parameter estimate is minimum" (Hudson, 2007, p.211).

[74] The choice experiment used a D-optimal design obtained using the Macro codes in SAS designed by Kuhfeld (2005) and Kuhfeld and Tobias (2005).

[75] Huber and Zwerina (1996) identify four principles for efficient choice designs: orthogonality, level balance, minimal overlap, and utility balance. A design satisfying these principles has a minimal D-error (the inverse of D-efficiency), i.e., it minimizes the determinant of the information matrix, where the D-error is $|\Sigma^{1/k}|$, with Σ = the covariance matrix of the maximum likelihood estimator, K= the number of parameters.

Lusk (2004) employed this macro to design a CE while studying the role played by risk and transaction costs in contracting decisions taken by agricultural producers in the US. In a similar fashion, Loureiro and Umberger (2007) and Liljenstolpe (2008a) used this technique to design CEs that involved food choices.

The data from the survey were analyzed using a number of regression analysis techniques, including: Multinomial Logit (MNL) model, Random Parameters Logit (RPL) model, Latent Class Logit (LCL) model and Ordered Probit model. The following section describes these estimation methods. Results are presented in Chapter 5.

4.6 Econometric Estimation Methods

The underlying theoretical basis for the estimation methods used in this study is the Random Utility Maximization (RUM) theory in which a decision maker is assumed to select an alternative consumption bundle among a set of mutually exclusive alternatives (Hensher et al., 2005). RUM theory is grounded in Lancaster's theory of heterogeneous preferences and product characteristics as arguments in the consumer's utility function (McFadden, 1974, cited in Nilsson, 2005). The indirect utility function U_{ni} is the utility that a sampled individual n (n = 1, ..., N) who faces a choice among I alternatives in each of the T choice situations gets and can be expressed as follows (Louviere et al., 2000):

$$U_{nit} = V(x_{nit}) + \varepsilon_{nit} \qquad\qquad (4.2)$$

The utility function is assumed to consist of two components: a systematic component V_{nit} and a random component ε_{nit}. As well, x_{nit} represents a full vector of explanatory variables that are

observed by the analyst.[76] In turn, the systematic component of the utility function is:

$$U_{nit} = \alpha_{nit} + \delta_n' P_{nit} + \beta_n' x_{nit} \qquad (4.3)$$

where α_{nit} represents individual n's preference for alternative I, P_{nit} is price and x_{it} is a 9 by 1 vector of pork attributes and verifying organizations. For example, x_{it} is composed of Outdoor Housing$_{it}$, Hoop Housing$_{it}$, Sows in Groups$_{it}$, Antibiotics Free$_{it}$, Farmer Verification$_{it}$, Processor Verification$_{it}$, Supermarket Verification$_{it}$, Government Verification$_{it}$, Third-Party Verification$_{it}$. α_{it}, δ_n, and β_n are parameter vectors to be estimated. The individual n always chooses the alternative that yields the highest utility from a choice set J = 1, …, j. This can be represented as in Louviere et al. (2000) as:

$$U_{in} > U_{jn} \quad (4.4) \text{ for all } j \neq i \text{, in the case that alternative } i \text{ is chosen.}$$

Substituting (4.3) into (4.4) leads to: $(V_{in} + \varepsilon_{in}) > (V_{jn} + \varepsilon_{jn})$ (4.5).

The probability P_{in} that an individual n chooses alternative i is:

$$P_{in} = \mathrm{Pr}ob(U_{in} > U_{jn}) = \mathrm{Pr}ob(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}) = \mathrm{Pr}ob(\varepsilon_{jn} - \varepsilon_{in} < V_{in} - V_j) \text{ for all } j \neq i \quad (4.6).$$

In other words, (4.6) is a RUM where the probability of individual n choosing alternative i 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 i and j. We do not know the actual distribution of $\varepsilon_{jn} - \varepsilon_{in}$ across the population, but assume that it is related to the choice probability. This probability can be solved by assuming a distributional form for the random components of the utility function, $(\varepsilon_{jq} - \varepsilon_{iq})$. Parameter estimation was carried out using the

---

[76] For instance, this vector may include the levels of the attributes from the choice experiment, socio-demographic characteristics of the individual, descriptors of the decision context, and the choice itself in situation t. The components β_n and ε_{nit} are not observed by the analyst and are treated as stochastic (Hensher et al., 2005).

econometric models described in the next section. The most common model used within the RUM framework is the Multinomial Logit (MNL) model (McFadden, 1974).

4.6.1 Multinomial Logit Model

The MNL model is considered as the starting point in the estimation of discrete choice econometric models (Train, 2003; Hensher et al., 2005).[77] It is well known for its simplicity in estimation – the solution set of estimated parameters is unique, that is, only one set of globally optimal parameters exists (Louviere et al., 2000). The cumulative distribution implies that the MNL choice probability can be written as:

$$P_{ni} = \frac{\exp(v_{ni}(x_i;\beta))}{\sum_{j=1}^{J} \exp(v_{nj}(x_j;\beta))} \qquad (4.7)$$

where all variables are as before and P_{in} is the probability of individual n choosing alternative i. This formulation is based on two major assumptions, namely: *Identically Independently Distributed errors* (IID) and *Independence from Irrelevant Alternatives* (IIA). The first assumption implies that the error term is independently and identically distributed (IID) and type I extreme value (Train, 2003). In practice, this implies that all individuals in a population have the same taste and we estimate beta as fixed across individuals. The second assumption states that "the ratio of probabilities of choosing one alternative over another (given that both alternatives have a non-zero probability of choice) is unaffected by the presence or absence of any additional alternatives in the choice set" (Louviere et al., 2000, p.44). The specification implies also that purchase probabilities are the same for all individuals in the population because the utility parameters are invariant across the population. However, work by Nilsson (2005),

---

[77] "Discrete Choice" means "the selection of one alternative among a set of mutually exclusive alternatives" (Hensher et al. 2005).

Liljenstolpe (2008a, 2008b), and Tonsor et al. (2008c) among others suggests that consumers are heterogeneous in their preferences, so making use of models that allow for and evaluate preference heterogeneity is appropriate. MNL estimation results are presented in Chapter 5. The analysis further examines preference heterogeneity by applying two alternative models, namely: the Random Parameters Logit (RPL) and Latent Class Logit (LCL) models.

4.6.2 Random Parameters Logit Model

A RPL model may be more appropriate because it allows for correlation between choices and individuals (Nilsson, 2005). More specifically, the parameters in the CE are assumed to be individual specific and taste is assumed to vary randomly across the population according to a continuous distributional function rather than being fixed as it is in the MNL framework. Thus, researchers can identify how preferences for various attributes might vary in a population (Lusk and Hudson, 2004). Since the RPL model allows coefficients to vary randomly and does not exhibit the restrictive "IIA" property, it is considered an improvement over the MNL model.[78] Thus, the IID property of the MNL model has to be relaxed (for a derivation of the model see Ben-Akiva and Lerman, 1984; Revelt and Train, 1998; Hensher and Green, 2003; Hensher et al., 2005). According to Hensher and Green (2003), one way to do this is to partition the stochastic component of the indirect utility function U_{in} (see expression 4.2), which becomes:

$$U_{in} = \beta_n' x_{nit} + \left[\eta_{in} + \varepsilon_{in}\right] \qquad (4.8)$$

where η_{in} is a random term with zero mean whose distribution over individuals and alternatives depends on underlying parameters and observed data related to alternative i and individual n. ε_{nit}

---

[78] West et al. (2002), Liljenstolpe (2008a), and Tonsor et al. (2008c) are authors that employed the RPL model in analyzing data from choice experiment surveys that elicited consumer preference for livestock products with FAW attributes and revealed the RPL model superiority over the MNL model.

is a random term with zero mean that is IID over alternatives and does not depend on underlying parameters or data (Hensher and Green, 2003, p.135).

The RPL model assumes a general distribution for η_{in} and an IID extreme value type 1 distribution for the error term.[79] That is, η_{in} can take on a number of distributional forms such as normal, lognormal, and triangular (Hensher and Green, 2003; Hensher et al., 2005). For any given value of η_{in}, the conditional probability for choice i is logit since the remaining error term is IID extreme value: $L_{ni}(\beta_n / \eta_{ni}) = \dfrac{\exp(\beta_n' x_{ni} + \eta_{ni})}{\displaystyle\sum_{j=1}^{I} \exp(\beta_n' x_{nj} + \eta_{nj})}$ (4.9)

Since the η_{in} is not given, the unconditional choice probability P_{ni} would be the logit formula integrated over all values of η_{in} weighted by the density of η_{in}:

$$P_{ni} = \int_{\beta} L_{ni}(\beta_n) f(\beta) d\beta \ (4.10)$$

Thus, the probability P_{ni} is labelled as unconditional choice as it is still conditional on observable characteristics of pork chops and demographic information of the sample captured in β_n', but it is not conditional on the unobservable η_{in} (Greene et al., 2006). Hensher et al. (2005) assert that the concept of "conditional choice" tells us that a specific choice is conditional on something else. For instance, the choice of a dish for a dinner (i.e., marinated pork chops without antibiotics) is conditional on a prior choice to eat or not to eat. It may also be conditional on the

---

[79] "Extreme value type 1 (EV1) is a commonly used distribution in discrete choice analysis. The phrase "extreme value" arises relative to the normal distribution. The essential difference between the EV1 and the normal distributions is in the tails of the distribution where the extreme values reside. With a small choice set such as two alternatives this may make little difference because the resulting differences in the choice probabilities between the normal and EV1 is usually negligible. When there are more than two alternatives, however, there can be a number of very small choice probabilities. As a result, differences between distributions can be quite noticeable" (see Hensher et al. 2005 citing Jones and Hensher, 2004, p.1016).

prior choice to eat away from home versus eat at home (conditional on the decision to eat). An unconditional choice is one that is not conditioned on any prior choice. It is only when we have taken into account all of these prior (or in some cases joint) conditions that we can refer to individual (unconditional) demand (Hensher et al., 2005, p.70).

Unlike the simple MNL model that has a closed form solution and guarantees a unique globally optimal set of parameters estimates, the RPL model can produce a wide range of solutions, only one of which is globally optimum (Jones and Hensher, 2004, p.1017).[80] As shown in Hensher and Green (2003) and Hensher et al. (2005), the concern that one may not know the location of each individual's preferences on the distribution can be accommodated by retrieving estimates of individual-specific preferences by deriving the individual's conditional distribution based (within sample) on their choices (prior knowledge). This is made using Bayes' rule, a procedure which is described in detail by Hensher and Green (2003) and Train (2003). As well, the choice probability from equation (4.10) cannot be calculated exactly because the integral does not have a closed form and instead is approximated through simulation (Hensher and Green, 2003). RPL estimation results are presented in Chapter 5.

Although the RPL model has a major strength over the MNL since it includes the source of preference heterogeneity in its procedure, it imposes some constraints on the number of parameters that may be estimated in regressions and thus cannot explain very well all the reasons that individual parameters vary. Work by Lusk and Hudson (2004), Nilsson et al. (2006) and

---

[80] "The mixed logit model has a likelihood surface that is capable of producing local optima in contrast to a single unique global optimum from the MNL model. Using the MNL parameter estimates as starting values produces a global solution since it begins the gradient search at a location of the nonlinear surface that tends to be the best starting location for determining the global optimum" (Jones and Hensher, 2004, p.1017).

Tonsor et al. (2008c) showed that incorporating socio-demographic characteristics and attitudinal information failed to improve the statistical performance of the RPL model. As a consequence, the RPL estimates contain unexplained heterogeneity. In other words, when reported as a mean for the population, the estimates may hide important variations in preference across the population. In this respect, the Latent Class Logit (LCL) model is an alternative to the RPL model as it incorporates unobserved preference heterogeneity into the estimation procedure.

4.6.3 Latent Class Logit Model

In the LCL model, the population is divided into F different classes (F=1,...,f), which leads to individual class specific β_f. Unlike the RPL model, where parameters follow a continuous joint distribution $f(\beta)$, the LCL model is approximated by a discrete distribution (see Boxall and Adamowicz, 2002; Greene and Hensher, 2003). The indirect utility function of an individual n belonging to class f and choosing alternative i is defined as:

$$U_{nif} = \alpha_{nif} + \delta'_f P_{ni} + \beta'_f x_{nit} + \varepsilon_{nif} \qquad (4.11)$$

The LCL model constitutes a generalization of the MNL model in the sense that homogeneity within groups and heterogeneity between groups is assumed. The behavioural model used in the LCL model is the ordinary MNL model, thus the error terms are assumed to be IID (Liljenstolpe, 2008b). The choice probability of an individual n choosing alternative i conditional on membership in class f is:

$$P_{ni/f} = \sum_{f=1}^{F} s_f \frac{\exp(v_{n,i,f})}{\sum_{j=1}^{C} \exp(v_{n,j,f})} \text{ where } s_f \text{ is the class probability, } 0<s<1, \text{ so that } s'1 = \sum_{m=1}^{M} s_m = 1 \quad (4.12)$$

Boxall and Adamowicz (2002), Greene and Hensher (2003), and Hu et al. (2005) provide a detailed discussion of the procedure employed in selecting the number of classes f. Boxall and

Adamowicz (2002) state that the membership function determining the structure of the latent is not a behavioural relation, but a statistical classification process. The LCL model can be viewed as a semi-parametric variant of the RPL model in the sense that it approximates a discrete underlying distribution and thus no continuous distributional assumptions of the error terms have to be made. This may be viewed as a major advantage of the LCL model relative to the RPL model (Liljenstolpe, 2008b). As well, another implication of the LCL model is that it identifies groups of people with similar preferences. In other words, this is one empirical way of identifying the degree of heterogeneity among consumers in a given sample with respect to specific attribute coefficients. LCL estimation results are presented in Chapter 5.

4.7 Estimation of Willingness-to-Pay

Nowadays, agribusinesses have a wide range of opportunities to market value added features of the agri-food products so that they can reduce consumer price sensitivity and increase brand loyalty. In order to determine the feasibility of marketing products with such features, agribusiness entrepreneurs need two important types of information, namely: production costs and consumer demand for products with value added attributes. While the cost of producing such products is relatively simple to calculate, by contrast, estimating consumer demand is often more difficult as there is no other benchmark on the market. To estimate consumer demand, or willingness-to-pay (WTP), for these new products, market researchers have used stated preference methods, contingent valuation and choice experiments (see Section 4.2). However, for the purposes of this study, the CE method was considered superior since it allows the estimation of the trade-offs that consumers make between attributes – i.e., FAW and certification attributes in this study.

While an initial set of WTP estimates can be calculated based on the ratio $-\beta_m/\beta_p$, where m = 1,..,9 are conditional mean utilities of the population for FAW attributes, verifying organization and price attributes from the MNL model, in a similar fashion, individual and class conditional specific WTP estimates can be derived from the utilities estimated by the RPL model (Hanemann, 1984). In a RPL model, 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 for each individual (Hensher et al., 2005). Revelt and Train (2000) and Train (2003) show that one can construct estimates of 'individual-specific preferences' by deriving the conditional distribution based (within-sample) on known choices (i.e., prior knowledge) (cited in Greene et al., 2006, p.80). Thus, researchers are not able to derive a unique set of estimates for each individual, but rather "they are able to identify a mean (and standard deviation) estimate for the sub-population who makes the same choice" (Greene et al., 2006, p.80). Unlike the traditional environmental valuation studies, for agri-food firms, knowledge of the distribution of WTP is more relevant. Let's consider a case when the mean WTP for value added agri-food products is small, but there is a small segment of consumers that have very high WTP. For agri-food firms, a:

"very profitable niche market may exist where this product can be highly priced. Regardless of whether a niche market exists, the profit-maximizing price level may be very different from mean WTP—and the knowledge of mean WTP alone does little to indicate what the profit-maximizing level might be" (Hudson and Lusk, 2004, p.163).[81]

---

[81] "Although the distribution of WTP is important for agribusinesses, in traditional environmental valuation studies, the focus is on estimating mean WTP and aggregate welfare changes. In environmental applications, mean WTP may be the only statistic needed to carry out cost-benefit analysis. For example, estimated mean WTP can simply be multiplied by the number of individuals affected to derive an approximate value of a particular policy, which can then be compared with aggregate costs" (Lusk and Hudson, 2004, p.163).

In order to circumvent this problem, researchers have to take numerous draws of WTP estimates – i.e., they have to be simulated – which are in fact the unconditional mean estimates for the population and have the feature of accommodating the entire distribution of WTP (see the procedure outlined by Hensher et al., 2005, p.621 and 686). The underlying idea behind this derivation is the concept of population moments. Accordingly, each sampled individual is randomly assigned along a continuous distribution, since there is no information imported that might assist in a more accurate allocation along the distribution (Hensher et al., 2005, p.621). However, the WTP calculated from the unconditional mean estimates for the population are more reliable in calculating confidence intervals.[82] The standard errors of the WTP values can be derived using the delta method (Greene, 2003, p.674; Nilsson, 2005).

Another important issue for agri-food firms is identification of heterogeneity in consumer segments. Although environmental applications are primarily interested in aggregate welfare changes, agribusinesses might serve specialized niche markets where consumers' preferences are quite different from aggregate markets (Lusk and Hudson, 2004). Thus, the WTP estimates derived from MNL and RPL models are more suited for agri-food markets where consumers' preferences are homogeneous and, by contrast, with the WTP estimates derived from a LCL model, discrete market segments can be identified. Each market segment is composed of different preference estimates for the attributes incorporated into the CE. For example, one segment might be extremely price sensitive, while another is less price sensitive. Agri-food firms can make appropriate pricing decisions depending upon the sizes of the segments (Lusk and

---

[82] As the conditional WTP 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.

Hudson, 2004). The WTP estimates derived from the MNL, RPL and LCL models are presented in Chapter 5.

4.8 Econometric Models to Evaluate Trust

The dimensions of trust employed in section 3 of the survey were identified by Frewer et al. (2005), Lang and Hallman (2005), Huffman et al. (2004).[83] Specifically, it is hypothesized that consumers' confidence in stakeholders (i.e., farmer, government, and supermarkets) depends upon the extent to which they trust different organizations for *accurate information*, think that these organizations are *knowledgeable*, think that these organizations are *transparent* (open) *and accountable*, and think that these organizations *act according to consumers' best interests* when providing information about the welfare of pigs. An ordered probit model is used to analyze respondents' assessment of the verifying organizations on these four dimensions of trust.[84,85] The ordered probit involves a qualitative dependent variable for which the categories have a natural order or ranking that reflects the magnitude of some underlying continuous variable (Nayga et

---

[83] Frewer et al. (2005) elicit the perceptions of a sample of Dutch consumers on animal husbandry practices for farmed pigs and farmed fish. As well, Lang and Hallman (2005) examined who the US public trusts in institutions involved in the genetically modified products supply chain. Respondents had to rate 10 institutions on a 5 point scale on dimensions of trust such as competence, transparency, public interest and honesty. Huffman et al. (2004) elicit the perception of US consumers on the trustworthiness of various institutions with respect to the provision of information on genetically modified foods. The authors formulate and empirically test various hypotheses about the role that measurable attributes of the consumer (i.e., household income, personal and social capital, prior beliefs) play in the formation of trust in information sources.

[84] The following stakeholders were assessed by respondents: Farmer (e.g., an individual farm), A Farmers' Association (e.g, Canadian Pork Council), Food Processor (e.g., a well-known meat processor), Supermarkets (e.g., a well-known grocery store), Government (e.g., a federal food agency), Independent Third-Party (e.g., a certifying company or a non-profit organization), Media (e.g., newspapers, television, or radio), Animal Rights Organizations, Scientific Experts in Animal Welfare.

[85] This method has a widespread use in disciplines such as consumer economics and behavioural economics where it is used to reveal the factors affecting trust between people or in institutions. Cook et al (2002) and Nayga et al. (2004) use this technique to examine attitudes and intentions toward genetically modified food or irradiated food products in New Zealand and the United States. In a similar vein, Innes (2008) used this technique in Canadian context to examine which are the most important components of trust in Canadian stakeholders – i.e., government, producers, downstream firms and third parties – for accurate information about farming methods.

al., 2004, p.179). In our particular case, respondents made four assessments of various organizations on a five point scale to indicate the level of trust.[86] More details on these constructs can be found in questions 16 to 19 in Appendix 6. Thus, the data can be represented as ordered (not at all = 0, very little = 1, somewhat = 2, very much = 3, completely = 4) and modelled according to the following choice specification (see Maddala, 1983; Greene, 2007; Nayga et al., 2004 for more details):

$$y_i^* = \beta' X_i + \varepsilon_i, \varepsilon_i \sim N[0,1] \qquad (4.13)$$

$y_i \quad = 0$ if $y_i \leq \mu_0$ (not at all)

$\quad = 1$ if $\mu_0 \leq y_i \leq \mu_1$ (very little)

$\quad = 2$ if $\mu_1 \leq y_i \leq \mu_2$ (somewhat)

$\quad = 3$ if $\mu_2 \leq y_i \leq \mu_3$ (very much)

$\quad = 4$ if $\mu_3 \leq y_i \leq \mu_4$ (completely)

where y_i^* = an unobserved variable measuring the amount of trust individual i has in a particular stakeholder for accurate information about the welfare of pigs; X_i = a vector of independent variables describing an individual's predilection to think of these organizations in terms of the other three dimensions of trust mentioned at the beginning of this section; β' = a vector of parameters to be estimated and ε_i = a random error term (assumed to follow a standard normal distribution). The observed counterpart to y_i^* is y_i. The μ_i are unknown threshold parameters for the levels of trust that are estimated along with the other parameters, $\beta's$, in the model. They are obtained based on the probabilities of observing a level of trust in each stakeholder given the

---

[86] For example: An on-going debate revolves around the implications of different farming methods for the welfare of farm animals. To what extent do you trust the following types of organizations for accurate information about the welfare of pigs? Please indicate this on the scale provided. If you don't know or are not sure, please select the "don't know/not sure" option. Possible answers were: not at all, very little, somewhat, very much, completely, and don't know/not sure (Question 16 in Appendix 6).

other three dimensions of trust which are further entered into the log likelihood function as follows:

Prob[y_i=j] = Prob [y_i*is in the jth range]   (4.14)

The marginal effects of the three independent variables on the probabilities are not identical to the coefficient estimates and depend on the values of the three independent variables. More detail on the estimation and mathematical modelling can be found in Madalla (1983), Greene (2003), and Nayga et al. (2004). In this particular case, the advantage of the ordered probit model is that it allows the respondents to express the intensity of their trust in each organization involved in providing information about the welfare of pigs, thereby allowing the researcher to determine the extent to which each dimensions of trust influences the general trust in the particular organization.

4.9 Summary

This chapter examined consumer preferences for FAW within a utility maximisation framework. As well, it presented a review of consumer studies in the area of FAW that used stated preference methods and concluded the appropriate method for elicitation of consumer preferences. Moreover it presented the data collection and choice experiment design method used in the survey. Lastly, this chapter outlines the econometric models used to estimate the utility consumers derive from FAW attributes. The next chapter presents the results of the analysis including the MNL, RPL, LCL models, WTP estimates and ordered probit analysis of the dimensions of trust.

CHAPTER 5: RESULTS OF THE PORK SURVEY

5.1 Introduction

This chapter reports the results of the pork survey which was tested on two samples of consumers: a general population (GP) sample across Canada and a sample of animal rights organizations (AROs) members. The GP sample included 541 respondents that were recruited via e-mail by Leger Marketing based in Edmonton from an on-line panel of 3974 Canadian consumers. The sample of AROs members included 82 respondents. Recall that in the graphical analysis presented in this chapter it was assumed that Canadian consumers comprise two groups according to their preferences for pork. A first group, A, included consumers who are indifferent between conventional pork (CP) and "animal-friendly" pork (FP), while a second group B included individuals who prefer FP to CP (i.e., consider FP of superior quality, in other words, consider FP healthier, tastier or that it carries a lower risk of food borne illness or better treats animals). Thus, it is believed that the two samples of respondents are a reasonable approximation of these two categories encapsulated in the theoretical analysis.

The chapter is organized as follows. First, the socio-demographic characteristics of the two samples are described. Second, descriptive statistics on individual questions that elicited consumer knowledge of current pig farming practices, awareness of farm animal welfare issues, and opinions on the current status of farm animal welfare in Canada are presented. Third, the relative strength of pork quality attributes is revealed. More specifically, this section examines evidence supporting some of the assumptions made in the conceptual framework in Chapter 3. Fourth, consumer attitudes on the appropriate role for public sector regulation and public sector enforcement of FAW standards are examined. Then, the chapter presents results of the choice

experiment (CE) described in Chapter 4. This section includes the estimates of the Multinomial Logit (MNL) model, Random Parameters Logit (RPL) model, Latent Class Logit (LCL) model and consumers' WTP estimates for FAW attributes and verifying organizations. Lastly, the level and determinants of trust for verifying organizations are revealed to identify the extent to which consumers trust different organizations in the provision of FAW quality assurances.

5.2 Demographic Characteristics of the Respondents

The distribution of the general population (GP) sample and members of animal rights organizations (AROs) sample by gender, age, education, household size, and number of children in the household, relative to the Canadian population is presented in Table 5.1.

The GP sample is representative of the Canadian population in terms of gender, household size, urban/rural split, and number of people under the age of 18 that live in the household. Although the AROs sample is representative of the Canadian population in terms of average age of the respondents and urban/rural split, it under-represents household size and has a much higher proportion of female respondents relative to the Canadian population. This likely reflects the type of demographics that comprises AROs membership.

Table 5.1: Demographic characteristics of the representative samples

Indicator	Members of AROs Sample	General Population Sample	Canadian Population
Gender (% of total sample/population)			
Men	15.38	48.8	48.95
Women	84.62	51.2	51.05
Age (years)			
Men	48.62	53.07	45.17
Women	44.04	45.38	46.67
Average Age for both genders	46.33	49.13	45.93
Split by Urban/Rural Area (% in each class of total sample/population)			
Urban	76.92	72.9	80.82
Rural	23.08	27.1	19.18
Household Information			
Household size	2.41	2.6	2.9
Number of people under the age of 18 live in the household	0.29	0.53	1.1

Source: Author's own calculations based on survey data and Statistics Canada data (i.e., adapted from Statistics Canada 2006a).

As can be seen from Figure 5.1, both samples have a higher level of education than the Canadian population in general, which is to be expected with an Internet-based survey. For instance, in the Canadian Internet use survey conducted by Statistics Canada in 2007, 89% of the home internet users had a university degree (Statistics Canada, 2008).

Figure 5.1: Breakdown of the survey samples and Canadian population by education
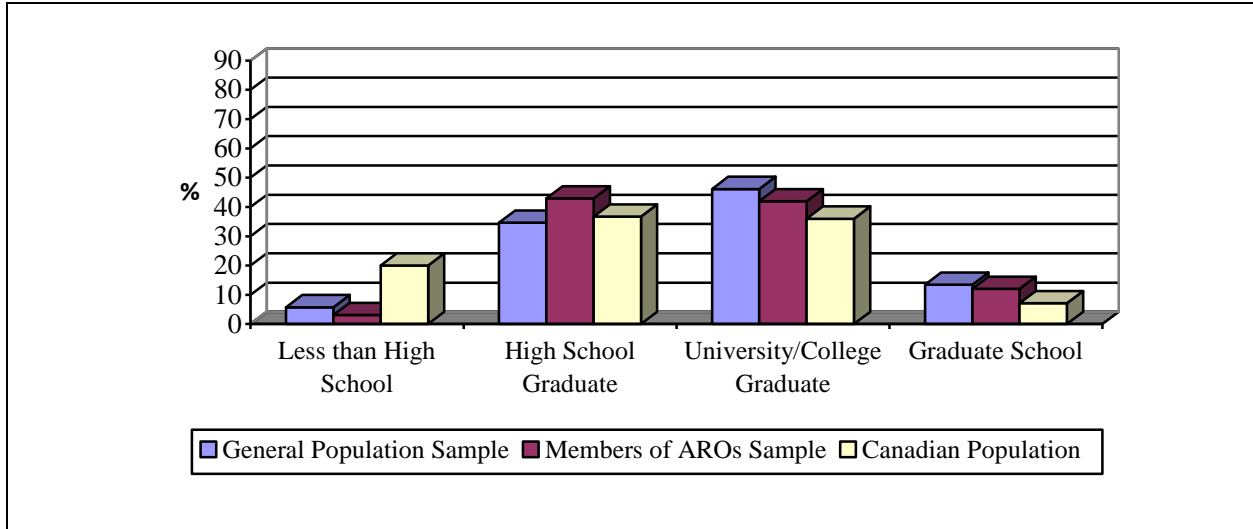
Source: Author's own calculations based on survey data and Statistics Canada data (i.e., adapted from Statistics Canada 2006b).
Notes: High School Graduate includes answers from "Some University/College". Size of the GP sample/AROs sample = 424/52 respondents. For the Canadian population, the average age was calculated for individuals being 20 years old and above.

The percentage breakdown of the two samples by province relative to the Canadian population is shown in Figure 5.2. Since the survey was only conducted in English, there is no representation from Quebec and, consequently, a slightly higher representation from the other provinces. The GP sample is slightly biased toward Western Canada relative to the Canadian population (i.e., 49% vs. 39%), while the AROs sample is heavily dominated by respondents from British Columbia. This is to be expected since many respondents were recruited via the BC SPCA.

Figure 5.2: Geographical distribution of the survey samples

Source: Author's own calculations based on survey data and Statistics Canada data (i.e., adapted from Statistics Canada 2006a).
Note: Size of the GP sample/AROs sample = 418/52 respondents (6/2 respondents did not provide their level of postal code).

The breakdown by income relative to the Canadian population is shown in Figure 5.3. As one can see, the two samples also had, on average, slightly higher income than the Canadian population in general which is to be expected with an Internet-based survey.

Figure 5.3: Breakdown of the survey samples and Canadian population by income

Source: Author's own calculations based on survey data and Statistics Canada data (i.e., adapted from Statistics Canada 2006c).
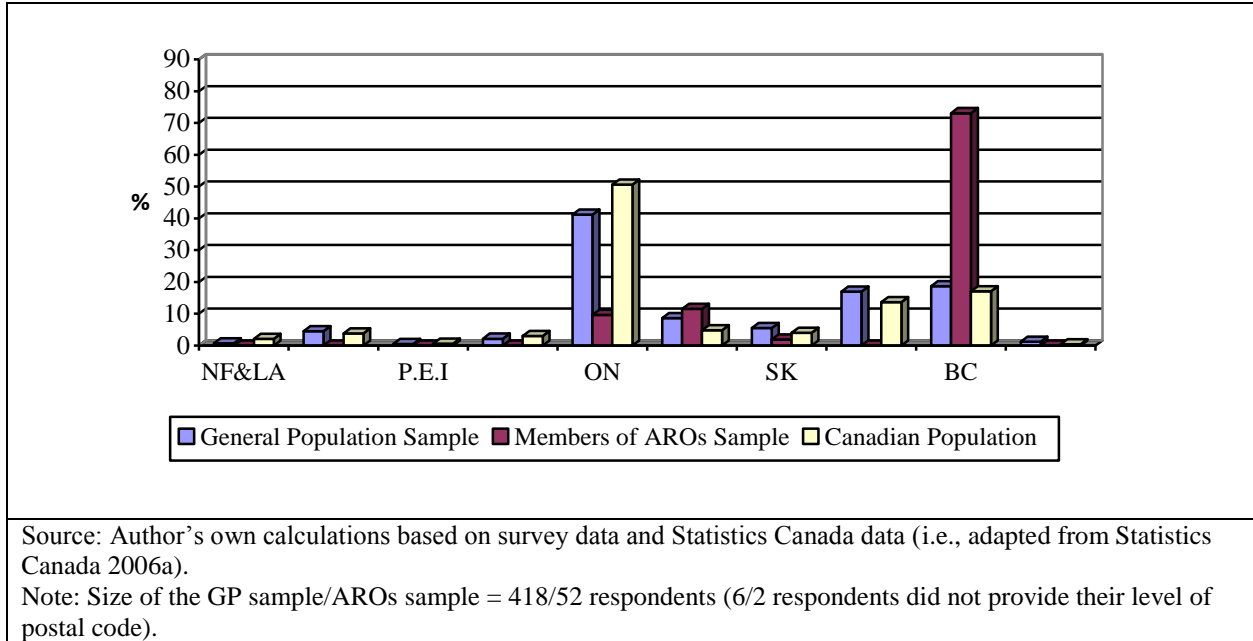Note: Size of the GP sample/AROs sample = 418/52 respondents (6/2 respondents did not provide their level of income).

131
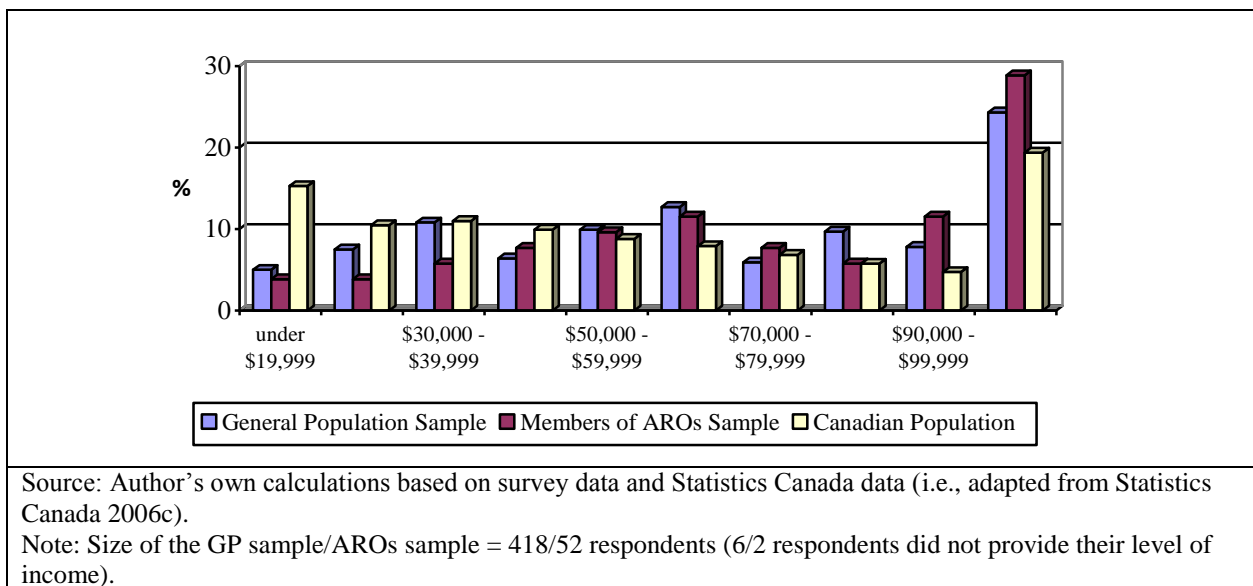
In conclusion, the GP sample is reasonably representative of the Canadian population, although slightly biased toward higher income and better educated respondents. The fact that the AROs sample is not representative of the general population is not a major concern since the key objective is to evaluate the preferences of this specific group separately.

5.3 Attitudes toward Farm Animal Welfare – Results of Individual Questions

A first major objective of this section is to reveal respondents' shopping habits and present the descriptive statistics that capture how respondents view the current status of pigs' welfare in Canada, respondents' familiarity with pig farming practices and awareness of FAW issues. A second major objective of this section is to test some of the assumptions that were made in Chapter 3, which presented the social welfare analysis of the Canadian market for animal friendly pork. The two key assumptions were vertical product differentiation between conventional pork (CP) and animal friendly pork (FP) (i.e., higher perceived quality of FP) and consumers' knowledge of the relative cost of CP and FP (i.e., consumers' perception of the relationship between meat prices and FAW standards). A third major objective of this section is to examine respondents' views of the appropriate role for public sector regulation and public sector enforcement of FAW standards. In order to answer these questions results from attitudinal and demographic questions from sections one and four of the survey are presented.

5.3.1 Shopping Habits

Initial survey questions and some of the socio-demographic questions from the last part of the survey (i.e., part four) assessed participants' shopping habits. Respondents tended to be the primary shopper, with 71% of respondents in the AROs sample being the main shopper and 55% of them undertaking a similar role in the GP sample (see Appendix 8). Pork was frequently

consumed by many of the respondents. For example, 70% of the respondents in the AROs sample declared that they eat pork at least once a week and 77% of the respondents in the GP sample declared a similar frequency. Both surveys contained an initial screening question, so that people who did not consume pork could not proceed with the survey. This was necessary in order to ensure greater realism in the choice experiment questions. The frequency with which respondents purchased poultry or livestock products that were assured as being sourced from animals raised 'naturally' is presented in Figures 5.4 and 5.5.[87]

Figure 5.4: Frequency of purchasing "natural" poultry or livestock products in the last three months – Members of Animal Rights Organizations Sample

Note: Size of the AROs sample = 52 respondents.

---
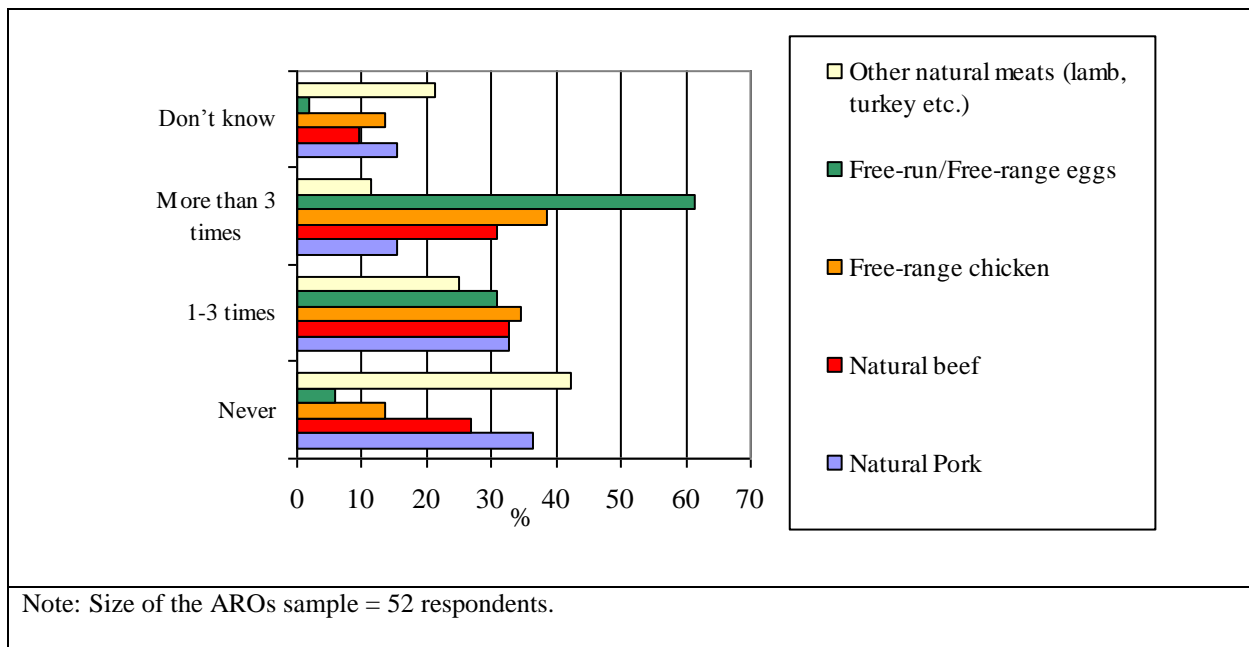
[87] Q2) In the last three months, how often have you purchased the following poultry or livestock products that were assured for being sourced from animals raised 'naturally'? E.g., raised outdoors, pasture-raised, free-run or free-range (free-run means chickens/hens have access to the floor of the barn, while free-range means they may also have access outdoors). Possible answers were: never, 1-3 times, more than three times, and don't know.

Figure 5.5: Frequency of purchasing "natural" poultry or livestock products in the last three months – General Population Sample

Note: Size of the GP sample = 424 respondents.
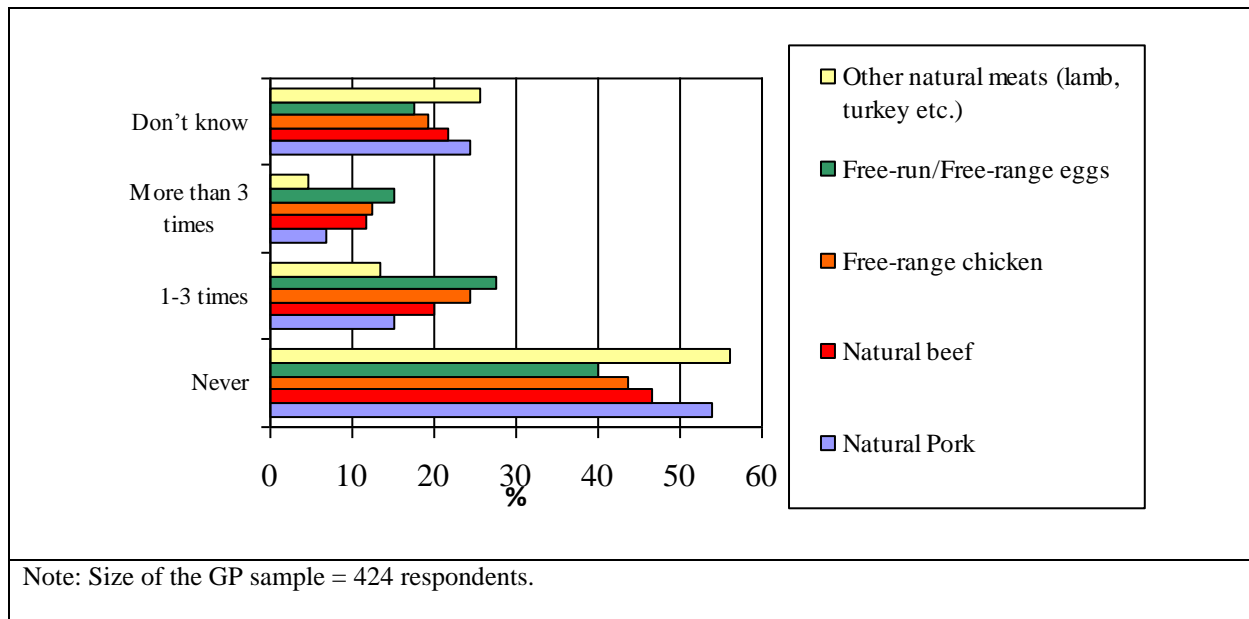
The size of the bars in these charts reveals that respondents in the AROs sample are more likely to have consumed "natural" poultry or livestock products compared to the respondents in the GP sample, which suggests a strong interest in animal welfare enhancing production methods by this subsample. Actually, more than 50% of the respondents in the GP sample stated that either they never ate these types of products or they were not able to answer. Among the "natural" poultry or livestock products, one can see that natural pork is among the least consumed products, while free-range/free run eggs are among the most consumed.

5.3.2 Canadians' Perception of Farm Animal Welfare

The survey asked a set of questions aimed at determining respondents' knowledge of pig farming practices or eliciting their perception of the current level of pigs' welfare in Canada. As well, a further objective was to determine whether concerns about FAW altered respondents' food

134

purchase decisions. All questions were presented as statements to which respondents could state their level of agreement on a five point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral (neither agree nor disagree), 4 = Agree, 5 = Strongly Agree). For instance, less than 20% of the respondents in the two samples had ties with agriculture and less than 10% of them were members of a farm organization (see Appendix 8). However, when asked whether they are aware of how pigs are raised, many respondents provided a positive self-assessment (i.e., almost 70% of the respondents in the AROs sample compared to 55% of the respondents in the GP sample (see Figure 1 in Appendix 9). Unsurprisingly, when asked "how many news reports on animal welfare have they heard or read in the last three months", 90% of the respondents in the AROs sample stated that they read or heard more than 1-2 news reports, while the respondents in the GP sample were less aware (58%), yet, there remained a significant percentage (i.e., 42%) of the GP sample that declared they had not read or heard this type of news (see Figure 2 in Appendix 9).

The breakdown of the responses regarding perceptions about the current level of pigs' welfare in Canada is presented in Figure 5.6.

Figure 5.6: Attitudes –"The current level of pigs' welfare in Canada is acceptable"
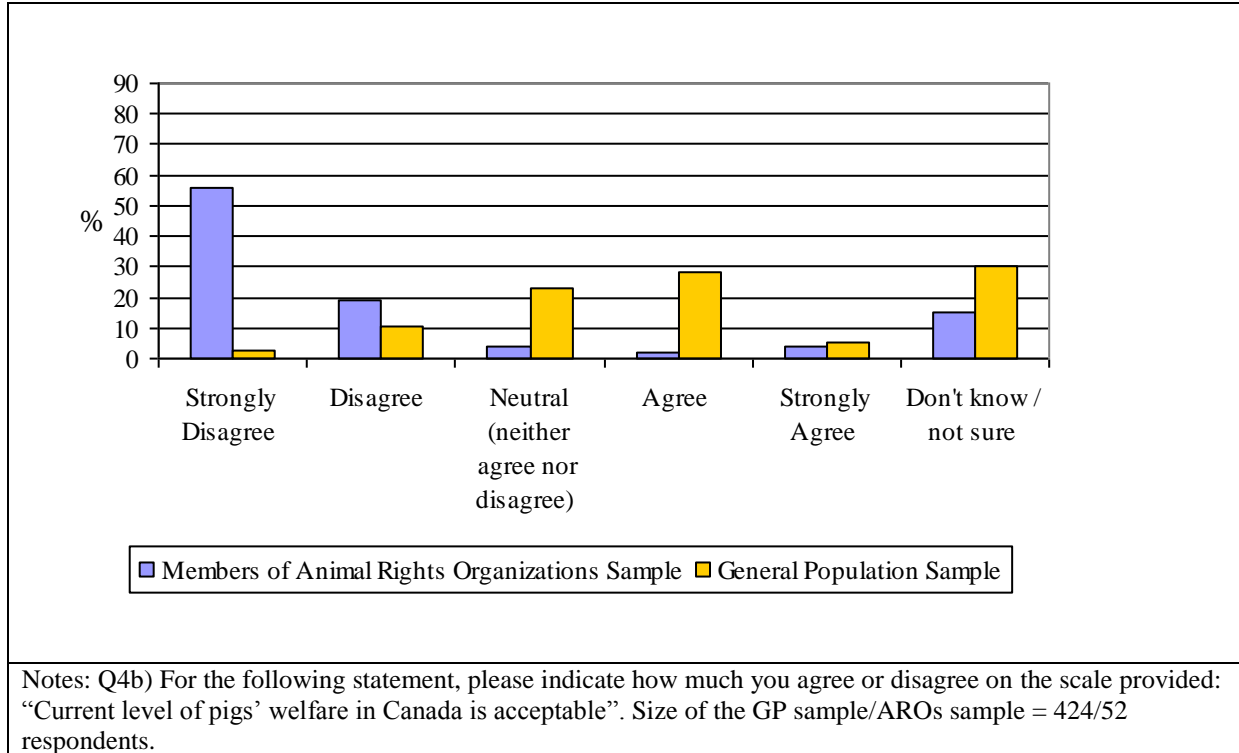
Notes: Q4b) For the following statement, please indicate how much you agree or disagree on the scale provided: "Current level of pigs' welfare in Canada is acceptable". Size of the GP sample/AROs sample = 424/52 respondents.

As expected, respondents in the AROs sample were more likely to disagree and strongly disagree with the assertion that the current level of pigs' welfare in Canada is acceptable (i.e., 75% of respondents), whereas only 35% of respondents in the GP sample were likely to agree and strongly agree; more than 52% were either not sure or neutral. This is not surprising given that 45% and 42% of these respondents could not say whether they are aware of how the pigs are raised or that they are aware of FAW issues, respectively. It also suggests that the supposition that the AROs subsample would have stronger preferences is correct, allowing the model from Chapter 3 to be tested using these two subsamples. These results seem to be generally consistent with previous work that elicited consumers' perceptions of the current status of FAW. Jones (2006) finds that 69% of consumers believe that pigs in Canadian farms are "very" or "somewhat" well treated. Two reports by Agriculture and Agri-Food Canada (2004, 2006) reveal

that in 2004, 58% of the respondents from a general sample of Canadian consumers stated that food produced in Canada is excellent or good with respect to the humane treatment of animals, while in 2006, the percentage of respondents agreeing with this statement increased to 62%.[88]

To further explore how respondents perceive FAW in general, they were asked the extent to which FAW affects their food purchase decisions. Figure 5.7 presents the results for this question. Whereas members of the AROs sample practice consumer activism with respect to FAW, this is far less common among the GP sample, with almost 25% of the GP sample respondents disagreeing with the statement, more than 35% of the respondents agreeing with the statement, and 40% being either neutral or not sure. In a similar vein, Appendix 10 provides more compelling evidence for the extent to which the respondents in the two samples undertook other forms of consumer activism. For instance, while a large portion of the respondents in the AROs sample donated money and goods, or volunteered time to an animal rights organization (i.e., 80%), or contacted a politician on an AW issue (i.e., 50%), by contrast, these practices are far less common for respondents in the GP sample, though the 2004 AAFC's study revealed that this is an emerging activity among Canadians (i.e., 35% of Canadians declared that they boycotted a particular food product because they were concerned about how animals have been treated on the farm and during the slaughter, AAFC, 2004).

---

[88] Agriculture and Agri-Food Canada (AAFC) commissioned Ipsos-Reid in 2004 and 2006 to conduct market research that revealed Canadian consumer perceptions, attitudes, and behaviours with respect to food safety. AW was one of the issues that was indirectly addressed. Q6) With regards to "the humane treatment of animals", do you think food produced in Canada is …? The range of answers included: Excellent/Good (AAFC, 2004; AAFC, 2006).

Figure 5.7: Concerns for farm animal welfare affecting food purchase decisions

Notes: Q4c) For each of the following statements, please indicate how much you agree or disagree on the scale provided: "Concerns for the welfare of farm animals affect my food purchase decisions". Size of the GP sample/AROs sample = 424/52 respondents.
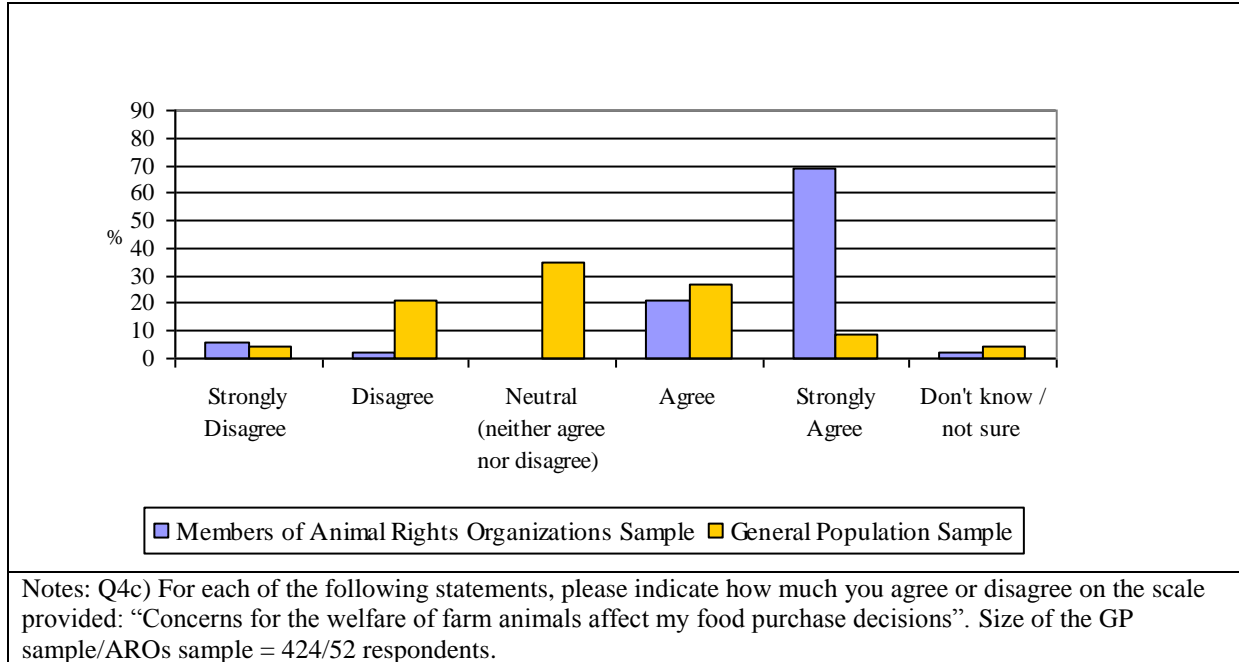
In conclusion, this section provides preliminary evidence supporting the assumption that AROs members are likely to have much more strongly held opinions about animal welfare. As well, it reveals that respondents in the GP sample are heterogeneous with respect to how they view the current status of pigs' welfare or the extent to which they take FAW into account when grocery shopping.

5.3.3 Testing Assumptions of the Theoretical Model

In the graphical analysis from Chapter 3 consumers were divided into two groups according to their preferences for pork. A first group, A, included consumers who are indifferent between conventional pork (CP) and friendly pork (FP), while a second group, B, included individuals who prefer FP to CP. Implicit in this assumption is also the notion that group B consumers are more likely to lobby for stricter (perhaps mandatory) animal welfare standards. It was considered that the B consumers perceive FP as being of higher quality than CP. As well, it was assumed

that consumers know the relative cost structure of CP and FP. The use of two subsamples in this survey provided the opportunity to test some of these assumptions. Figures 5.8 and 5.9 present descriptive statistics of consumer' perceptions of pork quality attributes.

Figure 5.8: Perceptions of natural pork quality - Animal Rights Organizations Sample

Note: Size of the AROs sample = 52 respondents.

139
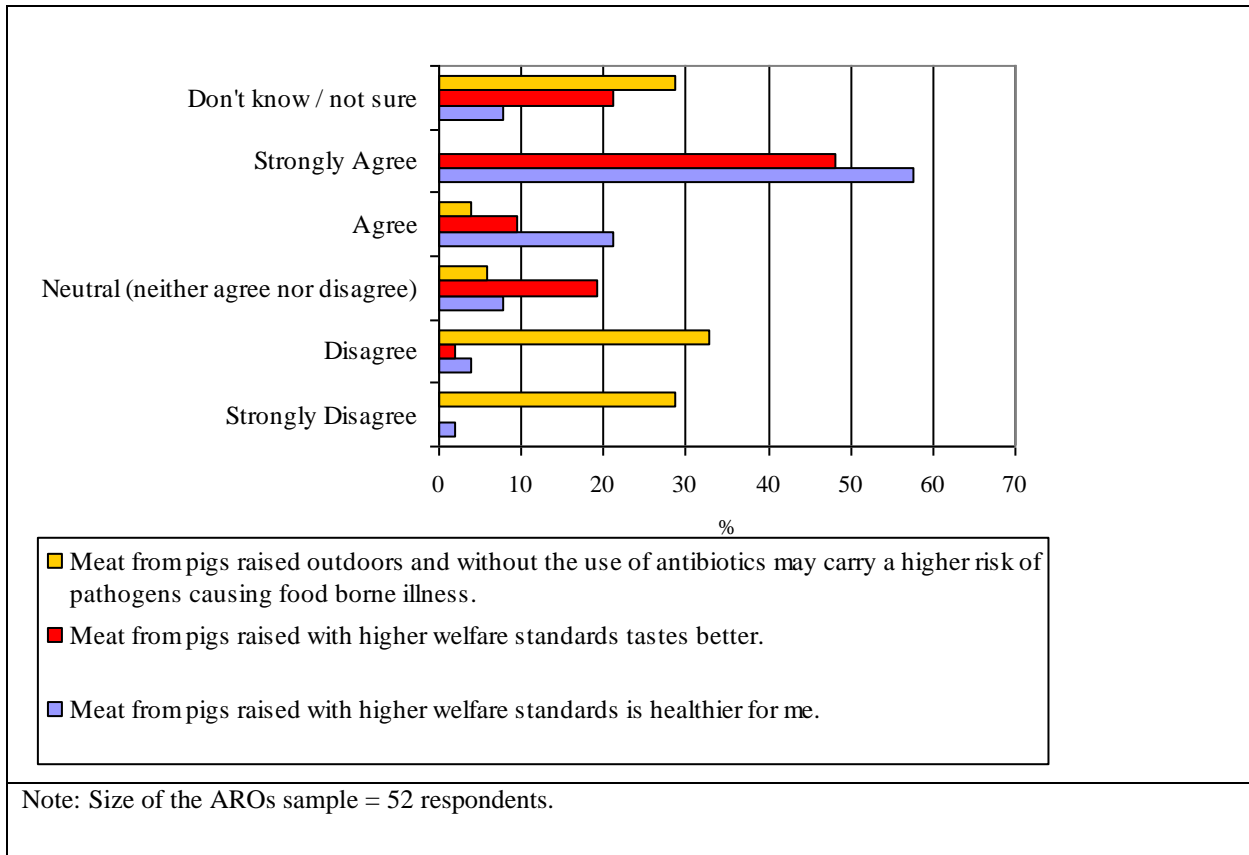
Figure 5.9: Perceptions of natural pork quality – General Population Sample

Note: Size of the GP sample = 424 respondents.
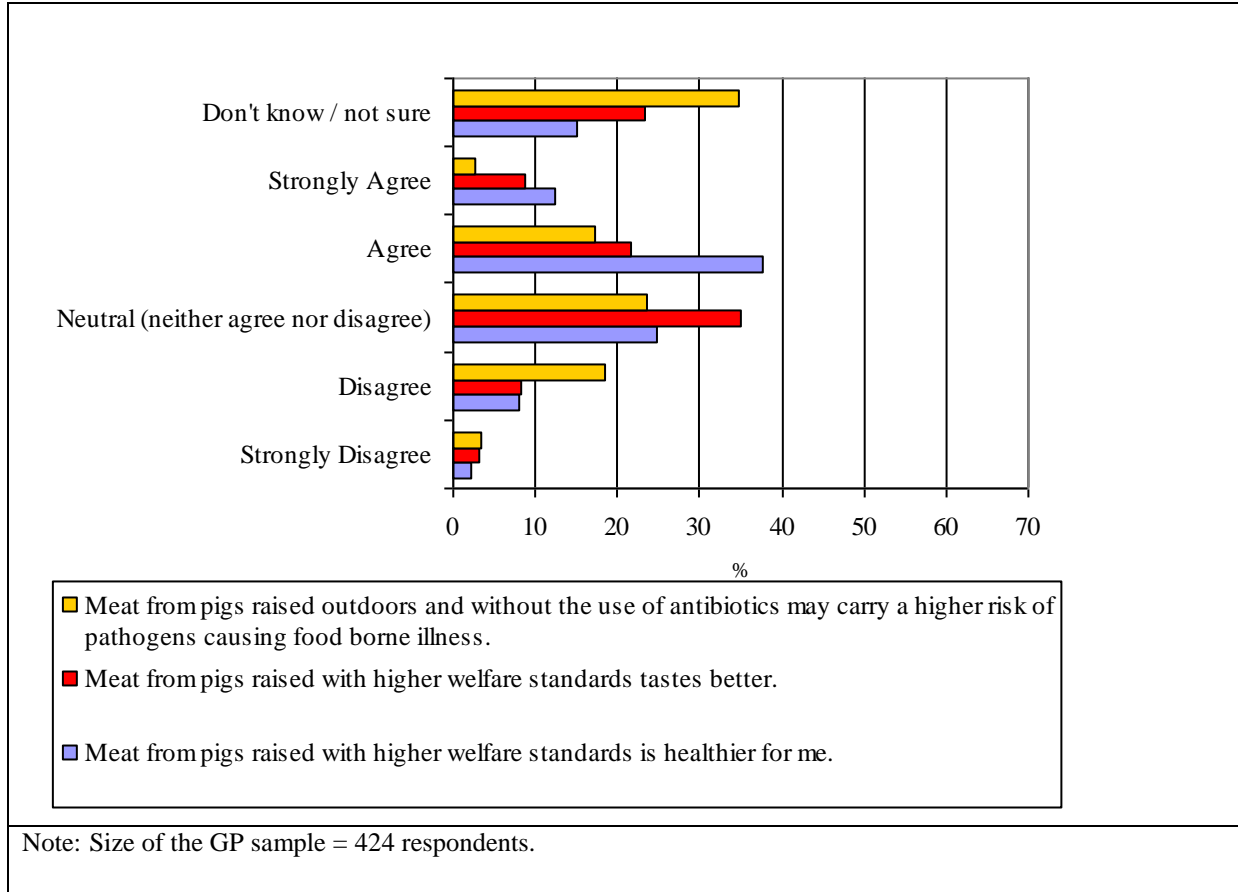
The first assumption is tested by eliciting opinions on whether "meat from pigs raised with higher welfare standards is healthier for me" or "meat from pigs raised with higher welfare standards tastes better" or "meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness". As shown in Figures 5.8 and 5.9, respondents in the AROs sample were more likely to believe that meat from pigs raised with higher welfare standards was healthier and tastier and less likely to have food safety concerns than the general population sample. As well, Figure 5.9 also reveals that a significant portion of

respondents in the GP sample are neutral as regards these three statements.[89] These figures confirm the existence of "group A" consumers, who are largely indifferent between FP and CP.

Another interesting finding emerges from a visual check of Figure 5.9. While in the first instance the majority of respondents in the GP sample partially agree with FP being of higher quality compared to CP (i.e., 50% of the respondents agreed that meat from pigs raised with higher welfare standards is healthier), in the second instance, only 20% of the respondents disagreed with the statement on whether "meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness". While about 20% of the respondents agreed with the statement, this perhaps reflects some uncertainty among consumers with respect to the food safety implications of different production methods. Work by Harris (1986) and Hoogland et al. (2007) that looked at consumer beliefs regarding the quality of livestock and poultry products with FAW characteristics found similar results.[90] More specifically, Harris (1986) found that 85% of German respondents believe that hens are healthier in barn systems than cage systems, but had more divided opinions on hygiene. In a similar vein, Hoogland et al. (2007) obtained relatively high mean values for respondents' beliefs about whether chicken fillet with a certified logo and details about AW standards of organic production on the label is tastier, safer, healthier, and more animal friendly than similar products.[91]

---

[89] For example, the following figures can be brought as evidence of group A of consumers who are indifferent between FP and CP, namely: 24.8% on "Meat from pigs raised with higher welfare standards is healthier for me" or 34.9% on "Meat from pigs raised with higher welfare standards tastes better" or 23.6% on "Meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness".

[90] Harris (1986) examined a sample of German consumers regarding the purchase motives of battery and barn eggs (Harris, 1986 cited in Kolhler and Wickenhauser, 2001, p.11). Hoogland et al. (2007) examined how Dutch consumers recognize, understand and value on-package information about food production methods that may contribute to more sustainable agriculture.

[91] The answer scale ranged from -2 (i.e., worse than similar products) to 2 (i.e., better than similar). The mean values obtained are: 0.45 for being tastier, 0.31for being safer, 0.71 for being healthier, and 1.46 for being more animal friendly than similar products.

In order to test the second assumption of the graphical analysis, i.e., consumers know the relative cost structure of CP and FP, a proxy statement was used. Respondents in both samples were asked to respond to the statement: "If food companies and farmers improve animal welfare standards, the price of meat will increase" (construct developed by Lusk et al., 2007). The breakdown of the responses to this question is presented in Figure 5.10.

Figure 5.10: Perceived relation between meat prices and farm animal welfare standards

Note: Size of the GP sample/AROs sample = 424/52 respondents.
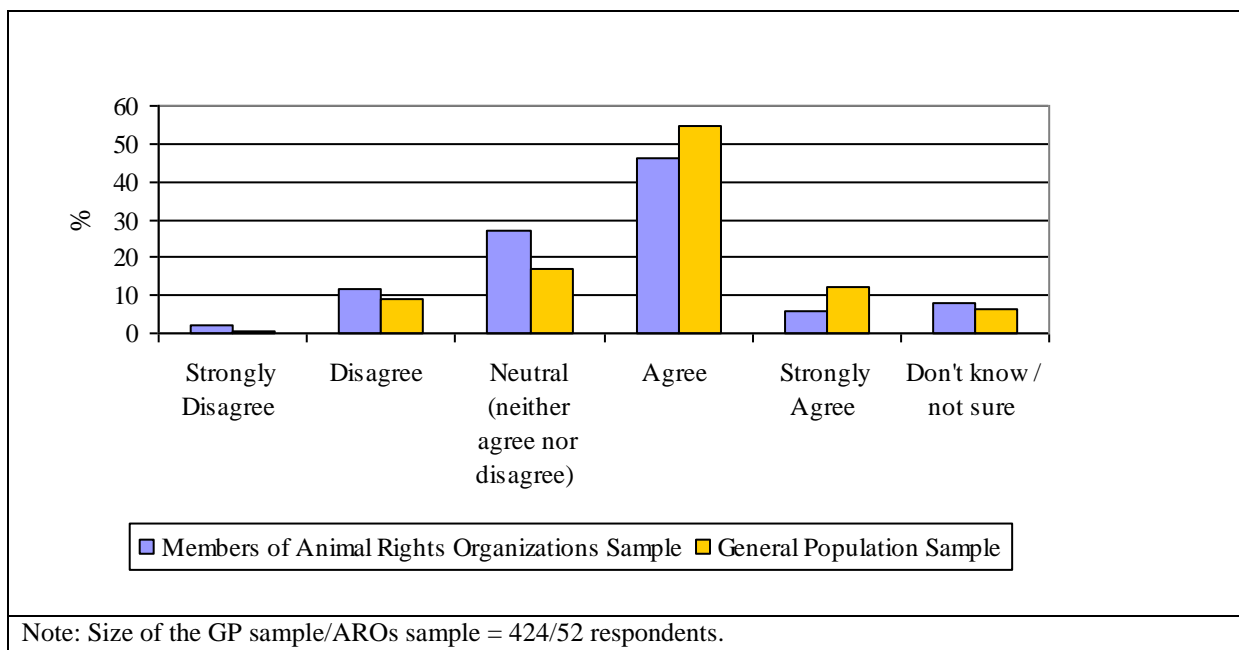
This chart reveals that respondents in both samples are aware that higher welfare standards may lead to an increase in meat prices. Previous literature provides similar findings. For instance, Scholderer et al. (2004) obtained relatively high negative average ratings on the stated expectation of a "low price" advantage of outdoor pork over conventional pork.[92] In a similar vein, Hoogland et al. (2007) obtained relatively high mean values for respondents' beliefs about

---

[92] Scholderer et al. (2004) looked at meat consumption habits, quality expectations, attitudes and buying intentions, both with regard to pork produced in conventional indoor systems and with regard to pork produced in extensive outdoor systems, for consumers from Denmark, Sweden, France and the UK.

whether chicken fillets with a certified logo and details about AW standards of organic production on the label is more expensive than similar products. Recall that in Scenario 5 "Mandatory FP standard with autarky" from Chapter 3, it was assumed that higher mandatory standards would lead to an increase in consumer prices. While the evidence from the present survey does not prove that higher prices will be an outcome, it does reflect respondents' expectations that this would be a likely outcome.

5.3.4 Perceptions of the Role of Stakeholders in the Regulation and Enforcement of Farm Animal Welfare Standards

This section presents results from the questions that elicited consumers' perceptions of the appropriate role for public and private sectors in regulation and enforcement of FAW standards. If the majority of consumers are indifferent between conventionally produced and 'animal friendly' pork, but policy is responsive to lobbyist pressure from a subset of consumers with strong preferences, there is a risk of 'over-regulating' the provision of AW. On the other hand, if the more vocal consumer minority in fact represents a latent preference for higher AW standards and more credible labelling, then the market may be under-providing this quality attribute. In this respect, respondents in the AROs sample were more likely to desire a higher involvement of the government in promoting FAW than the respondents in the GP sample.

The survey revealed that an overwhelming majority of respondents in the AROs sample (i.e., more than 95%) and a majority of respondents in the GP sample (i.e., 63%) either agreed or strongly agreed with the government putting in place higher mandatory welfare standards that require farmers to treat animals humanely. Figures 5.11 and 5.12 present these results. In a similar vein, AROs respondents were more likely to agree that food companies that monitor how

farmers treat their animals are doing the right thing than GP respondents (see Figure 5.13). These attitudinal questions were developed based on the work by Lusk et al. (2007). One may conclude based on these results that there is a much stronger support for government regulation or private sector enforcement of FAW standards among the AROs sample.

Figure 5.11: Attitudes – "The government should take an active role in promoting farm animal welfare"

Notes: Q5a) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.
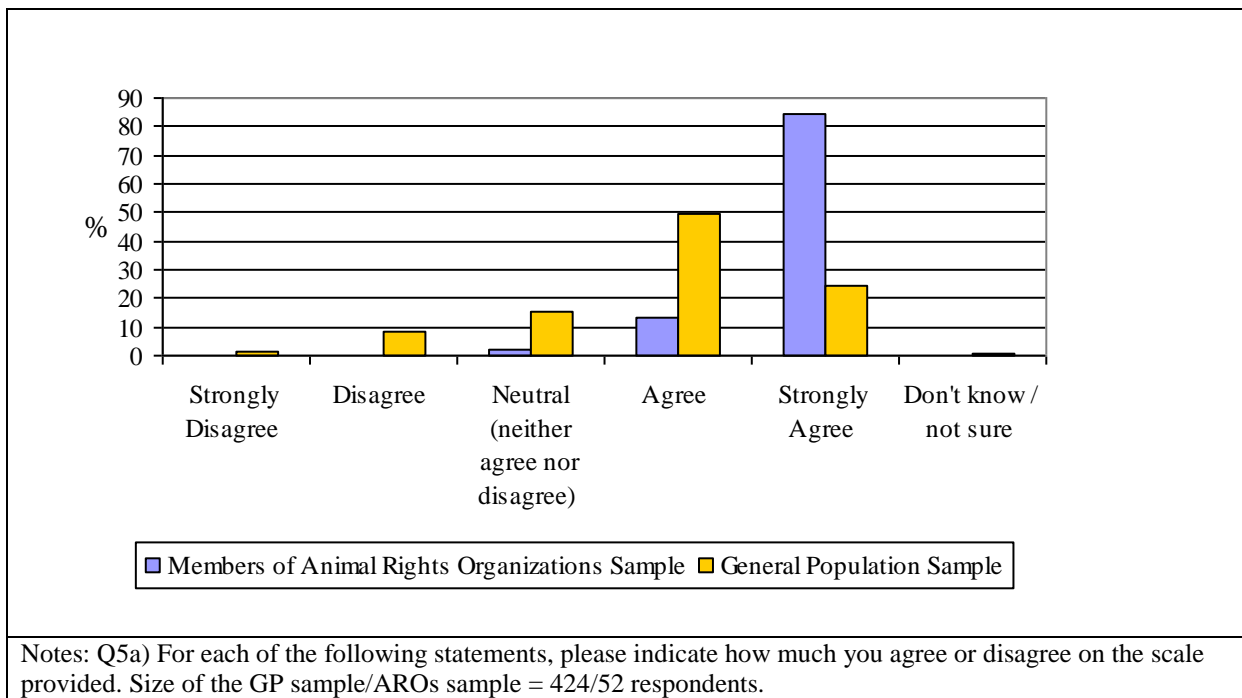
Figure 5.12: Attitudes – "The government has to put in place higher mandatory welfare standards that require farmers to treat animals humanely"

Notes: Q5b) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.

Figure 5.13: Attitudes – "Food companies that monitor how farmers treat their animals are doing the right thing"

Notes: Q5d) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.
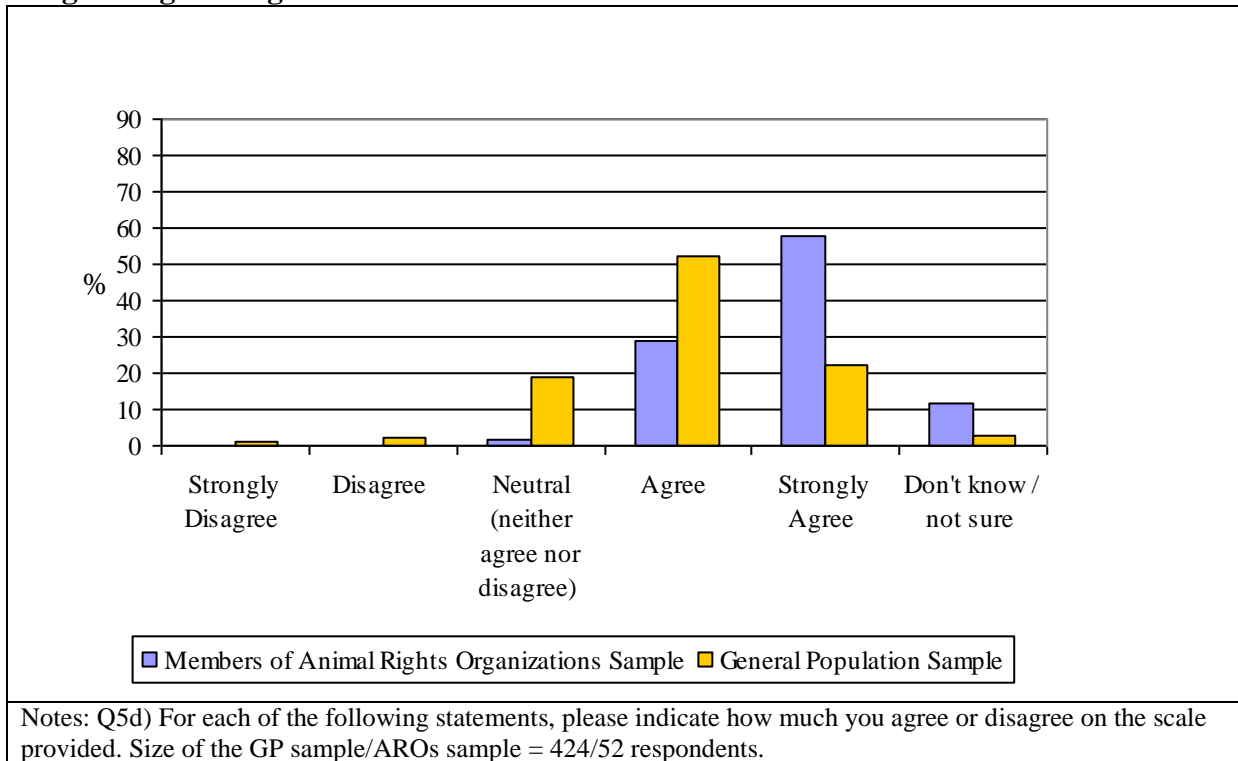
Previous consumer analysis in other countries found concurring evidence. For instance, Lusk and Norwoord (2008), using a random sample of US households, find that more than 60% of respondents expressed their agreement with public regulation of FAW standards.[93]

The results from the AROs sample suggest a stronger support for higher FAW standards than the similar results from the GP sample, but the latter have to be interpreted with caution. Respondents in the GP sample can freely say that the government should do more in promotion or regulation of FAW standards. Thus, respondents appear to be compassionate persons and they feel good by giving a compassionate answer. This is a phenomena referred to as social desirability bias, "where individuals give the answer they believe will create a favourable impression, as opposed to the answer reflecting their true preferences" (Lusk et al., 2007, p.12). It appears that a large percentage of the respondents in the GP sample (i.e., 57.6%) may not support stricter mandatory regulation if it resulted in financial distress to the farm sector and limited their purchase choices. Figures 5.14 and 5.15 present these results. Furthermore, respondents in the GP sample are more likely to disagree with the statement that "AROs do influence my decisions about what meat (i.e., conventional vs. outdoor pork) to buy". Figure 5.16 presents these results. Thus, it is important to consider the trade-offs that people may make between quality and price as well as the organization, either public or private, who provides FAW quality assurances. While these descriptive statistics provide some insight into respondents' attitudes, the choice experiment offers a more robust method of exploring these attributes and the inherent trade-offs present in a purchase decision.
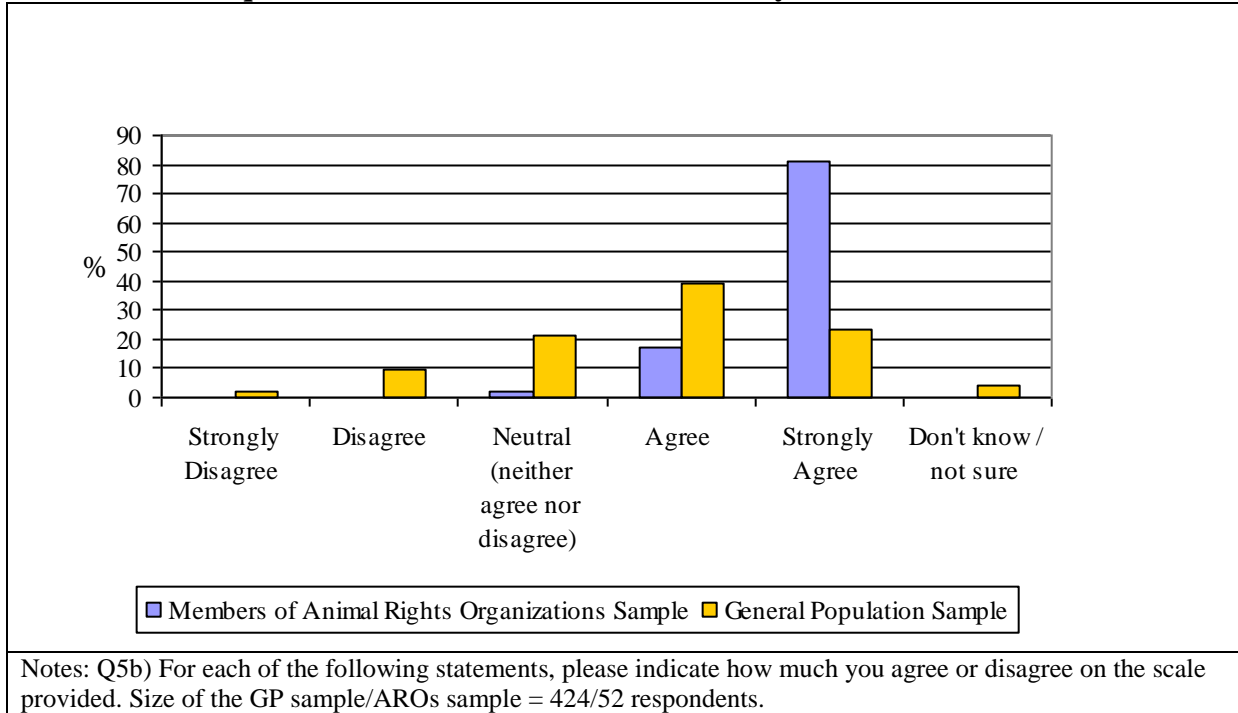
---

[93] Lusk et al. (2008) elicited consumers' opinions whether 1) Government should take an active role in promoting FAW; 2) I would vote for a law in their state that would require farmers to treat animals humanely; 3) Food companies would voluntarily improve animal welfare, and would advertise as such, if people really wanted it.

Figure 5.14: Attitudes – "Farmers should be compensated if forced to comply with higher FAW standards"
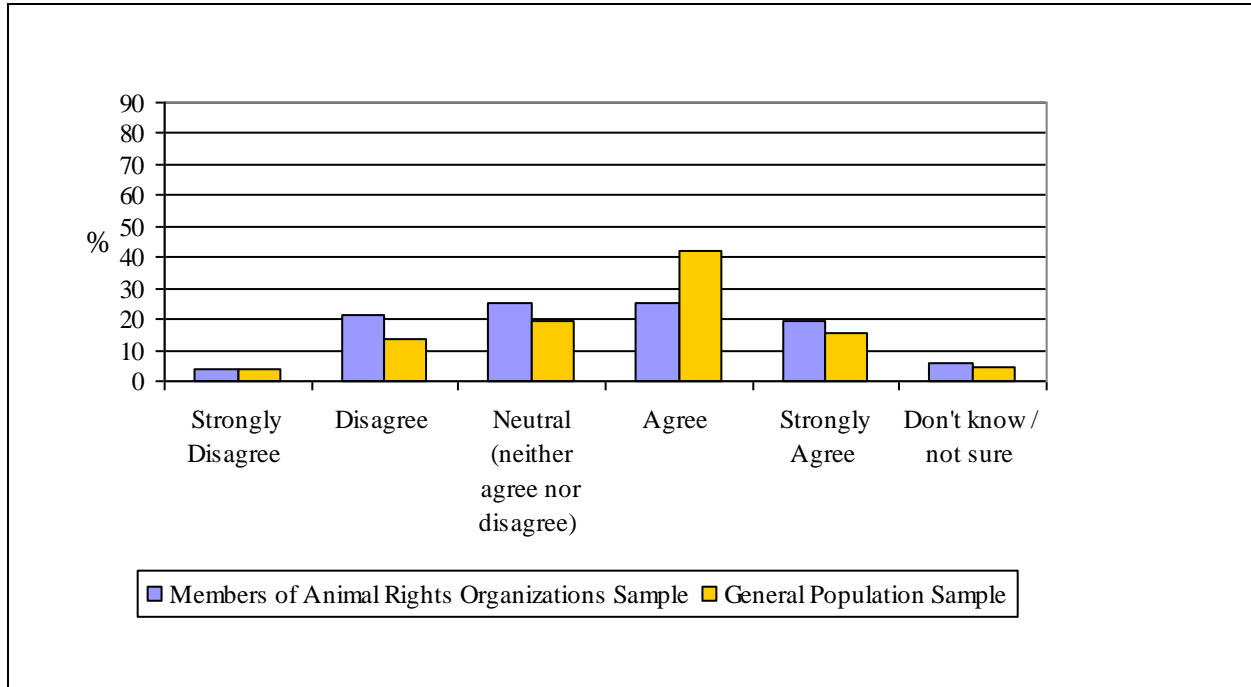
Notes: Qd) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.

Figure 5.15: Attitudes – "Consumers should have the right to choose what they eat and not have their choices limited by a small minority of animal rights organizations"
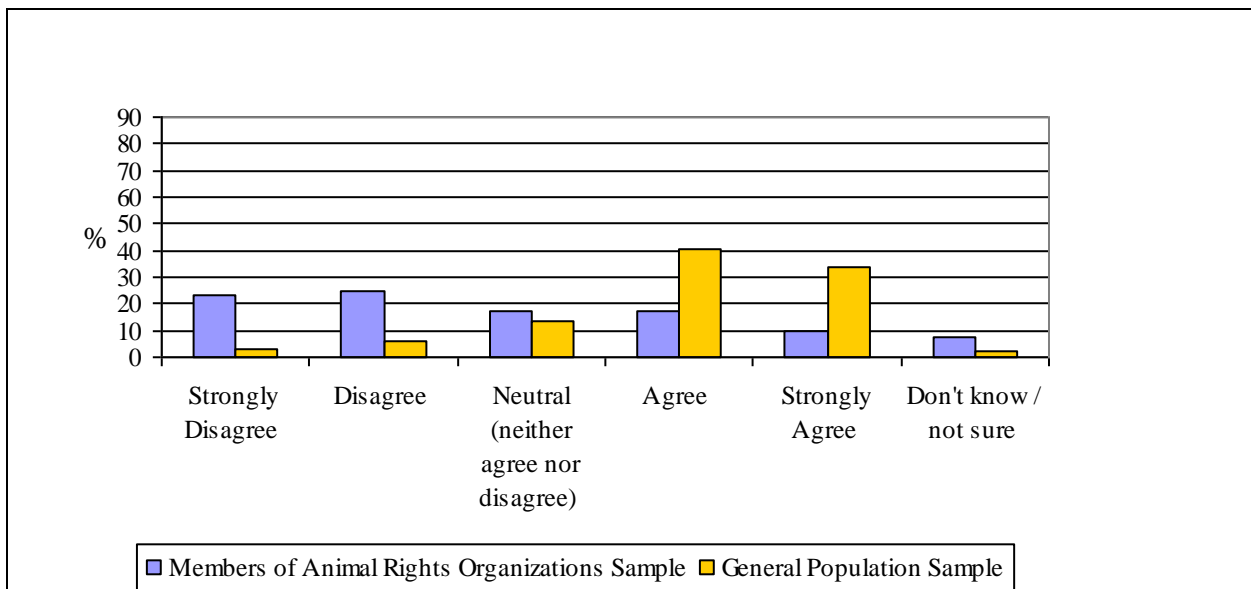
Notes: Q5g) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.

Figure 5.16: Attitudes – "Animal rights organizations influence my decisions about what meat (i.e., conventional vs. outdoor pork) to buy"

Notes: Q5e) For each of the following statements, please indicate how much you agree or disagree on the scale provided. Size of the GP sample/AROs sample = 424/52 respondents.
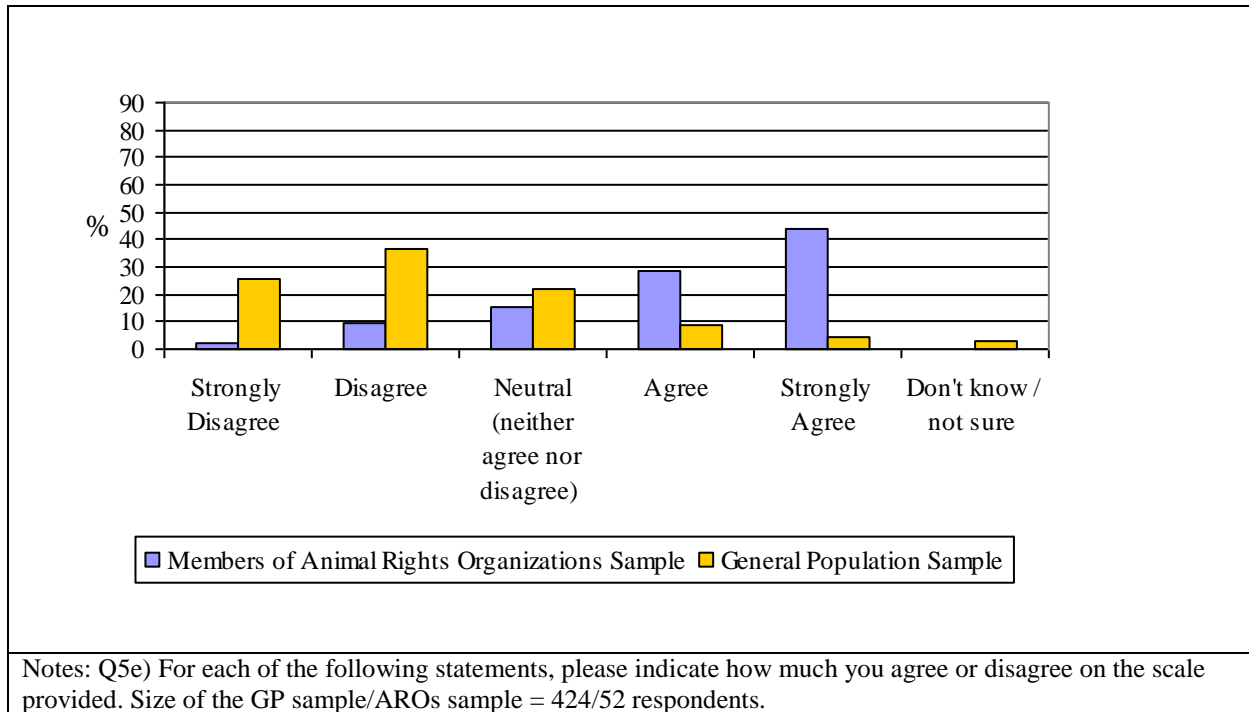
The findings of this section have to be analyzed in combination with the results from other sections of this chapter, i.e., the results of consumers' awareness of FAW issues, farming background, perception of the status of FAW in Canada (i.e., Section 5.3.2), as well as the WTP estimates for FAW attributes (i.e., Section 5.6). Thus, we can determine whether the responses to the survey questions are subject to social desirability bias. Recall that in Section 5.3.2 it was shown that less than 20% of the respondents in the two samples had ties with agriculture and that less than 10% of them were members of a farm organization. As well, a small majority (i.e., 55%) of the respondents in the GP sample provided a positive self-assessment when asked whether they are aware of how pigs are raised. This is an indication that respondents in the GP sample may have agreed with the attitudinal questions from Figures 5.11 to 5.13 believing that

they will create a favourable impression, as opposed to the answer reflecting their true preferences. The discrete choice experiment will enable a more thorough analysis.

In conclusion, Section 5.3 provided preliminary evidence for the existence of group B consumers with stronger preferences for FP. Group B consumers is comprised of members of the AROs sample and some respondents from the GP sample (i.e., up to 20%, the portion of respondents that disagreed with the statement that meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness or up to 35%, the portion of respondents that agreed with the statement that concerns for the welfare of farm animals affect my food purchase decisions). Additionally, this section provided evidence that group A consumers exist: consumers who are indifferent between FP and CP. Lastly, results presented in this section seem to reveal that there is a widespread acceptance among respondents that government should regulate FAW. Therefore, these descriptive statistics provide a useful overview of respondents' perceptions generally. The choice experiment, however, enables a more robust examination of these preferences that allows for implicit trade-offs between price, quality attributes and verifying organization. Choice experiment results will also allow the identification of groups of respondents with significantly different preferences.

5.4 Choice Experiment Results – Multinomial Logit and Random Parameters Logit Models

To recap, in the choice experiment, respondents were presented with eight choice sets, each containing four profiles (i.e., alternatives) of which they had to choose one. The first three alternatives of each choice set represented pre-packaged boneless pork chops characterized by different levels of FAW, verifying organization, and price. The fourth alternative was defined as

"I would not purchase any of these products". The choice experiment attributes and their levels were explained in Section 4.5. The choice experiment seeks to establish the values attached to the pork chop attributes. In this way it can be determined how WTP is derived from different components of perceived value and the trade-offs respondents are willing to make between the pork chop attributes. This chapter presents results of the quantitative analysis including the Multinomial Logit (MNL) model and Random Parameters Logit (RPL) model, following the estimation methods explained in Chapter 4. The description of the variables used in the MNL and RPL is provided in Table 5.2. As was shown in Sections 4.7.1 and 4.7.2, the first model assumes that consumers are homogeneous in their preferences and the second model allows for heterogeneity.

Table 5.2: Variable description for regression analysis

Variable	Code	Description
Outdoor Housing System	OUTDH	Effects coded dummy = 1 if finishing pigs were kept outdoors.
Hoop Housing System	HOOPH	Effects coded dummy = 1 if finishing pigs were housed in large tent-like shelters with straw bedding.
Conventional Housing System		Included in regression by effects coding the housing attribute. Can be calculated as (-OUTH) + (-HOOPH).
Sows in Groups	GROUP	Dummy = 1 if the pork chops were sourced from pigs bred at a farm where sows were kept in groups in pens.
Sows in Gestation Stalls		Included in regression by effects coding the "Sows in Groups" level. Can be calculated as (-GROUP).
Therapeutic Antibiotics	NANTIB	Dummy = 1 if the antibiotics were administered only with the approval of a veterinarian and were aimed at treating diseases.
Subtherapeutic Antibiotics		Included in regression by effects coding the "Therapeutic Antibiotics" level. Can be calculated as (-NANT).
Farmer Verified	FARMV	Effects coded dummy = 1 if pork chops were verified by an individual farmer or a farmers' association to contain at least one of OUTH, HOOPH, GROUP, and NANT.
Processor Verified	PROCV	Effects coded dummy = 1 if pork chops were verified by a well known meat processor to contain at least one of OUTH, HOOPH, GROUP, and NANT.
Supermarket Verified	SUPV	Effects coded dummy=1 if pork chops were verified by a well known grocery store to contain at least one of OUTH, HOOPH, GROUP, and NANT.
Government Verified	GOVV	Effects coded dummy = 1 if pork chops were verified by a federal food agency to contain at least one of OUTH, HOOPH, GROUP, and NANT.
Third-Party Verified	THRDPV	Effects coded dummy = 1 if pork chops were verified by a certifying company or a non-profit organization to contain at least one of OUTH, HOOPH, GROUP, and NANT.
Not Verified		Included in regression by effects coding the organization attribute. Can be calculated as (-FARMV) + (-PROCV) + (-SUPV) + (-GOVV) + (-THRDPV).
Price	PRI	Continuous variable ranging from \$11.07/kg to \$19.26/kg.[1]
No Choice Constant	ASCD	Alternative specific constant for option D (I would not purchase any of these products).

Note: If converted to \$/lbs, price ranged between \$5.02/lb and \$8.74/lb.

Table 5.3 presents the results from the Multinomial Logit (MNL) models estimated with data from the GP sample and the AROs sample separately, and the Random Parameters Logit (RPL) model estimated with data from the GP sample. The estimations were performed using the NLOGIT software. In order to test for the IID errors assumption of the MNL models, a Hausman and McFadden (1984) test was performed. Thus, a calculated p-value of 0.95 was obtained for the MNL estimated for the AROs sample and a p-value of 0.00058 for the MNL estimated for the GP sample. Comparing these two values with critical p-value 0.05, with 95% confidence, we reject the IID assumption for the MNL model estimated for the GP sample and accept it for the MNL model estimated for members of the AROs sample. To recap, the IID assumption implies that all individuals of a population have the same taste and we estimate beta as fixed across individuals. As well, the pseudo adj-R^2 for the GP sample model is 0.10028, while for the members of AROs model it is 0.29955. Louviere et al. (2000) indicate that values of pseudo adj-R^2 between 0.2-0.4 suggest a good fit for choice models. As expected, the MNL model fits the data from the AROs sample very well. This is not surprising given the expectation that respondents in this sample are likely to have stronger and homogeneous preferences toward FAW.

Table 5.3: Estimates from the Multinomial Logit and Random Parameters Logit models

Variable	MNL Model - AROs Sample		MNL Model - General Population Sample		RPL Model - General Population Sample	
	UC	SE	UC	SE	UC	SE
OUTDH	-1.3594***	0.1748	-0.3139***	0.0350	-0.3962***	0.0510
HOOPH	0.1559	0.1202	0.1659***	0.0323	0.1772***	0.0415
GROUP	0.7892***	0.2387	0.5197***	0.0560	0.6043***	0.0774
NANTIB	1.6198***	0.1997	0.3932***	0.0464	0.4948***	0.0891
FARMV	-0.3059	0.2037	-0.0400	0.0543	0.0198	0.0691
PROCV	-0.0966	0.2144	0.0733	0.0571	0.1649*	0.0687
SUPV	0.2444	0.1814	-0.0587	0.0560	-0.0212	0.0660
GOVV	0.6211***	0.1866	0.7353***	0.0524	0.9585***	0.0840
THRDV	0.3607*	0.2057	0.1270**	0.0565	0.1183*	0.0668
Price	-0.0363	0.0286	-0.1538***	0.0088	-0.1973***	0.0109
ASCD	1.4914***	0.4717	-2.3647***	0.1382	-2.9622***	0.1669
Derived standard deviations of parameter distributions						
OUTDH					0.5830***	0.0590
HOOPH					0.3287***	0.0690
GROUP					0.8463***	0.0834
NANTIB					1.3972***	0.0908
FARMV					0.3102**	0.1335
PROCV					0.2357*	0.1444
SUPV					0.0849	0.2566
GOVV					1.0104***	0.0954
THRDV					0.1181	0.1491
Log-Likelihood	-397.6561		-4123.116		- 3846.666	
Pseudo Adj-R^2	0.29955		0.10028		0. 1835	

Notes: * indicates significance at p<0.10; ** indicates significance at p<0.05, *** indicates significance at p<0.01; UC = utility coefficients; SE = standard errors.

In contrast, the MNL model does not fit the data from the GP sample well, which means that consumers in this sample have heterogeneous preferences that are not well captured by a simple MNL model, but may be better suited to a RPL or LCL model. At this stage of the analysis just the results from the RPL model are included in Table 5.3. While the pseudo adj-R^2 and log-likelihood from the MNL model estimated for the GP sample are 0.10028 and -4123.116 respectively, in contrast, the RPL model is a better fit since the values of the Adj-R^2 and log

153

likelihood are increasing to 0.1835 and decreasing to -3846.666, respectively. Though the RPL model brings an increase in the value of Adj-R^2, based on the above remark as to what comprises good fit for choice models, the conclusion is that the RPL model is a poor fit and fails to adequately capture the heterogeneity in consumer preferences. Therefore, the results from the RPL model have to be interpreted with caution.

With this caveat in mind, Table 5.3 reveals that the price utility coefficients have the expected sign in all MNL and RPL models, though are insignificant in the MNL model for members of the AROs sample, suggesting that respondents in this sample took into account other decision criteria rather than price. The coefficients for the FAW attributes (OUTDH, HOOPH, GROUP, NANTIB) are all significant in all statistical models, though the HOOPH attribute is not significant in the MNL model estimated for the AROs sample. Curiously, the coefficient for "outdoor housing system" (OUTDH), though significant, has a negative sign. This is contrary to the finding by Liljenstolpe (2008a).[94] A possible explanation may be that Canadians took into account other decision criteria, perhaps food safety perceptions or the "cold" Canadian weather as it negatively affects pigs. In this respect, the survey was designed in such a manner to provide consumers with an accurate description of different FAW attributes that balances the 'advantages' with the 'disadvantages' of different production practices. The distribution of consumers' responses to the earlier attitudinal question "Whether meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness" suggests that almost one-third of the respondents did not know, while almost 25% were

---

[94] Lilljenstolpe (2008a) described the "Outdoor Housing System" as "Pigs reared in a pen holding 8 pigs with possibility to stay inside or outside (size = 10.9 square feet/cwt pig). During summertime, pasture is provided with an opportunity for mud bathing and grazing."

neutral. Meuwissen et al., (2005) found a similar distribution of answers to a similar question related to outdoor pork production in the Netherlands. As well, Scholderer et al. (2004) found that consumers' expectations toward FAW have no significant effect on consumers' decision to buy outdoor pork.

The coefficient for "sows in groups" (GROUP) has a positive valuation and is highly significant in both MNL models and the RPL model. This result is similar to the finding by Tonsor et al. (2008). These results have to be interpreted with caution given the poor fit of the two models estimated for the GP sample. The coefficient for the attribute "antibiotics used for therapeutic purposes" (NANTIB) is positive and significant in all models. This result is similar to the finding by Nilsson (2005) in a US study which found a positive valuation for a "certified free of antibiotics" attribute. The coefficients for the FAW attributes GROUP and NANTIB seem to indicate that Canadians do take into account animal welfare when choosing products, though the outdoor housing system, that in fact represents the natural environment of pigs, is negatively valued.

What was the effect of verifying organization on consumer choices? The results suggest that neither "farmer verified" (FARMV) nor "supermarket verified" (SUPV) had a significant impact on respondent choices in all models. "Processor verified" (PROCV) is positive and significant in the more robust RPL model for the GP sample. Both "government verification" (GOVV) and "third-party verification" (THRDV) had a positive and significant effect on consumer choices in both samples.

155

As well, the derived standard deviations of parameter estimates are significant at 1%, 5% and 10% except for supermarket verification. These values represent the spread of the random parameters and thus confirm the fact that, in general, respondents in the GP sample have heterogeneous preferences. The coefficient for the alternative specific constant (ASCD) represents the utility a respondent associates with not purchasing any of the pork chops described. Hu (2004) and Kontoleon and Yabe (2003) discuss various approaches to the alternative specific constant in the literature. The negative and significant coefficient for ASCD is consistent with expectations.

To capture the source of respondents' preference heterogeneity, the RPL model was specified to include a number of socio-demographic characteristics. These 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. As well, in order to identify the variables that had consistently significant effects and/or significantly improved the model fit, the log-likelihood test (Greene, 2007) was performed. It was found that socio-demographic characteristics are not very effective in explaining preference heterogeneity and therefore the results are not reported here. 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 FAW attributes and FAW quality verification organization than socio-demographic characteristics. The LCL model whose results are presented in the next section will reveal more detail about respondents' preferences.

5.5 Choice Experiment Results – Latent Class Logit Model

As discussed in Chapter 4, Latent Class Logit (LCL) models are a more powerful tool for examining consumer preference heterogeneity. Heterogeneity in consumers' preferences means that researchers may expect to identify relatively homogeneous segments of consumers within the sample. A LCL model was used to identify whether consumer segments existed in both the AROs sample and the GP sample. Perhaps respondents in the AROs sample have homogeneous preferences as regards FAW, but may have heterogeneous preferences as regards the organization who verifies these attributes. Boxall and Adamowicz (2002) suggested two criteria to assist in determining the number of consumer segments – i.e., the minimum Akaike Information Criterion (AIC) and the minimum Bayesian Information Criterion (BIC). Following this approach, LCL models with up to five classes were estimated for both samples. As the NLOGIT Software estimates models with a limited number of classes, models with up to five classes were estimated and compared using the information in Table 5.4. The two selection criteria, the AIC and BIC, as well as log-likelihood at convergence are minimized in a two-segment model and five-segment model, respectively. Given the small improvement resulting from moving from a four-class model to a five-class model, additional classes are likely to improve the model fit only slightly.

Table 5.4: Comparison between Latent Class Logit models with 2, 3, 4, and 5 classes

	Log-Likelihood at convergence	Pseudo-R^2	AIC	BIC
LCL AROs Sample				
2 Class	-341.4772	.39676	1.75229	1.97514
LCL General Population Sample				
2 Class	-3873.360	0.17442	2.29738	2.33894
3 Class	-3724.315	0.20525	2.21658	2.27982
4 Class	-3707.260	0.20795	2.21360	2.29852
5 Class	-3577.488	.23477	2.14416	2.25077

Notes: Akaike Information Criterion (AIC) = $\log\left(\dfrac{e'e}{n}\right) + \dfrac{2k}{n}$ where k is the number of parameters and n is the

number of observations; Bayesian Information Criterion (BIC) = $\log\left(\dfrac{e'e}{n}\right) + \dfrac{k\log n}{n}$

Utility estimates for the two LCL models are presented in Tables 5.5 and 5.6. The LCL statistical

estimation for the AROs sample is a better fit than the MNL model presented in Table 5.3, as

indicated by a log-likelihood of -341.47 and a pseudo-R^2 of 0.3967; the MNL had a log-

likelihood of -397.65 and a pseudo-R^2 of 0.29955. As well, this estimation determines two

classes, revealing very little heterogeneity in consumer preferences across latent classes with

associated probabilities of 41.72% and 58.27%. These classes are not segments in the sense that

one can identify which class a specific respondent falls into, but there is a probability of 41.72%

and 58.27%, respectively, that a portion of the sample or a randomly chosen respondent will fall

into this class. Although predictions from these models are often interpreted as the probability

that an individual has WTP greater than a particular price, an equivalent interpretation is that the

prediction gives the frequency of individuals (e.g., market share) with WTP greater than a

particular price (Louviere et al., 2000).

Table 5.5: A Latent Class Logit model with two classes - Animal Rights Organizations Sample

Variable	Third-Party Trusters		Government Trusters	
	UC	SE	UC	SE
OUTDH	-2.1929***	0.3501	-1.3039***	0.1946
HOOPH	-0.1117	0.3135	0.3736***	0.1360
GROUP	1.7514***	0.6171	0.3267	0.2422
NANTIB	2.2491***	0.5273	2.1602***	0.2177
FARMV	-1.5962***	0.5815	-0.0051	0.2198
PROCV	-0.2766	0.5225	0.2401	0.2306
SUPV	0.4393	0.4484	0.1151	0.1892
GOVV	0.9402**	0.4577	0.7807***	0.1729
THRDV	1.5269***	0.4764	-0.0055	0.2006
Price	-0.04357	0.0635	-0.0269	0.0282
ASCD	-0.0627	1.3088	2.5773***	0.4096***
Class Probabilities	0.4172		0.5827	
Log-Likelihood	-341.4772			
Pseudo-R^2	0.39676			

Notes: *indicates significance at p<0.1; ** indicates significance at p<0.5, *** indicates significance at p<0.01. UC = utility coefficients, SE = standard errors.

As Table 5.5 indicates, the first segment (41.72% of the sample population) displays an interest in pig welfare attributes that are not related to the housing system, namely GROUP and NANTIB. The price coefficient is negative as expected, lower in magnitude, and insignificant. Consumers in this group rely more on verification by the government and third-parties, and appear distrustful of farmers. On balance, they have a relatively higher valuation for "third-party verification". For ease of interpretation, this segment could be referred to as "third-party trusters".

The second segment (58.27% of the sample population) is apt to be most influenced by government verification than other sources of verification. The utility coefficient for "no antibiotics" is positive and significant, leading to a relatively high negative WTP (see Section 5.5). Unlike the first segment, consumers in this group have a positive and significant valuation

of the "hoop housing system", although they show a negative valuation of the "outdoor housing system". Again, the price coefficient is negative as expected, but lower in magnitude and insignificant. It seems that consumers in this segment value "government verification". Accordingly, this segment could be referred to as "government trusters". The other big difference between these two consumer segments is in the valuation of the HOOPH attribute. Thus, members of AROs have relatively consistent preferences with respect to FAW and differ only with respect to their valuation of the source of verification for the FAW quality attribute and of the HOOPH attribute.

The LCL estimation for the GP sample is a better fit than the MNL model presented in Table 5.3 as indicated by a log-likelihood of -3577.488 and a pseudo-R^2 of 0.23477; the MNL had a log-likelihood of -4123.116 and a pseudo-R^2 of 0.1002. To date, there are no robust statistical tests to compare the fits of the RPL and LCL models and thus the model choice is context specific (Green and Hensher, 2003). The results of the LCL estimations for the GP sample are presented in Table 5.6.

Table 5.6: A Latent Class Logit model with five classes – General Population Sample

Variable	Utility Coefficients and Corresponding Standard Errors				
	Price-Conscious	Supermarket Trusters	Government Trusters	Conventional-Pork Consumers	Animal Welfare Sensitive
OUTDH	-0.0673 (0.1293)	-0.8165*** (0.0601)	-0.3291*** (0.0770)	-0.2548*** (0.0448)	0.0067 (0.1136)
HOOPH	0.0570 (0.1073)	0.2659*** (0.0556)	0.2585 (0.0749)	0.1129*** (0.0480)	0.0066 (0.0895)
GROUP	0.2359 (0.2020)	1.0417*** (0.0967)	0.6827*** (0.1409)	0.3950*** (0.0813)	0.7437*** (0.1667)
NANTIB	0.1907 (0.1632)	1.6808*** (0.0988)	-0.0852 (0.1044)	-0.8214*** (0.0617)	2.7351*** (0.1864)
FARMV	0.0565 (0.1865)	0.1873* (0.1076)	0.2512** (0.1192)	-0.6219*** (0.0824)	0.4976*** (0.1284)
PROCV	0.2862* (0.1781)	0.0031 (0.1019)	-0.3664* (0.1589)	0.3497*** (0.0819)	0.2744* (0.1517)
SUPV	0.0715 (0.1983)	0.5451*** (0.1070)	-1.5823*** (0.2254)	-0.0881 (0.0763)	0.2873** (0.1311)
GOVV	0.6215*** (0.1852)	0.1779* (0.0988)	1.9049*** (0.1055)	1.0623*** (0.0707)	1.0655*** (0.1416)
THRDV	-0.2166 (0.2251)	-0.0031 (0.1042)	0.6889*** (0.1171)	0.3403*** (0.0830)	-0.3826** (0.1621)
Price	-0.6857*** (0.0686)	-0.1728*** (0.0163)	-0.1261*** (0.0200)	-0.0644*** (0.0122)	-0.0927*** (0.0206)
ASCD	-12.9637*** (1.3094)	-3.3540*** (0.3030)	-0.2711*** (0.3001)	-2.5275*** (0.2042)	1.6334*** (0.3572)
Class Probabilities	0.1832 (0.01866)	0.2552 (0.0192)	0.1586 (0.0179)	0.2803 (0.0215)	0.1227 (0.0195)
Log-Likelihood	-3577.488				
Pseudo-R^2	0.23477				

Notes: *indicates significance at p<0.1; ** indicates significance at p<0.5, *** indicates significance at p<0.01.

Incorporating socio-demographic characteristics and attitudinal information (i.e., whether respondents considered pork produced outdoor as safe or unsafe, or whether they were members of animal rights organizations, etc.) failed to improve the statistical performance of the RPL and LCL models. This result is not necessarily surprising and is consistent with several other applications of latent class models to consumer food preferences (Lusk and Hudson, 2004; Nilsson et al., 2006; Tonsor et al., 2008c).

In contrast to the similar estimation from the AROs sample, the LCL statistical analysis for the GP sample revealed five classes, with significant heterogeneity in consumer preferences across latent classes with associated probabilities of 18.32%, 25.52%, 15.86%, 28.03% and 12.27%. As Table 5.6 indicates, the first segment (18.32% of the sample population) has just four coefficients that are significant, including "price", "processor verification", "government verification", plus the intercept. Consumers in this class do not appear to value any of the farm animal welfare attributes. The "price" coefficient in this class is at least three times larger than the similar coefficient from the other four classes, which indicates that members of this class are price sensitive. As such, we refer to this segment as the "price-conscious" group.

The second segment (25.52% of the sample population) displays an interest in all pig welfare attributes, with the exception of "outdoor housing system" which is significant and negative. The "price" coefficient is negative and significant, as expected, but is lower in magnitude than that of the first class. Consumers in this group appear to place a higher value on verification of farm animal welfare assurances, particularly from supermarkets, and this group had the second highest WTP for pork chops sourced from pigs fed without antibiotics (see Table 5.6 for more details). This segment could be referred to as "supermarket trusters".

The third segment (15.86% of the sample population) relies more on verification by the government and, to some extent, farmers and third-parties, and are very distrustful of supermarkets. On balance, they have a relatively higher WTP for "government verification". They appear only marginally interested in farm animal welfare, with a positive valuation of hoop housing systems. This segment could be referred to as "government trusters".

The fourth segment (28.03% of the sample population) is apt to be most influenced by government verification than other sources of verification, while they are distrustful of farmers. The utility coefficient for "no antibiotics" is negative and significant, revealing a relatively high negative WTP estimate for this attribute, along with the negative WTP for the "outdoor housing system". Even though the WTP estimate for the "government verification" in this model is the highest among all five latent classes, since the respondents appear to prefer pork chops sourced from pigs raised in the conventional housing system and fed with antibiotics, other quality attributes likely motivate their purchase decisions. As such, this group could be referred to as the "conventional-pork consumers" segment.

The fifth segment (12.27% of the sample population) reveal a positive WTP for two of the pig welfare attributes – i.e., "sows in groups" and "no antibiotics". The WTP estimates for these two attributes are the highest among the five latent classes of consumers. As regards verification of these attributes, this group of respondents tends to trust the government the most, relative to supermarkets, farmers and processors, and is distrustful of third-party verification. As one can see, the probability of a respondent belonging to this class is very low (i.e., 12.27%). This is not surprising given that very few respondents in the GP sample undertook specific actions to support FAW (see Appendix 10). For instance, less than 20% of the respondents in the GP sample "contacted a politician for an animal welfare issue" or "avoided purchasing meat or eggs because of the way it was produced" or "donated money and goods, or volunteered time to an ARO". By contrast, a larger portion of the respondents in the AROs sample undertook these specific forms of consumer activism to a greater extent (i.e., at least 50% of the sample). We refer to this last class as "animal welfare sensitive".

An interesting observation emerges from comparing the results of the regression analysis (i.e., MNL and LCL models) for the two samples. More specifically, one can observe that the utility parameters for "price" are not significant in the models estimated for the AROs sample, while they are significant in the models estimated for the GP sample. These findings suggest that respondents in the AROs sample are not responsive to the price of pork chops when grocery shopping and the respondents in the GP sample are the opposite. Moreover, the distribution of the consumers' responses to the earlier attitudinal question strengthens this observation.[95] Figures 5.17 and 5.18 reveal that almost 70% of the respondents in the AROs sample consider that the price of pork is "unimportant", "slightly" or "moderately" and, by contrast, 50% of respondents in the GP sample perceive the price of pork as "very" and "extremely" important. Another interesting observation rises from comparing the magnitude of the ASCD coefficient across the five segments of consumers identified by the LCL model in the GP sample. At one end of the spectrum are the "price-conscious consumers" with a negative and significant coefficient for ASCD (i.e., -12.9637) that suggests a negative utility that a respondent in this class associates with not purchasing any of the pork chops described in the purchase simulation. At the other end of the spectrum are the "animal-welfare sensitive consumers" with a positive and significant coefficient for ASCD (i.e., 1.63335) that suggests that a respondent in this class associates positive utility with purchasing any of the pork chops described in the purchase simulation. In between these two classes are the other three segments of consumers – i.e., "supermarket trusters", "government trusters", and "conventional-pork consumers" – with lower magnitude negative coefficients for ASCD. These results suggest a negative utility that a

---

[95] Q3: How important are the following in giving you confidence in the quality of pork you purchase? The possible answers are: 1) Availability of information on labels, 2) Organization verifying quality (e.g. certifying /grading organization), 3) Price of pork.

respondent in any of these three classes associates with purchasing any of the pork chops described in the purchase simulation.

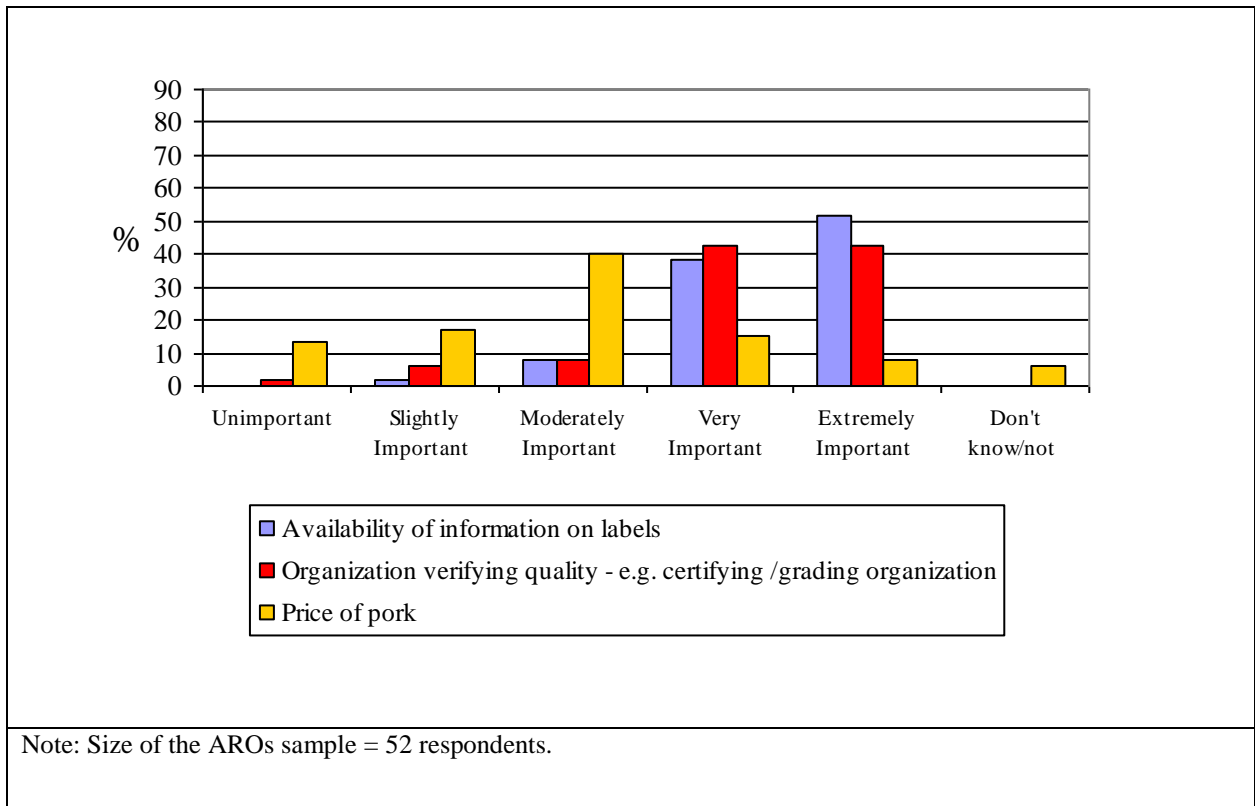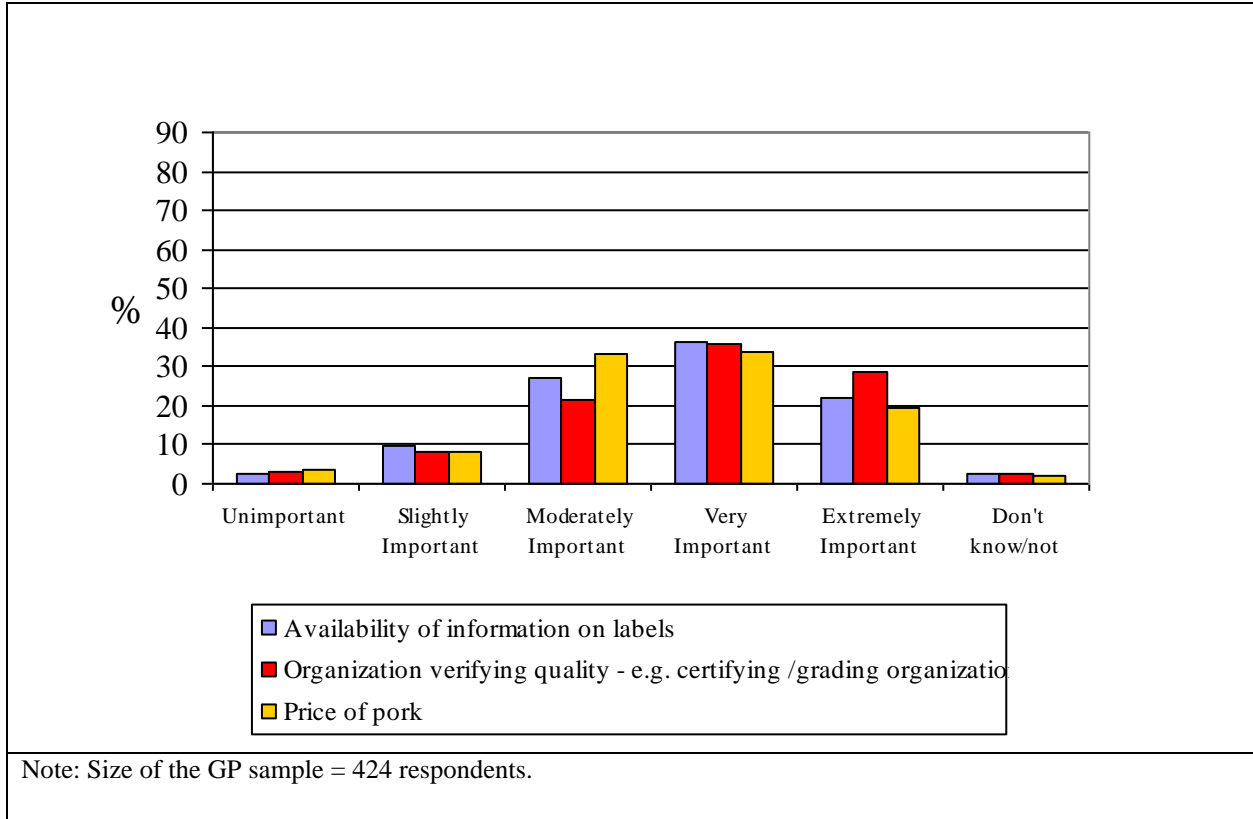**Figure 5.17: Priorities when purchasing pork – Animal Rights Organizations Sample**

Note: Size of the AROs sample = 52 respondents.

Figure 5.18: Priorities when purchasing pork – General Population Sample

Note: Size of the GP sample = 424 respondents.

5.6 Willingness-to-Pay Estimates for Farm Animal Welfare Attributes and Verifying Organizations

Currently, pork marketed by entrepreneurs on the North American market may be differentiated based on flavour, or on production method, or using identity (i.e., Niman Ranch in Minnesota), or purchase experience (e.g., Lobel's of New York), or with functional ingredients such as Omega-3 (i.e., Prairie Orchard Farms. Inc in Manitoba), or using third-party verification (i.e., Aliment Foods Breton in Quebec) (NSDA, 2006). In order to determine the feasibility of producing pork products with such features, pork sellers need to know two important pieces of information, namely: production costs and consumer demand for the pork with value added and FAW attributes. While the cost of production is relatively simple to calculate, by contrast,

estimating consumer demand for pork with FAW products is often more difficult, as there is no other benchmark pork product marketed. Similar information is important for the government as well in considering FAW regulation pertaining to the Canadian pork sector, since an indicator of consumer preferences is needed. Choice experiments are non-linear models and thus the utility coefficients have to be analyzed relative to the utility coefficients of the other attributes in the experiment. Section 4.7 outlined the methodology for calculating WTP estimates. Table 5.7 presents the conditional WTP estimates for the MNL and RPL models calculated as the average of the individual conditional WTP estimates. Each individual's WTP estimate for a given parameter is a ratio of the estimated mean of the individual's estimated distribution, which is conditional on revealed information for each individual including past choices, the alternatives in a choice set, and individual specific characteristics (see Greene, 2007). The standard errors of the conditional WTP values are derived using the delta method developed by Greene (2003, p.674) and utilized by Nilsson (2005) (see Section 4.7). The unconditional WTP estimates calculated for the GP sample and presented in Table 5.8 have been simulated from the RPL estimates presented in Table 5.3 following the methodology outlined by Hensher et al. (2005).

Table 5.7: Conditional willingness-to-pay estimates and 90 percent confidence intervals ($/kg of pork chops)

Variable	MNL Model -Members of AROs Sample	MNL Model – General Population Sample	RPL Model – General Population Sample
OUTDH	-$37.47***	-$2.04***	-$2.01*** (-$2.47, -1.55)
HOOPH	$4.29	$1.08***	$0.90*** ($0.45, 1.35)
GROUP	$21.76***	$3.38***	$3.06*** ($1.88, 4.25)
NANTIB	$44.65***	$2.56***	$2.51*** ($1.38, 3.64)
FARMV	-$8.43	-$0.26	$0.02 (-$0.48, 0.68)
PROCV	-$2.66	$0.48	$0.84** ($0.19, 1.48)
SUPV	$6.74	-$0.38	$0.84 (-$0.66, 0.44)
GOVV	$17.12***	$4.7821***	$4.86*** ($3.12, 6.60)
THRDV	$9.94*	$0.8262*	$0.60* ($0.01, 1.19)

Notes**:** WTP estimates are calculated as a ratio between the parameter estimate for the variable of interest and the parameter estimate for price. *indicates significance at $p<0.1$; ** indicates significance at $p<0.5$, *** indicates significance at $p<0.01$.

Table 5.8: Random Parameters Logit Model - unconditional willingness-to-pay estimates ($/kg of pork chops)

Variable	Mean	St.Dev.	Minimum	Maximum
OUTDH	-2.04	2.79	-9.50	15.44
HOOPH	0.88	3.39	-7.39	6.67
GROUP	3.02	5.80	-19.77	16.43
NANTIB	2.44	5.21	-30.10	29.68
FARMV	0.08	1.43	-6.23	7.05
PROCV	0.82	1.00	-5.49	4.59
SUPV	-0.11	4.35	-1.57	2.06
GOVV	4.81	4.18	-24.81	18.42
THRDV	0.59	0.59	-2.93	2.12

Note: Unit of measure is $/kg.

Table 5.7 reveals that respondents in the AROs sample have a higher WTP for both FAW and

"organization verifying" attributes compared to the similar estimates calculated for the GP

sample. However, these estimates cannot be used to make accurate predictions as regards the demand for pork with FAW attributes by members of the AROs sample, since the "price" coefficient is not significant. As well, the WTP estimates derived for the AROs sample are comparable with the highest level of the "price" attribute (i.e., $19.26/ kg or $8.76/lb) in our choice experiment which is calculated as the average price for "Naturally Raised" boneless pork chops currently sold in Whole Foods' grocery stores in Vancouver and Toronto. The "availability of information on the labels" and "organization verifying quality (e.g., certifying/ grading organization)" are regarded as important by respondents in the AROs sample – giving them confidence in the quality of pork (i.e., more than 80% of the respondents stated that each of these characteristics are "very" and "extremely" important) – while the same pork characteristics are valued by respondents in the GP sample to a lower extent (i.e., almost 60% of respondents in the GP sample agreed that these two factors are "very" and "extremely" important in giving them confidence in the quality of pork they purchase (see Figure 5.18). All of these findings explain why the stated WTP for pork chops with FAW attributes by respondents in the AROs sample are higher than the similar estimates by respondents in the GP sample. An important point to stress is that the WTP estimates are most appropriately interpreted as relative values, not absolute values, given the hypothetical nature of the choice experiment.

As regards the WTP estimates derived for the GP sample, one can see that there is a swing in the WTP estimates derived from the MNL model and the RPL model (see WTP for GROUP, NANTIB and GOVV), which indicates that the latter model is more appropriate to analyze the data and thus the estimates are more reliable. As well, a comparison of the conditional and unconditional WTP estimates derived from the utilities in the RPL model (Table 5.7, last

column, and Table 5.8) reveals that estimates have the same magnitude, which further suggests that deriving estimates conditional upon all information available does not affect WTP significantly.

In this respect, the willingness-to-pay estimates for the LCL model are prone to reveal the latent effect of unobserved consumer characteristics. Unlike the traditional environmental valuation studies, for agribusinesses, however, knowledge of the distribution of WTP is more relevant. For example, consider the case when the entrepreneurs have information just on the mean WTP for value added pork (e.g., pork with Omega-3 or without antibiotics) and assume that this mean is relatively low, but in reality there is a small segment of consumers that have very high WTP. For pork sellers, however, a very profitable niche market may exist where this product can be priced at a premium. Regardless of whether a niche market exists, the profit-maximizing price level may be very different from the mean WTP and the knowledge of the mean WTP alone does little to indicate what the profit-maximizing level might be (Hudson and Lusk, 2004). The WTP estimates from the LCL model are a better alternative. These estimates were calculated according to the methodology outlined in Section 4.7. These estimates are presented in Table 5.9 and are measured in dollars per kilogram of pork chops.

Table 5.9: Willingness-to-pay estimates for the Latent Class Logit model - General Population Sample ($/kg of pork chops)

Variable	Price-Conscious	Supermarket Trusters	Government Trusters	Conventional-Pork Consumers	Animal Welfare Sensitive
OUTDH	-0.10	-4.73***	-2.61***	-3.96***	0.07
HOOPH	0.08	1.54***	2.05***	1.75*	0.07
GROUP	0.34	6.03***	5.42***	6.14***	8.02***
NANTIB	0.28	9.73***	-0.68	-12.76***	29.50***
FARMV	0.08	1.08*	1.99**	-9.66***	5.37***
PROCV	0.42*	0.02	-2.91**	5.43***	2.96*
SUPV	0.10	3.15***	-12.55***	-1.37	3.10**
GOVV	0.91***	1.03*	15.11***	16.50***	11.49***
THRDV	-0.32	-0.02	5.47***	5.29***	-4.13**
Class Probabilities	18.32%	25.52%	15.86%	28.03%	12.27%

Notes: *indicates significance at p<0.1; ** indicates significance at p<0.5, *** indicates significance at p<0.01.

To reiterate, 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. Given this, the results presented above provide an indication of how Canadian consumers value FAW attributes and the verification of these attributes relative to each other. As such, WTP values are most informative when considered relative to each other and not in absolute monetary terms. From this analysis, it seems clear that many respondents (i.e., "government trusters", "conventional-pork consumers" and "animal welfare sensitive") in the GP sample were willing to pay relatively more for government verification of FAW quality attributes than for the other sources of verification. As well, other classes of consumers such as "government trusters" and "conventional-pork consumers" revealed a significant WTP for other types of FAW quality verification such as that provided by third-parties or by supermarkets.

Responses to the FAW attributes were mixed. All classes of respondents revealed a negative WTP for "outdoor housing system" and, by contrast, three classes expressed a small WTP for

"hoop housing system". As well, a positive and significant WTP for "sows in groups" was derived for four classes of consumers – i.e., "supermarket trusters", "government trusters", "conventional-pork consumers", and "animal welfare sensitive". Summing the average class probabilities for these four classes together gives a 81.68% probability that respondents in the GP sample would buy pork chops sourced from pigs raised on farms where sows are kept in groups in pens. Moreover, a positive and significant WTP for the "no antibiotics" attribute was derived for the "supermarket trusters" and the "animal welfare sensitive" groups. At the other end of the spectrum were the "conventional-pork consumers" with a significant negative WTP for pork chops without antibiotics. WTP estimates from the current study are comparable to those previously reported in the literature. The Swedish study by Liljenstolpe (2008a, 2008b) derived a positive premium for the "outdoor housing system" in the RPL model and a mixed (i.e., positive and negative) premium for different classes in the LCL model. By contrast, another Swedish study by Lagerkvist et al. (2006) derived a negative WTP for this attribute based on the utilities estimated in the RPL model.[96] In a similar vein, the US study by Tonsor et al. (2008) reported a positive premium for pork chops labelled "gestation free" calculated based on the utilities estimated with the RPL model and mixed WTP for different classes in the LCL model. Another US study by Nilsson (2005) reported a positive premium for pork chops labelled "certification free of antibiotics" calculated based on the utilities estimated with the RPL model and mixed WTP for different classes in the LCL model.[97]

---

[96] The outdoor attribute was interacted with shopping experience. By shopping experience it is meant that the respondent is responsible for most food purchases in the household (Lagerkvist et al., 2006).

[97] "Certification free of antibiotics" requires that pigs have received no antibiotics through feed or injections during their entire life (Nilsson, 2005).

In conclusion, this section provided an assessment of the strength of consumer preferences for FAW and the value placed on different forms of quality assurance. It is clear that consumers in the AROs sample have stronger preference for FAW compared to the respondents in the GP sample, which is strong evidence of the existence of group B consumers. Additional evidence of group B consumers are the WTP estimates derived for the "animal welfare sensitive" consumer group in the GP sample (i.e., 18.7% probability that a randomly chosen consumer will fall in this class).

5.7 Perceptions of the Trustworthiness of Verification by Different Stakeholders

A final piece of analysis examines whether declared trust in verifying organizations relates to WTP for FAW assurances. The dimensions of trust employed in section three of the pork survey were based on Frewer et al. (2005), Lang and Hallman (2005), and Huffman et al. (2004). Specifically, it is hypothesized that consumers' confidence in these stakeholders depends upon the extent to which they trust different organizations for *accurate information* about FAW, think that these organizations are *knowledgeable*, think that these organizations are *transparent* (open) *and accountable*, and think that these organizations *act according to consumers' best interests* when providing information about the welfare of pigs.

A series of questions in the survey probed respondents' assessment of the verifying organizations on these four dimensions of trust. While in section two of the survey (i.e., the choice experiment), the "verifying organization" attribute included seven stakeholders, namely government, independent third-parties, supermarkets, food processors, and farmers (both individual farmers and farmers' associations), for this component of the analysis, three additional

stakeholder groups were identified: scientific experts in animal welfare, media, and animal rights

organizations. The mean values of respondents' valuations are presented in Tables 5.10 and 5.11.

Table 5.10: Perceptions of organization type to provide "accurate information about the welfare of pigs" - Animal Rights Organizations Sample

Organization Verifying	Mean values (s.d.) by organization type [3,4] "To what extent..."			
	Do you trust...[1]	Are they knowledgeable...[1]	Are they transparent and accountable...[1]	Do they act according to your best interests...[2]
Individual Farmers	2.90 (0.931)	**3.46**[d] **(0.803)**	2.68 (0.844)	**3.04**[d] **(0.791)**
Farmers' Associations	2.67 (0.964)	3.27 (0.866)	2.47 (0.981)	2.86 (0.960)
Food Processor	2.15 (0.849)	2.33 (0.944)	1.88 (0.773)	2.38 (0.901)
Supermarkets	2.59 (0.753)	2.08 (0.763)	2.14 (0.849)	2.65 (0.926)
Government	**2.98**[d] **(0.980)**	2.84 (0.925)	**2.69**[d] **(1.049)**	3.00 (0.929)
Independent Third-Party	**3.96**[a] **(0.676)**	**3.53**[c] **(0.731)**	**3.62**[b/c] **(0.753)**	**3.82**[a] **(0.684)**
Media	2.71 (0.855)	2.21 (0.750)	2.60 (0.984)	2.80 (0.895)
Animal Rights Organizations	**3.73**[c] **(0.910)**	**3.80**[b] **(0.800)**	**3.62**[b/c] **(0.901)**	**3.71**[c] **(0.723)**
Scientific Experts in Animal Welfare	**3.84**[b] **(0.903)**	**4.06**[a] **(0.705)**	**3.76**[a] **(0.662)**	**3.78**[b] **(0.708)**

Notes:
1) Evaluated using a five point visual analogue scale where 1 = not at all, 2 = very little, 3 = somewhat, 4 = very much, and 5 = completely.
2) Evaluated using a five point visual analogue scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = usually, and 5 = always.
3) Participants answering "don't know/not sure" were excluded from the above calculations.
4) The bolded numbers with superscript (i.e., a, b, c, d) represent the first four highest mean ratings.

174

Table 5.11: Perceptions of organization type to provide "accurate information about the welfare of pigs" - General Population Sample

Organization Verifying	Mean values (s.d.) by organization type [3,4] "To what extent..."			
	Do you trust...[1]	Are they knowledgeable...[1]	Are they transparent and accountable...[1]	Do they act according to your best interests...[2]
Individual Farmers	3.06 (0.820)	**3.90[a]** **(0.689)**	3.02 (0.957)	3.31 (0.809)
Farmers' Associations	3.41[d] (0.787)	**3.87[b]** **(0.658)**	3.24[d] (0.900)	**3.41[d]** **(0.870)**
Food Processor	2.84 (0.907)	3.10 (0.854)	2.64 (0.927)	2.94 (0.977)
Supermarkets	2.87 (0.869)	2.57 (0.868)	2.56 (0.929)	2.94 (0.937)
Government	**3.60[a]** **(0.863)**	**3.49[d]** **(0.845)**	**3.28[c]** **(0.953)**	**3.60[a]** **(0.850)**
Independent Third-Party	**3.56[b]** **(0.899)**	3.48 (0.788)	**3.31[b]** **(0.924)**	**3.48[b/c]** **(0.853)**
Media	2.45 (0.929)	2.20 (0.859)	2.39 (1.022)	2.69 (0.970)
Animal Rights Organizations	2.38 (1.070)	2.91 (1.063)	2.56 (1.106)	2.68 (1.081)
Scientific Experts in Animal Welfare	**3.43[c]** **(0.966)**	**3.74[c]** **(0.938)**	**3.43[a]** **(1.015)**	**3.48[b/c]** **(0.969)**

Notes:
1) Evaluated using a five point visual analogue scale where 1 = not at all, 2 = very little, 3 = somewhat, 4 = very much, and 5 = completely.
2) Evaluated using a five point visual analogue scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = usually, and 5 = always.
3) Participants answering "don't know/not sure" were excluded from the above calculations.
4) The bolded numbers with superscript (i.e., a, b, c, d) represent the first four highest mean ratings.

Table 5.10 shows that "independent third-parties" obtained the highest valuation from respondents in the AROs sample in terms of whether respondents trusted the organization in providing accurate information about the welfare of pigs and perceived this organization as acting in their best interest, followed closely by "scientific experts in animal welfare", "animal rights organizations", and lastly by "government" for the trust dimension and "individual

175

farmers" for the best interest dimension. "Scientific experts in animal welfare" were felt to be the most knowledgeable and to be the most transparent and accountable, followed by "animal rights organizations", then "independent third-parties" and again lastly by "individual farmers" for the knowledgeable dimension or "government" for the transparent and accountable dimension. In contrast, Table 5.11 shows that "government" obtained the highest valuation from respondents in the GP sample in terms of whether respondents trusted the organization in providing accurate information about the welfare of pigs, followed closely by "independent third-parties", "scientific experts in animal welfare", and "farmers' associations". "Individual farmers" were felt to be the most knowledgeable, followed closely by "farmers' associations, "scientific experts in animal welfare" and lastly by the "government". "Scientific experts in animal welfare" were felt to be the most transparent and accountable, followed by "independent third-parties", then by the "government" and lastly by "farmers' associations". Finally, "government" received the strongest ranking in terms of "acting in your best interests", followed by "scientific experts in animal welfare" and "independent third-parties" and lastly by "farmers' associations". Even though "media" and "animal rights organizations" are a major source of information on animal welfare, interestingly, they did not score high on these dimensions of trust.

The ranking by respondents in the AROs sample for "third-parties" is consistent with the magnitude of the estimated WTP for FAW verifications by this organization. The same assertion cannot be extended to the rating for "government". For example, the results of the LCL estimations (see Sections 5.5 and 5.6) revealed that respondents in this sample appear to value FAW quality verification by "government". A possible explanation may be the fact that the

AROs respondents are aware of the FAW labelling programs developed by AROs such as the BC SPCA and the WHS (see Appendix 4).

The rankings by respondents in the GP sample for "government" and "third-parties" are consistent with the estimated WTP for FAW verifications by these organizations (see Section 5.6). These results are consistent with similar findings by other studies. For instance, Frewer et al. (2005) find that in the Netherlands, farmers and the government are perceived to be equally accountable regarding their activities, more trustworthy and knowledgeable relative to supermarkets. Huffman et al. (2004) find that people in the US who claimed to be informed about genetic modification before the survey were more likely to trust the government than third-party sources. In a similar vein, Lang and Hallman (2005) examined who the US public trusts in relation to genetically modified food. 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. Another US study by Miller and Unnevehr (2001) finds that pork consumers in Illinois are more likely to trust a food safety program implemented by the USDA rather than an industry certification.[98] Lastly, Kjaernes and Lavik (2007) surveyed consumers in a number of European countries to elicit their perceptions on FAW and levels of trust. They find a clear differentiation with respect to perceptions of truth-telling in the case of an animal welfare scandal. Specifically, they find that food experts, consumer organizations, animal protectionists, and food authorities generally were the most trusted to provide truthful information. Similarly, the "scientific experts in animal welfare", in our survey, received high mean scores. Results from this study are the closest to our findings.

---

[98] Miller and Unnevehr (2001) conducted a telephone survey on a sample of 609 consumers living in Illinois and assessed their perceptions of food safety with respect to pork consumption.

In conclusion, the results presented in this section imply that there are stakeholders that are best suited to provide FAW quality assurances in the Canadian pork sector. "Government", "independent third-parties" and "scientific experts in animal welfare" obtained high mean ratings by respondents in both samples. Probably these stakeholders could be assumed to be objective and to provide both positive and negative information about the welfare of pigs. In contrast, "supermarkets" and "food processors", which obtained low mean ratings, may be perceived as having a vested interest, as they may disseminate just the positive information about the welfare of pigs. "Individual farmers" obtained the highest valuation from respondents in the GP sample in terms of their knowledge about the welfare of pigs as did "farmers' associations". As well, "individual farmers" obtained the fourth rating from individuals in the AROs sample in terms of their knowledge about the welfare of pigs and "acting in your best interests". However, the latter two stakeholders along with "supermarkets" and "food processors" obtained the lowest ratings from respondents in both samples as regards the other trust dimensions. In order to obtain similar levels of trust as "government", "third-parties" and "scientific experts in animal welfare", these stakeholders have to concentrate their efforts on improving their image among consumers so as to develop a positive reputation.

5.8 Results of the Ordered Probit Analysis

Using the data from Tables 5.10 and 5.11, an ordered probit (OP) analysis was conducted to ascertain the degree to which a stakeholder is perceived as *knowledgeable*, *transparent* (open) *and accountable*, and *acting according to consumers' best interests* when providing information about the welfare of pigs and to explain the respondents' trust in each stakeholder. Thus, individual regressions for each of the nine stakeholders were estimated.

The dependent variable in each of the nine regressions represents the extent to which respondents trust a stakeholder for accurate information about the welfare of pigs; answers were coded as ordinal data from 0 to 4 (0 = not at all, 1 = very little, ..., 4 = completely). Independent variables are the responses to the other three dimensions of trust eliciting respondents' opinions on the extent to which they think that these stakeholders are *knowledgeable*, are *transparent* (open) *and accountable*, or act *according to respondents' best interests*, as described in Tables 5.10 and 5.11. The answers to these questions were treated as continuous and assumed to be linear. For instance, the difference between a "not at all" and "very little" response is assumed to be the same as the difference between the response "very little" and the response "somewhat". Results of the OP analysis for the two samples are included in Appendices 11 and 12. The OP models for organizations such as "third-parties" and "animal rights organizations" in the AROs sample could not be estimated because of insufficient variation in the dependent variable.

The models estimated for both samples were a good fit, with pseudo adj-R^2 taking values between 0.23 and 0.36, except for the model estimated for "media" where the corresponding value of the pseudo adj-R^2 does not fall within this range (i.e., 0.176). It is likely that other

factors explain respondents' trust in "media". In general, the parameters of the independent variables are significant at any given level of significance (i.e., 1%, 5% and 10%) and of the expected sign, which indicates that each of the three dimensions of trust explains why consumers trust a particular stakeholder.

A parameter value in a probit model does not estimate the change in the probability of a given outcome due to a change in the relevant explanatory variable. As a result, marginal effects must be calculated. The estimates of the marginal effects for the two sets of models are reported in Tables 5.12 and 5.13, and represent the change in the probability of choosing a given level of trust by increasing one from the mean for each independent variable. Significant positive changes in selecting a given level of trust are highlighted with bold numbers. The larger are these values, the higher is the likelihood that a dimension influences a respondent's tendency to trust a stakeholder.

Table 5.12: Marginal effects of the probability of selecting a given level of trust – Animal Rights Organizations Sample

Level of Trust	Not at All (0)	Very Little (1)	Somewhat (2)	Very Much (3)	Completely (4)	Mean
Individual Farmers						
Knowledge	-.0098***	-.1052***	.0122	**.0855***	.0174***	3.46
Transparent and Accountable	-.0202***	-.2148***	.0250	**.1745***	.0355***	2.68
Best Interest	-.0083**	-.0886***	.0103	**.0720***	.0146**	3.04
Farmers' Associations						
Knowledge	-.0335***	-.2283***	.1225***	**.1360***	.0033**	3.27
Transparent and Accountable	-.0170***	-.1155***	.0619***	**.0688***	.0017**	2.47
Best Interest	-.0135**	-.0917**	.0492**	**.0546**	.0013*	2.86
Food Processor						
Knowledge	-.1080***	-.0770**	**.2456***	.0148***	n.e.	2.33
Transparent and Accountable	-.0249	-.0156	.0499	.0030	n.e.	1.88
Best Interest	-.0423***	-.0446*	**.1423***	.0086***	n.e.	2.38
Supermarket						
Knowledge	-.0327***	-.2928***	**.2330***	.0925***	n.e.	2.08
Transparent and Accountable	-.01293**	-.1158***	**.0921***	.03657**	n.e.	2.14
Best Interest	-.00894*	-.0801**	**.0637**	.02529**	n.e.	2.65
Government						
Knowledge	-.0202***	-.2309***	.0497	**.1833***	.0181***	2.84
Transparent and Accountable	-0.0035	-0.0403	.0087	.0320	0.0032	2.69d
Best Interest	-.0088**	-.1008***	.0217	**.0800***	.0079**	3
Media						
Knowledge	-.0540***	-.2179***	.1034***	**.1685***	n.e.	2.21
Transparent and Accountable	-.0104	-.0421	.0200	.0326	n.e.	2.6
Best Interest	-.0199**	-.0801**	.0380*	**.0620**	n.e.	2.8
Scientific Experts in Animal Welfare						
Knowledge	.357911D-04	-.0235**	-.1031***	.0493	**.0773***	4.06
Transparent and Accountable	.219955D-04	-0.0120	-0.0517	0.0247	0.0388	3.76
Best Interest	.657709D-04	-.0468***	-.2055***	0.0983	**.1541***	3.78

Notes: ***, **, * = Significance at 1%, 5%, 10% level. n.e. = not estimated (OP estimations for "third-parties" and "animal rights organizations" could not be performed due to insufficient variation in the dependent variable).

Table 5.13: Marginal effects of the probability of selecting a given level of trust – General Population Sample

Level of Trust	Not at All (0)	Very Little (1)	Somewhat (2)	Very Much (3)	Completely (4)	Mean
Individual Farmers						
Knowledge	-.0064***	-.0927***	-.0230***	**.1077*****	.0144***	3.9
Transparent and Accountable	-.0045***	-.0651***	-.0162**	**.0757***	.0101***	3.02
Best Interest	-.0075***	-.1085***	-.0270***	**.1260***	.01692***	3.31
Farmers' Associations						
Knowledge	-.0019***	-.0323***	-.1761***	**.1924***	.0180***	3.87
Transparent and Accountable	-.0019***	-.0325***	-.1770***	**.1934***	.0181***	3.24
Best Interest	-.0016***	-.0280***	-.1527***	**.1668***	.01560***	3.41
Processor						
Knowledge	-.0148***	-.0716***	.0308***	**.0519***	.0036***	3.1
Transparent and Accountable	-.0284***	-.1378***	.0593***	**.0999***	.0070***	2.64
Best Interest	-.0230***	-.1116***	.0480***	**.0809***	.0056***	2.94
Supermarket						
Knowledge	-.0170***	-.1233***	.0435***	**.0924***	.0044***	2.57
Transparent and Accountable	-.0152***	-.1104***	.0390***	**.0827***	.0039***	2.56
Best Interest	-.0151***	-.1097***	.0387***	**.0822***	.0039***	2.94
Government						
Knowledge	-.0020***	-.0173***	-.2229***	**.1938***	.0483***	3.49
Transparent and Accountable	-.0013***	-.0110***	-.1422***	**.1237***	.0308***	3.28
Best Interest	-.0019***	-.016109***	-.2080***	**.1808***	.0451***	3.6
Third-Party						
Knowledge	-.0038***	-.0448***	-.1523***	**.1501***	.0507***	3.48
Transparent and Accountable	-.00416***	-.04937***	-.16773***	**.1654***	.0559***	3.31
Best Interest	-.0017***	-.0207***	-.0702***	**.0693***	.0234***	3.48
Media						
Knowledge	-.0974***	-.2171***	**.2608***	.0508***	.0029***	2.2
Transparent and Accountable	-.0333***	-.0743***	**.0893***	.0174***	.0010***	2.39
Best Interest	-.0390***	-.08696***	**.10446***	.0203***	.0012***	2.69
Animal Rights Organizations						

Knowledge	-.1165***	-.1447***	**.2214***	.0390***	.0007***	2.91
Transparent and Accountable	-.0556***	-.0691***	**.1057***	.0186***	.0003***	2.56
Best Interest	-.1083***	-.1345***	**.2059***	.0363***	.0007***	2.68
Scientific Experts in Animal Welfare						
Knowledge	-.0073***	-.0683***	-.2503***	**.2738***	.0521***	3.74
Transparent and Accountable	-.0026***	-.0248***	-.0909***	**.0994***	.0189***	3.43
Best Interest	-.0027***	-.0257***	-.0941***	**.1029***	.0196***	3.48

Note: ***, **, * = Significance at 1%, 5%, 10% level.

The results presented in these tables reveal that the three dimensions of trust are not of equal importance to respondents' perception of a stakeholder as a trustworthy source of information. The largest values in Tables 5.12 and 5.13 indicate the 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 organization are perceived. Knowledge is more important in predicting the AROs members' trust in "media", "government", "supermarkets", "food-processors", and "farmers' associations" than, for example, "individual farmers" and "scientific experts in animal welfare". In contrast, "transparent and accountable" and "best interest" are more important in predicting the AROs members' trust in latter stakeholders, that is "individual farmers" and "scientific experts in animal welfare", respectively. In a similar vein, "knowledge" is the most important factor in predicting GP sample respondents' trust for "government", "media", "animal rights organizations", "scientific experts in animal welfare", and "supermarkets" than, for example, "independent third-parties", "food processors", and "individual farmers" and "farmers' associations". In contrast, "transparent and accountable" is more important in predicting the GP sample respondents' trust for "independent third-parties" and "farmers' associations", while acting in consumers' "best interest" is more likely to increase

GP sample respondents' trust in "individual farmers". An interpretation of these results for the GP sample is that if a supermarket is perceived to be knowledgeable about the welfare of pigs, it is more likely to be trusted than a supermarket that does not exhibit this knowledge. Similarly, respondents perceiving government or animal rights organizations to be more knowledgeable are more likely to express a higher level of trust in these organizations. These results provide an indication of how sensitive respondents' trust ratings of an organization are to changes in their perceptions of an organization's competencies. In a similar vein, a Canadian study by Innes (2008) found that trust in government and third-party organizations is likely to be most affected by consumers' perception of their knowledge of farming methods. Trust in farmers is likely most affected by their perceived transparency and accountability. Trust in food processors is likely most affected by the extent to which they are seen to represent consumers' best interests.

To fully understand how much effort is required for specific stakeholders to achieve equal levels of consumer trust would require a much more complex data gathering exercise to summarize various events that build or deteriorate trust over time. 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 the welfare of pigs. While Tables 5.12 and 5.13 provide an indication of the sensitivity of respondents' trust in an organization according to the analyzed factors, it does not disclose how sensitive these dimensions of trust are to outside shocks and is by nature a "snapshot in time". Though it is related to food safety, it is likely that the listeriosis outbreak, which occurred at Maple Leaf processing facility in Toronto in the summer of 2008, affected consumers' trust in the organizations involved in the Canadian meat inspection system. This event occurred after the survey has been conducted. Thus, if the survey was conducted after this

event, it might lead to different results – i.e., the respondents' propensity to trust a stakeholder for accurate information about the welfare of pigs may be driven or stated in conjunction with their perceived knowledge of food safety – and thus some stakeholders might be perceived differently than in the *snapshot*.

In conclusion, the major finding of this section is that an increase in the respondents' perceived level of knowledge of each stakeholder about the welfare of pigs is likely to have the most impact on the perceived level of trust in the particular stakeholder. This information provides guidance regarding the directions in which these stakeholders should concentrate their efforts to improve their reputation among Canadians as regards their overall image as a credible source for information about the welfare of pigs.

5.9 Conclusions

This chapter reported the results of the pork survey which was tested on two samples of consumers: a general population (GP) sample across Canada and a sample of animal rights organizations (AROs) members. Thus, it was hypothesized that these two samples of respondents are a reasonable approximation of the two categories encapsulated in the theoretical analysis. Recall that in the graphical analysis from Chapter 3, consumers were divided into two groups according to their preferences for pork. A first group, A, included consumers who are indifferent between conventional pork (CP) and friendly pork (FP), while a second group, B, included individuals who prefer FP to CP. Implicit in this assumption is also the notion that group B consumers are more likely to lobby for stricter (perhaps mandatory) animal welfare standards. It was considered that group B consumers perceive FP as being of higher quality than CP. It was

concluded that consumer preference research in a Canadian context is strongly needed to identify the extent to which Canadians comprise the group A and group B consumers, and the strength of preferences of each group. Thus, the price sensitivity of each group is also relevant.

The descriptive statistics from individual questions that elicited consumer knowledge of current pig farming practices, awareness of FAW issues, and opinions on the current status of FAW in Canada revealed expected results. It was found that respondents in the AROs sample are more likely to disagree and strongly disagree with the assertion that the current level of pigs' welfare in Canada is acceptable, whereas, in contrast, respondents in the GP sample were found to agree and strongly agree with this statement to a considerable extent (35%). A general finding of this section is that respondents in the GP sample are not knowledgeable about farming practices – i.e., almost a half of the respondents in this sample could not say whether they are aware of how the pigs are raised or that they are aware of FAW issues, respectively (i.e., 45% and 42% of the GP sample).

This assumption that group B consumers prefer FP to CP was first tested by eliciting opinions on whether "meat from pigs raised with higher welfare standards is healthier for me" or "meat from pigs raised with higher welfare standards tastes better" or "meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness". As shown in Section 5.3.2 (see Figures 5.8 and 5.9), respondents in the AROs sample were more likely to believe that meat from pigs raised with higher welfare standards was healthier and tastier and less likely to have food safety concerns than respondents in the GP sample. As well, this section revealed that almost a third of the respondents in the GP sample are neutral as

regards these three statements (see Figure 5.8). These figures confirm the existence of group A consumers, who are largely indifferent between FP and CP. As well, it was found that respondents in AROs sample are more likely to lobby the government for stricter (perhaps mandatory) animal welfare standards or to agree with the statement that the "food companies that monitor how farmers treat their animals are doing the right thing". Lastly, the descriptive part of this chapter found that respondents in both samples are aware that "higher welfare standards may lead to an increase in meat prices".

Sections 5.5 and 5.6 presented the results of the LCL estimations, which allowed discrete market segments of respondents to be identified. It was found that the GP sample can be divided into five classes of consumers differentiated with respect their preferences for FAW, verifying organization, and their sensitivity to price. More than two thirds (i.e., 80%) of the respondents in the GP sample are likely to value pork chops sourced from pigs raised on farms where sows are kept in groups in pens. As well, one third of the respondents in the GP sample (i.e., 37.79%) are likely to value pork chops without antibiotics and two thirds (i.e., 69.41%) would pay a small price premium for pork chops sourced from pigs raised on farms where pigs are raised in hoop housing system. As expected, respondents in the AROs sample revealed a higher valuation of pork chops without antibiotics, or sourced from pigs raised on farms where sows are kept in groups in pens or pigs raised in hoop housing system, but not from pigs raised outdoors. Moreover, the latter respondents are not price sensitive as regards purchases of livestock and poultry products with FAW attributes which suggests that they would not suffer large utility losses from higher pork prices that resulted from more stringent AW standards. Section 5.5 revealed that members of the AROs sample are less likely to consider price as the main indicator

of the quality of pork, but rather information on the packaging and verifying organization (see Figures 5.17 and 5.18). In addition, the low magnitude of the utility coefficients for price and intercept for the MNL and LCL estimations for the members of the AROs sample are another indication of their insensitivity as regards the price of products with FAW attributes (see Tables 5.3 and 5.5 in Sections 5.4. and 5.5, respectively). Price effects are therefore not likely to deter this group from lobbying for stricter AW standards. In contrast, similar results of the LCL model estimated for the GP sample revealed that the price coefficient across the five segments of consumers has a higher magnitude, which indicates that respondents in this sample are more likely to be price sensitive. In a similar vein, the large negative values of the coefficients for the constant term (i.e., ASCD) estimated for four of the five segments of consumers identified by the LCL model indicate the negative utility that a respondent associates with not purchasing any of the pork chops described in the purchase simulation. "Government verification" of the AW attributes was most valued by respondents in the GP sample who obtained the most utility from this type of verification. Results in Section 5.7 revealed why "government" and "third-party" verifications are most valued, as questions probing respondents' trust in various verifying organizations showed significant differences in the ratings between "government" and "third-parties" compared to the other stakeholders. As trust in "government" and "third-party" verification is found to coincide with WTP for verification provided by these organizations, it is likely that respondents see these verifications as more credible. It is clear that the value associated with these verifications stems from a perception that the verification is credible based on the factors examined in the current study, namely: the extent to which consumers think that these stakeholders are *knowledgeable*, are *transparent* (open) *and accountable*, or act *according to respondents' best interests* in providing information about the welfare of pigs. Among these

188

three factors, the extent to which consumers think that these stakeholders are knowledgeable is the one that enhances the respondents' trust in a particular stakeholder about the provision of information on the welfare of pigs.

CHAPTER 6: SUMMARY AND CONCLUSIONS

This sixth and final chapter summarizes the objectives and the major findings of the previous chapters. Research findings resulting from the descriptive chapter with the overview of FAW, the theoretical chapter with graphical analysis, and the consumer survey are summarized to provide the reader with a general idea of the main conclusions. Policy implications derived from these conclusions are explored. Limitations pertaining to the research methodology are discussed to explain the applicability of the conclusions. Lastly, suggestions for future research arising from this thesis are made.

6.1 Objectives and Methodology

The primary objective of this thesis was to assess Canadian consumers' preferences for FAW attributes and quality verification provided by different stakeholders. In particular, the thesis aimed to elicit and/or estimate 1) consumers' perception of the current status of FAW in Canada, 2) consumers' WTP for alternative livestock production methods (i.e., pig farming methods), 3) consumers' WTP for FAW quality assurances provided by different stakeholders involved in the Canadian pork sector (i.e., government, agricultural producers, producer associations, downstream food firms, or a third-party enterprise), 4) whether declared trust in verifying organizations relates to WTP for the assurances provided for FAW attributes, and 5) whether Canadian consumers are heterogeneous, that is the extent to which Canadians comprise two groups of consumers with and without preferences for FAW, and the strength of preferences of each group. In order to achieve these goals, an overview of FAW was first provided by reviewing the approaches used in defining FAW and summarising the corresponding legislation enacted in developed countries. The thesis then analyzes the relation between consumers and

FAW as a credence attribute, and the role of various stakeholders and the appropriate mechanisms that can be used to address deficiencies related to FAW in the market place. A social welfare analysis of the Canadian market for animal friendly pork was presented under different scenarios with respect to the strength of consumer preferences, the existence of voluntary standards versus mandatory standards, and a varying level of credibility in these standards. Lastly, a stated preference consumer survey was tested on two samples of pork consumers, namely: a general population sample drawn from across Canada and a sample of animal rights organizations members who were expected to have stronger preferences for FAW. Thus, it was hypothesized that the two samples of respondents are a reasonable approximation of these two categories encapsulated in the theoretical analysis in Chapter 3. The data from the survey were analyzed using a number of regression analysis techniques, including: Multinomial Logit model, Random Parameters Logit model, Latent Class Logit model, and Ordered Probit model. The analysis of the survey data permitted an empirical assessment of some of the assumptions made in Chapter 3, as well as an assessment of consumer preferences for specific FAW attributes and quality assurances.

6.2 Summary of Research Findings

Chapter 2 revealed that from the consumer's perspective FAW practices are credence attributes: consumers cannot determine through inspection at the point of purchase nor through experience after consumption, whether the livestock or poultry products were sourced from animals raised in friendly ways. For example, when the consumer sees a package of pork chops or a carton of free-range eggs in the grocery store, he/she cannot determine whether sellers have sourced these products from farms that used production methods designed to enhance FAW. This is not

possible even after the consumption of the pork chops or free-range eggs. Since consumers cannot assess whether the livestock or poultry product incorporates the FAW attributes advertised by the sellers, the latter have an opportunity to supply false information to consumers. This is a classical case of information asymmetry. Legislation, codes of practice, and labelling are the main mechanisms that can address market deficiencies for FAW products. Various authors stressed the importance of a trusted certification in the context of labelling credence goods such as organic, environmental goods, and animal welfare (see Section 2.4). Credible labelling also requires effective implementation of a farm monitoring system for FAW-oriented products by a credible investigator, independent of whether this is imposed voluntarily or through statutory requirement, and involves a universally agreed definition of the FAW attribute. All of these mechanisms are aimed at providing appropriate levels of FAW in the Canadian market place and helping consumers to make informed choices about the quality of the food they buy. In the Canadian context, various stakeholders in the livestock and poultry supply chain – i.e., government, private producers, downstream firms, and independent third-parties – can play different roles in FAW standard setting, testing, certification, and enforcement.

Governments can legislate minimum animal welfare standards. Chapter 2 provided several examples of the legislative approaches adopted in various countries. The analysis revealed a stronger tendency toward proscriptive mandatory standards in the EU and some other European countries than that present in Canada, the US, or Australia. Rather than legislative minimum standards, codes of practice (i.e., recommended codes of practice for all major farm species developed and released by the AAFC in the 1980s) are often a basis for the FAW strategies of livestock and poultry industries in Canada. In parallel, private enterprises – i.e., processors,

retailers, restaurant chains, and third-party organizations (e.g., the BC SPCA or the WHS) – have their own FAW industry codes of practice which are, in general, more stringent than the AAFC/producer groups' codes of practice. In the absence of public standards and enforcement, the private sector needs to bear responsibility for setting and enforcing standards if there is a genuine demand for FAW products from consumers. The phasing-in by CEMA of higher welfare standards for egg producers (i.e., voluntary adoption of increased space per hen in battery cages starting April 1, 2008) suggests that there may be an ongoing shift in responsibility for FAW from the public to the private sector in Canada. The economic analysis presented in Chapter 4 predicts that a voluntary standard that is credible would yield the highest social welfare. The key element here is credibility – welfare gains dissipate in the absence of credibility. As also noted in Chapter 4, voluntary standards allow heterogeneous consumers to choose between different combinations of price and quality according to their preferences.

Labels are a final mechanism the agri-food industry and governments use to help consumers make informed choices. Canada does not currently have a government-sanctioned quality label or quality assurance process that would verify assurances to consumers that livestock and poultry products have been sourced from animals raised on farms using production methods that enhance animal welfare. Is public accreditation of a quality label necessary? This thesis notes in Chapter 2 several incidences of firms that already use labels and third-party verification to achieve market premiums – e.g., Aliments Breton Foods in the case of pork production or Burnbrae Farms in the case of egg production. Clearly there exists a subset of consumers who are willing to pay for FAW products. The consumer analysis in Chapter 5 identified significant

heterogeneity in consumer attitudes and the existence of a subset of consumers who appear to be willing to pay premiums for FAW assurances.

The literature review conducted in Chapter 3 concluded that consumers are heterogeneous in their preferences, values, and attitudes, and therefore in their expectations for food products. Another conclusion that emerged is that there is a need for a credible quality assurance system in the context of credence goods such as animal welfare. The extent of mislabelling by sellers and the degree of consumers' trust in the FAW quality assurance is one of the factors that influence the relative welfare ranking in different market scenarios from the welfare analysis. The graphical analysis from Chapter 3 divided consumers into two groups to their preferences for pork with AW attributes. A first group, A, included consumers who are indifferent between conventional pork and friendly pork, while a second group, B, included individuals who prefer friendly pork to conventional pork. Implicit in this assumption is also the notion that group B consumers are more likely to lobby for stricter (perhaps mandatory) animal welfare standards. It was considered that the group B consumers perceive friendly pork as being of higher quality than conventional pork. Based on these assumptions, the graphical analysis in Chapter 3 predicts that a situation of voluntary labelling that is relatively credible will maximize the welfare that accrues to all players on the Canadian pork market. In addition, this scenario allows heterogeneous consumers to choose between different combinations of price and quality according to their preferences.

Understanding the factors that enhance or constrain the credibility of a voluntary quality label is critical to this welfare outcome and a key topic for the consumer analysis whose results are

presented in Chapter 5. Also, key to determining the size of the relative welfare gains and losses is the extent to which consumer preference heterogeneity exists with respect to FAW (i.e., the existence of group A and group B consumers). It was concluded that consumer preference research in a Canadian context is needed to identify the extent to which Canadians comprise the group A and group B consumers, and the strength of preferences of each group. Thus, the price sensitivity of each group is also relevant. The analysis in Chapter 5 also examines whether Canadian consumers associate improvements in FAW with higher meat prices and, if so, are they willing to accept such price increases, taking into account the heterogeneity highlighted above? Information on which alternative production techniques (i.e., housing system, gestation stalls vs. sows in groups, and subtherapeutic vs. therapeutic use of antibiotics) Canadians perceive as being the most important for delivering higher levels of FAW informs the analysis. Moreover, insights into consumers' valuation of alternative methods of quality verification (i.e., government, farmers, producer associations, downstream food firms, or a third-party enterprise) were supposed to shed light on the extent to which voluntary (vs. mandatory) quality assurances are credible.

Chapter 4 concluded that choice experiment consumer surveys were the most appropriate method to elicit consumers' preferences for FAW and quality assurances for the purposes of this study. This research method allows for multi-attribute valuation and permits the measurement of trade-offs among numerous attributes. Another major advantage of the choice experiment is that it more closely mimics consumers' typical shopping experiences choosing one product from several competing options and the use of a no-choice option which enhances the realism of the experiment.

As expected, results presented in Chapter 5 revealed that respondents in the AROs sample are more likely to disagree and strongly disagree with the assertion that the current level of pigs' welfare in Canada is acceptable whereas, in contrast, respondents in the GP sample were found to agree and strongly agree with this statement to a certain extent. A general finding of this section is that respondents in the GP sample are not knowledgeable about farming practices – i.e., almost a half of the respondents in this sample could not say whether they are aware of how pigs are raised or that they are aware of FAW issues, respectively (i.e., 45 % and 42% of the respondents in the GP sample). As well, in the graphical analysis from Chapter 3 consumers were divided into two groups according to their preferences for pork with AW attributes. As shown in Section 5.3.2 (see Figures 5.8 and 5.9), respondents in the AROs sample were more likely to believe that meat from pigs raised with higher welfare standards was healthier and tastier and less likely to have food safety concerns than the respondents in the GP sample, which is a clear indication of the existence of group B consumers. As well, this section revealed that almost a third of the respondents in the GP sample are neutral as regards these three statements (see Figure 5.9). These figures confirm the existence of group A consumers, who are largely indifferent between friendly pork and conventional pork.

As expected, in Section 5.4 the results of the Multinomial Logit and Random Parameters Logit models revealed that respondents in the AROs sample have homogeneous preferences with respect to FAW. The estimations revealed that a Random Parameters Logit model is not suited to analyzing the GP sample respondents' preferences for FAW. Instead, Sections 5.5 and 5.6 presented the results of the LCL estimations, which allowed discrete market segments of respondents to be identified. As expected, respondents in the AROs sample revealed a higher

196

valuation of pork chops with FAW attributes, though not for all attributes (i.e., outdoor housing system). While the therapeutic use of antibiotics is the most important attribute delivering higher levels of FAW in the AROs sample, in contrast, sows kept in groups in pens is the most important attribute delivering high levels of FAW in the GP sample. Government verification of the animal welfare attributes was most valued by respondents in the GP sample who obtained the most utility from this type of verification. As well, it is likely that more than one third (i.e., 43.89%) and less than one third (i.e., 22.52%) of the respondents in the GP sample value verifications by independent third-parties and supermarkets, respectively. In a similar vein, there is an equal chance that respondents in the AROs sample value government and third-party verifications of the animal welfare attributes.

Results in Section 5.7 revealed why government and third-party verifications are most valued, as questions probing respondents' trust in various organizations showed significant differences in the ratings between government and third-parties compared to other stakeholders. Scientific experts in animal welfare obtained comparable ratings with the government and third-parties. As trust in government and third-party verifications is found to coincide with willingness-to-pay for verifications provided by these organizations, it is likely that respondents see these verifications as more credible. It is clear that the value associated with these verifications stems from a perception that the verification is credible based on the factors examined in the current study, namely: the extent to which they think that these stakeholders are *knowledgeable*, are *transparent* (open) *and accountable*, or act *according to respondents' best interests* in providing information about the welfare of pigs. Among these three factors, the extent to which they think

197

that these stakeholders are knowledgeable most enhances the respondents' trust in a particular stakeholder.

6.3 Policy and Marketing Implications

The analysis revealed that consumers are not homogenous in their attitudes toward FAW. This is important from a policy perspective if those with strong preferences are more vocal lobbyists for changes to FAW regulations. Cleary, if policy is responsive to lobbyist pressure from a subset of consumers with strong preferences, there is a risk of 'over-regulating' the provision of animal welfare. On the other hand, if the more vocal consumer minority in fact represents a latent preference for higher animal welfare standards and more credible labelling, then the market may be under-providing this quality attribute. The initial results from this study confirm that there are two broad groups of consumers with respect to preferences for FAW, and provide some evidence as to the strength of preferences of each group.

The welfare analysis presented in Chapter 3 suggests that regulatory minimum standards for animal welfare (i.e., a ban on the use of gestation stalls or the use of antibiotics – see Case 5 with mandatory friendly production standard and autarky) will result in a lower level of social welfare. That is, the Canadian pork industry must incur higher production costs to comply with the mandatory regulation and all consumers have to pay substantially higher prices for pork when only some of them have stronger preferences regarding FAW. These conclusions are supported by several empirical studies undertaken in other countries with a longer experience than Canada with respect to regulation of FAW (Liljenstolpe, 2008c, in Sweden; Tonsor et al., 2008, in the US; and Trewin, 2002, analyzing a similar situation for Switzerland). Linking back

to the six market outcomes analyzed in Chapter 3, it is clear that group B consumers (i.e., members of AROs) have incentives to lobby the government to enact higher FAW standards. In this respect, Case 5 – mandatory friendly production standard and autarky – is one that is welfare enhancing for group B consumers, but to the detriment of group A (i.e., conventional-pork consumers). The latter are confronted with a restriction on their food choices. The findings of the Latent Class Logit model estimated for the GP sample in Sections 5.5 and 5.6 of the thesis reveal that there is a 82% likelihood for consumers (i.e., price-sensitive, supermarket trusters, government trusters, and conventional-pork consumers) to derive negative utility if they purchased any of the pork chops described in the purchase simulation.

Results from this thesis also suggest that there are potential marketing opportunities for pork chops sourced from pigs raised on farms where sows are kept in groups and antibiotics are used only for therapeutic purposes. Private industry should investigate whether this information could be included in their marketing strategies. As well, quality assurances provided by government and third-parties are the most credible among Canadian consumers. In addition, the results suggest that consumers would derive benefits from the government taking a more active role with respect to validating FAW quality assurances.

6.4 Limitations of the Research

Practical limitations of this project confined its scope. The online survey was conducted only in English with 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 trade-offs that consumers make between three FAW attributes – i.e., housing system (conventional vs. hoop vs. outdoor), gestation stalls (vs. group pens), antibiotics (therapeutic vs. subtherapeutic use) – as well as the quality verifying organization (i.e., government vs. private industry vs. independent third-party), and price for one product (i.e., pork chops). Subsection 5.3.1, which presented the results of the frequency of purchasing "natural poultry or livestock products in the last three months", revealed that natural pork was among the least consumed products by respondents in both samples; in contrast, poultry products with FAW attributes such as free-run and free-range eggs or free-range chicken were consumed the most. It is unclear how consumers would respond if presented with the latter products, or a larger number of FAW attributes. Including FAW attributes that consumers are more familiar with may result in consumers making more realistic trade-offs in the discrete choice experiment and produce more accurate estimates of willingness-to-pay for FAW attributes. In this respect, the thesis did not make use of semi-structured in-depth interviews with groups of consumers. It may have been possible that other FAW attributes (i.e., transportation or slaughter of pigs, some veterinary practices such as castration or tooth clipping or tail docking) may have emerged to be the most important in consumers' perception as delivering higher levels of FAW.

Further, in the choice experiment it was hypothesized that the quality of pork is primarily comprised of FAW attributes which may not be entirely true; in reality, there may be other factors (i.e., physical attributes such as meat colour, fat colour, marbling, meat texture, flavour, tenderness, and juiciness) that consumers value. Lastly, one has to take into consideration respondents' knowledge of pig production practices and awareness of FAW issues. As it was

200

shown in Section 5.3.2, a significant portion (i.e., 45% on average) of respondents in the GP sample provided a negative self-assessment with respect to awareness of how pigs are raised or of FAW issues.

The format of the survey – an online survey – may be less realistic than an experiment carried out in the grocery store, as substitute goods and a budget constraint (i.e., experimental auction method) are more prevalent in a normal shopping environment (see the discussion in Subsection 4.3). Nevertheless, it is difficult to do this type of analysis without the physical presence of products with those specific attribute combinations. As a result of the survey methodology, the willingness-to-pay estimates presented in this thesis should be regarded as optimistic values for Canadian consumer preferences for FAW, and should be interpreted as relative rather than absolute values. One of the primary issues surrounding the credibility of an elicitation technique is that of incentive compatibility.

Trust in the stakeholders pertaining to the provision of information on the welfare of pigs was conceptualized and assessed using an ordered probit analysis according to three criteria: knowledge, transparency, and acting in consumers' best interests. These factors, however, did not entirely explain consumers' trust in certain stakeholders such as media. In reality there may have been other factors such as factual, proactive, proven right, and unbiased in providing information (see Frewer et al., 1996) that were important. As well, this study is just a *snapshot* in time and a follow up of this study could shed more light on the rating of different stakeholders on how trustworthy they are in providing information about the welfare of pigs.

Finally, the study did not elicit consumers' perceptions on which are the most suitable stakeholders to perform specific roles with respect to standard setting, testing, verification, and certification. It may be that different stakeholders are more or less trusted (more or less credible) to perform specific roles within the general rubric of quality assurance for FAW attributes.

6.4 Areas for Further Research

As touched upon in the previous section, an important area for future research is a complete welfare assessment encompassing the costs and benefits of some of the market outcomes pertaining to the Canadian pork sector that were graphically analyzed in Chapter 3. More specifically, this means an assessment of the willingness-to-pay estimates for the pork welfare attributes derived from this thesis against the costs that government and private industry have to incur with the setting and enforcement of the standards, as well as the effect of new standards on production costs incurred by farmers. Thus, to develop concrete policy conclusions one would also have to consider the costs of a mandatory friendly production standard and the relevant costs of establishing credible voluntary friendly production labels.

Future research should consider employing focus group discussions in order to identify which are the most important livestock production attributes that consumers perceive as delivering higher levels of welfare. As well, researchers should consider designing surveys that would elicit consumers' willingness-to-pay for animal welfare attributes and FAW quality verification for other livestock and poultry products (e.g., free-run eggs and free-run poultry) that would employ a different research technique – i.e., experimental auctions. Presumably, this research would provide a more accurate representation of the shopping environment and budget restriction with

which consumers are confronted when grocery shopping. While experimental studies eliciting Canadian consumers' willingness-to-pay for general traceability, animal welfare, and food safety assurances for red meats have been conducted (see Hobbs et al., 2005), dedicated experimental studies eliciting consumers' willingness-to-pay for FAW attributes in the context of specific issues pertaining to pork production in Canada would be instructive. As well, to examine the extent of hypothetical bias pertaining to the choice experiment method, a comparison of the willingness-to-pay estimates across the two methods – i.e., choice experiment and experimental auction – would shed light on the accuracy of the estimates emanating from different research techniques.

Another area for future research is to expand on the results of the current research related to which organizations are the most trusted in providing information about the welfare of pigs, and all farm animals in general, by conducting similar research at different moments in time, as well as including and taking into account other dimensions that may explain consumers' trust. For example, monitoring the impact of specific events (i.e., a major food safety incident or an accountability scandal regarding a certifier) or examining public trust in public vs. private sector agents would be valuable. This would require tracking a cross-section of consumers over a period of time, hence, generating panel data. As well, a related research subject would be to identify the organization or the stakeholders that would be most appropriate to perform tasks such as setting, testing, and certification of FAW standards, which are mechanisms that would enhance consumer trust in FAW quality assurances in the Canadian livestock and poultry supply chain.

Lastly, more insights on consumers' perceptions of current labelling methods for FAW attributes (i.e., free-range, antibiotics free, natural) are needed. How do consumers interpret these descriptions? Do they understand them? Are consumer perceptions of the meaning of, for example, 'natural' consistent across consumers or between consumers and participants in the agri-food supply chains? Finally, an analysis of the Canadian supply chain for livestock and poultry products with FAW will shed light on whether there are barriers that impede the development of these markets in Canada.

REFERENCES:

Adamowicz, W., J. Swait, P. Boxall, J. Louviere and M. Williams. 1997. Perception versus objective measures of environmental quality in combined revealed and stated preference models of environmental valuation. *Journal of Environmental Economics and Management* 32: 65-84.

Adamowicz, W., R. Boxall, M. Williams and J. Louviere. 1998a. Stated preference approaches for measuring passive use values: Choice experiments and contingent valuation. *American Journal of Agricultural Economics* 80 (1): 64-75.

Adamowicz, W., J. J. Louviere and J. D. Swait. 1998b. Introduction to Attribute-Based Stated Choice Methods. Final Report to Resource Valuation Branch. Damage Assessment Centre. US National Oceanic and Atmospheric Administration, Department of Commerce. Prepared by Advanis Inc. Edmonton, Alberta. http://www.darrp.noaa.gov/library/pdf/pubscm.pdf (accessed October 16, 2008).

Adams , B. and J. Larson. 2007. Legislative History of the Animal Welfare Act. AWIC Resource Series No. 41. http://www.nal.usda.gov/awic/pubs/AWA2007/printPHP2 .php (accessed January 3, 2009).

Agriculture and Agri-Food Canada (AAFC). 1989. Recommended Code of Practice for the Care and Handling of Poultry from Hatchery to Processing Plant. Publication 1757/E.

Agriculture and Agri-Food Canada (AAFC). 1993. Recommended Code of Practice for the Care and Handling of Farm Animals: Pigs. Publication 1898.

Agriculture and Agri-Food Canada (AAFC). 2004. Consumer Perceptions of Food Safety and Quality. November. Prepared by Ipsos-Reid Corporation POR # 005-06. http://www4.agr.gc.ca/resources/prod/doc/agr/pdf/Canadian_Perceptions.pdf (accessed July 14, 2007).

Agriculture and Agri-Food Canada (AAFC). 2006. Consumer Perceptions of Food Safety and Quality-Wave 2 Tracking 2006. August. Prepared by Ipsos-Reid Corporation POR#005-06.http://www4.agr.gc.ca/resources/prod/doc/agr/pdf/canadian_perceptions _e.pdf (accessed July 14, 2007).

Agriculture and Agri-Food Canada (AAFC). 2007. Farm Animal Welfare and Codes of Practice Consultation Workshop. Report of Proceedings. http://www4.agr.gc.ca/AAFC -AAC/display-afficher.do?id=1184872505755&lang=eng (accessed May 14, 2008).

Agriculture and Agri-Food Canada (AAFC). 2008. Growing Forward: The New Agricultural Policy Framework. http://www4.agr.gc.ca/AAFC-AAC/display-afficher. do?id=1200339470715&lang=eng (accessed January 8, 2009).

Akerlof, G. A. 1970. The market for lemons: Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics* 84 (3): 488-500.

Aliments Breton Foods Canada. 2008. Farming and Processing – Certifications. http://www.dubreton.ca/en/production/standards/ (accessed April 19, 2008).

American Association of Swine Veterinarians (AASV). 2007. Colorado Pork Producers Announce New Animal Management Procedures. December 17. http://www.aasv.org /news/story.php?id=2728 (accessed November 28, 2008).

American Veterinary Medical Association (AVMA). 2008a. Colorado Will Phase Out Gestation Stalls and Veal Crates. News. July 1. http://www.avma.org/onlnews/javma/ jul08/080701n.asp (accessed November 21, 2008).

American Veterinary Medical Association (AVMA). 2008b. California Voters Call for Changes in Livestock Housing. News. December 1. http://www.avma.org/onlnews/ javma/dec08/081201a.asp (accessed November 21, 2008).

American Veterinary Medical Association (AVMA). n.d. H.R. 1726 - Farm Animal Stewardship Purchasing Act. Issue brief. http://www.avma.org/advocacy/federal/ legislative/issue_briefs/faspa.asp (accessed November 9, 2009).

Anania, G. and R. Nistico. 2004. Public regulation as a substitute for trust in quality food markets: What if the trust substitute cannot be fully trusted? *Journal of Institutional and Theoretical Economics* 160: 681-701.

Andrews, D., B. Nonnecke and J. Preece. 2003. Electronic survey methodology: A case study in reaching hard to involve internet users. *International Journal of Human Computer Interaction* 16 (2): 185-210.

Anon. 1996a. Bully for quality assurance. *Supermarketing* 14 June, 1227: 22.

Arey, D. and P. Broke. 2006. *Animal Welfare Aspects of Good Agricultural Practice (GAP)*. Compassion in World Farming Trust. http://www.ciwf.org/education/ gapresources.html#whole (accessed February 14, 2008).

Armah, P.W. and D. Kennedy. 2000. Evaluating consumer perceptions and preferences for pasture-raised pork in the Mississippi delta of Arkansas. *Journal of Agribusiness* 18 (3): 261-273.

Australian Consumer Association (ACA). 2007. Free-Range or Free-Range Bred? on-line news 12/07. http://www.choice.com.au/viewArticle.aspx?id=106111&catId=100570 &tid=10001 (accessed October 28, 2008).

Australian Competition and Consumer Commission (ACCC). 2008. Customer and Business Directory: Choice. http://www.accc.gov.au/content/index.phtml/itemId/ 287075/fromItemId/303217 (accessed April 2, 2008).

Australian Egg Corporation Limited (AECL). 2008. Producer Resources-Animal Welfare. http://www.aecl.org/index.asp?pageid=414 (accessed April 15, 2008).

Babcock, B. A., J. Miranowski and R. Carbone. 2002. An Initial Analysis of Adoption of Animal Welfare Guidelines on the U.S. Egg Industry. Working Paper 02-BP 37. Department of Economics. Iowa State University. http://www.econ.iastate.edu/ research/webpapers/paper_10015.pdf (accessed January 21, 2008).

Badertscher, F. R. 1997. Tierwohl: Verantwortung der Konsumentinnen und Konsumenten oder Aufgabe des Staates?. PhD dissertation No. 12347, Swiss Federal Institute of Technology, Zürich.

Bayvel. D. 2007. International Animal Welfare Trends and Developments and the Role of the OIE. Presented at the National Farm Animal Care and Welfare Conference. National Farm Animal Care Council. September 20-21. Ottawa. Ontario. http://www.nfacc.ca /News-Item.aspx?id=5 (accessed October 1, 2007).

Becker, T. 1999. The Economics of Food Quality Standards. Proceedings of the Second Interdisciplinary Workshop on Standardization Research. University of the Federal Armed Forces, Hamburg. May 24-27.

Belcher, K. W., A. E. Germann and J. K. Schmutz. 2007. Beef with environmental and quality attributes: Preferences of environmental group and general population consumers in Saskatchewan, Canada. *Agriculture and Human Values* 24: 333-342.

Belk, K. E., J. A. Scanga, G. C. Smith and T. Grandin. 2002. The Relationship Between Good Handling / Stunning and Meat Quality in Beef, Pork, and Lamb. Presented at the

2002 Animal Handling and Stunning Conference of the American Meat Institute Foundation. http://www.grandin.com/meat/hand.stun.relate.quality.html (accessed December 18, 2008).

Ben-Akiva, M. and S. Lerman.1985. *Discrete Choice Analysis: Theory and Application to Travel Demand*. Cambridge: MIT Press.

Bennet, R. and D. Larson. 1996. Contingent valuation of the perceived benefits of farm animal welfare legislation: An exploratory survey. *Journal of Agricultural Economics* 47 (2): 224-235.

Bennet, R. 1997. Farm animal welfare and food policy. *Food Policy* 22 (4): 281-288.

Bennet, R. and R. J. P. Blaney. 2003. Estimating the benefits of farm animal welfare legislation using contingent valuation method. *Agricultural Economics* 29 (1): 85-98.

Blandford, D. 2006. Animal welfare. In *The Future of Agriculture in North America*, edited by D. Blandford. Chapter 8. pp. 133-150. http://www.farmfoundation.org/projects/04-32ReportTranslations.htm (accessed July 12, 2007).

Bock, B. and F. Van Leeuwen. 2005. Review of socio-political and market developments of animal welfare schemes. In *Farm Animal Welfare Concerns, Consumers, Retailers and Producers,* edited by J .Roex. and M. Miele, Part III, pp. 115-167. Welfare Quality: Report No. 1. Cardiff University, Cardiff.

Bock, B. and M. Van Huik. 2007. Pig farmers and animal welfare: A study of beliefs, attitudes and behaviour of pig producers across Europe. In *Attitudes of Consumers, Retailers and Producers to Farm Animal Welfare*, edited by U. Kjaernes, M. Miele and J. Roex, Part III, pp. 73-124. Welfare Quality: Report No. 2. Cardiff University, Cardiff.

Boxall, C. P. and W. Adamowicz. 2002. Understanding heterogeneous preferences in random utility models: A latent class approach. *Environmental and Resource Economics* 23: 421-446.

British Columbia Society for Prevention of Cruelty to Animals (BC SPCA). 2008. Farm Animal Welfare, Pig Welfare Concerns. http://www.spca.bc.ca/farminfo/pigs/default.asp#pig%20welfare (accessed April 15, 2008).

Bredahl, M. E., J. E. Northen, A. Boecker and M. A. Normille. 2000. Consumer demand sparks the growth of quality assurance schemes in the European food sector. In *Changing Structure of Global Food Consumption and Trade,* edited by A. Regmi. Market and Trade Economics Division, Economic Research Service. Chapter 10, pp. 90-102. US Department of Agriculture, Agriculture and Trade Report. http://www.ers.usda.gov/Publications/WRS011/ (accessed December 8, 2008).

Brown, K. H. and J. Hollingsworth. 2005. The food marketing institute and the national council of chain restaurants: Animal welfare and the retail industry in the United States of America, food retail industry and programme. *Revue Scientifique et technique – Office International Des Epizooties* 24 (2) : 655-681.

Burgess, D., J. Hutchinson, T. McCallion and R Scarpa. 2004. Choice Rationality in Stated Preference Methods Applied to Farm Animal Welfare Improvements. Presented at the Applied Environmental Economics Conference, The Royal Society. http://www.eftec.co.uk/UKNEE/envecon/2004_documents/envecon04_CONSERVATION_Burgess_et_al.pdf (accessed April 12, 2008).

Bureau, J. C., S. Marette and A. Schiavina. 1998. Non-tariff trade barriers and consumers' information: The Case of EU-US trade dispute over beef. *European Review of Agricultural Economics* 25: 437-62.

Burnbrae Farms Limited. 2008a. Company Overview. http://www.burnbraefarms.com/consumer/about_us/index.htm (accessed May 2, 2008).

Burnbrae Farms Limited. 2008b. Our Products. http://www.burnbraefarms.com/consumer/our_products/shell_naturegg_freerun.htm (accessed May 2, 2008).

Canadian Coalition for Farm Animals (CCFA). 2005. Farm Animal Welfare. Research Poll prepared by Decima Research. www.humanefood.ca/docs/Poll2005.pdf (accessed August 3, 2007).

Canadian Egg Marketing Agency (CEMA). 2001. The 2001 Annual Report. http://www.canadaegg.ca/data/1/rec_docs/107_2001_annual_e.pdf (accessed June 20, 2008).

Canadian Egg Marketing Agency (CEMA). 2002. The 2002 Annual Report. http://www.canadaegg.ca/data/1/rec_docs/106_2002_annual_e.pdf (accessed June 20, 2008).

Canadian Egg Marketing Agency (CEMA). 2004. The 2004 Annual Report. http://www.canadaegg.ca/data/1/rec_docs/468_CEMA-2004-AR-e.pdf (accessed June 20, 2008).

Canadian Egg Marketing Agency (CEMA). 2008. Managing Issues. In *The 2007 Annual Report*. Section 5. http://www.canadaegg.ca/bins/content_page.asp?cid=155-6-65&lang=1 (accessed June 20, 2008).

Canadian Food Inspection Agency (CFIA). 2005. Clarifying the Labelling Guidelines for Method of Production Claims on Meat, Poultry and Fish Products – A Discussion Paper.

Canadian Food Inspection Agency (CFIA). 2007. Transportation of Animals Fact Sheet. http://www.inspection.gc.ca/english/anima/trans/transporte.shtml (accessed May 14, 2008).

Canadian Food Inspection Agency (CFIA). 2008a. Canada's Animal Welfare Infrastructure. http://www.inspection.gc.ca/english/anima/trans/infrae.shtml (accessed May 14, 2008).

Canadian Food Inspection Agency (CFIA). 2008b. Purpose of Food Labelling. http://www.inspection.gc.ca/english/fssa/labeti/guide/ch1e.shtml (accessed May 14, 2008).

Canadian Food Inspection Agency (CFIA). 2009. Organic Products. Canada Organic Regime: A Certified Choice. http://www.inspection.gc.ca/english/fssa/orgbio/stainte.shtml (accessed January 5, 2009).

Canadian Gazette (CG). 2006. Canada Agricultural Products Act*:* Organic Products Regulations, Vol. 140, No. 35. September 2, 2006. http://canadagazette.gc.ca/partI/2006/20060902/html/regle2-e.html (accessed January 5, 2009).

Canadian Gazette (CG). 2008. Regulations Amending the Organic Products Regulations**,** Vol. 142, No. 19. September 17, 2008. http://canadagazette.gc.ca/partII/2008/20080917/html/sor279-e.html (accessed January 5, 2009).

Canadian General Standards Board (CGSB). 2006. Organic Production Systems General Principles and Management Standards, National Standards of Canada, CAN/CGSB-32.310-2006. http://www.tpsgc-pwgsc.gc.ca/cgsb/on_the_net/organic/032_0310_2006

-e.pdf (accessed December 8, 2008).

Canadian Pork Council (CPC). 2005. Animal Care at Work. http://www.cqa-aqc.ca/ downloads/aca/ACA_Complete_e.pdf (accessed May 14, 2008).

Carriquiry, M. A., B. A. Babcock and R. Carbone. 2003. Optimal Quality Assurance Systems for Agricultural Outputs. Working Paper: 03-wp328, Center for Agricultural and Rural Development, Iowa State University. http://ideas.repec.org/p/ias/cpaper/03-wp328.html (accessed April 15, 2008).

Carriquiry, M. A. and B. A. Babcock. 2007. Market structure, and the choice of quality assurance systems in the food industry and quality assurance systems. *American Journal of Agricultural Economics* 89 (1): 12-23.

Carlsson, F. and P. Martinsson. 2003. Design techniques for stated preference methods in health economics. *Health Economics* 12: 281-294.

Carlsson, F., P. Frykblom and C. Liljenstolpe. 2003. Valuing wetland attributes: An application of choice experiments. *Ecological Economics* 47 (1): 95-193.

Carlsson, F., P. Frykblom, and C.J. Lagerkvist. 2005. Consumer preferences for food product quality attributes from Swedish agriculture. *Ambio* 34: 366-370.

Carlsson, F., P. Frykblom and C. J. Lagerkvist. 2007a. Consumer willingness-to-pay for farm animal welfare: Mobile abattoirs versus transportation to slaughter. *European Review of Agricultural Economics* 34 (3): 321-344.

Carlsson, F., P. Frykblom and C. J. Lagerkvist. 2007b. Farm animal welfare – Testing for market failure. *Journal of Agricultural and Applied Economics* 39 (1): 61-73.

Caswell, J. A. 1998. How labelling of safety and process attributes affects markets for food. *Agricultural and Resource Economics Review* 27 (2): 151-158.

Caswell, J. A. and E. M. Mojduszka. 1996. Using informational labelling to influence the market for quality in food products. *American Journal of Agricultural Economics* 78: 1248-1253.

Caswell, J. A., M. E. Bredahl and N. H. Hooker. 1998. How quality management metasystems are affecting the food industry? *Review of Agricultural Economics* 20 (2): 547-557.

Christensen, B. J., D. V. Bailey, L. Hunnicutt and R. Ward. 2003. Consumer preferences for public and private sector certifications for beef products in the United States and the United Kingdom. *International Food and Agribusiness Management Review* 6 (3): 19-39.

Cole, A. and J. Harris. 2005. Rising interest in credence qualities in agricultural products and the role for the government. Economics and Policy Research Branch Publications, Department of Primary Industries Australia. Presented at the 2005 meeting of the Australian Agricultural Economics Society Conference, Coffs Harbour, NSW. http://www.nre.vic.gov.au/DPI/ (accessed January 25, 2008).

Coleman, G. J. and M. Hay. 2004. Consumer Attitudes and Behaviour Relevant to Pork Production. Proceedings of the Australian Association of Pig Veterinarians Conference. p.133-142. May. Canberra.

Coleman, G. J., M. Hay and S. Toukhsati. 2005. Effects of Consumer Attitudes and Behaviour on the Egg and Pork Industries. Report to Australian Pork Ltd. and Australian Egg Corporation Ltd.

Coleman, G. J. 2007. Public Perceptions of Animal Pain and Animal Welfare. Proceedings of the Australian Animal Welfare Strategy Summit on Pain and Pain Management.

May. Canberra Conference. pp.133-142. http://www.daff.gov.au/_data/assets/pdf_file/0006/299103/grahame-coleman.pdf (accessed April 10, 2008).

Conner. D. S., V. A. Arvai and M. W. Hamm. 2008. Value in the values: pasture-raised livestock products offer opportunities for reconnecting producers and consumers. *Renewable Agriculture and Food Systems Cambridge University Press* 23: 62-69.

Consumers' Association of Canada (CAC). 2008. About Us. http://www.consumer.ca/1646 (accessed May 14, 2008).

Cook, A. J., G. N. Kerr and K. Moore. 2002. Attitudes and intentions towards purchasing GM food. *Journal of Economic Psychology* 23: 557-572.

Cowan, C., H Meehan and B. Winkless. 1998. Consumer Concerns about Animal Welfare and the Impact on Food Choice: Ireland – Literature Review. EU FAIR-CT98-3678, http://ec.europa.eu/food/animal/welfare/survey/index_en.htm (accessed October 1, 2007).

Cranfield, J., B. Deaton and S. Shelikeri. 2007. Evaluating Consumer Preferences for Organic Standards. Working Paper No. 4. FSD International Food Economy Research Group, Department of Food, Agricultural and Resource Economics, University of Guelph, Ontario. www.inferg.ca/workingpapers/WP4_FSD.pdf (accessed December 16, 2008).

Crespi, J and S. Marette. 2003. Some economic implications of public labelling. *Journal of Food Distribution and Research* 34(3): 83-94.

Crespi, J. and S. Marette. 2005. Ecolabeling economics: Is public involvement necessary? In *Environment, Information and Consumer Behaviour*, edited by C. S. Russell and S. Krarup, Chapter 5, pp. 93-109, Cheltenham (UK): Edward Elgar.

CWS Retail. 1995. *Responsible retailing: a survey of consumers' ethical concerns*. CWS Retail.

Dalla Costa, O. A., L. Faucitano, A. Coldebella, J. V. Ludke, J. V. Peloso, D. Dalla Roza and M. J. R. Paranhos da Costa. 2007. Effects of the season of the year, truck type and location on truck on skin bruises and meat quality in pigs. *Livestock Science* 107: 29-36.

Darby, M. and E. Karni.1973. Free competition and the optimal amount of fraud. *Journal of Law and Economics* 16:67-88.

Darby, K., M. Batte, S. Ernest and B. Roe. 2006. Willingness-to-pay for locally produced foods: A customers intercept study of direct market and grocery store shoppers. Presented at the 2006 meetings of the American Agricultural Economics Association, Long Beach, California. http://aede.osu.edu/programs/vanburen/pdf/aaea%20selected%20paper-156532.pdf (accessed July 15, 2008).

De Passillé, A. M. and J. Rushen. 2005. Food safety and environmental issues in animal welfare. *Revue Scientifique et Technique – Office International Des Epizooties* 24 (2): 655-681.

Den Ouden, M., R. B. M. Huirne and A. A. Dijkhuizen. 1997. The Impact of Changing Pig Welfare Preferences on the Economics of Pork Production-Marketing Chains. In *Agricultural Marketing and Consumer Behaviour in a Changing World*, edited by B. Wierenga, A. Tilburg, K. van Grunert, J. E. M. Steenkamp and M. Wedel, Chapter 4, pp.75-91. Boston: Kluwer Academic Publishers.

Department of Primary Industry Australia (DPIA). 2004. Review of Animal Welfare. Evaluation Report 7. Evaluation report series. Biosecurity. The State of Victoria, Australia. http://www.dpi.vic.gov.au (accessed May 9, 2008).

Desire, L., A. Boissy and I. Veissier. 2002. Emotions in farm animals: A new approach to animal welfare and applied ethology. *Behavioural Processes* 60: 165-180.

Dhar, R. 1997. Consumer preference for a no-choice option. *Journal of Consumer Research* 24: 215-231.

Dillman, D. 2000. *Mail and Internet Surveys – The Tailored Design Method*. New York: John Wiley and Sons.

Dotson, E. 2007. Value Added Opportunities Based on Animal Care. Paper presented at the *Advances in Pork Production Seminar*. Vol. 18, pp. 309-317. Banff, Alberta. http://www.banffpork.ca/ proc/2007pdf/309%20-%20Dotson.pdf (accessed April 2, 2008).

Dransfield. E., T. M. Ngapo, N. A. Nielsen, L. Bredahl, P.O. Sjoden, M. Magnusson, M. M. Campo and G. R. Nute. 2005. Consumer choice and suggested price for pork as influenced by its appearance, taste and information concerning country of origin and organic pig production. *Meat Science* 69: 61-70.

Early, R. 1995. *A Guide to Quality Management Systems for the Food Industry*. London. Blackie Academic and Professional.

European Commission (EC). 2005. Attitudes of Consumers towards the Welfare of Farmed Animals, Wave 1. Special Eurobarometer 270. TNS Opinion & Social, Fieldwork February-March 2005. http://ec.europa.eu/food/animal/ welfare (accessed July 6, 2007).

European Commission (EC). 2007a. Attitudes of Consumers towards the Welfare of Farmed Animals Wave 2. Special Eurobarometer 270. TNS Opinion & Social, Fieldwork September-October 2006. http://ec.europa.eu/food/animal/welfare (accessed July 6, 2007).

European Commission (EC). 2007b. FACTSHEET: Animal Welfare - Ensuring the Humane and Responsible Treatment of Farmed Animals. http://ec.europa.eu/food /animal/welfare/factsheet_farmed03-2007_en.pdf (accessed January 3, 2009).

European Commision (EC). n.d. European Rules on the Protection of Animals during Transport, Power Point presentation. General Directorate, Health and Consumer Protection, http://ec.europa.eu/food/animal/welfare/transport/legislation_en.htm (accessed May 14, 2008).

Farm Animal Welfare Council (FAWC). 1988. Report on Priorities in Animal Welfare Research and Development. FAWC. London.

Farm Animal Welfare Council (FAWC). 2001. Interim Report on the Animal Welfare Inspections of Farm Assurance Schemes. FAWC. London. http://www.fawc.org.uk/ pdf/farmassurance.pdf (accessed May 14, 2008).

Farm Animal Welfare Council (FAWC). 2006. Report on Welfare Labelling. FAWC. London. www.fawc.org.uk/reports/welfarelabel-0606.pdf (accessed May 14, 2008).

Farm Animal Welfare Council (FAWC). 2008. Opinion on Policy Instruments for Protecting and Improving Farm Animal Welfare. FAWC. London. www.fawc.org.uk /pdf/policy-instr-081212.pdf (accessed January 6, 2009).

Faucitano, L. 1997. Preslaughter stressors effects on pork: A review. *Journal of Muscle Foods* 9: 293-303.

Fearne, A. and D. Lavelle. 1996. Segmenting the UK egg market: results of a survey of consumer attitudes and perceptions. *British Food Journal* 98 (1): 7-12.

Fraser, D. and D. M. Weary. 2004. Quality of life for farm animals: linking science, ethics and animal welfare. In *The Well-Being of Farm Animals: Challenges and Solutions,* edited by G. J. Benson and B. E. Rolin, pp. 39-60. Ames. IA: Blackwell.

Frewer, L., C. Howard, D. Hedderly and R. Shepherd. 1996. What determines trust in information about food-related risks? Underlying Psychological constructs. *Risk Analysis* 16 (4): 473-486.

Frewer, L. J., A. Kole, S. M. A. Van de Kroon and C. De Lauwere. 2005. Consumer attitudes towards the development of animal-friendly husbandry systems. *Journal of Agricultural and Environmental Ethics* 18 (4): 345-367.

Gaisford, J. D., J. E. Hobbs, W. A. Kerr, N. Perdikis and M.D. Plunkett. 2001. *The Economics of Biotechnology.* Cheltenham, Edward Elgar Publishing Limited.

Gentry, J. G., J. J. McGlone, J. R. Blanton Jr. and M. F. Miller. 2002. Alternative housing systems for pigs: Influences on growth, composition, and pork quality. *Journal of Animal Science* 80: 1781-1790.

Giannakas, K. 2002. Information asymmetries and consumption decisions in organic food products markets. *Canadian Journal of Agricultural Economics* 50 (1): 35-50.

Giannakas, K. and M. Fulton. 2002. Consumption effects of genetic modification: What if consumers are right? *Agricultural Economics* 27: 97-109.

Goddard, E., P. Boxall, J. P. Emunu, C. Boyd, A. Asselin and A. Neall. 2007. Consumer Attitudes, Willingness-to-Pay and Revealed Preferences for Different Egg Production Attributes: Analysis of Canadian Egg Consumers. Project Report #07-03. Department of Rural Economy, Faculty of Agriculture and Forestry, and Home Economics, University of Alberta, Edmonton. http://www.uofaweb.ualberta.ca/re//pdfs/PR%2007-03.pdf (accessed January 25, 2008).

Golan, E., F. Kuchler and L. Mitchell. 2001. Economics of Food Labelling. Report No. 793. Economic Research Service, United States Department of Agriculture. http://www.ers.usda.gov/publications/aer793/AER793.PDF (accessed May 14, 2008).

Grandin. T. n.d. Stress and Meat Quality: Lowering Stress to Improve Meat Quality and Animal Welfare, Personal Communications. http://www.grandin.com/meat/meat.html (accessed December 18, 2008).

Greene, W. H. 2003. *Econometric Analysis*. 5th Edition. Upper Saddle River: Prentice Hall.

Greene, W. H. and D. Hensher. 2003. A latent class model for discrete choice analysis: Contrast with mixed logit. *Transportation Research* Part B 37: 681-698.

Greene, W. H., D. Hensher and J. Rose. 2006. Accounting for Heterogeneity in the Variance of Unobserved Effects in Mixed Logit Models. *Transportation Research* Part B 40: 75-92.

Greene, W. H. 2007. NLOGIT 4.0 Reference Manual. Plainsview: Econometric Software Inc.

Greener Choices (GC). 2008a. About Consumer Union. http://www.greenerchoices.org/aboutgreenerchoices.cfm (accessed October 25, 2008).

Greener Choices (GC). 2008b. Meat, Dairy, and Eggs Buying Guide 12/06: How to read the labels. http://www.greenerchoices.org/eco-labels/label.cfm?LabelID=151(accessed October 25, 2008).

Grunert, K. G. 1997. What's in a steak? A cross-cultural study on the quality perception of beef. *Food Quality and Preference* 8 (3): 157-174.

Hanemann, M.W. 1984. Discrete-continuous models of consumer demand. *Econometrica* 52: 541-546.

Hanemann, M. W. 1991. Willingness-to-pay and willingness-to-accept: How much can they differ? *American Economic Rev*iew 81 (6): 635-47.

Haris, J. 1986. Eier aus Boden-oder Käfighaltung-eine Verbraucherbefragung. In: Hauswirtschaft und Wissenschaft 34 (3): 150-158.

Harper, G. and S. Henson. 2001. Consumer Concerns about Animal Welfare and the Impact on Food Choice. Final Report. EU FAIR CT98-3678. http://ec.europa.eu/food/animal/welfare/survey/index_en.htm (accessed October 1, 2007).

Harper, G. and A. Makatouni. 2002. Consumer perception of organic food and animal welfare. *British Food Journal* 3/4/5: 287-299.

Hausman, J. and D. McFadden. 1984. Specification tests for the multinomial logit model. *Econometrica* 52 (5): 1219-1240.

Hensher, D. and W.H. Greene. 2003. The Mixed Logit Model: The State of Practice. *Transportation* 30 (2): 133-176.

Hensher, D., J. Rose and W. H. Greene. 2005. *Applied Choice Analysis: A Primer*. Cambridge University Press.

Hobbs, J. E. 2004. Information asymmetry and the role of traceability systems. *Agribusiness* 20 (4): 397-415.

Hobbs, J. E., D. Bailey, D. L. Dickinson and M. Haghiri. 2005. Traceability in the Canadian red meat sector: Do consumers care? *Canadian Journal of Agricultural Economics* 53 (1): 47-65.

Hoehn, J. P. and B. J. Deaton. 2004. The Welfare Consequences of Certified Labelling for Credence Attributes. Staff Paper Series #2004-03, Department of Agricultural Economics, Michigan State University.

Holloway, I. A., N. Waran and E. J. Austin. 1999. Assessing public attitudes toward pig welfare in the UK. *The Pig Journal* 44: 38-51.

Hoogland, C. T., J. De Boer and J. J. Boersema. 2007. Food and sustainability: Do consumers recognize, understand and value on-package information on production standards? *Appetite* 49: 47-57.

Hooker, N. H. and J. A. Caswell. 1996. Trends in food quality regulation: Implications for processed food trade and foreign direct investment. *Agribusiness* 12 (5): 411-419.

Horgan, R. and A. Gavinelli. 2006. The expanding role of animal welfare with EU legislation and beyond. *Livestock Science* 103: 303-307.

Hu, W. 2004. Three Essays on Genetically Modified Food Labelling and Consumer Behaviour. Unpublished Ph.D. Thesis. University of Alberta. Edmonton.

Hu, W., A. Hunnemeyer, M. Veeman, W. Adamowicz and L. Srivastava. 2005. Trading off health, environmental and genetic modification attributes. *European Review of Agricultural Economics* 31 (3): 389-408.

Huber, J. and K. Zwerina. 1996. The importance of utility balance in efficient choice designs. *Journal of Marketing Research* 33: 307-317.

Hudson. D. and J. Lusk. 2004. Risk and transaction cost in contracting: Results from a choice-based experiment. *Journal of Agricultural and Food Industrial Organization* 2 (2): 1-17.

Hudson. D. 2007. *Agricultural Markets and Prices*. Blackwell Publishing.

Huffman, W. E., M. Rousu., J. F. Shogren and A. Tegene. 2004. Who do consumers trust for information: The case of genetically modified foods? *American Journal of Agricultural Economics* 86 (5): 1222-1229.

Hughes, D. 1995. Animal welfare: The consumer and the food industry. *British Food Journal* 97 (10): 3-7.

Humane Food Society of United States (HSUS). 2006. Support H.R. 5557 – Farm Animal Welfare/Federal Procurement Support. http://www.hsus.org/webfiles/PDF/109_ stewardship_factsheet.pdf (accessed April 15, 2008).

Humane Food Society of United States (HSUS). 2007. Nation's Largest Pig Producer Moves to Phase Out Confinement of Pigs in Gestation Crates. http://www.hsus.org/farm/news/ournews/smithfield_phases_out_crates.html (accessed April 15, 2008).

Humane Food Society of United States (HSUS). 2008. Safeway Leading the Way on Animal Welfare Nation's Largest Pig Producer Moves to Phase Out Confinement of Pigs in Gestation Crates. http://www.hsus.org/farm/news/ournews/safeway_animal _welfare_021108.html (accessed April 15, 2008).

Innes, B. 2008. Assuring Production-Derived Quality in Canadian Food Markets. Unpublished M.Sc. Thesis. University of Saskatchewan. Saskatoon.

Ippolito, P. M. 2003. Asymmetric information in product markets: Looking to other sectors for institutional approaches. *American Journal of Agricultural Economics* 85 (3): 731-736.

Jahn, G., M. Schramm and A. Spiller. 2005. The reliability of certification: Quality labels as a consumer policy tool. *Journal of Consumer Policy* 28: 53-73.

Jones, S. 2006. Consumer's Views of Pork Production. Presented at the *Advances in Pork Production Seminar* Vol. 17, pp. 65-73. Banff, Alberta. http://www.banffpork.ca/ proc/2006pdf/065%20-%20Jones.pdf (accessed October 15, 2007).

Jones, D. 2008. Crimes without Consequences: The Enforcement of Humane Slaughter Laws in the United States. Research report prepared for Animal Welfare Institute, Washington D.C. http://www.awionline.org/farm/pdf/08SlaughterReport.pdf (accessed March 27, 2008).

Jones, S. and D. A. Hensher. 2004. Predicting firm financial distress: A mixed logit model. *The Accounting Review* 79 (4): 1011-1038.

Kehoe, C. M. and J. E. Pitkow. 1996. Surveying the territory: GVU's five www user surveys. *The World Wide Web Journal* 1 (3): 77-84.

Köhler, F. 2001. Consumer Concerns about Animal Welfare and the Impact on Food Choice. Report on National Survey: Germany. EU FAIR CT98-3678. http://ec.europa.eu/food/ animal/ welfare/survey/index_en.htm (accessed October 1, 2007).

Köhler, F. and M. Wickenhäuser. 2001. Strategies to Address Consumer Concerns about Animal Welfare - Report on Focus Groups in Germany. EU Project CT 98 3678, University of Kiel, Germany. http://www.uni-kiel.de/Agraroekonomie/Abteilungen/ agrarmarketing/EU/Koewick.PDF (accessed October 9, 2008).

Kontoleon, A. and M. Yabe. 2003. Assessing the impacts of alternative 'Opt-out' formats in choice experiments studies: Consumer preferences for genetically modified content and production information in food. *Journal of Agricultural Policy Research* 5: 1-43.

Kjaernes, U. and R. Lavik. 2007. Farm Animal Welfare and Food Consumption Practices: Results from Surveys in Seven Countries. In *Attitudes of Consumers, Retailers and Producers to Farm Animal Welfare*, edited by U. Kjaernes, M. Miele. and J. Roex. Part I, pp. 1-29. Welfare Quality Report No. 1. Cardiff University, Cardiff.

Kuhfeld, W. 2005. Marketing Research Methods in SAS. http://support.sas.com/techsup/technote/ts722.pdf (accessed April 2, 2008).

Kuhfeld, W. and R. Tobias. 2005. Large factorial designs for product engineering and marketing research applications. *Technometrics* 47 (2): 132-141.

Lancaster, K. 1966. A new approach to consumer theory. *Journal of Political Economy* 74: 132-157.

Lancsar, E., J. Louviere and T. Flynn. 2007. Several methods to investigate relative attribute impact in stated preference experiments. *Social Science and Medicine* 64: 1738-1753.

Lang, J. and W. Hallman. 2005. Who does the public trust? The case of genetically modified food in the United States. *Risk Analysis* 25 (5): 1241-1252.

Lagerkvist, C. J., F. Carlsson and D. Viske. 2006. Swedish consumer preferences for animal welfare and biotech: A choice experiment. *AgBioForum* 9 (1): 51-58.

Lawrence, D. 2007. An Overview of the Animal Care Assessment Program. Presented at the 2007 Manitoba Swine Seminar. http://prairieswine.usask.ca/database/details.php?id=2256 (accessed April 12, 2008).

Leavitt, E. S. 1990. Humane slaughter laws. In: *Animals and Their Legal Rights.* Animal Welfare Institute. 4th Edition. Washington, DC.

Liljenstolpe, C. 2008a. A quantitative assessment of the Swedish animal welfare regulation: The case of pork sector. In *Consumer valuation studies and structural modelling of the pig industry.* Doctoral Thesis No. 2008:35. Faculty of Natural Resources and Agricultural Sciences, Swedish University of Agricultural Sciences.

Liljenstolpe, C. 2008b. Evaluating animal welfare with choice experiments: An application to Swedish pig production. In *Consumer valuation studies and structural modelling of the pig industry.* Doctoral Thesis No. 2008:35. Faculty of Natural Resources and Agricultural Sciences, Swedish University of Agricultural Sciences.

Liljenstolpe, C. 2008c. Demand for value added pork in Sweden: A latent class approach. In *Consumer valuation studies and structural modelling of the pig industry.* Doctoral Thesis No. 2008:35. Faculty of Natural Resources and Agricultural Sciences, Swedish University of Agricultural Sciences.

Lo Fo Wong, D. M. A., T. Hald, P. J. Van der Wolf and M. Swanenburg. 2002. Epidemiology and control measures for salmonella in Pigs and Pork. *Livestock Production Science* 76: 215-222.

Loureiro, M. L. and W. J. Umberger. 2007. A choice experiment model for beef: What US Consumer responses tell us about relative preferences for food safety, country-of-origin labelling and traceability. *Food Policy* 32: 496-514.

Louviere, J., A. D. Hensher, J. D. Swait and W. Adamowicz. 2000. *Stated Choice Methods: Analysis and Applications*. Cambridge University Press.

Louviere, J. J. and T. Islam. 2004. A Comparison of Importance Weights/Measures Derived from Choice-Based Conjoint, Constant Sum Scales and Best– Worst Scaling. CenSoC Working Paper. University of Technology. Sydney. http://www.business.uts.edu.au/censoc/papers/wp04003.pdf (accessed September 26, 2008)

Lusk, J. L., J. Roosen and J. Fox. 2003. Demand for beef from cattle administered growth hormones or fed genetically modified corn: A comparison of consumers in France, Germany, the United Kingdom, and the United States. *American Journal of Agricultural Economics* 85 (1): 16-29.

Lusk, J. L. and T. C. Schroeder. 2003. Auctions Bids and Shopping Choices: Are Consumer Preferences Contextual. Working paper. Department of Agricultural Economics, Purdue University.

Lusk, J. L. and D. Hudson. 2004. Willingness-to-pay estimates and their relevance to agribusiness decision making. *Review of Agricultural Economics* 26 (2): 152-169.

Lusk, J. L., F. B. Norwood and J. R. Pruit. 2006. Consumer demand for a ban on antibiotic drug use in pork production. *American Journal of Agricultural Economics* 88 (4): 1015-1033.

Lusk, J. L., F. B. Norwood and B. Prickett. 2007. Consumers Preferences for Farm Animal Welfare: Results of a Nationwide Telephone Survey. Working paper. Department of Agricultural Economics, Oklahoma State University. http://asp.okstate.edu/ baileynorwood/Bailey/research.htm (accessed February 28, 2008).

Lusk, J. L. and F. B. Norwood. 2008. A survey to determine public opinion about the ethics and governance of farm animal welfare. *Journal of the American Veterinary Medical Association* 233 (7): 1121-1126.

MacDonald, J. 2005. Economic analyses of certification programs. In *the Certification and Education Programs: Current Status of Farm Animal Welfare, One in a Series of Educational Programs*, edited by R. Reynnells. www.nal.usda.gov/awic/pubs/FTAA Proceedings/ProceedingsSept2005.pdf (accessed May 15, 2008).

Maddala, G. S. 1983. *Limited dependant and qualitative variables in econometrics*. New York: Cambridge University Press.

Manning, L., R. N. Baines and S. A. Chadd. 2006. Quality assurance models in the food supply chain. *British Food Journal* 108: 91–104.

Maple Leaf Inc. 2008. Maple Leaf Animal Welfare Statement. http://www.mapleleaf.com /AboutUs/AnimalWelfareStatement.aspx (accessed March 23, 2008).

McCluskey, J. J. 2000. A game theoretic approach to organic foods: An analysis of asymmetric information and policy. *Agricultural and Resource Economics Review* 29 (1): 1-9.

McDonald's Canada Inc. 2008. Animal Welfare Guiding Principles available at: http://www.mcdonalds.ca/en/community/animal_principles.aspx (accessed March 23, 2008).

McDonald's Corporation. 2008. Responsible Purchasing - Animal Welfare. http://www. mcdonalds.com/corp/values/purchasing/animalwelfare.html (accessed March 23, 2008).

McFadden, D. 1974. The measurement of urban travel demand. *Journal of Public Economics* 3 (4): 303-328.

McInerney, J. 2004. Animal Welfare, Economics and Policy. Report on a Study Undertaken for the Farm and Animal Health Economics Division of the Department for Environment, Food and Rural Affairs, UK. http://statistics.defra.gov.uk/esg/ reports/animal welfare.pdf (accessed August 12, 2007).

McVittie, A., D. Moran and L. Nevison. 2006. Public Preferences for Broiler Chicken Welfare: Evidence from Stated Preference Studies. Land Economy Paper Series. Land

Economy Research Group, Scottish Agricultural College. http://www.sac.ac.uk/research/publications/lee/workingpapers/2006/ (accessed October 12, 2007).

Mealey, E. 2002. PETA and the Fars Food Industry. Ethical Corp Magazine. May 2002. pp. 27.

Mennecke, B. E., A. M. Townsend, D. J. Hayes and S. M. Lonergan. 2007. A study of the factors that influence consumer attitudes toward beef products using the conjoint market analysis tool. *Journal of Animal Science* 85: 2639-2659.

Meredith, M. 2000. Farm Animal Welfare, The Power of Struggle. http://www.pighealth.com/welfare.htm (accessed April 15, 2008).

Meuwissen, M. P. M., I. A. Van Der Lans and A. Ivo. 2005. Trade-offs between Consumer Concerns: An Application for Pork Supply Chains. *Food Economics - Acta Agriculturae Scandinavica* Section C 2 (1): 27-34.

Meuwissen, M. P. M., I. A. Van Der Lans and R. B. M. Huirne. 2007. Consumer preferences for pork supply chain attributes. *NJAS Wageningen Journal of Life Sciences* 54 (3): 293-312.

Miele, M. and V. Parisi. 1998. Consumer Concerns about Animal Welfare and the Impact on Food Choice: Italy – Literature Review. EU FAIR-CT98-3678.

Miele, M. and V. Parisi. 2001. Consumer Concerns about Animal Welfare and the Impact on Food Choice: Italian Survey Report. EU FAIR-CT98. http://ec.europa.eu/food/animal/welfare/survey/index_en.htm (accessed October 1, 2007).

Ministry of Agriculture, Fisheries and Forestry, Australia (MAFF). 2007. Australian Animal Welfare Strategy. http://www.daff.gov.au/animal-plant-health/welfare/aaws (accessed March 24, 2008).

Miller, G. Y. and L. J. Unnevehr. 2001. Characteristics of consumers demanding and their willingness to pay for certified safer pork. *Journal of Agribusiness* 19 (2): 101-119.

Mintel. 1991. *The UK Egg Market*. Mintel, London.

Mitchell, L. 2001. Impact of consumer demand for animal welfare on global trade. In *Changing Structure of Global Food Consumption and Trade*, edited by A. Regmi. Chapter 9. pp. 80-89, Market and Trade Economics Division, Economic Research Service, US Department of Agriculture, Agriculture and Trade Report, WRS-01-1 http://www.ers.usda.gov/Publications/WRS011/ (accessed in December 8, 2008).

Moynagh, J. 2000. EU regulation and consumer demand for animal welfare. *AgBioForum* 3 (2 & 3): 107-114.

Murdoch, J. 2005. A comparative analysis of retail structures. In *Farm Animal Welfare Concerns, Consumers, Retailers and Producers*, edited by J. Roex and M. Miele, Part II, pp. 81-112. Welfare Quality Report No. 1. Cardiff University, Cardiff.

Murray, P. 2003. New Jerseyans' Opinions on Humane Standards for Treatment of Livestock. Project conducted for Farm Sanctuary by Eagleton Institute of Politics at the State University of New Jersey, Rutgers. http://www.njfarms.org/NJ_opinons.pdf (accessed September 12, 2007).

Mussa, M. and S. Rosen. 1978. Monopoly and product quality. *Journal of Economic Theory* 18: 301-37.

National Farm Animal Care Council (NFACC). 2008. About NFACC. http://www.nfacc.ca/AboutNFACC.aspx (accessed April 15, 2008).

National Hog Farmer (NHF). 2007. Oregon Passes Gestation Stall Ban. http://nationalhogfarmer.com/news/oregon-gestation-stall-ban/ (accessed December 15, 2008).

Nova Scotia Department of Agriculture (NSDA). 2006. Innovation and Opportunity Digest – Differentiation, Monthly Bulletin, Business Development and Economics Division. http://www.gov.ns.ca/agri/bde/digest/ (accessed May 16, 2008).

Nayga, M. R., A. Poghosyan and J. P. Nichols. 2004. Will consumers accept irradiated food products? *International Journal of Consumer Studies* 28 (2): 178–185.

Nelson, P. 1970. Information and consumer behaviour. *Journal of Political Economy* 78 (3): 11-329.

Nilsson, T. K. H. 2005. Market Opportunities for Certified Pork Chops. In *Product and Process Certification in Imperfectly Competitive industries*. Chapter 2. Ph.D. Thesis. Purdue University. West Lafayette.

Nilsson,T., K. Foster and J. L. Lusk. 2006. Marketing opportunities for certified pork chops. *Canadian Journal of Agricultural Economics* 54 (4): 567-583.

Noelke, M. C. and J. A. Caswell. 2000. A Model of the Implementation of Quality Management Systems for Credence Attributes. Presented at the 2005 meeting of the American Agricultural Economics Association. Tampa, Florida.

Northen, J. R. 2000. Quality attributes and quality cues: Effective communication in the UK meat supply chain. *British Food Journal* 102 (3): 230-245.

Norwood, F. B. and J. L. Lusk. 2008. *Agricultural Marketing and Price Analysis*. Pearson Education Inc. Upper Saddle River. New Jersey.

Office of the United States Trade Representative (OUSTR). 2006. Norway - Trade Summary - Import Policies - Industrial Goods. http://www.ustr.gov/assets/Document _Library/Reports_Publications/2006/2006_NTE_Report/asset_upload_file260_9196. pdf (accessed January 18, 2009).

Ohler, T., A. Le, J. J. Louviere and J. Swait. 2000. Attribute Range Effects in Binary Response Tasks. *Marketing Letters* 11 (3): 249–260.

Olson, J. C. and J. Jacoby. 1972. Cue utilisation in the quality perception process. In the Proceedings of the 3rd Annual Conference of the Association for Consumer Research, edited by Venkatesan. pp. 167-79. Iowa City.

Olsson, V., K. Andersson, I. Hansson and K. Lundstrom. 2003. Differences in meat quality between organically and conventionally produced pigs. *Meat Science* 64: 287-297.

Ontario Pork Council. n.d. Animal Care Assessment. http://www.ontariopork.on.ca/ cms/en/Programs/ACA.aspx (accessed May 15, 2008).

Ophuis, O.P.A.M. 1994. Sensory evaluation of 'free range' and regular pork meat under different conditions of experience and awareness. *Food Quality and Preference* 5: 173-178.

Parliament of Canada. 2008a. Bill S-203 - An act to amend the Criminal Code (Cruelty to Animals), as passed by the Senate of Canada on November 27, 2007, Legislative information 39th Parliament - 2nd Session. http://www2.parl.gc.ca/content/Senate/ Bills/392/public/pdf/s-203_3.pdf (accessed June 15, 2008).

Parliament of Canada. 2008b. Bill S-203 - An act to amend the Criminal Code (Cruelty to Animals), Status of the Bill/Coming into Force. http://www.parl.gc.ca/legisinfo/ index.asp?Language=E&Chamber=N&StartList=A&EndList=Z&Session=15&Type= 0&Scope=I&query=5263&List=force (accessed June 15, 2008).

Phan-Huy, A. S. and F. R. Badertscher Fawaz. 2003. Swiss market for meat from animal-friendly production: Responses of public and private actors in Switzerland. *Journal of Agricultural and Environmental Ethics* 16: 119-136.

Revelt, D. and K. Train. 1998. Mixed logit with repeated choices: Households' choices of appliance efficiency level. *Review of Economics and Statistics* 80:1-11.

Revelt, D. and K. Train. 2000. Customer-Specific Taste Parameters and Mixed Logit: Household' Choice of Electricity Supplier. Working Paper, Department of Economics, University of California, Berkeley. http://econpapers.repec.org/paper/ucbcalbwp/e00-274.htm (accessed October 15, 2008).

Roe, B. and I. Sheldon. 2007. Credence good labelling: The efficiency and distributional implications of several policy approaches. *American Journal of Agricultural Economics* 89 (4): 1020–1033.

Rolfe, J. C. 1999. Ethical rules and the demand for free range eggs. *Economic Analysis and Policy* 29 (2): 187-206.

Saskatchewan Pork Development Board. n.d. How pigs are raised? Information sheet. http://www.saskpork.com/content/education/how_pigs_raised.shtml#trans (accessed April 15, 2008).

Safeway Inc. 2008. Animal Welfare Policy. http://shop.safeway.com/corporate/safeway/animal_welfare.asp (accessed April 15, 2008).

Scholderer, J,. L. Bredhal and M. Magnuson. 2004. Consumer Expectations of the Quality of Pork Produced in Sustainable Outdoor Systems", SUSPORKQUAL Deliverable 22: Determination of the weighting of factors influencing attitudes to pork in different countries, Aarhus School of Business, University of Uppsala, Project paper No. 03/04, July. http://research.asb.dk/fbspretrieve/41/pp0304.pdf (accessed September 23, 2008).

Sedjo, R. A. and S. K. Swallow. 2002. Voluntary eco-labeling and the price premium. *Land Economics* 78 (2): 272-284.

Sheehan, K. B. and M. B. Hoy.1999. Using E-mail to survey Internet users in the United States: Methodology and assessment. *Journal of Computer Mediated Communication 4* (3).

Sheehan, K. B. and S. J. McMillan. 1999. Response variation in E-mail surveys: An exploration. *Journal of Advertising Research* 39 (4): 45-54.

Sohn, C. 2001. Validity of Web-Based Survey in IS Related Research as an Alternate to Mail Survey. Presented at the Seventh Americas Conference on Information Systems. Boston, MA. http://aisel.aisnet.org/amcis2001/318/ (accessed October 3, 2008).

Statistics Canada. 2006a. Population by Age Group and Sex, 2006 - Provinces and Territories in Canada. Estimates of Population by Age and Sex for Canada, Provinces and Territories – Survey no. 3604, Using E-STAT (distributor).

Statistics Canada. 2006b. Census of Population. Highest Level of Education Attained - Catalogue No. 97-560-XCB2006007.

Statistics Canada. 2006c. Census of Population, Household Income. Catalogue No. 97-563-XCB2006045.

Statistics Canada. 2008. Canadian Internet Use Survey. News Release, June 12. http://www.statcan.ca/Daily/English/080612/d080612b.htm (accessed October 20, 2008).

Stigler, G. J. 1961. The economics of information. *Journal of Political Economy* 69: 213-215.

Swallow, S. K., and R. A. Sedjo. 2000. Eco-labeling consequences in general equilibrium: A graphical assessment. *Land Economics* 76 (1): 28-36.

Swanson, J. 2007. An Overview of Farm Animal Care and Welfare Approaches Taken in the United States. Presented at the National Farm Animal Care and Welfare Conference, National Farm Animal Care Council, September 20-21, Ottawa, Ontario. http://www.nfacc.ca/News-Item.aspx?id=5 (accessed October 2, 2007).

Teisl, M., B. Roe and A. Levy. 1999. Ecocertification: Why it may not be a 'field of dreams. *American Journal of Agricultural Economics* 81 (5): 1066-1071.

The PigSite. 2008. ThePigSite News Desk*: Colorado Commended for Banning Farm Confinement Systems. May 15. http://www.thepigsite.com/swinenews/17924/colorado-commended-for-banning-farm-confinement-systems (accessed November 15, 2008).

Tonsor, G. T. 2008a. Michigan Consumer Gestation Stalls Perceptions and Preferences. *MSU Pork Quarterly* 13 (2): 4-5. http://web1.msue.msu.edu/msue/aoe/swine/quarter. html (accessed December 12, 2008).

Tonsor, G. T. 2008b. Consumer Demand for Animal Welfare Practices. Presented at the Michigan Agricultural Credit Conference. November 6. https://www.msu.edu/user/gtonsor/PresentationArchives.html (accessed December 12, 2008).

Tonsor, G. T., N. Olynk and C. Wolf. 2008. Consumer Preferences for Animal Welfare Attributes: Case of Gestation Crates. Presented at the 2008 American Agricultural Economics Association meeting. Orlando, Florida.

Train, K. 2003. *Discrete Choice Methods with Simulation*. Cambridge University Press.

Trewin, R. 2002. The Economic Impact of Changing Australian Egg Production Systems. RIRDC Publication No. 02/107 Rural Industries Research and Development Corporation Australia, Project No. ANU-41A. http://www.rirdc.gov.au/reports/EGGS/02-107sum.html (accessed January 28, 2008).

United Egg Producers (UEP*). 2008. Egg Industry Establishes Welfare Guidelines. http://www.uepcertified.com/abouttheprogram.html (accessed May 8, 2009)

United States Department of Agriculture (USDA). 2001. Key Facts: Humane Slaughter, http://www.fsis.usda.gov/Fact_sheets/Key_Facts_Humane_Slaughter/index.asp (accessed January 3, 2009).

Walley, K., S. Parson and M. Bland. 1999. Quality assurance and the consumer: A conjoint study. *British Food Journal* 101 (2): 148-162.

Webster Edition. 1976. Webster's New World Dictionary, 2nd Edition. Cleveland OH: William Collins and World Publishing Co.

Wessells, C. R., R. J. Johnson and H. Donath. 1999. Assessing consumer preferences for eco-labelled seafood: The influence of species, certifier, and household attributes. *American Journal of Agricultural Economics* 81 (5): 1084-1089.

West, G. E., B. Larue, C. Gendron and S. L. Scott. 2002. Consumer confusion over the significance of meat attributes: The case of veal. *Journal of Consumer Policy* 25: 65-88.

Whiting, T. L. 2005. Legislation for Animal Welfare. Paper presented at the Livestock Care Conference. Alberta Farm Animal Care. http://www.afac.ab.ca/current/leg/WhitingAPC.pdf (accessed March 22, 2008).

Winnipeg Humane Society (WHS). 2008. Issues and News: WHS Certified. http://www.winnipeghumanesociety.ca/animal_Issues_And_News/index.php (accessed May 11, 2008).

Yun, G. W. and C. W. Trumbo. 2000. Comparative response to a survey executed by post,

e-mail, and Web Form. *Journal of Computer Mediated Communication* 6 (1).

Appendix 1: Example of Codes of Practice and Certification in Canada

The Canadian Egg Marketing Agency – Animal Care Program (ACP)

"Recognizing its leadership role in promoting humane treatment of farm animals, the Agency agreed to serve as secretariat for the development of a Recommended Code of Practice for the care and handling of pullets, layers and spent fowl. Under the auspices of the Canadian Agri-Food Research Council, CEMA organized two meetings with representatives of the Canadian Federation of Humane Societies, the Canadian Veterinary Medical Association, the Canadian Food Inspection Agency and other credible organizations in the animal care field to reach consensus on guidelines for the humane treatment of animals used in the egg laying industry" (CEMA, 2001, p.28). This action finalized in 2002 with the release of a new code which was substantially different from the one of 1989 in that it only addresses guidelines specific to the care and handling of birds in the egg sector (CEMA, 2002, p.15). In addition to the increase in the recommended housing space and the phase out of the controlled moulting, other major differences in the guidelines from the 1989 Code to the new one are:

- There is now a specific recommendation that beak trimming should ideally take place prior to 14 days of age. Beak trimming is not recommended after eight weeks of age.
- There is a recommendation to provide an electrolyte solution containing vitamins, particularly vitamin K.
- There are now special sections to address the specific welfare concerns associated with free-range and free-run operations.
- There is a recommendation to have generators available in the event of electrical failure.
- There are new building and yard design considerations for transportation. Specific suggestions are made for moving birds from one laying operation to another.

"The Code is the most authoritative welfare text on laying operations in Canada. It is science-based and was developed by consensus among several groups, including welfare advocates. The egg industry is demonstrating to egg customers that it is serious when it comes to animal welfare. Several provincial boards have worked together to develop measurable welfare criteria, based on the recommendations in the Code, for egg farms. CEMA participated in numerous meetings that resulted in a preliminary rating system that is to be field tested in 2003" (CEMA, 2002, p.15). "The Animal Care Program was developed to be credible and realistic, the main tool for conveying to producers the major guidelines found in the Code. Farms are inspected against 14 criteria pertaining to density, water and feed, beak trimming, house temperature, lighting, air quality, moulting, generators and layer condition" (CEMA, 2004, p.25).

"While it is obvious to egg farmers that welfare is a critical consideration in laying operations, this is not as clear to some egg users who have considered putting welfare criteria in their purchasing specifications. By developing a rating system based on the Code, the industry will have consistent, generally accepted practices based on what is good for layers, rather than what may allow one or another company to temporarily secure a greater share of the market" (CEMA, 2002, p.15).

Appendix 2: Examples of Private Sector Animal Welfare Policies

A 2.1: Example of Animal Welfare Policies of a Major Restaurant Chain

McDonald's – Animal Welfare Guiding Principles

1. **Safety:** *First and foremost, McDonald's will provide its customers with safe food products. Food safety is McDonald's number one priority.*
Food safety at McDonald's Canada is central to company operations and supply chain management. To this end, food safety is integrated into all facets of our business from raw material production to our customer service operations.

2. **Quality:** *McDonald's believes treating animals with care and respect is an integral part of an overall quality systems program that makes good business sense.*
Quality is a cornerstone at McDonald's. Quality defines our process "From Farm to Customer", with animal welfare a critical component of our quality strategy.

3. **Animal Treatment:** *At McDonald's Canada, we support that animals should be free from cruelty, abuse and neglect while embracing the proper treatment of animals and addressing animal welfare issues.*
McDonald's believes in the ethical treatment of animals, and that animals should be raised, transported and slaughtered in an environment free from cruelty, abuse and neglect.

4. **Partnership:** *McDonald's works continuously with our suppliers to audit animal welfare practices, ensuring ongoing compliance and continuous improvement.*
Outside experts have helped McDonald's develop systems to measure the effectiveness of our animal welfare practices. To that end, McDonald's is committed to implementing an auditing system with our suppliers that ensures animal welfare compliance and sharing "Best Practices" for continuous improvement. We also encourage all our suppliers to conduct self-audits with independent third party bodies on an ongoing basis.

5. **Leadership:** *McDonald's leads our industry, working with our suppliers and industry experts to advance animal welfare practices and technology.*
We will continually educate ourselves and our suppliers relative to animal welfare issues, ensuring that our programs are based on the best science available. This will include working with industry experts and scientists to develop training programs and material that will be used to ensure continuous improvements in the area of animal welfare.

6. **Performance Measurement:** *McDonald's sets annual performance objectives to measure our improvement and will ensure our purchasing strategy is aligned with our commitment to animal welfare issues.*
We will continue to dedicate resources to monitor and coordinate activities associated with improving animal welfare, and will incorporate animal welfare objectives into our annual business strategy. McDonald's recognizes our responsibility as a major purchaser of animal products and the need to establish animal welfare standards and measurements ensuring alignment with our purchasing strategy.

7. **Communication:** *McDonald's will communicate our process, programs, plans and progress surrounding animal welfare.*
McDonald's is committed to sharing our progress with our customers and shareholders, while sharing best practices with our competitors.

Source: McDonald's Canada Inc. (2008), "Animal Welfare Guiding Principles", available at
http://www.mcdonalds.ca/en/community/animal_principles.aspx

A 2.2: Example of Animal Welfare Policies of a Major Meat Processor

Maple Leaf Inc. – Animal Welfare Statement

As a leading food processor, Maple Leaf Foods is responsible for ensuring the safe and humane treatment of all animals within our care.

A healthy respect for the well-being, proper handling and humane slaughter of all animals within our care is a social and ethical responsibility that maintains an important balance between respecting the needs of animals and providing consumers with high quality, wholesome and affordable food. This responsibility is shared between Maple Leaf Foods and our suppliers, as we all depend on these animals for our products and our livelihood. Everyone involved in the raising and processing of animals and poultry, from producers and transport workers to all of our employees, are required to adhere to good animal handling practices in accordance with industry guidelines, serving as stewards of the animals entrusted to their care.

Maple Leaf retains humane handling experts to inspect our hog and poultry primary processing facilities on an ongoing basis. All our meat processing operations are federally inspected by on-site inspectors and veterinarians employed by the Canadian Food Inspection Agency, who continuously review and audit our animal handling practices.

Maple Leaf Foods and its operating companies support this commitment by:

- Adhering to policies and procedures across all our primary processing facilities and growing operations that assure the respectful and humane treatment of animals in accordance with industry codes of practice for animal well-being.
- Providing our employees with the knowledge and skills required to ensure proper animal handling and welfare practices in their related work areas to ensure they perform their jobs in accordance with best practices.
- Enforcing a ZERO tolerance for employee abuse of animals within our care and taking appropriate disciplinary action including termination of employment when these standards are violated.
- Routinely auditing our primary processing plants to test the effectiveness of our animal welfare practices and procedures based on established and quantifiable animal well-being guidelines.
- Working with producers who share our commitment to upholding high standards of animal welfare.
- Contracting only with specialty agricultural transportation companies that provide safe and comfortable transportation of livestock and poultry in accordance with industry codes of practice.
- Taking appropriate disciplinary action against any producers or third party suppliers who violate animal welfare practices, which may include the termination of contracts.
- Regularly consult with leading industry experts and animal psychologists on welfare and handling practices.

Continuously improving our animal welfare practices and supporting the development of new industry standards and codes through active participation on advisory councils, including a leadership role in the National Farm Animal Care Council and support for ongoing research.

Source: Maple Leaf Inc. (2008), "Animal Welfare Statement", available at http://www.mapleleaf.com/AboutUs/AnimalWelfareStatement.aspx

A 2.3: Example of Animal Welfare Policies of a Major Food Retailer

Safeway Inc. – Animal Welfare Policy

Introduction
Safeway is a retail grocery industry leader in animal welfare. The company understands that its responsibility as a purchaser of food products must include working with its vendors to ensure that animals in the food production system are being treated humanely. The company has developed a comprehensive animal welfare program to ensure that both its national brand and private label suppliers have programs in place standard for the humane treatment of animals in all aspects of animal husbandry, shipment, and handling during the harvest process.

Scope: All Safeway meat, pork, poultry, egg, dairy and seafood suppliers are required to meet a set of designated animal treatment guidelines. In addition to national brands, all suppliers of Safeway branded products will be required to meet the same standards. Secondary Safeway-branded processors must demonstrate that they require their raw material suppliers to meet Safeway's animal welfare standards. Compliance with the Safeway brand produce guidelines will be the responsibility of the Meat Quality Assurance Group and the Supply Operations Quality Assurance Group.

Audits
Safeway's overall commitment to animal welfare includes an audit program conducted by a rotating team of internal and independent auditors. The company has established a set of procedures and standards designed to ensure humane treatment of animals. Audits are conducted and scheduled under the guidance of Virginia Littlefield, Safeway's Manager, Meat Laboratory and Animal Welfare. Ms. Littlefield is a member of the company's Animal Welfare Advisory Council.
Audit results are reviewed by Safeway's Animal Welfare Council and with vendors.
The third party audit firms approved for inspections are:
• Silliker Labs
• Food Safety Net Services
• NSF-Cook & Thurber
• Process Management Consulting

Safeway's Animal Welfare Advisory Council
Since 2001 Safeway has maintained a professional association with a number of well-recognized experts in animal welfare. The company recently decided to establish a more formal and fully functioning Animal Welfare Council composed of both company and independent animal welfare members. The Council's broad mandate is to provide guidance and counsel to the company on matters relating to the humane treatment of animals in the food production system. The members of the advisory council are:
Temple Grandin, Ph.D (Dr. Grandin is an Associate Professor of Animal Science at Colorado State University), **Sara Shields, Ph.D** (Dr. Shields is an animal welfare scientist at the University of Nebraska, Lincoln, where she teaches in the Animal Science department), **Janice Swanson, Ph.D.** (In April 1992, Dr. Swanson joined the faculty in the Department of Animal Sciences and Industry at Kansas State University. In 2002, Dr. Swanson achieved the rank of full professor and has been serving as the interim department head since January 2005. She is a member of the KSU graduate school faculty.), **Jim Sheeran**, Vice President, Corporate Meat Merchandising, Safeway Inc. **Virginia Littlefield**, Manager, Meat Laboratory/Animal Welfare, Safeway Inc. **Brian Dowling**, Vice President, Public Affairs. Safeway Inc.

Our Commitment
Safeway remains committed to ensuring that its suppliers are engaged in a process of continuous animal welfare improvement. We will work collaboratively with our vendors and the animal science community toward further ensuring that the company's national brand and private label brands are sourced from suppliers who meet this standard.

Source: Safeway Inc (2008), "Animal Welfare Policy", available at http://shop.safeway.com/corporate/safeway/animal_welfare.asp

Appendix 3: Example of the Internet as a Source of Information for Consumers – Aliments Foods DuBreton Canada

Our Hog Farming Programs

Our hog farming standards correspond to the needs of our clientele and are clearly indicated in official program specifications. Here is a comparative summary of our main programs:

Features	DuBreton Certified Organic Pork	DuBreton Certified Humane Pork	DuBreton Pork Raised Without Antibiotics, Vegetable Grain-Fed	Natural USDA	Conventional
Organic feed, GMO free	X	-	-	-	-
Outdoor access for animals	X	-	-	-	-
Loose sow housing	X	X	-	-	-
Controlled animal welfare (farms, transportation, and processing plant)	X	X	X	-	-
Rendered animal by-products in feed	Never ever	Never ever	Never ever	X	X
Subtherapeutic antibiotics	Never ever	Never ever	Never ever	X	X
Therapeutic antibiotics	Never ever	Never ever	Never ever	X	X
Monitoring for antibiotic residues	X	X	X	-	-
Third party certification	X	X	X	-	-
Minimal processing	X	X	X	X	Yes and no
No preservatives	X	X	X	X	Yes and no

Source: Aliments Breton Foods Canada (2008), "Farming and Processing – Our Hog Faming Programs", available at http://www.dubreton.com/en/production/standards

Appendix 4: Examples of Animal Welfare Certification Programs Offered by Third-Parties

British Columbia Society for Prevention of Cruelty to Animals	The Winnipeg Humane Society
Certified Adherence to BC SPCA Farm Animal Welfare Standards	**Certified Adherence to WHS Farm Animal Welfare Standards**
The *SPCA Certified* program is an independent third party certification system. It is a certified assurance to consumers that food products bearing the program label comply with the farm animal welfare standards developed by the BC SPCA. 	A first for Canada, meat and eggs certified by The Winnipeg Humane Society is now available in Winnipeg.
Participating farms pay for their certification, and this provides a guarantee that they have met the BC SPCA's standards for the raising and handling of farm animals. The BC SPCA standards differ from the national code of practices published by the Canadian Agri-Food Research Council in farm animal husbandry practices, including space per animal and transportation times. **SPCA Certified program goals:** The goals of the SPCA Certified Program are: - Facilitate and support changes to farm animal welfare standards; - Provide voluntary third party certification services to those involved in the animal agricultural industry; - Support scientific research and development in farm animal welfare.	The new label marks the first time Canadian consumers will be able to choose meat from animals raised according to standards approved by an animal-welfare organization. Our standards include: no animal caging; minimum space requirements; no hormones or unnecessary antibiotics; and mandatory barn inspections by independent professionals. The label represents an exciting new partnership between Manitoba farmers and The Winnipeg Humane Society. "It's the right thing to do because it works for me and it works for the animals," says Bruce Daum, a hog farmer near Brandon, Manitoba who raises humane-certified pork. "The partnership lets consumers choose humane-labelled products while supporting Manitoba farmers."

Sources: British Columbia Society for Prevention of Cruelty to Animals (2008), "Certified Adherence to BC SPCA Farm Animal Welfare Standards, available at http://www.spca.bc.ca/farm/default.asp; Winnipeg Humane Society (2008), "Issues&News: WHS Certified, available at http://www.winnipeghumanesociety .ca/animal_Issues_And_News/index.php

Appendix 5: Example of Point of Sale Materials Used by a Private Firm to Advertise Animal Welfare Features and the Certification Program for Livestock and Poultry Products

Source: Aliments Breton Foods Canada.

Appendix 6: Pork 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 and is intended to improve our understanding of what is important to you about the meat you consume – pork, in particular. It will give us insights into how you see different organizations involved in verifying things such as farm animal welfare.

The researchers are interested in what you think; there are no questions that have a "right" or "wrong" answer. 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 should take between 15 and 20 minutes to complete.
•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 regarding 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 or would like a copy of the final report, please do not hesitate to email us at: adrian.uzea@usask.ca, jill.hobbs.@usask.ca or ellen.goddard@ualberta.ca. You can also write to us at:

Dr. Jill E. Hobbs (supervisor)   Dr. Ellen Goddard
Adrian Uzea (student)   University of Alberta
University of Saskatchewan   Department of Rural Economy
Department of Bioresource Policy, Business & 515 General Services Building
Economics   T6G 2H1, Edmonton, AB
51 Campus Dr.   Telephone: (780) 492-4596
S7N 5A8, Saskatoon, SK
Telephone: (306) 966-2445

We thank you for your time and valuable contribution to this study.

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.

1. How often do you purchase or eat pork?

□ Once per week
□ 2-3 times per week
□ More than 3 times per week
□ Don't know

2. In the last three months, how often have you purchased the following poultry or livestock products that were assured for being sourced from animals raised 'naturally'? E.g., raised outdoors, pasture-raised, free-run or free-range (free-run means chickens/hens have access to the floor of the barn, while free-range means they may also have access outdoors).

	Never	1-3 times	More than 3 times	Don't know
a. Natural pork	□	□	□	□
b. Natural beef	□	□	□	□
c. Free-range chicken	□	□	□	□
d. Free-run/Free-range eggs	□	□	□	□
e. Other natural meats (lamb, turkey, etc.)	□	□	□	□

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

	Unimportant	Slightly Important	Moderately Important	Very Important	Extremely Important	Don't know/ not sure
Availability of information on labels	☐	☐	☐	☐	☐	☐
Organization verifying quality - e.g., certifying /grading organization	☐	☐	☐	☐	☐	☐
Price of pork	☐	☐	☐	☐	☐	☐

4. For each of the following statements, please indicate how much you agree or disagree on the scale provided. If you don't know, or neither agree nor disagree, please select the "don't know/not sure" option.

	Strongly Disagree	Disagree	Neutral (neither agree nor disagree)	Agree	Strongly Agree	Don't know / not sure
I am aware of how pigs are raised.	☐	☐	☐	☐	☐	☐
Current level of pigs' welfare in Canada is acceptable.	☐	☐	☐	☐	☐	☐
Concerns for the welfare of farm animals affect my food purchase decisions.	☐	☐	☐	☐	☐	☐
Meat from pigs raised with higher welfare standards is healthier for me.	☐	☐	☐	☐	☐	☐
Meat from pigs raised with higher welfare standards tastes better.	☐	☐	☐	☐	☐	☐
Meat from pigs raised outdoors and without the use of antibiotics may carry a higher risk of pathogens causing food borne illness.	☐	☐	☐	☐	☐	☐

5. For each of the following statements, please indicate how much you agree or disagree on the scale provided.

	Strongly Disagree	Disagree	Neutral (neither agree nor disagree)	Agree	Strongly Agree	Don't know/ not sure
If food companies and farmers improve animal welfare standards, the price of meat will increase.	☐	☐	☐	☐	☐	☐
The government should take an active role in promoting farm animal welfare.	☐	☐	☐	☐	☐	☐
The government has to put in place higher mandatory welfare standards that require farmers to treat animals humanely.	☐	☐	☐	☐	☐	☐
Farmers should be compensated if forced to comply with higher farm animal welfare standards.	☐	☐	☐	☐	☐	☐
Food companies that monitor how farmers treat their animals are doing the right thing	☐	☐	☐	☐	☐	☐
Animal rights organizations influence my decisions about what meat (i.e., conventional vs. outdoor pork) to buy	☐	☐	☐	☐	☐	☐
Consumers should have the right to choose what they eat and not have their choices limited by a small minority of animal rights organizations	☐	☐	☐	☐	☐	☐
Animal rights organizations are too radical in their protection of animals	☐	☐	☐	☐	☐	☐

6. Please indicate whether you have participated in the following activities in the last year:

Avoided purchasing meat or eggs because of the way it was produced (e.g., battery cages, gestation stalls)	Yes	No
Deliberately chosen meat or eggs for animal welfare reasons	Yes	No
Read newspaper articles, listened to radio programs, or watched television programs about livestock or poultry farming	Yes	No
Expressed dissatisfaction with livestock or poultry farming by signing a petition or writing to a newspaper	Yes	No
Encouraged friends or family to purchase animal friendly products	Yes	No
Participated in a protest or demonstration related to animal welfare	Yes	No
Contacted a politician on an animal welfare issue	Yes	No
Expressed support for livestock or poultry farming by signing a petition, writing to a newspaper etc.	Yes	No
Donated money and goods, or volunteered time to an animal welfare organization	Yes	No

7. In the last three months, how many news reports on animal welfare have you heard or read?

□ None
□ 1-2
□ 3-6
□ 6-10
□ More than 10
□ Don't know/ not sure

Purchase Simulation

Imagine that you are planning to purchase pre-packaged boneless pork chops at a supermarket. All of the pork chops are of the same kind that you normally purchase. We are going to present you with a number of purchase options that have different farming methods, verifying organizations, and price. We will ask you to mark which of these you would most prefer to buy. Before proceeding, please read the descriptions, of the following characteristics of pork chops, as they will be applied in the questions to follow:

1. Pigs' Housing System;
2. Gestation Stalls;
3. Antibiotics;
4. Organization Verifying;
5. Price.

The next few screens will contain explanations of these features; please read them through carefully.

1. PIGS' HOUSING SYSTEM – represents different ways of raising the pigs in terms of barn type, floor material, and temperature environment. In the choices that follow three housing options will be available:

1.1 Conventional Housing System ● Pigs are housed in indoor barns having floors made of concrete; ● Floors have slots that drain manure into an underground pit; ● No bedding is used. Temperature is controlled with automatic heaters in winter and ventilation fans in summer.	
Advantages: ● Constant temperature enhances pigs' comfort; ● Controlled environment diminishes the risk of getting diseases (i.e., from insect bites). **Disadvantages:** ● Higher incidence of leg injuries and skin lesions; ● Stored manure may produce gases, which may irritate pigs; ● Pigs may die from overheating in summer if the barn experiences a several-hour blackout, as fans rely on electrical power.	

1.2 Hoop Housing System

- Pigs are housed in large tent-like shelters with straw bedding;
- Airflow is controlled by openings at the hoop's ends.
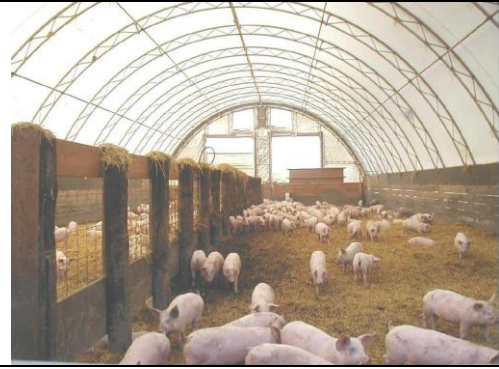
Advantages:
- Lower incidence of leg injuries and skin lesions, as pigs have more room to move;
- Pigs can express natural behaviour (i.e., roam, root, dig).

Disadvantages:
- Risk of infection with intestinal parasites trapped in the mix of straw, manure, and urine;
- Fluctuating temperature:
  - ➢ In hot summers, temperature in the hoop may increase substantially affecting pigs' comfort (however, hoops are less susceptible to overheating than are conventional barns in case of power failure);
  - ➢ In winter, the air inside the hoop may be as cold as that outside, slowing down pigs' vital functions.

1.3 Outdoor System

- Finishing pigs are kept in a coral, which can be either a yard with straw or a pasture field;
- In summer, portable huts are used to protect pigs from rain and sunburn;
- In winter, large bales of straw can be set out, so that pigs can burrow for warmth. Alternatively, pigs can be housed in indoor barns with straw bedding.

Advantages:
- Pigs live in a natural environment where they can roam, root, and dig;
- Lower incidence of leg injuries and skin lesions as pigs have more room to move.

Disadvantages:
- In winter, the cold may slow down the pigs' vital functions;
- Risk of infection from intestinal parasites that can survive in the corral;
- Risk of getting diseases from insect bites.

2. GESTATION STALLS – represents different ways of keeping the sows after breeding while they are pregnant. Pork chops can be sourced from pigs bred at a farm where:

2.1 Gestation stalls are used – Gestation stalls are individual pens in which sows are confined after breeding while they are pregnant.	

Advantages:
- Allows for control over individual feed intake and prevents aggression between sows.

Disadvantages:
- Provides just enough room for sows to stand, lie down, or sit; other movements (i.e., walking or turning around) are restricted;
- Sows may suffer from leg injuries, reduced bone strength and poor muscle tone.

2.2 Group pens are used – Sows are kept in groups in pens.	

Advantages:
- Sows have more room to move and the opportunity for social interaction.

Disadvantages:
- High incidence of aggression between sows in the first hours of interaction when they are grouped together;
- Feeding system may be such that sows compete for feed.

3. ANTIBIOTICS – pigs have been:

3.1 Raised With the Use of Antibiotics – Pigs are routinely administered low levels of antibiotics in feed to prevent diseases, improve digestion, and make them grow faster.

3.2 Raised Without the Use of Antibiotics – Antibiotics are administered only with the approval of a veterinarian and are aimed at treating diseases. If the symptoms of a disease are observed too late, antibiotics are not effective and the mortality rate in the herd of pigs may be high.

4. VERIFYING ORGANIZATION – represents the organization that is responsible for assuring that a farmer raises pigs in accordance with specific animal welfare requirements. To be assured that practices described are being followed, an inspector must visit the farm. Consumers recognize this because the verifying organization allows pork producers to place a certification stamp, including an assurance logo and a message, on the package. The verifying organization may be:

- **Farmer** (e.g., an individual farmer or a farmers' association);
- **Processor** (e.g., a well known meat processor);
- **Supermarket** (e.g., a well known grocery store);
- **Government** (e.g., a federal food agency);
- **Independent Third-Party** (e.g., a certifying company or a non-profit organization);
- **None** (i.e., no organization verifies whether a farmer raises pigs in accordance with specific animal welfare requirements).

5. PRICE – represents the retail price for pre-packaged boneless pork chops sourced from pigs raised under the different systems described above. The pork chops represented in the following questions will have four price levels:

- **$ 5.02/ lb or $ 11.07/ kg;**
- **$ 5.99/ lb or $ 13.21/ kg;**
- **$ 7.29/ lb or $ 16.08/ kg;**
- **$ 8.74/ lb or $ 19.26/ kg.**

EXAMPLE: During a typical shopping trip to the grocery store to purchase boneless pork chops, if the following options were the only ones available, which option would you choose? For example:

- Option A represents pork chops sourced from pigs raised on farms that use outdoor housing and group pens. Pigs are administered antibiotics only with the approval of a veterinarian. All of these characteristics are verified by a third-party. The price of these pork chops is $ 19.26/ kg (or $ 8.74/ lb).

- Option B represents pork chops sourced from pigs raised on farms that use hoop housing and gestation stalls. Pigs are administered antibiotics only with the approval of a veterinarian. All of these characteristics are verified by the government. The price of these pork chops is $ 13.21/ kg (or $ 5.99/ lb).

- Option C represents pork chops sourced from pigs raised on farms that use conventional housing and gestation stalls. Pigs are routinely administered low levels of antibiotics. No organization verifies these characteristics. The price of these pork chops is $ 11.07/ kg (or $ 5.02/ lb).

- Option D is to be selected when you would not wish to buy any of the A, B or C options.

In this particular example option B is the most preferred.

Features	A	B	C	D
Pigs' housing system	Outdoor	Hoop	Conventional	I would not buy any of these products.
Gestation stalls	Group pens	Gestation stalls	Gestation stalls	
Antibiotics	Not used	Not used	Used	
Organization verifying	Third-Party verified	Government verified	None	
Price	$ 19.26/ kg (or $ 8.74/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	
I would choose…	☐	✔	☐	☐

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

8. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Outdoor	Outdoor	Hoop	
Gestation stalls	Group pens	Group pens	Group pens	
Antibiotics	Not used	Used	Not used	I would not buy any of these products.
Organization verifying	Third-Party verified	Supermarket verified	Government verified	
Price	$ 16.08/ kg (or $ 7.29/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	
I would choose…	☐	☐	☐	☐

9. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Hoop	Hoop	Conventional	
Gestation stalls	Gestation stalls	Group pens	Group pens	
Antibiotics	Used	Not used	Used	I would not buy any of these products.
Organization verifying	None	None	Third-Party verified	
Price	$ 11.07/ kg (or $ 5.02/ lb)	$ 16.08/ kg (or $ 7.29/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	
I would choose…	☐	☐	☐	☐

239

10. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Conventional	Conventional	Conventional	
Gestation stalls	Gestation stalls	Gestation stalls	Gestation stalls	
Antibiotics	Not used	Not used	Not used	I would not buy any of these products.
Organization verifying	None	Farmer verified	Third-Party verified	
Price	$ 16.08/ kg (or $ 7.29/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	
I would choose…	☐	☐	☐	☐

11. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Conventional	Conventional	Hoop	
Gestation stalls	Group pens	Group pens	Group pens	
Antibiotics	Used	Used	Not used	I would not buy any of these products.
Organization verifying	Farmer verified	Government verified	Government verified	
Price	$ 13.21/ kg (or $ 5.99/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	
I would choose…	☐	☐	☐	☐

12. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:
Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Outdoor	Outdoor	Outdoor	I would not buy any of these products.
Gestation stalls	Group pens	Group pens	Group pens	
Antibiotics	Not used	Used	Not used	
Organization verifying	Supermarket verified	None	None	
Price	$ 13.21/ kg (or $ 5.99/ lb)	$ 16.08/ kg (or $ 7.29/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	
I would choose…	☐	☐	☐	☐

13. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:
Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Hoop	Outdoor	Conventional	I would not buy any of these products.
Gestation stalls	Group pens	Group pens	Gestation stalls	
Antibiotics	Not used	Used	Not used	
Organization verifying	Processor verified	Processor verified	Processor verified	
Price	$ 11.07/ kg (or $ 5.02/ lb)	$ 11.07/ kg (or $ 5.02/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	
I would choose…	☐	☐	☐	☐

241

14. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Conventional	Hoop	Conventional	
Gestation stalls	Gestation stalls	Gestation stalls	Group pens	
Antibiotics	Not used	Not used	Used	I would not buy any of these products.
Organization verifying	Processor verified	Supermarket verified	Supermarket verified	
Price	$ 19.26/ kg (or $ 8.74/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	$ 19.26/ kg (or $ 8.74/ lb)	
I would choose…	☐	☐	☐	☐

15. If you were planning to buy pork chops, and you were able to select from the following choices, which choice below would you buy? The following links allow you to review the descriptions of each feature of the pork chops:

Pigs' housing system *Gestation stalls* *Antibiotics* *Organization verifying* *Price*

Features	A	B	C	D
Pigs' housing system	Outdoor	Hoop	Hoop	
Gestation stalls	Group pens	Gestation stalls	Gestation stalls	
Antibiotics	Not used	Used	Used	I would not buy any of these products.
Organization verifying	Government verified	Processor verified	Government verified	
Price	$ 11.07/ kg (or $ 5.02/ lb)	$ 13.21/ kg (or $ 5.99/ lb)	$ 16.08/ kg (or $ 7.29/ lb)	
I would choose…	☐	☐	☐	☐

16. An on-going debate revolves around the implications of different farming methods for the welfare of farm animals. To what extent do you **trust** the following types of organizations for **accurate information about the welfare of pigs**? Please indicate this on the scale provided. If you don't know or are not sure, please select the "don't know/not sure" option.

Organization	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know/not sure
Farmer (e.g., an individual farm)	☐	☐	☐	☐	☐	☐
A Farmers' Association (e.g., Canadian Pork Council)	☐	☐	☐	☐	☐	☐
Food Processor (e.g., a well-known meat processor)	☐	☐	☐	☐	☐	☐
Supermarkets (e.g., a well-known grocery store)	☐	☐	☐	☐	☐	☐
Government (e.g., a federal food agency)	☐	☐	☐	☐	☐	☐
Independent Third-Party (e.g., a certifying company or a non-profit organization)	☐	☐	☐	☐	☐	☐
Media (e.g., newspapers, television, or radio)	☐	☐	☐	☐	☐	☐
Animal Rights Organizations	☐	☐	☐	☐	☐	☐
Scientific Experts in Animal Welfare	☐	☐	☐	☐	☐	☐

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

Organization	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know/not sure
Farmer (e.g., an individual farm)	☐	☐	☐	☐	☐	☐
A Farmers' Association (e.g., Canadian Pork Council)	☐	☐	☐	☐	☐	☐
Food Processor (e.g., a well-known meat processor)	☐	☐	☐	☐	☐	☐
Supermarkets (e.g., a well-known grocery store)	☐	☐	☐	☐	☐	☐
Government (e.g., a federal food agency)	☐	☐	☐	☐	☐	☐
Independent Third-Party (e.g., a certifying company or a non-profit organization)	☐	☐	☐	☐	☐	☐
Media (e.g., newspapers, television, or radio)	☐	☐	☐	☐	☐	☐
Animal Rights Organizations	☐	☐	☐	☐	☐	☐
Scientific Experts in Animal Welfare	☐	☐	☐	☐	☐	☐

18. To what extent do you think the following types of organizations are **transparent (open) and accountable** when providing information about pigs' welfare? i.e., Is it easy to get information from them? Would they be held responsible for their actions? Please indicate this on the scale provided.

Organization	Not at All	Very Little	Somewhat	Very Much	Completely	Don't know/not sure
Farmer (e.g., an individual farm)	☐	☐	☐	☐	☐	☐
A Farmers' Association (e.g., Canadian Pork Council)	☐	☐	☐	☐	☐	☐
Food Processor (e.g., a well-known meat processor)	☐	☐	☐	☐	☐	☐
Supermarkets (e.g., a well-known grocery store)	☐	☐	☐	☐	☐	☐
Government (e.g., a federal food agency)	☐	☐	☐	☐	☐	☐
Independent Third-Party (e.g., a certifying company or a non-profit organization)	☐	☐	☐	☐	☐	☐
Media (e.g., newspapers, television, or radio)	☐	☐	☐	☐	☐	☐
Animal Rights Organizations	☐	☐	☐	☐	☐	☐
Scientific Experts in Animal Welfare	☐	☐	☐	☐	☐	☐

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

Organization	Never	Rarely	Sometimes	Usually	Always	Don't know/ not sure
Farmer (e.g., an individual farm)	☐	☐	☐	☐	☐	☐
A Farmers' Association (e.g., Canadian Pork Council)	☐	☐	☐	☐	☐	☐
Food Processor (e.g., a well-known meat processor)	☐	☐	☐	☐	☐	☐
Supermarkets (e.g., a well-known grocery store)	☐	☐	☐	☐	☐	☐
Government (e.g., a federal food agency)	☐	☐	☐	☐	☐	☐
Independent Third-Party (e.g., a certifying company or a non-profit organization)	☐	☐	☐	☐	☐	☐
Media (e.g., newspapers, television, or radio)	☐	☐	☐	☐	☐	☐
Animal Rights Organizations	☐	☐	☐	☐	☐	☐
Scientific Experts in Animal Welfare	☐	☐	☐	☐	☐	☐

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 a female? (*Check one*)
        □ Male
        □ Female

21. What is your age? (*Enter number*)
        _____

22. What is 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. Do you live in an urban or a rural area?
        □ Urban area
        □ Rural area

24. What are the first three characters of your postal code?
        _____

25. 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

26. How many people live in your household including yourself? (*Enter number*)
        _____

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

28. Have you been involved with any of the following types of organizations? (*Check all that apply*)
        □ Animal welfare organization
        □ Farm organization
        □ None of the above

29. 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

30. 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

31. If you have any other comments feel free to let us know in the text box provided below:

_____

Thank you very much for taking the time to complete this questionnaire. Your participation in this research study is very important and is greatly appreciated. The results of this study will form a key part of my Masters' thesis, which examines the role of various organizations (i.e., government, industry associations, businesses) in delivering and accrediting food quality assurances regarding farm animal welfare to Canadian consumers. The final results will be used to inform debate on policy options and may be published in academic journals or presented at academic conferences. If you have any comments or concerns, please do not hesitate to contact us at the number provided.

By completing this survey, you have donated $4 to a food bank in Saskatoon or Edmonton. The researchers will make a donation on your behalf.

If you wish to be informed about the outcome of this research, please e-mail the researchers at adrian.uzea@usask.ca.

<div align="center">

Adrian Uzea (student)
Dr. Jill E. Hobbs (supervisor)
Department of Bioresource Policy, Business & Economics
University of Saskatchewan
51 Campus Dr.
Saskatoon, SKS7N 5A8
(306) 966-4039

</div>

Appendix 7: Example of Recruitment Message Posted in Electronic Newsletters of the Animal Rights Organizations

open, can rapidly reach a level that will seriously harm or even kill a pet. The society has already received hundreds of complaints from around the province about dogs left in hot cars since the beginning of the season.

- *To learn more, click here...*

< back to top >

July 2008
Do you purchase pork products? Researchers want your views...

Do you have opinions on the welfare of pigs raised on Canadian farms? If so, do your shopping choices reflect those views?

Researchers at University of Saskatchewan and University of Alberta want to hear your answers to these questions to better understand how Canadians take animal welfare into account when grocery shopping.

- If you consume or purchase pork and would like to participate in this survey, please **send an email to** Web.Surveys@ualberta.ca with the subject heading **Farm Animal Welfare Survey** to receive a unique ID and password for access to the survey.

< back to top >

July 2008
Chronic animal abuser arrested in Grand Forks

Grand Forks resident Louise Mcanerin was arrested again this week after BC SPCA animal cruelty officers learned she was keeping five badly neglected dogs at her residence. In February, Mcanerin was banned by the courts from having any contact with an animal or bird after SPCA constables removed 24 animals in distress from her care.

The BC SPCA's Cruelty Investigations Department has had numerous dealing with Mcanerin in recent

Appendix 8: Consumer Shopping Habits and Organization Membership

Indicator	Members of AROs Sample	General Population Sample	Canadian Population
Role in grocery shopping[1]			
Primary shopper	71.2	54.5	n/a
Share the shopping	21.2	38.4	n/a
Someone else is the primary shopper	7.7	7.1	n/a
Frequency of Pork Consumption[2]			
Once per week	57.7	53.5	n/a
2-3 times per week	9.6	21.9	n/a
More than 3 times per week	1.9	1.9	n/a
Don't know	30.8	22.6	n/a
Organization Membership[3]			
Animal Rights Organization	63.5	6.6	n/a
Farm Organization	13.5	6.4	n/a
Farming Background[4]			
Yes	19.2	15.6	
No	80.8	82.3	
Not Sure	0	2.1	

Source: Author's own calculations based on survey data.
Size of the GP sample/ AROs sample = 424/52 respondents.
Note 1: Q25) Which of the following categories best describes your role in the grocery shopping for your household?
Note 2: Q1) How often do you purchase or eat pork?
Note 3: Q28) Have you been involved with any of the following types of organizations?
Note 4: Q29) 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.

Appendix 9: Consumer Awareness of Pork Farming Practices and Farm Animal Welfare Issues

Figure 1: Awareness of Pig Farming Practices

Q4a) For each of the following statements, please indicate how much you agree or disagree on the scale provided: I am aware of how pigs are raised.
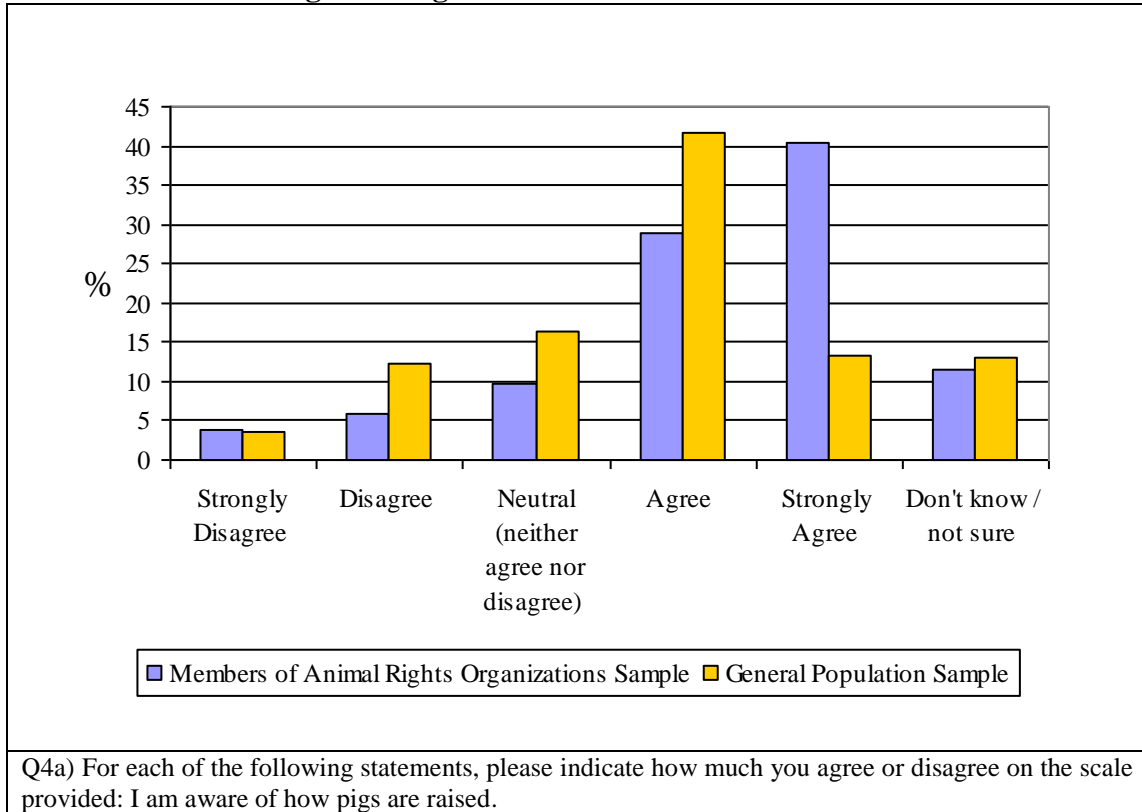
Figure 2: Awareness of FAW Issues

Q7) In the last three months, how many news reports on animal welfare have you heard or read? None, 1-2 news, 3-6 news, 6-10 news, More than 10 news, Don't know/ not sure.
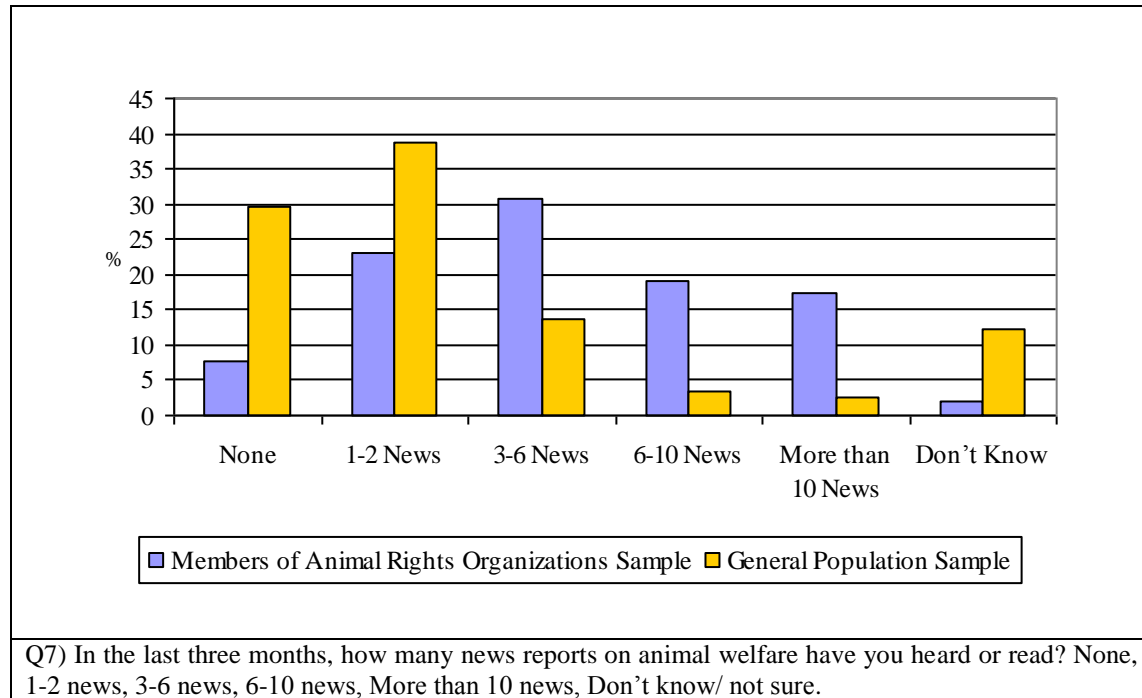
Appendix 10: Different Forms of Consumer Activism

1) Donated money and goods, or volunteered time to an ARO

2) Expressed support for livestock or poultry farming by signing a petition, writing to a newspaper etc.

3) Contacted a politician on an AW issue

4) Participated in a protest or demonstration related to AW

5) Encouraged friends or family to purchase AW products

6) Expressed dissatisfaction with livestock or poultry farming by signing a petition or writing to a newspaper

7) Read newspaper articles, listened to radio programs, or watched television programs about livestock or poultry farming?

8) Deliberately chosen meat or eggs for AW reasons

9) Avoided purchasing meat or eggs because of the way it was produced

%

☐ Members of Animal Rights Organizations Sample ■ General Population Sample

Q6) Please indicate whether you have participated in the following activities in the last year (Yes/No)
Note: Constructs have been developed by Coleman and Hay (2004).

252

Appendix 11: Ordered Probit Results – Animal Rights Organizations Sample

	Variable	Coefficient	Standard Error
Dependant variable = How much do you trust each organization for accurate information about the welfare of pigs?			
Coded as 0 = not at all, 1 = very little, 2 = somewhat, 3 = very much, 4 = completely			
Individual Farmers			
	Constant	-0.92315***	0.307095
	Knowledge	0.41871***	0.117084
	Transparent	0.85486***	0.10154
	Best Interest	0.35253***	0.117441
	Pseudo-R^2	.2609150	
Farmers' Associations			
	Constant	-.53721**	0.25084
	Knowledge	.67080***	0.138823
	Transparent	.33921***	0.106367
	Best Interest	.26941**	0.12135
	Pseudo-R^2	.2304384	
Food Processor			
	Constant	-.84173***	0.178877
	Knowledge	.78043***	0.121611
	Transparent	0.15867	0.118394
	Best Interest	.45210***	0.102888
	Pseudo-R^2	.2599809	
Supermarket			
	Constant	0.49507**	0.193042
	Knowledge	0.83175***	0.132348
	Transparent	0.32896***	0.121336
	Best Interest	0.22752**	0.105167
	Pseudo-R^2		0.2261390
Government			
	Constant	-0.1723	0.210141
	Knowledge	0.85606***	0.121529
	Transparent	0.14946	0.12179
	Best Interest	0.37379***	0.127387
	Pseudo-R^2	0.2902766	
Media			
	Constant	0.15164	0.201732
	Knowledge	.73792***	0.134976
	Transparent	0.14261	0.10257
	Best Interest	.27141**	0.129801
	Pseudo-R^2	.1760718	
Note: ***, **, * = Significance at 1%, 5%, 10% level.			

Appendix 11: Ordered Probit Results – Animal Rights Organizations Sample (Continued)

	Variable	Coefficient	Standard Error
Dependant variable = How much do you trust each organization for accurate information about the welfare of pigs?			
Coded as 0 = not at all, 1 = very little, 2 = somewhat, 3 = very much, 4 = completely			
Scientific Experts in Animal Welfare			
	Constant	-1.99774***	0.438706
	Knowledge	.61954***	0.164677
	Transparent	0.31044*	0.177373
	Best Interest	1.23449***	0.178224
	Pseudo-R^2	0.3591390	
Note: ***, **, * = Significance at 1%, 5%, 10% level			

Appendix 12: Ordered Probit Results – General Population Sample

	Variable	Coefficient	Standard Error
Dependant variable = How much do you trust each organization for accurate information about the welfare of pigs?			
Coded as 0 = not at all, 1 = very little, 2 = somewhat, 3 = very much, 4 = completely			
Individual Farmers			
	Constant	-0.94621***	0.136997
	Knowledge	0.51042***	0.045705
	Transparent	0.35849***	0.037705
	Best Interest	0.59734***	0.045581
	Pseudo-R^2	0.2241982	
Farmers' Associations			
	Constant	-0.79858***	0.144924
	Knowledge	0.53796***	0.052133
	Transparent	0.54055***	0.041235
	Best Interest	0.46629***	0.041231
	Pseudo-R^2	0.2518387	
Food Processor			
	Constant	-0.27871***	0.085251
	Knowledge	0.27395***	0.040303
	Transparent	0.52728***	0.043766
	Best Interest	0.42702***	0.037931
	Pseudo-R^2	0.2190885	
Supermarket			
	Constant	-0.01005	0.077561
	Knowledge	0.46550***	0.041571
	Transparent	0.41678***	0.042507
	Best Interest	0.41432***	0.036724
	Pseudo-R^2	0.2244627	
Government			
	Constant	-0.88060***	0.116888
	Knowledge	0.62819***	0.047467
	Transparent	0.40090***	0.042309
	Best Interest	0.58609***	0.046152
	Pseudo-R^2	0.3038296	
Independent Third-Party			
	Constant	-.30723***	0.107267
	Knowledge	.51165***	0.04745
	Transparent	.56358***	0.044021
	Best Interest	.23602***	0.045101
	Pseudo-R^2	0.2220049	
Note: ***, **, * = Significance at 1%, 5%, 10% level			

Appendix 12: Ordered Probit Results – General Population Sample (Continued)

	Variable	Coefficient	Standard Error
Dependant variable = How much do you trust each organization for accurate information about the welfare of pigs?			
Coded as 0 = not at all, 1 = very little, 2 = somewhat, 3 = very much, 4 = completely			
Media			
	Constant	-0.35078***	0.062883
	Knowledge	0.78849***	0.044826
	Transparent	0.27004***	0.038487
	Best Interest	0.31585***	0.040755
	Pseudo-R^2	.2617884	
Animal Rights Organizations			
	Constant	-1.52100***	0.075578
	Knowledge	.66202***	0.040835
	Transparent	.31604***	0.042064
	Best Interest	.61562***	0.040056
	Pseudo-R^2	0.3579162	
Scientific Experts in Animal Welfare			
	Constant	-0.95925***	0.104568
	Knowledge	0.82193***	0.044795
	Transparent	0.29849***	0.04489
	Best Interest	0.30899***	0.0418
	Pseudo-R^2	0.2913678	
Note: ***, **, * = Significance at 1%, 5%, 10% level.			