Do Canadians Care About Dairy Animal Welfare?

Exploring Consumer Perceptions and Preferences

by

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Abstract

Currently, research pertaining to consumer perceptions and preferences towards animal welfare on dairy operations is lacking in Canada. Though consumers have become increasingly aware of and opinionated towards animal welfare issues in other animal industries, the dairy industry remains largely ignored. This research attempted to discover how Canadians felt about animal welfare in the Canadian dairy industry.

The research reported in this thesis employed a one page, double-sided mail survey, which included a cheap talk script, in order to discover the opinions and preferences of Canadians. Respondents answered questions about the importance of animal welfare and its relative importance in comparison to low milk prices, the current state of dairy animal welfare in Canada and how it compared to the United States and other livestock sectors, the practices that consumers believed to be most important for proper dairy animal welfare, as well as the amount they were willing to pay for certified animal welfare friendly milk. These questions used five point Likert scales, a pair wise comparison method and a two stage willingness to pay (WTP) question. A summary of the responses was provided and an ordered logistic regression was used to determine how different demographic characteristics affected consumer responses.

The results suggested that Canadian consumers believed animal welfare was important and that the Canadian dairy industry had average to good animal welfare practices. They also believed that outdoor access, as well as banning the use of growth hormones, were important. Finally, a majority indicated a willingness to purchase animal welfare friendly milk though less so when a premium had to be paid for this product.

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Chapter 1: Introduction

Animal welfare was an issue that, for many years, was generally ignored in favour of producing large numbers of food animals at the lowest possible cost. This preference led to large increases in farm sizes so that livestock producers were able to maintain acceptable profit margins while providing food to consumers at low prices. Recently, consumers began to show concern over certain livestock production practices. The use of battery cages in poultry, gestation crates for sows and veal crates for calves have now become contentious issues, especially in the United States and Europe. Due to this new heightened consumer awareness, new legislations have been passed to phase out practices that consumers perceived to negatively affect the animal's well being (Blandford 2006).

These practices were brought to light by animal welfare and activist groups to show the consumer how their food was being raised. The information and distance gap between producers and consumers resulted in consumers largely buying a product in which they had very little idea about how it was being produced. Faced with what they believed were unacceptable living conditions, some consumers began to lobby for changes in how these animals were being raised. Large food companies in North America, such as Safeway, Maple Leaf and Smithfield Foods, have been swayed by public opinion to pressure livestock producers to phase out the practices that appeared to impair proper animal welfare (Uzea et al 2011).

While the poultry and hog industries have been closely scrutinized for the way their animals were being treated and raised, the dairy industry has received much less attention. But the information gap between producers and consumers still exists, which

likely means that production practices exist on dairy operations that consumers may believe are detrimental to animal welfare but are currently unaware of. Likewise, very little academic research had been done to examine how consumers perceived animal welfare in the dairy industry, with most of it concentrated in the United States (Olynk et al 2010) and Europe (Burgess et al 2003; Chilton et al 2006) and not in Canada.

However, it is likely only a matter of time before animal welfare in the dairy industry, like other animal industries, is looked at by consumers and animal welfare groups in an attempt to decide whether they approve of the way Canadian dairy cattle are being treated. Additionally, Dairy Farmers of Canada set up a Canadian Quality Milk (CQM) program, with input from the Canadian Food Inspection Agency (CFIA), that outlined the best management practices for Canadian dairy farmers and audited them to ensure that they were producing safe and ethical milk (Dairy Farmers of Canada 2012). This program was also developing an "on-farm animal care assessment program" to ensure that dairy animals were being provided with proper animal welfare (Dairy Farmers of Canada 2012). The purpose of this thesis then was to determine whether Canadian consumers actually cared about dairy animal welfare in Canada and to discover what they believed was important for ensuring proper animal welfare. If the results of this research suggested that they did care, then this would be an important finding that the Canadian government and the dairy industry should take notice of and work to ensure that animal welfare in the dairy industry meets the standards demanded by Canadians consumers.

The organization of this thesis was as follows: Chapter two of this thesis reviewed the relevant literature of other agricultural economists who have studied consumer preferences for animal welfare in a variety of animal industries and countries, as well as

the methods that were most commonly used for this type of research. The choice of survey and data collection technique was examined in chapter three. In chapter four, the economic theory that was utilized for the empirical models and techniques in this research was examined, as well as the methodology used in this study, while the fifth chapter provided and analyzed the results of this research. Chapter six concluded this thesis by summarizing the research and acknowledging the limitations that are present, while also suggesting future research possibilities.

Chapter 2: Literature Review

2.1 Review of Relevant Research Pertaining to Farm Animal Welfare

Academic interest in the area of farm animal welfare has grown considerably over the past two decades. Early work by Bennett (1995) discussed the need to examine how society viewed farm animal welfare and to what degree it had been affected by current farming practices. He stated that poor animal welfare created a negative externality, which resulted in the failure to maximize total societal welfare.

Later, Bennett and Larson (1996) measured the benefits of improving animal welfare in veal and poultry production by estimating the WTP of U.S. consumers for banning veal crates and battery cages by using the contingent valuation method. By asking double bounded dichotomous choice questions, the authors discovered what consumers were WTP for these bans in the form of a single one-time tax or an increase in food prices. They found that consumers were WTP a premium of $0.35/dozen eggs purchased or a one-time payment of $7.90/person for a ban of battery cages and $7.88/person for a ban of veal crates. Their survey also found that 74% supported this legislation on veal housing and nutrition, while 72% also indicated that they were unwilling to consume veal.

Bennett and Blaney (2003) employed the use of a single bounded dichotomous choice question for their contingent valuation study of U.K. consumers. The authors used a two-stage question where they first asked respondents whether they supported a ban of battery cages (with 79% indicating they would) and then following it up by asking whether they still supported the ban if they had to pay a randomly selected premium on

each dozen eggs they purchased. Bennett and Blaney (2003) discovered that the mean WTP of U.K. consumers was £0.41/dozen eggs in order to ban the use of battery cages for laying hens. They used this WTP calculation to estimate the minimum net benefit of banning battery cages to be £9,000,000 and concluded that legislation would be more effective than market mechanisms at looking after farm animal welfare. Bennett and Blaney (2003) also discovered that 86% of respondents were at least "somewhat concerned" with how current farming practices affected animal welfare. The respondents also ranked veal crates as the most unacceptable farming practice, with poultry cages ranking second.

A similar valuation technique to Bennett and Larson (1996) and Bennett and Blaney (2003) was employed by Tonsor and Wolf (2011) to determine whether U.S. consumers supported mandatory labeling of farming practices that affect animal welfare and to estimate how much the consumers were WTP for this mandatory labeling. In that study, the authors used the two-stage question where they first asked whether respondents would purchase a new product (with improved animal welfare characteristics) over the conventional product, if both were being sold for the same price. If the respondent indicated they were willing to purchase the new product, then a follow up question was asked to ascertain whether they would still be willing to purchase the new product if it was priced at a randomly selected premium above the conventional product. Tonsor and Wolf (2011) used this method to estimate the WTP for both egg and pork products with labeled animal welfare attributes. They discovered that U.S. consumers were willing to pay a premium of 19.8% for gestation crate-free labeled pork and of 21.3% for battery cage-free labeled eggs. They also found that, while 62% initially indicated that they were

willing to purchase the new product at the same price, only 44% were still willing to purchase this product when they were faced with the prospect of having to pay a premium for it.

Choice experiments have also been a popular method used by agricultural economists to determine consumer preferences and valuations for products with improved animal welfare characteristics. Carlsson et al (2007) utilized a choice experiment to examine whether Swedish consumers were willing to pay for beef and poultry products that used a mobile abattoir for the slaughter of animals, which was seen as more animal welfare friendly due to the fact that animals did not experience as much stress because they were not being transported long distances. Their choice experiment asked respondents to choose between two beef products with randomized characteristics and prices, where one of the characteristics was the method by which animals were slaughtered. This was repeated for a pair of poultry products and some respondents were also randomly offered an opt-out option if they did not wish to buy either product. Carlsson et al (2007) discovered that WTP estimates did not significantly change for both beef and poultry products when an opt-out option was included. The authors estimated a WTP premium of 10% for beef slaughtered with a mobile abattoir for Swedish consumers. The WTP for poultry slaughtered using a mobile abattoir was actually negative, which meant that Swedish consumers preferred the conventional slaughtering method for poultry over the use of a mobile abattoir. These dissimilar findings for beef and poultry were a surprising result and showed that consumers may have had different preferences for animal welfare for different types of farm animals.

Tonsor et al (2009) employed a similar choice experiment to calculate consumer WTP in Michigan for pork from farms that did not use gestation crates. Their survey included eight hypothetical purchase situations, each with a choice between two pork products and a no preference option, and they also attempted to determine whether societal welfare would increase from a ban on gestation crates. Additionally, the authors also attempted to split the respondents into four groups based on preferences and then examined the size of each group and how the WTP valuations of the four groups differed. Tonsor et al (2009) found a mean WTP of $2.11/lb for pork from operations that did not use gestation crates. The authors also looked at preference for pork from the United States compared to pork from Canada and Brazil. They calculated that the Michigan consumers were WTP a premium for Canadian pork of $1.44/lb but also preferred pork from the United States over that from Brazil. Their findings on societal welfare indicated that, as long as accurate labeling was included on products, there was no advantage in terms of increasing societal welfare that came from legislating a ban on gestation crates rather than a voluntary labeling scheme.

Uzea et al (2011) examined animal welfare perceptions and preferences in the Canadian hog industry using a choice experiment that included three product choices and an opt-out option. The objective of their research was to determine how WTP for animal welfare changed with three different verification entities (public, private or third-party). Uzea et al (2011) utilized a latent class model, which found that consumer preferences in Canada for animal welfare certification agents in the hog industry were very diverse, though there was a general consensus that stated that public (ie government) verification was most preferred. The authors were also able to calculate that the mean WTP values for

both group and outdoor housing of sows were statistically significant and at least $2.10/kg, while the use of gestation crates had a statistically significant negative WTP value of -$2.61/kg.

2.2 Review of Animal Welfare Literature Using a Pair Wise Comparison Method

Economists have used the pair wise comparison method as an alternative to willingness to pay valuations for measuring consumer preferences. This method has been utilized to easily discover which farming practices were preferred by consumers and which were seen as most unacceptable in terms of animal welfare. In these pair wise comparison questions, two practices were randomly paired up and respondents were asked which they preferred. This process was repeated multiple times so that the researchers could calculate which practice was seen as most important, which was commonly discovered by using importance scores or preference shares (Prickett et al 2010).

A study by Lusk and Norwood (2008) used the pair wise comparison technique to compare how the respondents viewed animal welfare in terms of importance compared to other issues facing society, such as poverty and food safety. Their findings illustrated that consumers ranked animal welfare quite low (preference share of 4.3%) and as being relatively unimportant in comparison to other societal issues, the highest being poverty (24.1%) and health care (23.0%). Lusk and Norwood (2008) also asked respondents who should be responsible for making animal welfare decisions. A small majority of about 56% indicated that experts, and not the public, should be responsible for deciding what practices were acceptable in animal production, while a similar percentage of respondents indicated a belief that acceptable practices should be based on science, not morals. They

also divided the respondents into four groups based on their beliefs and examined how their responses differed for the pair wise comparisons and attitudinal questions. Lusk and Norwood (2008) found that scientific elitists were more likely to support low food prices over animal welfare (26.8%), whereas moral populists placed slightly more importance on animal welfare (5.7%) than the other groups in the pair wise comparison.

Prickett et al (2010) also used the pair wise comparison method in their research in determining which farming practices U.S. consumers believed to be more important in ensuring the best animal welfare. The authors looked at a total of nine different farming practices, with each respondent answering six pair wise comparison questions. These were used to create importance scores, which were interpreted as the percentage of respondents that viewed that practice as being the most important in terms of animal welfare. Prickett et al (2010) determined that "Receiving ample food and water" ranked as the most important by 38.43% of the survey respondents, while "Provided comfortable bedding" ranked most important by only 1.72% of the respondents. The importance scores of two practices could also be compared to each other, where "Receiving ample food and water" (importance score = 38.43) was viewed as being about five times more important for acceptable animal welfare than "Allowed to exercise outdoors" (importance score = 7.95) based on the ratio of the two importance scores. Prickett et al (2010) also calculated importance scores for different social issues and compared them to animal welfare. They found that poverty and health care were deemed to be most important at around 23%, while animal welfare placed last of the seven choices with an importance scores of just 4.15%. This meant that, while animal welfare on its own was viewed as important, when comparing it to other issues that more directly affect humans, it became

relatively unimportant. Prickett et al (2010) also found that over 75% of respondents either somewhat or strongly disagreed that low meat prices were more important than animal welfare, while almost 70% somewhat or strongly agreed that government should take a role in ensuring acceptable animal welfare.

2.3 Review of Research on Dairy Animal Welfare

While studies on animal welfare pertaining to battery cages and gestation crates were quite plentiful, research on how consumers viewed animal welfare in the dairy industry was very limited in other countries and almost non-existent in Canada. Some studies looked at the perceptions of U.S. animal science faculty members and vet students towards dairy animal welfare (Heleski et al 2004; Chilton et al 2006), but consumer-based research in this area needs to be increased. Consumers were asked about veal crates in Bennett and Larson (1996) and indicated they found the practice to be unacceptable, but research has largely stayed away from the practices being used daily on the average dairy farm. The works cited below examined the few studies that could be found that looked at dairy animal welfare.

Burgess et al (2003) utilized dichotomous choice contingent valuation two-stage willingness to pay questions to discover how consumers in Northern Ireland felt about welfare improving production practices for dairy cattle, hogs, broiler chickens and layer hens. For dairy, the improved production practice included providing the cows with a "straw yard system of winter housing" as a solution to the current system, which included small lying areas that resulted in an increased occurrence of leg injuries. Their study found that consumers indicated a WTP of £2.89 per week, which was the second highest

WTP estimate of the four livestock systems behind that of layer hens. The WTP differences between dairy cattle, layer hens and broiler chickens were insignificant (consumers were indifferent between the three practices), but all were statistically greater than that of hogs. In addition, the authors were able to calculate an annual net benefit to society from improving animal welfare in dairy cattle of £29.2 million, which was only the third highest annual net benefit, mostly due to the large costs (£42.5 million per year) associated with the improved production system.

Levine et al (2005) utilized a survey of U.S. veterinary students at Cornell University. They examined how the students perceived different types of animals and what they thought their mental abilities were. The authors found that vet students believed that cows, small ruminants and pigs all had relatively similar thinking ability. They also believed that the aforementioned group of animals had less ability to think than dogs and cats, but more than chickens. This created a hierarchy of perceived animal intelligence, which may have influenced what the students, and perhaps consumers, believed to be acceptable animal welfare, based on the animals ability to think. In other words, it was more important to have good animal welfare for dogs than chickens because a dog had a greater perceived ability for thought.

Chilton et al (2006) investigated which animal welfare improving methods were most valued in relation to each other by consumers in Northern Ireland. The improvement practices that they included were for dairy, hogs, broilers and layer hens. The improved dairy practice was aimed at decreasing the occurrence of lameness and included group housing with a large, straw laying area. Results from their survey indicated that 90% of respondents believed animal welfare was important and also that a large majority

believed that implementing the stated production changes would improve animal welfare. Chilton et al (2006) found that improving dairy cow welfare was viewed as the most valuable improvement with an annual benefit of £239.00 per person, though it had the lowest annual net benefit (£97.33 per person) of the four livestock industries when using a matching method. This result illustrated the effect that high costs of improving animal welfare on dairy farms had on the net benefit to each person.

Research performed by Tsakiridou et al (2010) looked at how much Greek consumers are WTP for certified animal welfare products, which included meat, dairy and eggs. The authors found that 27.5% of respondents revealed that they were WTP a five percent premium for certified milk, while 19% of respondents indicated they were WTP a ten percent premium for the animal welfare certified milk.

Olynk et al (2010) examined the willingness to pay of respondents in the United States for different certification agents, who ensured that the products being labeled as using animal welfare friendly practices were actually from the dairy and hog operations that used those practices. They used four general practices that were somewhat similar in dairy and hogs, including confinement to individual stalls, access to pasture, utilization of antibiotics and usage of licensed livestock transportation. The four different certification agency types included government, producer, private third party and consumer group. The WTP estimates were largest for private verification of milk products. The authors also studied the differences in consumer WTP when switching from direct to indirect questioning. The results and implications of this appear in a later section of this paper.

It was also important to consider what "animal experts" thought about animal welfare on dairy operations. In a study that focused on the views of U.S. animal science faculty members, Heleski et al (2004) looked at how the animal science faculty perceived animal welfare on different U.S. livestock operations. In terms of dairy, they discovered that the faculty members who worked closely with dairy animals believed that lameness was the biggest problem affecting animal welfare.

Some veterinarians, such as Garry (2008), believed that animal welfare on U.S. dairies was acceptable but could use improvements in certain areas. He stated that dairies needed to work to reduce heat stress and downer cows, while improving calf management and worker training, to make animal welfare better on dairy farms. He believed that the dairy industry was moving in the right direction with new technologies that improved animal welfare, but also that farms were becoming much larger and owners had to realize that they had to train their workers to work well with the animals to ensure animal welfare practices were as good as when the owner did the work himself.

2.4 Review of Techniques to Eliminate Survey Biases

Surveys that attempted to discover consumer perceptions were likely to have their results affected by a variety of biases unless certain measures were taken. Hypothetical, information, social desirability and ordering biases have greatly affected survey results and must be taken into consideration when constructing the survey.

Due to the hypothetical nature of most studies that attempted to determine consumer preferences and WTP for animal welfare characteristics, most researchers chose to include cheap talk scripts in order to reduce hypothetical bias (examples include:

Carlsson et al 2007; Tonsor et al 2009; Olynk et al 2010; etc). Hypothetical bias may occur because the respondents did not actually have to pay what they offered as their WTP valuation when using a hypothetical good, which may have result in inflated estimates over what they were actually WTP (Murphy et al 2005). Murphy et al (2005) therefore defined hypothetical bias as the "difference between stated and revealed values".

Tonsor and Shupp (2011) summarized previous notions of the reasons for the existence of hypothetical bias as being "uncertainty of one's true valuations", "lack of commitment costs" and "the existence of social desirability bias". Olynk et al (2010) described a cheap talk script as an instrument to use before any valuation questions were posed to tell respondents about hypothetical bias, how it inflates their answers and how they should treat the experiment as a real life purchase situation.

Carlberg and Froehlich (2011) determined how well a cheap talk script worked by comparing the WTP estimates of a hypothetical experiment using a cheap talk script with those of an experimental auction, where hypothetical bias was not present. They found that the estimates from the experimental auction were still 20% less than the hypothetical experiment that included a cheap talk script, which in turn were about 8% lower than the same from the non cheap talk treatment. This result showed that, while a cheap talk script decreased the WTP values in the hypothetical data, there was still hypothetical bias present in the WTP values of a hypothetical experiment even after a cheap talk script was applied. Tonsor and Wolf (2011) believed that, even with the use of a cheap talk script, there was still hypothetical bias present in the WTP estimates and that these values

should therefore be the upper limits or "ceiling values" of what the respondent's actual WTP was.

Survey research in animal welfare also looked at the presence of social desirability bias through the use of direct and indirect questioning. Lusk and Norwood (2010) defined social desirability bias as "the desire to comply with social norms and expectations". Therefore, researchers were more likely to receive dishonest answers from respondents when asked the question directly (ie what "they" believed) because of this bias. To reduce social desirability bias, the authors used indirect questioning, which asked the respondents how they believed the "average person" would answer the questions. These types of questions were shown by the authors to give more accurate reflections on a person's true beliefs. In other words, people who were asked the question directly were likely to respond with the "social norm" answer and indirect questioning helped to make the respondents less concerned about making themselves look good and hence give more accurate answers.

When consumers were asked both direct and indirect questions, Lusk and Norwood (2010) found that 78% of respondents changed their answers between the two types, which revealed the likely presence of social desirability bias. In comparison, a survey on cloning by Lusk (2008) revealed that when the researchers asked consumers if they were willing to eat cloned meat as an indirect question, the percentage of respondents who indicated they would dropped from 31% to 21%. This result indicated that surveys were prone to having inaccurate information given as responses due to social desirability bias.

The Olynk et al (2010) study mentioned previously also used indirect questioning to examine social desirability bias when looking at animal welfare certifications. When comparing the WTP values for direct and indirect questioning, the authors found that social desirability bias was present in only one ("self-verified certified trucking/transport") out of the nineteen pork chop variables, while three out of the nineteen milk variables were found to exhibit social desirability bias ("self-verified pasture access", "consumer group-verified pasture access", "USDA-verified pasture access"). In this study, it was determined that social desirability bias was present when the 95% confidence intervals of the direct and indirect WTP estimates did not intersect each other. Another condition for social desirability bias to be present that Olynk et al (2010) used was that the absolute value of the indirect WTP value had to be larger than that of the direct value. Olynk et al (2010) determined that, in the cases where social desirability bias was present, the responses from direct questions resulted in a significant overestimation of the WTP values.

Many studies on consumer views of animal welfare examined the effects of different sources of information on the subject's responses. The information given to survey respondents could include no prior information, as well as, information from producer groups, animal welfare groups, veterinarians and government agencies. The effect of information was somewhat different for each study, with some finding a substantial change in responses when faced with differing information treatments and others finding no significant differences resulting from changing information types.

Bennett and Blaney (2002) used two versions of their animal welfare survey, where the first contained a "high social consensus" information section and the second

contained a "low social consensus" information section on the hog slaughter method. Their information sections differed in the way the slaughter method was worded in terms of social acceptability. They determined that respondents who were given the low social consensus information package were more likely (21% opposition) to oppose new legislation that would make slaughter of pigs more humane than those who received the high social consensus package (only 5% opposition). This finding by Bennett and Blaney (2002) illustrated that, all other factors being equal, the type of information given in a survey could drastically affect the responses of the subjects. This was also evident in their WTP estimates, which showed a higher WTP from respondents given the high social consensus survey (WTP = £2.75/week) than those given the low social consensus survey (WTP = £1.09/week).

In the study by Lusk and Norwood (2008), the effects of information on responses was also tested. They used two variations of the same survey, where one survey had more information in the questions and statements explaining the welfare practices than the other survey. In other words, one of their surveys had very little information attached and the other had a larger explanation attached. From the survey results, Lusk and Norwood (2008) found that the belief that keeping sows in gestation crates was humane was shared by only 20% of respondents when they were given no extra information, but increased up to 50% when respondents were told that this type of crate provided safety from other pigs. Hence, Lusk and Norwood (2008) determined that giving a reason why a practice was used (ie provide safety from other pigs) could potentially greatly impact how consumers felt about a practice.

The Tonsor et al (2009) study randomly assigned each respondent with one of three different information packages in their survey on gestation crates. The different types of information in their survey included industry-based views, consumer group-based views or just the basic information. The authors carried out a log-likelihood ratio test and were unable to reject the null hypothesis that they could pool the results from the different information groups. Therefore, Tonsor et al (2009) found that, in their study on gestation crates, the different information packages that they gave in the surveys did not significantly affect the responses that they received. The authors stated three reasons for this finding: the presence of similar messages in all three information packages, the fact that the three information packages were all quite short in length, and respondents had strong opinions on the subject before taking the survey.

While looking at milk and pork chop animal welfare verification characteristics, Olynk et al (2010) used four different information treatments for both products (base, consumer group, industry group, and a consumer-industry group mixture). When the log likelihood ratio test was performed, they observed that the data from the four different information treatments was not significantly different and hence could be pooled into one data set. Thus, much like the findings of Tonsor et al (2009), it was determined that the type of the information presented to respondents of the Olynk et al (2010) survey did not affect their responses.

Another potential bias seen in previous research that influenced responses and resulted in incorrect conclusions was ordering bias. To avoid ordering bias, previous studies (Lusk and Norwood 2008; Prickett et al 2010) have randomized the ordering of the survey questions. These studies performed this randomizing procedure so that the

order in which the questions were posed did not affect or influence the answers given by the survey respondents. Therefore, the data that the researcher received was more accurate, which further resulted in statistical and econometric findings that were unbiased and thus provided a more reliable view of consumer preferences.

Chapter 3: Survey Choice and Data Collection

3.1 Introduction

Upon examination of previous literature that related to consumer perceptions and preferences for animal welfare in livestock industries, there appeared to be two areas where little research had been carried out. The first area pertained to how consumers viewed animal welfare on dairy operations. This industry had received much less scrutiny than poultry or hog production and therefore there was very little known about how the dairy industry was perceived. The second area noted was that of Canadian consumer preferences and whether they varied from those of consumers in the United States or Europe, which appeared in a much larger number of research projects. As a result, one goal of this study was to address these two deficiencies and provide information on how Canadian consumers viewed animal welfare in general and more specifically, in relation to the dairy industry.

3.2 Data Collection

The following subsections of Section 3.2 outlined the process that was undertaken to collect data on consumer preferences and opinions in order to meet the objectives of this research. This section focused on how the method for data collection was chosen and the tasks that were carried out for the creation and refinement of the consumer survey instrument. Subsequent sections laid out how the data was tabulated and examined through the use of statistical software.

3.2.1 Survey Choice

The first step in discovering the opinions of Canadians towards dairy animal welfare was to determine the optimal method to collect information from this population of consumers. Consumer surveys were a common method for discovering the preferences and opinions of the population in academic research. Looking at previous studies, a small proportion of the population was randomly chosen to complete the survey and if the sample was large enough and representative of the actual population, then it was somewhat reasonable to assume that the opinions of the sample population were reflective of those of the actual population.

As was evident in the multiple studies reviewed in the previous chapter, surveys that were used to examine consumers were carried out in a variety of different methods. Common survey methods in these studies included mail surveys, telephone surveys, online surveys and in-person surveys. Each type of survey provided certain advantages, while also having some weaknesses. For example, mail surveys were a more traditional method that were utilized to reach a broad audience of all age groups with no time restraint on completing the questionnaire. However, these types of surveys could be costly, both in terms of resources (envelopes, printing, postage) and labour (folding, inserting, mailing out), and while many of these tasks are now automated or computerized, they still resulted in a significant cost for the researcher. Also, in addition to the large amount of time spent on preparing mail surveys to be sent out, there were long turn around times for receiving completed surveys in the mailing system and postage costs usually resulted in restrictions on the size of survey that could be sent.

At the other end of the spectrum as the in-person survey, where the researcher met with each individual respondent and information was collected quickly and at a lower cost than a mail survey. The disadvantage for this type of survey was that it was very time consuming to meet with each individual in the sample and was usually only carried out in small numbers in a restricted area, which made the sample population not quite as representative of the actual population.

Telephone surveys, similar to in-person surveys, allowed the researcher to speak directly to the participants. This was achieved at a lower cost than mail surveys and allowed for a broader reach than in-person studies. However, telephone surveys could be very time consuming and potentially difficult for participants to complete due to the fact that they must listen to each question and did not have the survey in front of them. This could potentially make this type of survey particularly difficult for older participants.

A more recent survey method and one that had been increasingly used was the online survey. Online surveys allowed researchers to reach a broad national audience at a comparatively low cost. One large advantage was that, unlike a mail survey, the length of the survey was not restricted when using this survey method. However, reaching a representative population may have been more difficult as those without readily available access to or experience with the internet may not have wanted to or been able to complete online surveys. Having considered these advantages and weaknesses, this study uses the more traditional mail survey.

3.2.2 Mailing List

The next step in sending out the mail survey was to obtain the mailing list. For this research, a sample size of 5,000 Canadians from across ten provinces was used. Since the survey was only written in English, the mailing list had to include only respondents who could read and write in English. Although this may create a bias in who was responding to the survey, particularly in Quebec, it was a necessary requirement and similar to other Canadian surveys, such as Uzea et al (2011). In addition to this, requesting only English-speaking respondents resulted in the mailing lists of many market research companies being either more expensive or unavailable due to them not having this option. After examining the many mailing lists available, the chosen Canadian consumer mailing list came from Prospects Influential Inc. (British Columbia) at a cost of $0.095 per mailing address ($475.00 for 5,000 records) plus $50.00 for processing and 5% GST.

The mailing addresses purchased were spread across the ten Canadian provinces in the same proportions as each province's actual proportion of the total Canadian provincial population, which were obtained from Statistics Canada's Quarter 3 (July 1st) 2012 population estimates (Statistics Canada, 2012a). A chart that shows these proportions, as well as those of the returned surveys, can be found in section 4.6.2.6 of this thesis. The actual number of surveys that were sent to each province is shown in Table 1.

Table 1. Number of surveys sent to each Canadian province.

	BC	AB	SK	MB	ON	PQ	NL	NS	NB	PEI
Sample Size	665	557	155	182	1,942	1,159	74	136	109	21

Canadian residents of the three territories were not included in this study due to the fact that food prices were much higher in these northern regions because of high transportation costs. Each territory also only had a small population that did not make up a significant proportion of the Canadian population. There were also no dairy farms present in these areas.

3.2.3 Survey Instrument

The survey instrument developed for this research had to be short enough to fit onto one double-sided page so as to not exceed the 30 gram weight limit on regular mail in Canada for a 61 cent stamp. If the envelopes were overweight, then the postage cost rose to $1.05 per envelope, which, when calculated over 5,000 surveys, resulted in an additional cost of over $2,000. Hence, the need to be creative in developing the survey instrument was extremely important. A survey brochure using a "z-fold" to create six sections was used to accomplish this goal. When printed on ordinary 8.5" by 11" printer paper, the survey was then light enough to be sent out with the rest of the survey package without requiring additional postage. Additionally, eight different survey versions were used in order to fit as many questions as possible into this study. The need for this many versions will be discussed in further detail later on in section 3.2.3.2.

The survey instrument (shown in Appendix C) included five areas of questioning which asked consumers about their opinions pertaining to certain animal welfare statements, dairy farming practices, experiences with agriculture and/or animal welfare groups or products, demographic information, and willingness to pay for animal welfare certified dairy products. The following sections look at these five areas in closer detail.

3.2.3.1 Animal Welfare Statements

The first section of questioning in the survey instrument focused on basic statements related to animal welfare. Each participant was presented with the same ten statements and had to indicate whether they strongly disagreed, disagreed, were neutral, agreed or strongly agreed with each statement. This process was carried out using a 5 point Likert scale, where choosing a 1 indicated that the participants strongly disagreed and a 5 indicated that they strongly agreed. These statements were randomly ordered in the eight different survey versions in order to reduce the effects of ordering biases on a participant's responses, similar to Lusk and Norwood (2008) and Prickett et al (2010).

In certain cases, the same statement was repeated twice, with the only difference being that the question asked the participants how the average Canadian felt, rather than how they themselves felt. These types of questions were known as indirect questioning and were discussed in Chapter 2. This method was carried out to discover whether the respondents were being untruthful in an attempt to make themselves appear better off by giving what they believed to be the more socially acceptable answer. As was discussed in the previous chapter, social desirability bias has been shown to lead to untruthful responses. By asking how the average Canadian felt, the participant actually provided a response that would be closer to their true feelings (Lusk and Norwood 2010). The full list of statements that were used in this section of the survey instrument can be found in Table 2.

Table 2. Animal welfare statements used with 5 point Likert scales.

1. I believe animal welfare is important.
2. The average Canadian believes animal welfare is important
3. I believe the current level of animal welfare on Canadian dairy farms is acceptable.
4. I believe animal welfare has improved on Canadian dairy farms in the past 20 years.
5. I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States.
6. I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs.
7. I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens.
8. I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle.
9. I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.
10. The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.

The first two statements, as shown in Table 2, were almost identical except for the fact that statement 1 was asking how the participant felt about the importance of animal welfare, while statement 2 was asking how they believed the average Canadian felt about the importance of animal welfare. In theory, when the Likert scale responses from these two statements were summarized, the results should have been the same for each. If the participants were representative of the Canadian population, then the collective response from combining each individual's view in the sample population (statement 1) should have shown how the average Canadian viewed the importance of animal welfare (statement 2). Therefore, the collective results for statements 1 and 2 should have been

very similar. If they were not, then perhaps the participants were either not representative of the actual population or there was some sort of social desirability bias coming into play, which caused the participants to lie about their true opinions in order to make themselves seem more socially acceptable. The results of these two statements were examined further in the Results chapter of this paper in order to determine whether this phenomenon was actually occurring.

Statement 3 was a fairly straight forward assertion that asked the respondents whether the level of animal welfare currently being given to dairy cattle was, in their opinion, at an acceptable level. This was an important question as it gave an idea of how Canadians viewed the stewardship of Canadian dairy producers. Since there were very few studies on this topic, it was important to ask a simple, straight forward question like this to have Canadian consumers clearly indicate whether they believed Canadian dairy farms were doing an acceptable job of caring for their animals. Building on their responses to statement 3, the fourth statement sought to determine whether consumers believed animal welfare on dairy farms had improved in the past 20 years. Therefore, statements 3 and 4 enabled the researchers to discover whether consumers believed dairy animal welfare was acceptable or not in Canada and whether it was seen to be improving or becoming worse.

The fifth statement was an interesting comparison between dairy animal welfare in Canada and its closest neighbour, the United States. By asking participants whether they agreed with the notion that dairy animal welfare was better in Canada than it was in the United States, they were able to indicate how Canada as a country fares in terms of animal welfare compared to another country. One important difference between Canadian

dairy production and American dairy production was the fact that Canadian producers were banned from using growth hormones, whereas American producers had the option of using these. Therefore, it was important to discover whether this difference in allowable production methods had an effect on how consumers chose to respond to statement 5. The use of growth hormones in dairy production and how consumers felt about their usage was also examined in the second section of the survey instrument, as described in Section 3.2.3.2.

The sixth, seventh and eighth statements each focused on comparing animal welfare in Canada's dairy industry to other livestock industries within Canada. Participants were asked whether they agreed or disagreed with the assertion that the animal welfare that was provided to dairy cattle was superior to that being provided to hogs (statement 6), poultry (statement 7), and beef cattle (statement 8). Somewhat similar to statement 5, these statements allowed respondents to compare dairy animal welfare to animal welfare in a different sector; in this case, other livestock industries in Canada. Wording these three statements in the same manner allowed the researchers to discover how consumers ranked animal welfare for the dairy industry in terms of how it compared to other animal industries. For example, it may be possible to learn whether consumers were more (or less) concerned about dairy animal welfare than the animal welfare of hogs.

The final pair of statements invited participants to evaluate the importance they placed on dairy animal welfare in comparison to the importance they placed on having low milk prices. This line of questioning was essential because, while some consumers may have chosen to indicate that animal welfare was important to them, they may have

believed that having low prices for milk products was much more important and therefore, to consumers, animal welfare may have been relatively unimportant compared to other issues, such as milk prices. Similar to the first pair of statements in Table 2, statements 9 and 10 were very similar except that respondents were being asked what they believed in statement 9 and what the average Canadian believed in statement 10. The reasoning for this was the same that was discussed earlier in this section for statements 1 and 2. Further information on the compilation and statistical evaluation of these ten statements will be provided in Section 4.5.1.1.

3.2.3.2 Importance of Dairy Farming Practices in Terms of Animal Welfare

The second section of questioning in the survey instrument aimed to discover which dairy practices consumers believed were most important for ensuring proper animal welfare. Essentially the goal of this section was to create a ranking of various practices that were associated with dairy farming in order to rank them in order of perceived importance towards providing proper animal care. A list of nine dairy farming practices was created using previous knowledge of the Canadian dairy industry, the Code of Practice for the Care and Handling of Dairy Cattle created by the Dairy Farmers of Canada and the National Farm Animal Care Council (2009), and input from thesis committee members and other members of the dairy industry. Previous work by Prickett et al (2010) on American consumers was also used as a template for the list of production practices, with appropriate changes made to make it more specific to the dairy industry in Canada. This allowed for responses from this research to be compared to the results from the Prickett et al (2010) research.

In this section, a pair wise comparison method was used to create nine questions that asked participants to choose between a pair of dairy practices and indicate which they believed was more important for ensuring proper animal welfare, similar to previous research by Prickett et al (2010). According to Prickett et al (2010), a pair wise comparison was more suitable for creating a ranking of practices because it only asked the participants to examine two practices at one time. Therefore, they were more likely to give an accurate ranking between two practices than they would if they were asked to create a ranking for all nine practices at once.

The farming practices that were chosen focused mainly on the animal welfare of a mature dairy cow that was producing milk, as well as veal production, which may be the most contentious animal welfare issue currently associated with the dairy industry. This allowed consumers to indicate how important restricting veal calf production was in comparison to taking proper care of the mature milk cows. For the purpose of this research, the animal welfare associated with rearing female dairy calves, transportation or slaughter methods were not examined due to their lesser importance and also the space limitations associated with a one page double sided survey instrument. Even so, eight unique survey variations had to be created in order to include every possible pairing of practices exactly two times, since there were 36 possible pairs in total and the order that the pairs appeared in each pairing could be presented in two different ways. This was done to help ensure that the order in which the practices appeared in a pairing did not influence the participant's decision in any way. Hence, a total of 72 uniquely ordered pairs were randomly divided among the eight survey variations so that each of the surveys included nine pair wise comparison questions and each unique ordered pair was

used exactly once. The full list of dairy farming production practices that was used in this research can be viewed below in Table 3.

Table 3. Dairy farming practices used for the pair wise comparison questions.

1. Milk cows are always given room to turn around, walk and lie down.
2. Milk cows are allowed to interact with other animals.
3. Milk cows are provided with time outdoors and access to grazing.
4. Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.
5. Milk cows are provided with proper shelter that offers protection from severe weather.
6. Milk cows are provided with clean bedding material to lay on.
7. Milk cows are milked in a safe and calm environment.
8. Milk cows are not administered growth hormones.
9. Male calves are raised for beef purposes and not for veal.

While many of the practices found in Table 3 were fairly straight forward practices that affected the health and welfare of a dairy cow, there were also a few that different consumers may perhaps have held a very strong opinion towards, either in favour of or in opposition of, that practice. The last two practices in Table 3 were a good example of this. Different consumers may have had different views on the importance or ethics of allowing growth hormones and veal production. Therefore, it was interesting to include them in order to later examine where these more contentious practices ended up ranking in terms of perceived importance for animal welfare. The methods utilized in creating this ranking were explored further in Section 4.5.1.2.

3.2.3.3 Demographic Questions

The next section of the survey instrument focused on gathering demographic information about the survey participants, which were used to determine how an individual's responses in the first two sections of the survey were affected by their personal attributes. Participants were asked to indicate their gender, annual household income, province, postal code, year of birth, highest level of education, birth country, as well as any additional ethnic groups that they considered themselves to be a part of.

For annual household income and highest level of education, respondents were provided with five categories to choose from. This was particularly important for annual household income because it gave a range of income levels to choose from. So, rather than writing down what their exact income was, which they may have been hesitant to do, they would just be asked which income bracket they fell into. This was done to hopefully increase the number of responses for this specific question, which was critical because income could be a particularly important indicator of opinions and preferences. The categories of annual household income were: less than $39,999, between $40,000 and $69,999, between $70,000 and $99,999, between $100,000 and $129,999, and greater than $130,000. Similarly, categories were made for the highest level of education so that the participant could identify themselves as having completed a specific category, rather than indicate any number of other various responses. The categories for education level included: did not complete high school, completed high school, some but did not complete trade school, college or university, completed trade school, college or university, and completed master's degree or Ph.D. A discussion of how these

demographic characteristics were entered into statistical software and their use in the regression models will follow in section 4.5.1.

3.2.3.4 Agriculture and Animal Welfare Familiarity and Consumption Habits

The fourth section of the survey instrument examined a variety of factors that may have served as indicators for explaining the responses of the survey participants. These factors focused mostly on the consumption habits and familiarity of the participants with both the dairy industry and animal welfare groups. Their experiences were collected through a series of ten short yes/no questions.

The first set of questions in this section of the survey inquired as to whether the participant was, or had a family member that was, engaged in either agriculture or, more specifically, dairy farming. They were also asked whether they had ever visited a dairy operation. These inquiries were important because having visited or worked on a dairy operation may cause a participant to answer in a different way than those who had no prior experience in these areas. It was important to determine whether having visited a dairy farm resulted in one having a more positive or negative view towards animal welfare in the dairy industry, as the results to this may be quite helpful and interesting.

It was also important to ask whether the individual consumed dairy products and if not, what their reasons were for not consuming. These reasons were important in determining whether not consuming dairy products resulted in them having a negative view towards dairy animal welfare. For example, if they did not consume dairy products because they were lactose intolerant, then this may not have affected their responses as

much as if they did not consume because of animal welfare concerns. Therefore, it was important to allow the respondents to indicate why they did not consume dairy products.

The next set of questions in this section of the survey focused on gathering information on activities with or familiarity of animal welfare groups or products that may have indicated that the participant was more concerned about animal welfare than most consumers. Survey participants were asked whether they purchased animal welfare friendly products, whether they boycotted products due to animal welfare concerns, whether they donated to animal welfare organizations, if they were a vegan or vegetarian, whether they volunteered for animal welfare groups or humane societies, as well as if they ever looked at product labeling for assurances of proper animal welfare. By answering yes to some or all of these inquiries, a great deal may be learned about a participant's characteristics and how they truly felt about animal welfare, as well as how this affected their responses to other survey questions compared to those who did not take part in the above mentioned activities.

3.2.3.5 Eliciting Willingness to Pay Valuations

The final section of the survey instrument attempted to discover the amount that participants were willing to pay for milk that had been certified to have been produced using animal welfare friendly production practices. Previous questions in the survey tended to focus on whether the respondent believed animal welfare was important. This final series of questioning extends the analysis in an attempt to discover whether Canadian consumers were actually willing to pay for improved animal welfare for dairy cattle using a pair of WTP questions. The first question asked whether the survey

participant wanted to purchase milk that was certified to have been produced using animal welfare friendly production practices. If they answered yes to the first question, then the survey asked them to select the premium they would be willing to pay for this milk from a group of five categories provided, which were: 0%, 10%, 25%, 50% or 100%.

This line of questioning was similar to the final two Likert scale statements from the first section of the survey instrument. It attempted to force the respondents to indicate whether price or animal welfare was more important to them. If price was more important, they would choose to not purchase or perhaps purchase only if the price was the same as conventional milk (ie a 0% premium). If animal welfare truly was more important to them, then they would indicate that they were willing to pay a high premium for the animal welfare friendly milk. What exactly constitutes "animal welfare friendly" milk was examined in further detail in the information sheet that was provided with the survey, which participants were asked to read prior to filling out the survey and will be discussed in detail in section 3.2.4.

It should be noted that the responses to the willingness to pay questions were hypothetical, with no real money being exchanged. Therefore, the estimates were liable to be inflated due to hypothetical bias. To attempt to counter this bias, a cheap talk script was included in the information sheet that alerted participants of the likelihood of overestimating their premiums and asked them to keep this in mind when completing the final section of the survey. However, Carlberg and Froehlich (2011) showed that, while the cheap talk script would decrease the level of inflation, the premium estimates would still be much larger than that of an experimental auction. Tonsor and Wolf (2011)

indicated that these hypothetical premiums were more likely to be the upper limit or ceiling price values that consumers were willing to pay.

Choice experiments were another option to use in mail surveys, however the space limitations of the survey instrument and the complexity of this type of experiment made them impossible to include in this survey on dairy animal welfare. The complexity of a choice experiment may have also potentially reduced the response rate by causing potential participants to view the survey as being too long or difficult to complete.

While both a pair wise comparison and a willingness to pay question can be used individually to discover consumer preferences for animal welfare, the decision was made to include both of them because the pair wise comparison allowed participants to name individual practices that they believed to be important, while the WTP allowed the researchers to discover the value that consumers put on receiving dairy products that included these production practices.

3.2.4 Information Sheet

A one page, double-sided information sheet (Appendix B) that was printed on bright yellow paper accompanied the survey instrument for all participants of this survey. The beginning of the survey instrument (Appendix C) informed the participants to only fill out the survey after they had read the cover letter and information sheet that accompanied it. This helped to ensure that all participants knew what was being asked of them. The information sheet was used to inform survey participants on how to properly complete the Likert scale and pair wise comparison questions. They were also informed of the

presence of hypothetical bias in hypothetical valuation questions through the use of a cheap talk script. The exact wording of the cheap talk script was:

"Past research has shown that consumers tend to overestimate the amount they would pay for products in situations like this where they are not actually making a purchase decision. Accordingly, please think carefully about how much of a premium you really would be willing to pay for milk that has been certified as being produced using animal welfare friendly practices." (excerpt from the Information Sheet: Appendix B)

In addition, the information sheet indicated that the animal welfare friendly milk that they were asked to put a value on was being produced using all nine production practices that were listed on the reverse side of the information sheet. These were the same nine practices that were used in the pair wise comparison question and that appeared in Table 3. Each production practice in the list that appeared in the information sheet was accompanied by a short description of the practice to which it referred. These descriptions were kept neutral and served only to clarify them for participants so that they could make knowledgeable choices when choosing which practice was more important to them for ensuring proper animal welfare in the second section of the survey instrument. Other materials that were included with the survey package will be further described later in Section 3.2.6.

3.2.5 Pre-testing

In order to receive the highest quality of responses possible, procedures were employed to ensure that all survey materials were clear and easy to fill out. The first of these included pre-testing the survey with numerous volunteers of different age groups and

with varying levels of familiarity with dairy farming in Canada. It was important to discover how other people interpreted the questions because then the researchers were able to take their suggestions and clarify or change the wording to make the questions easier to comprehend. Therefore, the volunteers completed the survey and indicated any areas where the questions were unclear or too difficult. Any comments or suggestions made by the volunteers were taken into account in order to craft a better survey instrument. These volunteers were also timed to determine how long it would take for participants to complete the survey. This was helpful in deciding whether the survey was too long or difficult, which may have ended up decreasing the response rate. The information from performing this pre-testing turned out to be valuable and helped to improve the revised survey instrument.

Another important source of knowledge for crafting the survey instrument was that of the thesis committee members. Their experience was drawn upon in order to create a survey that was properly formatted and worded in a way that all consumers would understand. Suggestions from the committee members on how to phrase production practices, as well as how to structure the survey and pose the questions was invaluable and helped to further improve the response rate and quality of information obtained from the survey participants.

3.2.6 Creation and Mailing Out of Surveys

Ethics approval for the creation and mailing out of any survey must first be received from the University of Manitoba Joint-Faculty Research Ethics Board (given on October 16, 2012). At that time, the process of purchasing mailing supplies, such as outgoing

envelopes, business reply envelopes and postage stamps, was able to begin. In order to send out the survey package that only utilized a single 61 cent postage stamp, the entire survey package could weigh no more than thirty grams. This allowance was adhered to by creating a one page, double-sided survey brochure, while also including a one page cover letter and a one page, double-sided information sheet. The University of Manitoba Digital Copy Centre was also able to print the 5,000 information sheets and 5,000 survey brochures (625 of each of the eight different survey versions), which saved on cost and time.

The cover letter used University of Manitoba Faculty of Agricultural and Food Sciences letterhead. This process was performed using printers from the Department of Agribusiness and Agricultural Economics, which again saved on the cost of printing. Special attention and care as taken in order to attempt to maximize the response rate of the mail survey. One such example to improve the response rate was to have each cover letter individually signed in ink by the principal investigator, Dr. Jared Carlberg. Included with each cover letter was also a one dollar Canadian coin, which acted as an incentive and a small token of gratitude for the consumers filling out the survey.

In the cover letter (Appendix A), recipients were informed about the contents of the survey package and the intentions of the investigators. They were advised that the survey was completely voluntary and told not to include any information that would allow the researchers to identify individual participants, which allowed their responses to remain anonymous. It was noted that the survey would only take 15 minutes of their time and that their participation was greatly appreciated. Should they have had any questions or concerns, they were encouraged to contact Dr. Carlberg using the email address or

phone number that were provided. The cover letter also indicated that the survey had been approved by the University of Manitoba Joint-Faculty Research Ethics Board and a contact number was provided for the Ethics Board. The names and addresses of the survey recipients were printed onto labels and affixed to the outgoing envelope. Individual postage stamps were used instead of bulk printed postage in order to increase the individual look of each envelope, which was again arranged in order to improve response rates.

After all the supplies had been purchased and the printing completed, the organization of the survey materials and filling of the survey envelopes began. This was a process that took place over a number of weeks in December 2012 with the help of various family members. Once completed, the envelopes were transported to Canada Post locations to be sent out to the survey recipients. Sending out of the 5,000 surveys was completely finished by January 7, 2013. The first returned surveys were obtained on January 17, 2013, a turn around of ten days, and continued until the number of returned surveys slowed down in late April and early May.

Chapter 4: Economic Theory and Empirical Models

4.1 Introduction

The main theoretical principles exhibited in this thesis relate to the characteristics of a good or product and their role in creating value for that good. This section begins by examining the theories developed by previous academics that prove this notion and then looks at how these related to the animal welfare characteristics that were a part of milk products yet had little research done on them to discover their true value. The models and theories of the methodology utilized in this research will then be examined and discussed later in chapter four. It concludes by detailing the raw data from the survey instrument.

4.2 Theoretical Approach to Valuing Product Characteristics

The utility (or value) that certain characteristics or attributes may bring to a product for consumers has been the focal point of the research for many economists. Starting with the modernized approach for consumer economic theory of Lancaster (1966), economists argued that the utility that a consumer received from a good was based on the fact that the characteristics of that good, and not the good itself, provided the utility. Building upon this, Ladd and Martin (1976) showed that the utility contained in these characteristics provided value and the sum of the values of these characteristics made up the value of the good. Likewise, the value of a good was not something brought about by that good as an object, but from the characteristics that the good contained. In other words, milk did not have value simply because it was milk, but rather because it contained characteristics, such as calcium and vitamin D, which individually provided value and contributed to the

total value of milk. Ladd and Martin (1976) mathematically demonstrated that the value of a good was the sum of the value of the characteristics contained in that good. To do this, they created a series of equations to show how the price of each characteristic for any product can be derived. Provided is a walkthrough of these equations as they relate to milk and the potential animal welfare characteristic associated with it.

(1) $$q_h = F_h(x_{1h}, x_{2h}, \ldots, x_{mh})$$

Equation 1 from Ladd and Martin (1976) illustrated the production function, q_h, which showed that the type of product created, in this case good *h*, was reliant on the different characteristic levels that were employed to create this good. For example, the type of milk can be dependent on the amount of fat contained in that milk product (ie 0%, 1%, 2%, etc.). In other words, each level of fat characteristic created a slightly different milk product. Alternatively, a milk product produced using "good" animal welfare production practices was a different product than milk produced using "poor" animal welfare production practices. Ladd and Martin (1976) then transformed the production function (Equation 3) using the relationship in Equation 2, which showed that the amounts of the various characteristics, x_{jh}, could be shown as the association between input levels, v_{nh}, and a "characteristic input-output coefficient", x_{jnh}, which was the level of the j^{th} characteristic created using one single unit of the n^{th} input for forming the h^{th} product.

(2) $$x_{jh} = X_{jh}(v_{1h}, v_{2h}, \ldots, v_{nh}, x_{j1h}, x_{j2h}, \ldots, x_{jnh})$$

When Equation 2 was inserted into Equation 1, the third equation relating the production of q_h to the input levels, v_{nh}, and the characteristic input-output coefficients, x_{jnh}, was created:

$$(3)\quad q_h = G_h(v_{1h}, v_{2h}, \ldots, v_{nh}, x_{11h}, x_{12h}, \ldots, x_{mnh})$$

Next, Ladd and Martin (1976) calculated the profit function, π, for a business that sold product q_h, as shown in Equation 4.

$$(4)\quad \pi = \sum_{h=1}^{H} p_h F_h(x_{1h}, x_{2h}, \ldots x_{mh}) - \sum_{h=1}^{H}\sum_{i=1}^{n} r_i v_{ih}$$

Equation 4 asserted that the profit achieved by a retailer was calculated as the sum of the prices of each product multiplied by the amount of each product (with given levels of each characteristic) produced and then subtracting the sum of the prices of each characteristic multiplied by the amount of each input used. For example, a milk plant would have revenues calculated as the amount of each different type of milk produced (skim, 1%, 2%, etc.) multiplied by the price for each type of milk and costs related to the cost of each input multiplied by the amount of each input used in production of each milk product. Next, Ladd and Martin (1976) differentiated the profit function, π, in Equation 4 with respect to the level used of each input, v_{ih}, which was illustrated in Equation 5.

$$(5)\quad \partial\pi / \partial v_{ih} = p_k \sum_{j=1}^{m} \left(\partial F_h / \partial x_{jh}\right)\left(\partial x_{jh} / \partial v_{ik}\right) = r_i = 0$$

This process was performed so that the differential equation for r_i could be solved, which revealed the value associated with an input characteristic, as derived in Equation 6. Thus, Equation 6 illustrated the value of a characteristic.

(6) $$r_i = p_h \sum_j \left(\partial F_h / \partial x_{jh}\right)\left(\partial x_{jh} / \partial v_{ih}\right)$$

Through Equation 6, the authors demonstrated that the value of a characteristic was equal to the price of the overall good multiplied by the summation of the various marginal characteristic yields that created product h from input i, which was multiplied by the marginal physical product in which a unit of the j^{th} attribute is used for creating good h. The definition that Ladd and Martin (1976) used describes r_i as "the marginal implicit price paid for the j^{th} product characteristic used in product h". Through their empirical methods, the authors were able to prove this equation and showed that the value of a good was created by the values of its various characteristics. So, in the example of milk, the value of the milk would be seen as coming from the value provided by any one of its attributes, such as butterfat, vitamins and even animal welfare. Also, it was possible to view how consumers valued each characteristic by measuring the additional amount they were willing to pay for a dairy product with a certain characteristic over a dairy product with the exact same characteristics except for the one characteristic that was unique to the first product. However, as will be seen in the next section, the unique characteristics were not always present in a real world situation and therefore, may have values that are difficult to measure.

4.3 The Value of an Animal Welfare Characteristic

It stands to reason that consumers demand certain characteristics in products like milk, such as good taste, vitamins, etc., and the supply chain for milk included these characteristics in the milk products based on demand from consumers. Additionally, due

to the fact that each characteristic demanded provided value to the overall good (assuming that this value was positive), higher characteristic levels resulted in a higher retail price for that good (Ladd and Martin 1976). Historically, however, animal welfare and the way in which a food animal was treated in producing the product was not taken into account when assigning value to the various characteristics of animal products, partly due to the fact that consumers were not demanding heightened levels of animal welfare (or were not aware of the current level of animal welfare). Recently though, certain products have appeared, such as free range eggs, that were marketed as being produced under animal welfare friendly guidelines. This improved level of animal welfare associated with the eggs provided certain consumers with additional utility when consuming the eggs and therefore, they became more valuable. In this case, consumers of eggs could indicate their demand or preferences for improved animal welfare in chickens by purchasing this product and the value that this individual animal welfare characteristic provided towards the overall value of the eggs could be measured by looking at the difference in prices between eggs where the only different attribute was the animal welfare friendly "free range" characteristic.

However, due to the scarcity of dairy products that were labeled with animal welfare characteristics, it was unknown whether there was a demand from consumers for these types of characteristics in dairy products or whether consumers place value on dairy animal welfare. It should be the case that, since the care that was provided to dairy cows (dairy animal welfare) was a characteristic of the dairy products, this characteristic should then have provided utility and value in the context of the overall good. But it was unknown whether consumers exhibited any sort of demand for this characteristic because

there existed no market mechanism where consumers could make a choice between conventional and animal welfare friendly dairy products to show their preferences. Therefore, it was unknown how valuable an animal welfare characteristic in dairy products was to consumers.

It is therefore important to ascertain the value that consumers placed on dairy animal welfare, whether they believed it was currently acceptable or lacking in dairy products, and whether they would be willing to pay to receive a good with improved animal welfare characteristics. Methods to discover the answers to these questions are explored in section 4.5.1 in an attempt to discover the opinions and preferences of Canadian consumers towards dairy animal welfare.

4.4 Hedonic Models

Hedonic models have been used to find the implicit value associated with individual product characteristics that were not always readily available (Le Goffe 2000). The theory behind hedonic pricing reveals that consumers received a certain amount of utility from characteristic vectors, objects that are made up of multiple attributes (Nesheim 2006). Therefore, heterogeneous goods are thought of as two or more of the same good that possess the same characteristics (in this case, milk) but having different quantities of these characteristics (Nesheim 2006). For example, this could have included different levels of vitamins, fat or animal care attributes associated with dairy products.

4.5 Methods for the Examination of the Data

Once the survey instruments talked about in Chapter 3 were completed and returned to the researcher, they were packaged together based on the date that they were returned and then subsequently opened and entered into an Excel spreadsheet, after which they were destroyed in order to completely ensure confidentiality. A summarized version of the Excel data was then created to provide a clear overview of the results of the survey and of the demographic characteristics of the participants that completed the survey. The following subsections of Section 4.5 examined the various methods, tests and models utilized in this research for the further statistical examination of the survey results. Then, the data received was looked at in Section 4.6.

4.5.1 Empirical Models

For this research, Stata 12.0 was chosen for the statistical analysis due to the various analysis techniques available in it, the ease of converting Excel files into Stata files, and the ease with which the program was used. Sections 4.5.1.1 and 4.5.1.2 focus on the regression models that were utilized in this study and how they were used to analyze the data obtained from the survey instrument. The analysis technique for the WTP question was then examined in section 4.5.1.3.

4.5.1.1 The Ordered Logit Model

Likert scale responses to the ten animal welfare statements in the first section of the survey instrument were tallied and compared on an actual and percentage basis of agreement for each statement. In other words, the total number of participants that

responded with each number on the Likert scale for each of the ten statements were counted and then the percentage that responded with that choice was calculated.

Results were also broken down by the demographic and knowledge characteristics that were collected in the third and fourth sections of the survey instrument to see how responses were affected by a participant's personal attributes. An ordered logit model was utilized for this task, similar to the one used by Prickett et al (2010). According to those authors, an ordered logit enabled the researcher to hold an independent variable constant in order to examine the individual effect a related independent variable had on the dependent variable. In this case, the dependent variable, Y*, was the actual unobserved attitude, which was estimated by the observed Likert scale responses (where the observed y-value could take on a value from 0 - 4) from the attitudinal questions, while the independent variables were the demographic values (Prickett et al 2010). Following the procedure laid out by Prickett et al (2010), the μ_i parameters, or "cut points" as they were referred to in Stata (2009), were calculated to show the estimated range of values that the unobserved attitude, y*, could take for each actual observed attitude value, y, which were the Likert scale responses. Prickett et al (2010) described this process as the illustration of "latent (unobserved) attitudes into statements of agreement" and this was said to follow:

(7) Strongly disagree ($y = 0$) if $y^* < 0$

Disagree ($y = 1$) if $0 < y^* < \mu_1$

Neutral ($y = 2$) if $\mu_1 < y^* < \mu_2$

Agree ($y = 3$) if $\mu_2 < y^* < \mu_3$

Strongly agree ($y = 4$) if $y^* > \mu_3$

The initial cut point μ_0 was set to equal zero for the ordered logistic regression (Stata 2009). The rest of the μ_i were estimated using the ordered logistic regression, which calculated them by maximizing a log likelihood function (Prickett et al 2010).

The demographic characteristics were combined to be binary variables so that the X values were either a 0 or 1. For example, the gender variable was equal to a 1 if female, 0 if male. The population or "area" variables were determined by population numbers and sorted the participants into five groups of varying population levels. These were included in an attempt to discover whether living in an urban area or a rural area affected the perceptions that a consumer had in terms of animal welfare. These population levels were determined from postal codes that the survey respondents provided. The Statistics Canada Postal Code Search (2013) option was utilized to determine the population numbers for the city or region that was associated with each postal code. Participants were arranged into five populations groups, including 9,999 residents or less in the associated city/region, between 10,000 and 49,999 residents, between 50,000 and 99,999 residents, between 100,000 and 499,999 residents, or 500,000 residents or greater. Four out of the five area groupings had an associated variable in the ordered logit model. These variables took on a value of either 0 or 1. If all the area variables were equal to zero, then the respondent lived in an area within the lowest population density category (10,000 or fewer residents in the city/region for that postal code).

The household income variable utilized four binary household income brackets where, if all of the four binary variables equaled zero, then that respondent's annual household income was $39,999 or less. The four household income variables in the logit

model included: between $40,000 and $69,999, between $70,000 and $99,999, between $100,000 and $129,999, and greater than $130,000.

The education variable included five levels of education corresponding to a total of four binary variables, where if the four variables were equal to zero, then that person had not completed high school. The four education variables included: completed high school, some but did not finish trade school, college or university, completed trade school, college or university, and completed graduate school (M.Sc., Ph.D., etc).

Respondent ages that were collected in the survey instrument were based on birth year. These birth years were grouped into five different ranges of years and therefore, had four variables in the logit model, including the following age brackets: 1948 or earlier, between 1949 and 1958, between 1959 and 1968, and between 1969 and 1978. If all the age variables were equal to zero, then the respondent was born 1979 or later.

Each province was represented by a variable in the model to differentiate the preferences of consumers living in different provinces. However, residents of the four Maritime provinces (Newfoundland and Labrador, Nova Scotia, New Brunswick and Prince Edward Island) were grouped together due to relatively low population/response numbers. If all of the province variables equaled 0, then that represented an individual living in Manitoba.

The demographics of the sample population were compared to that of the actual Canadian population to ensure that the sample was representative of the target population. This was further examined later in Chapter 4 in Section 4.6 of this thesis, which summarized the data utilized for this research. Also included were the variables

derived from the knowledge and experience that a consumer had with animal welfare and dairy farming, along with whether or not they were willing to pay for a milk product with enhanced animal welfare characteristics. These were also included in the ordered logit model as variables that would take on either a 0 or 1 value. The list of these variables were found in Section 3.2.3.4.

Using the example of the Prickett et al (2010) study, the ordered logit model for this research was:

(8) $Y^* = \beta_0 + \beta_1 Gender + \beta_2 Income1_{(\$40,000\text{-}\$69,999)} + \beta_3 Income2_{(\$70,000\text{-}\$99,999)} + \beta_4 Income3_{(\$100,000\text{-}\$129,999)} + \beta_5 Income4_{(\$130,000+)} + \beta_6 Education1_{(HighSchoolDip)} + \beta_7 Education2_{(SomeSecondary)} + \beta_8 Education3_{(FinishSecondary)} + \beta_9 Education4_{(Graduate)} + \beta_{10} Age1_{(1969\text{-}1978)} + \beta_{11} Age2_{(1959\text{-}1968)} + \beta_{12} Age3_{(1949\text{-}1958)} + \beta_{13} Age4_{(1948\ or\ earlier)} + \beta_{14} Area1_{(10,001\text{-}50,000)} + \beta_{15} Area2_{(50,001\text{-}100,000)} + \beta_{16} Area3_{(100,001\text{-}500,000)} + \beta_{17} Area4_{(500,001\ or\ more)} + \beta_{18} BC + \beta_{19} AB + \beta_{20} SK + \beta_{21} ON + \beta_{22} PQ + \beta_{23} MP + \beta_{24} Engaged\_Ag + \beta_{25} Engaged\_Dairy + \beta_{26} Visit\_Dairy + \beta_{27} Consume\_Dairy + \beta_{28} Buy\_FAW + \beta_{29} Boycott + \beta_{30} Donate + \beta_{31} Vegan/Vegetarian + \beta_{32} Volunteer + \beta_{33} Read\_Labels + \beta_{34} WTP1 + e,$

where e is the Type I extreme value error term associated with the ordered logit model (Prickett et al 2010). The β values for each demographic variable included in the ordered logit regression were calculated by choosing the β values that maximized a log likelihood function, as shown by Prickett et al (2010). Likewise, when all the demographic variables were equal to zero, the intercept, β_0, represented the expected Likert scale response of an individual who was a male, lived in an area with a population of less than 10,000 people, had an annual household income of $39,999 or less, lived in Manitoba, did not complete high school and answered "no" to all the dairy farming, animal welfare experience/knowledge-based and willingness to pay questions.

However, since the Stata econometric software program that was used for the ordered logistic regression automatically set the intercept, β_0, equal to zero rather than the first cut point, as shown in the Prickett et al (2010) study, an extra step had to be taken to instead set the first cut point to zero (Stata 2009). To find the intercept using Stata, the sign of the first cut point presented in the ordered logistic regression results had to be changed (ie from a negative to a positive) and this then became the intercept coefficient for the regression (Stata 2009). Next, according to Stata (2009), the cut points that separated the responses for each response on the Likert scale (0-4) had to be calculated using the "lincom" function from the Stata program, which generated the coefficient, standard error and z-value for each cut point. These values are presented with the ordered logistic regression results in the Results chapter.

4.5.1.2. The Conditional Logit Model

There were two techniques that could be used to analyze the pair wise comparison questions from section two of the mail survey: (1) calculations using Excel functions or (2) a conditional logistic regression. Either of these methods were acceptable and could be utilized to create a consumer ranking of dairy production practices based on their perceived level of importance for providing proper animal welfare on dairy farms in Canada. The goal for each technique was to create an importance score that indicated what percentage of the population believed that that practice was most important for dairy animal welfare (Prickett et al 2010). Both of the techniques that were stated above will be examined in this section.

The first technique was the simpler method and utilized the raw data that had been compiled in the Excel spreadsheet. First, the number of times that a production practice had been included in a completed pair question with any other production practice was established using a COUNTIF function. The COUNTIF function enabled the user to count the number of cells that a certain value appeared in. Next, the number of times that a production practice had been chosen as being more important in terms of animal welfare was determined using the COUNTIF function. This process was completed for each of the nine production practices. Then, by dividing the number of times a production practice was chosen as more important by the number of times it was included in a pairing question, a percentage was received that showed the percentage of the time that each production practice was chosen as being more important than another production practice. This was again completed for each production practice. Finally, the percentages for all the production practices were added together and each individual percentage was divided by this total percentage to create an importance score for each production practice.

A conditional logit regression could also be used to analyze the results from the pair wise comparisons, as seen in Lusk and Norwood (2008) and Prickett et al (2010), though it was not used in this research due to the relative ease of the first technique. For this method, the raw data had to be organized and formatted into a form that could be transferred into Stata in order to run a regression using the clogit command. This regression then calculated the β parameters of the probability that a respondent would choose one practice (i) over another practice (j) as being more important for dairy animal

welfare (Lusk and Norwood 2008). Using Lusk and Norwood's (2008) method, the β parameters were then calculated from maximizing a log likelihood function where:

(9) Probability i is chosen over j = $e^{\beta_i}/(e^{\beta_i} + e^{\beta_j})$

The results could then be used to help create importance scores for each practice. These importance scores indicated what proportion of the sample believed that practice to be most important for ensuring proper animal welfare in the dairy industry (Prickett et al 2010). The importance scores would also be used to make comparisons of relative importance between different production practices, as shown by Prickett et al (2010). As shown in Prickett et al's (2010) paper, the importance scores would be calculated as:

(10) $I_i = e^{\beta_i}/\sum_j e^{\beta_j}$

In equation 10, I_i was the importance score for the i^{th} production practice, the β's were the estimated coefficients from the logit regression of the production practices and the sum of the importance scores equaled 100% (Prickett et al 2010). The list of production practices that was used (Table 3) was similar to previous work by Prickett et al (2010) on American consumers but was adapted to be more specific to the dairy industry in Canada.

4.5.1.3 Willingness to Pay Logit Models

For statistical analyses of the results of the two WTP questions presented in section five of the survey instrument, two logistic regressions were utilized in order to determine how the characteristics from sections three and four of the survey affected whether or not a

consumer was willing to purchase the animal welfare certified milk and how much these consumers were willing to pay.

The first WTP question had a Y_{WTP1}* dependent variable that either took on a value of 0 if the participant declined to purchase the milk or 1 if they indicated that they wanted to purchase the animal welfare certified milk product. This decision on whether or not to purchase was affected by a multitude of factors, similar to those in Section 4.5.1.1. An ordinary logistic regression was used for this type of question, as shown in Equation 11.

$$(11)\quad Y_{WTP1}^{*} = \beta_0 + \beta_1 Gender + \beta_2 Income1_{(\$40,000\text{-}\$69,999)} + \beta_3 Income2_{(\$70,000\text{-}\$99,999)} + \beta_4 Income3_{(\$100,000\text{-}\$129,999)} + \beta_5 Income4_{(\$130,000+)} + \beta_6 Education1_{(HighSchoolDip)} + \beta_7 Education2_{(SomeSecondary)} + \beta_8 Education3_{(FinishSecondary)} + \beta_9 Education4_{(Graduate)} + \beta_{10} Age1_{(1969\text{-}1978)} + \beta_{11} Age2_{(1959\text{-}1968)} + \beta_{12} Age3_{(1949\text{-}1958)} + \beta_{13} Age4_{(1948\ or\ earlier)} + \beta_{14} Area1_{(10,001\text{-}50,000)} + \beta_{15} Area2_{(50,001\text{-}100,000)} + \beta_{16} Area3_{(100,001\text{-}500,000)} + \beta_{17} Area4_{(500,001\ or\ more)} + \beta_{18} BC + \beta_{19} AB + \beta_{20} SK + \beta_{21} ON + \beta_{22} PQ + \beta_{23} MP + \beta_{24} Engaged\_Ag + \beta_{25} Engaged\_Dairy + \beta_{26} Visit\_Dairy + \beta_{27} Consume\_Dairy + \beta_{28} Buy\_FAW + \beta_{29} Boycott + \beta_{30} Donate + \beta_{31} Vegan/Vegetarian + \beta_{32} Volunteer + \beta_{33} Read\_Labels + e$$

Similar to Equation 11, the second WTP question attempted to discover how a consumer's response was affected by their demographic characteristics and experiences with dairy farming and animal welfare. However, this second WTP question would take on five different values for the dependent variable, Y_{WTP2}*. In this case, the participant was indicating the level of premium that they were willing to pay (0%, 10%, 25%, 50% or 100%). Hence, it took on the structure of an ordered logistic regression, similar to equation 8 that was used for the 5 point Likert scale questions. This type of regression

determined how different factors, such as income and education level, affected the size of the premium that the participant was willing to pay. The ordered logistic regression for the second WTP question was shown in Equation 12.

(12) $$Y_{WTP2}^{*} = \beta_0 + \beta_1 Gender + \beta_2 Income1_{(\$40,000\text{-}\$69,999)} + \beta_3 Income2_{(\$70,000\text{-}\$99,999)} + \beta_4 Income3_{(\$100,000\text{-}\$129,999)} + \beta_5 Income4_{(\$130,000+)} + \beta_6 Education1_{(HighSchoolDip)} + \beta_7 Education2_{(SomeSecondary)} + \beta_8 Education3_{(FinishSecondary)} + \beta_9 Education4_{(Graduate)} + \beta_{10} Age1_{(1969\text{-}1978)} + \beta_{11} Age2_{(1959\text{-}1968)} + \beta_{12} Age3_{(1949\text{-}1958)} + \beta_{13} Age4_{(1948\ or\ earlier)} + \beta_{14} Area1_{(10,001\text{-}50,000)} + \beta_{15} Area2_{(50,001\text{-}100,000)} + \beta_{16} Area3_{(100,001\text{-}500,000)} + \beta_{17} Area4_{(500,001\ or\ more)} + \beta_{18} BC + \beta_{19} AB + \beta_{20} SK + \beta_{21} ON + \beta_{22} PQ + \beta_{23} MP + \beta_{24} Engaged\_Ag + \beta_{25} Engaged\_Dairy + \beta_{26} Visit\_Dairy + \beta_{27} Consume\_Dairy + \beta_{28} Buy\_FAW + \beta_{29} Boycott + \beta_{30} Donate + \beta_{31} Vegan/Vegetarian + \beta_{32} Volunteer + \beta_{33} Read\_Labels + e$$

Similar to Equation 8, the e variable in both Equation 11 and 12 represented the Type I extreme value error term associated with the logit model (Prickett et al 2010). Likewise, when all the demographic values were equal to zero, the intercept, β_0, represented the expected response (whether or not they would purchase for equation 11; the WTP premium for equation 12) of an individual who was male, lived in an area with a population of less than 10,000 people, had an annual household income of $39,999 or less, lived in Manitoba, did not complete high school and answered "no" to all the dairy farming and animal welfare experience/knowledge-based questions. The β values were calculated by choosing the β values that maximized a log likelihood function, as shown by Prickett et al (2010). The same process was used to estimate the μ_i values, as discussed in Section 4.5.1.1. Likewise, the same correction that was used on the Stata readout data for Section 4.5.1.1 was also applied to the second WTP question results in

order to set the first cut point to zero and to determine the intercept, which used the "lincom" function in Stata (Stata 2009).

4.5.2 Misspecification Testing

According to Begg and Lagakos (1990), misspecification has been a common issue amongst logistic regressions and can result in unreliable results. These authors defined misspecification to include inaccurate measurement of explanatory variables, incorrectly defined variables and not including the relevant variables. Researchers must determine whether they have missed or included too many variables and have measured these variables in a proper manner. A problem may also occur from choosing the wrong type of model for the statistical analysis. Model misspecification results in inconsistent variable results (Murphy 1996).

Therefore, it was important to attempt to create the best regression model possible in order to obtain the most accurate findings, while avoiding the downfalls of model misspecification. A common test to check for model specification errors in Stata was the "linktest", where the p-value of the hatsq variable revealed whether any specification errors were made. A significant (less than 0.05) result for this variable denoted a specification error being present. The linktest was used in this research to check for misspecification in the ordered logit models and the results of this test will be shown in Section 4.6.4.

4.6 Data Summary

In this section, the data collected from the sample population through the mail surveys was summarized and compared to the actual Canadian population. Also, the response rate was calculated and discussed for this research in order to determine whether the data was truly representative of the Canadian population. Next, the data section commented on the individual provincial response rates and offered reasoning as to why some provinces may be over or under represented in this study. Then, additional survey respondent characteristics from the responses to the ten experience/knowledge questions, found in section four of the survey instrument, are presented. Lastly, Section 4.6 concluded by detailing the results to the misspecification tests that were applied to each regression in this research.

4.6.1 Survey Response Rate

Of the 5,000 surveys sent out across Canada, a total of 1,311 returned in the business reply envelopes provided. Of these 1,311 return envelopes, a total of 43 had participants indicating that they declined to fill out the survey for various reasons. The balance of 1,268 surveys returned completed. The answers in these surveys were used to construct an Excel spreadsheet of consumer responses. In addition, 258 envelopes ended up sent back by Canada Post as being undeliverable, usually because the intended recipient no longer resided at the address provided.

(13) Response rate =
(Completed - Declines) / (5,000 - Undeliverable - Declines)

Equation 13 illustrated the formula that was used to determine the overall response rate for this consumer survey. Furthermore, Table 4 below illustrated the values used in the response rate calculation, as well as the actual response rate for this study.

Table 4. Survey response rate for the 5,000 mail surveys.

	Completed	Declines	Undeliverable	Response Rate
Dairy Survey	1,268	43	258	26.98%

4.6.2 Survey Demographics

Table 5, shown on the next page, summarized the demographic characteristics provided by the participants of this research. It should be noted that a total of 1,268 respondents filled out the survey but not every participant answered every question. Some participants chose not to indicate their annual household income or their province, for example. For this reason, the total participation for each category did not necessarily add up to the total 1,268 participants.

4.6.2.1 Gender Breakdown

Taking a closer look at the data, it was interesting to see that a large majority of the people in this study were males, as opposed to the normally expected 50:50 ratio of genders. It may be unlikely to assume however that males were more likely to fill out an animal welfare survey. One potential factor may have been attributed to the composition of the mailing list. Perhaps home addresses or property titles acquired by the mailing list provider were largely registered under the husband's name for a married couple. This may explain why the ratio of males to females was skewed more towards male responses.

Table 5. Survey participant demographics.

Gender breakdown	Male	756	61.26%
	Female	478	38.74%
Annual household income	Less than $39,999	127	10.91%
	Between $40,000 and $69,999	355	30.50%
	Between $70,000 and $99,999	280	24.05%
	Between $100,000 and $129,999	202	17.35%
	Greater than $130,000	200	17.18%
Population density	Under 10,000	87	7.94%
	Between 10,000 and 49,999	291	26.55%
	Between 50,000 and 99,999	185	16.88%
	Between 100,000 and 499,999	258	23.54%
	Greater than 500,000	275	25.09%
Year of birth	1979 or later	59	4.95%
	Between 1969 and 1978	137	11.50%
	Between 1959 and 1968	250	20.99%
	Between 1949 and 1958	325	27.29%
	1948 or earlier	420	35.26%
Level of education	Did not complete high school	53	4.31%
	Completed high school	168	13.65%
	Some, but did not complete, trade school, college or university	170	13.81%
	Completed trade school, college or university	686	55.73%
	Completed Master's degree or Ph.D.	154	12.51%
Provincial breakdown*	British Columbia	204	16.35%
	Alberta	120	9.62%
	Saskatchewan	36	2.88%
	Manitoba	69	5.53%
	Ontario	448	35.90%
	Quebec	282	22.60%
	Newfoundland and Labrador	15	1.20%
	Nova Scotia	37	2.96%
	New Brunswick	29	2.32%
	Prince Edward Island	8	0.64%

*The percentages given for the provincial breakdowns are the proportion of the total returned surveys (those who actually indicated a province) that are from each province and should add up to 100% for all provinces.

4.6.2.2 Annual Household Income

The number of participants that found themselves in each annual household income category was quite evenly distributed, with the largest number (30.5%) having an annual household income of between $40,000 and $69,999. If the lowest three income categories were combined, the results indicated that over 65% of all respondents had an annual household income of less than $100,000. Likewise, 34.5% of survey respondents had an income of over $100,000. However, it was difficult to find actual Canadian data to compare this to. When these results were compared to income data from Statistics Canada (2012b), which showed that 34.6% of Canadian families (2,761,360 out of 7,989,380) had an income of over $100,000, the 34.5% found in this range for this study seemed remarkably similar. The Statistics Canada (2012b) could also be transformed to show that 20.1% of Canadian families had an annual household income of less than $40,000, a much larger value than the 10.91% found in this study. It should be noted that the Statistics Canada (2012b) data did not include those who were not part of a family unit. Therefore, a household with only one earner would likely have a lower annual household income than a household with two or more earners and this may have skewed the data somewhat.

The response rate for the income question was quite strong. Providing categories of income ranges rather than asking their exact household income resulted in 1,164 of the survey participants willing to indicate their annual household income range, which corresponded to approximately 92% of all of those who filled out the survey.

4.6.2.3 Area Population Levels

The next category in Table 5 examined the distribution of participants among locations with various population levels. These population levels were determined using postal codes provided by the participants. However, it turned out that a large number of participants were unwilling to provide their postal code and thus, there were only 1,096 responses for this question, which was approximately 86% of the total sample population. Of those that provided a postal code, the largest number of participants, 291, lived in areas with a population between 10,000 and 49,999, which corresponded to 26.55% of the sample population. Another 25.09% lived in cities with populations greater than 500,000 and 23.54% in cities with a population in the range of 100,000 to 499,999. As would be expected, less than 8% resided in areas with smaller populations (less than 10,000).

4.6.2.4 Birth Year and Participant Age

The subsequent survey question asked the participants to indicate their birth year. The response rate for this section was 1,191 out of 1,268, or around 94%. The sample population for this study was actually quite old, with over 62% being born in 1958 or earlier. This meant that almost two thirds of the sample population was 55 years of age or older. The average birth year of the sample population was 1954.3, which, again, indicated that the average participant was in their late fifties. Only 59 participants in this study were born in 1979 or later. This statistic indicated that less than 5% of the survey population members were 34 years old or younger.

Table 6. Comparison of Canadian and survey age range proportions.

	< 34	35 – 44	45 – 54	55 – 64	> 65
Actual Canadian Population	43.3%	13.4%	15.4%	12.9%	14.8%
Adjusted Canadian Population*	27.0%	17.3%	19.9%	16.7%	19.1%
Survey Sample Population	5.0%	11.5%	21.0%	27.3%	35.3%

*Adjusted to exclude persons under 20 years of age
Source: Statistics Canada (2012c)

While the Canadian population is aging, it was quite unlikely that the overly skewed age demographics of sample population were representative of that of the actual Canadian population. This was illustrated by examining the age statistics collected by Statistics Canada (2012c), shown in Table 6. While their numbers were collected for the previous year (2012) and as ages in years, not by birth year as was done in this study, it was quite evident that the actual Canadian population differed in terms of age in comparison to the sample population that was used in this research. Where the sample population had 62.6% of its members turning 55 years old or older in 2013 (ie born after 1958), only 27.7% of the actual Canadian population fell into this age range. Likewise, whereas only about five percent of the sample group was aged 34 years old or younger, 43.3% of the actual Canadian population was younger than 34 years old.

It should be noted that, while this survey was answered by adults, the Canadian statistics included those who were younger than 18 years of age. So, to compare the adult population of Canada to the population of this survey, it was more proper to ignore the youth population of Canada and then examine the proportions of each age range. However, the data from Statistics Canada for the adult category only began at 20 years old, as the next category included Canadians aged 15 to 19. Due to the fact that there

were no known participants under 20 years of age, for the purpose of this study, the sample population's ages are only compared to that of the Canadian population aged 20 years old or older.

When the data from Statistics Canada (2012c) was transformed to reflect this, it was still quite apparent that the age of the sample population did not correspond with the age of the actual Canadian population. In this scenario, as shown in Table 6, 35.8% of the actual Canadian population was at least 55 years old, which was larger than the original numbers for the Canadian population but was still much smaller than that of this survey, which was 62.6%. The actual Canadian population over 20 years old was made up of 27.0% who were between 20 and 34 years of age. As discussed before, the proportion of the sample population in this age range was only 4.95%, which illustrated how different the actual Canadian population was from the sample population. Thus, the older age ranges were greatly over represented in this research and the younger age groups were vastly under represented.

The reasons for this may stem from the fact that the mailing list may have potentially been quite old or not updated recently. If the mailing list were to be 5 years out of date, then that would make everyone in the sample population 5 years older than when the list had originally been compiled. Additionally, five years of new participants (the 18 – 23 year old age range) would not have been included in the mailing list database because they were too young to be included at the creation of the database. Perhaps it was also more difficult for marketing companies to acquire permanent addresses, which was what this mailing list was created from, for younger consumers in comparison to older consumers who had already bought a house and settled into a permanent place of

residence. This was likely a large disadvantage of a mail survey, as opposed to a phone or in-person survey, where perhaps a more representative age range could be reached. This limitation will be further discussed in the Conclusion chapter of this thesis.

4.6.2.5 Education Level

The next part of the questionnaire asked participants which of the five education categories best described their highest level of education achieved. This question was very well responded to, with 1,231 of the 1,268 providing a response, which corresponded to a response rate of just over 97%. A large majority (686) indicated that they had completed some form of post-secondary education, such as college, university or trade school. This corresponded to 55.73% of the sample population. Likewise, only about 4% of respondents did not complete high school, meaning that over 95% of the sample population had completed some form of education. Those who had completed a Master's degree or a Ph.D. made up approximately 12.5% of the sample population, or, in other words, one out of every eight people in this study purported to have received a graduate-level degree.

Table 7. Comparison of survey and actual Canadian population education levels.

	Survey Sample Population	Actual Canadian Population
Did not complete high school	4.3%	20.1%
Completed high school	13.7%	19.7%
Some, but did not complete, trade school, college or university	13.8%	8.3%
Completed trade school, college or university	55.7%	55.3%
Completed Master's degree or Ph.D.	12.5%	6.5%

Source: Statistics Canada (2010)

The next step was to examine how the level of education achieved by this survey's participants compared to that of the Canadian population by looking at Statistics Canada education numbers (Statistics Canada 2010). When the education values of the sample population were compared to those of the actual Canadian population, it became obvious that the participants who had completed this survey were higher educated, on average, than the actual Canadian population. As was shown in Table 7, one fifth of the Canadian population had not completed high school, whereas only 4.3% of the sample population did not complete high school. Likewise, the survey's sample population was almost double the percentage of people who had completed a Master's or Ph.D. program (12.5%) compared to the actual Canadian population (6.5%). However, the percentage of the population that had completed some form of post secondary education was the largest percentage for both the sample and actual population, coming in around 55%. These differences though should be taken into account when analyzing the results that were published in this research.

4.6.2.6 Provincial Breakdown

The provincial numbers in Table 5 illustrated the geographic breakdown of the survey participants. It also provided sample population percentages, which indicated what proportion of the sample population came from each province. It was important to note that only 1,248 actually indicated their province (over 98%) and that the percentages indicated were only for the 1,248 who indicated a province. Therefore, the actual sample population percentages may have been slightly different. If these percentages are compared to the actual provincial shares in Canada, as shown in Table 8, that were used

to create the consumer mailing list from data obtained from Statistics Canada (2012a), the similarities between the sample population to that of the actual Canadian population can be examined.

While the actual percentages may have been slightly different from those seen in this survey, the order of the provinces based on their population was quite accurate. Ontario had the largest percentage of the population, followed by Quebec, British Columbia and Alberta. Some provinces, such as British Columbia and Manitoba, had relatively higher percentages of the sample population than one would expect, though Manitoba's may have been as a result of the survey coming from a Manitoban university and therefore, potential participants may have been more willing or likely to respond to a random mail survey.

Table 8. Comparison of the survey and actual provincial breakdowns.

	This Survey	Actual for Canada
British Columbia	16.35%	13.30%
Alberta	9.62%	11.14%
Saskatchewan	2.88%	3.11%
Manitoba	5.53%	3.64%
Ontario	35.90%	38.85%
Quebec	22.60%	23.17%
Newfoundland and Labrador	1.20%	1.47%
Nova Scotia	2.96%	2.73%
New Brunswick	2.32%	2.17%
Prince Edward Island	0.64%	0.42%

*the sum of all provinces may not sum up to exactly 100.00% due to rounding.

Table 9. Individual provincial response rates.

	Returned Surveys	Surveys Sent	Response Rate*
British Columbia	204	665	30.68%
Alberta	120	557	21.54%
Saskatchewan	36	155	23.23%
Manitoba	69	182	37.91%
Ontario	448	1,942	23.07%
Quebec	282	1,159	24.33%
Newfoundland and Labrador	15	74	20.27%
Nova Scotia	37	136	27.21%
New Brunswick	29	109	26.61%
Prince Edward Island	8	21	38.10%
Survey Response Rate	1,268	5,000	*25.36%

*does not include declines or undeliverables

Table 9 depicted the response rates on a provincial basis, which, for this table, had been calculated as the number of participants from each province divided by the number of surveys sent to each province. It should be noted that 20 participants declined to identify their province and as such, these were the most accurate provincial response rates that could be obtained for this research.

As was shown in the previous table, the response rates of British Columbia and Manitoba were much higher than the average for the survey, at 30.68% and 37.91%, respectively. Prince Edward Island was the only other province with a response rate of over 30% (38.10%), though this could be attributed mostly to the fact that only 21 surveys were sent to this province and receiving eight of them back was not a really large number. Manitoba's large response rate, as discussed earlier, may be due to the survey coming from the provincial university. It was interesting that British Columbia had such a

high response rate. The reasons for this were unclear, though perhaps the high response rate may have indicated that consumers in British Columbia cared more about animal welfare and therefore, were more likely to fill out the survey.

4.6.3 Additional Participant Characteristics

As part of section four of the survey instruments, participants were asked to answer ten yes or no questions related to their experiences and knowledge of the dairy industry and animal welfare. Table 10 summarized the responses of the participants to each of these questions, as well as the first WTP question.

The first pair of questions asked participants whether they or a family member were currently engaged in agriculture and dairy farming. Just under 10% indicated that they or a family member were engaged in agriculture but only 1.61% in dairy farming. Surprisingly, over two thirds (67.42%) replied that they had visited a dairy farm before. This was unexpected since such a large proportion of the Canadian population now lives in cities. However, this question may have been more useful if perhaps participants were asked if they had visited a dairy farm in the past five years because some older participants indicated that it had been over fifty years since they had visited a dairy farm. This would have also ensured that those who indicated yes to this question had a more current experience and knowledge of dairy production. At 98.63%, an overwhelming majority of the survey respondents consumed dairy products, with only 17 out of 1,245 indicating that they did not consume dairy.

Table 10. Additional survey respondent characteristics.

	Yes	No
Are you or a family member currently engaged in agriculture?	9.83% 122	90.17% 1,119
Are you or a family member currently engaged in dairy farming?	1.61% 20	98.39% 1,222
Have you ever visited a dairy farm?	67.42% 836	32.58% 404
Do you consume dairy products?	98.63% 1,228	1.37% 17
Do you ever purchase products that are considered animal welfare friendly?	64.26% 755	35.74% 420
Do you ever boycott products because of animal welfare concerns?	43.01% 523	56.99% 693
Do you ever donate to any animal welfare organizations, such as People for the Ethical Treatment of Animals (PETA)?	20.62% 254	79.38% 978
Are you a vegan or a vegetarian?	3.69% 45	96.31% 1,175
Do you volunteer for animal welfare groups or humane societies?	8.78% 109	91.22% 1,133
Do you read the labels of animal products to look for assurances of proper animal welfare?	38.49% 468	61.51% 748
Would you purchase milk that was certified to have been produced using animal welfare friendly production practices over regular milk?	79.46% 971	20.54% 251

Table 10 also illustrated that Canadian consumers were aware of and perhaps concerned about farm animal welfare. This was revealed by the fact that just under two thirds of the consumers who completed this survey had purchased products that were considered animal welfare friendly. Similarly, approximately 43% said that they had boycotted certain products because of animal welfare concerns. These were both

relatively large proportions of the Canadian population and show an awareness of animal welfare issues. This may also potentially have indicated that consumers who care more about animal welfare were the ones who completed the survey. About one in five survey participants donated to animal welfare organizations, while 8.78% volunteered for animal welfare groups or humane societies. A small percentage, just under four percent, indicated that they were either a vegan or a vegetarian. Finally, 38.49% revealed that they had read labeling for animal welfare assurances. However, many also included comments that there were no such assurances to be found, particularly on dairy products.

The last yes/no question in Table 10 revealed that 79.46% of survey participants would purchase animal welfare friendly milk. This question will be further discussed in the Results section of this thesis, along with the premium levels that consumers indicated they were willing to pay in order to purchase this animal welfare friendly milk.

4.6.4 Results of the Link Tests

As described in section 4.5.2, closely examining the econometric models that were being used and ensuring that the proper model and variables were utilized was critical to ensure accurate findings from a logistic regression. In this study, extra care was taken to ask the survey respondents as many questions about themselves as the survey instrument permitted, so that all relevant information needed for a proper econometric model was available. Likewise, all demographic variables used in the model were studied to ensure that they were important descriptive factors related to the dependent variable.

In order to test that there were no specification errors or missing variables, a "linktest" was used in STATA for each ordered logit regression (ten Likert scale

questions and the WTP decision). The result of this test indicated that the "hatsq" coefficient was not significant at a five percent level of significance for each of the ten regression models. This test result illustrated that no specification errors were being made and that there were no missing variables in these logistic regressions.

Chapter 5: Results

5.1 Introduction

The following chapter presents the results of the consumer survey and subsequent statistical analyses of the consumer data. This presentation was completed in three segments. The first segment of this section explored the consumer Likert scale responses to the ten animal welfare statements included in the first section of the survey instrument (see Appendix C for the full survey). This first segment also presented and analyzed the logistic regression results for these animal welfare statements.

The second segment of the Results chapter organized the findings of the pair wise comparison questions and created a ranking of the dairy farming practices in terms of importance for animal welfare through the utilization of importance scores. Finally, the third segment displayed the responses of the survey participants for the WTP question, which was the last question in the survey. This segment also studied the factors that affected both their WTP decision and the size of the premium that Canadian consumers were willing to pay for proper dairy animal welfare.

5.2 Animal Welfare Statements

Table 11 summarized the results of the Likert scale responses to the animal welfare statements posed to the participants of the mail survey. The data was presented both as total responses and as percent responses for each point on the scale. The total number of consumers that responded to each statement was noted in the last column.

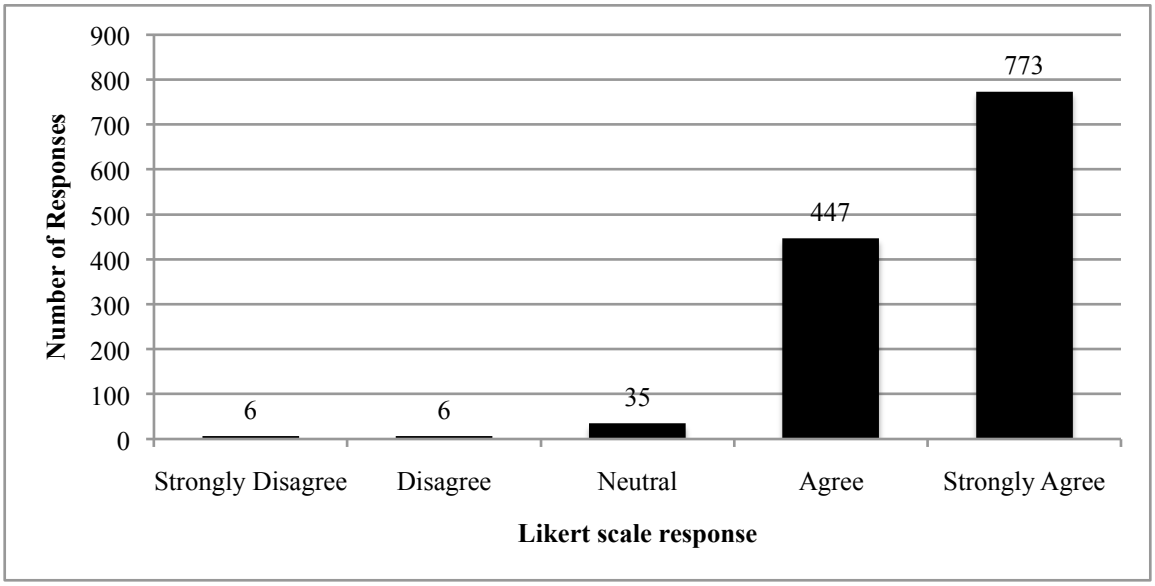
Table 11. Likert scale responses to ten animal welfare statements.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Total Obs.
I believe animal welfare is important.	0.47% 6	0.47% 6	2.76% 35	35.28% 447	61.01% 773	1,267
The avg Canadian believes animal welfare is important.	1.35% 17	7.93% 100	18.40% 232	56.62% 714	15.70% 198	1,261
I believe the current level of animal welfare on Canadian dairy farms is acceptable.	3.12% 39	11.10% 139	36.26% 454	41.53% 520	7.99% 100	1,252
I believe animal welfare has improved on Canadian dairy farms in the past 20 years.	2.08% 26	8.07% 101	32.21% 403	46.04% 576	11.59% 145	1,251
I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States.	0.88% 11	3.69% 46	51.33% 639	31.49% 392	12.61% 157	1,245
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs.	3.21% 40	6.41% 80	45.59% 569	32.21% 402	12.58% 157	1,248
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens.	2.96% 37	5.68% 71	33.01% 413	39.01% 488	19.34% 242	1,251
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle.	2.48% 31	10.39% 130	49.48% 619	30.78% 385	6.87% 86	1,251
I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	1.42% 16	5.49% 62	15.93% 180	47.70% 539	29.47% 333	1,130
The avg Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	4.34% 54	24.60% 306	31.35% 390	32.07% 399	7.64% 95	1,244

5.2.1 The Importance of Animal Welfare

As was apparent in Table 11, the vast majority of participants either agreed (35.28%) or strongly agreed (61.01%) that animal welfare was important to them (Statement #1). By comparison, only 12 participants in total disagreed with this statement, which made up less than one percent of the sample population. This extreme level of agreement was further illustrated in Figure 1 below.

Figure 1. Consumer responses to the first animal welfare statement: "I believe animal welfare is important".

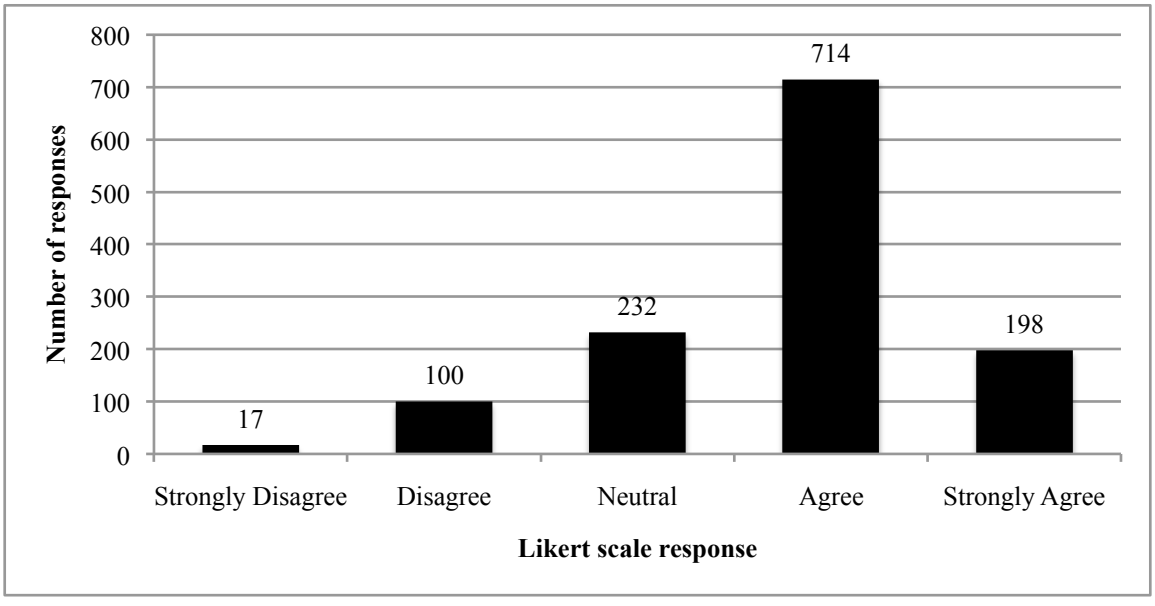


However, when consumers were asked how the average Canadian felt about animal welfare (statement two), the results were much different. While a large majority still agreed with this statement, as shown in Figure 2, there was a drastic shift in the number of participants who strongly agreed. Whereas 61.01% strongly agreed with

statement one, only 15.70% strongly agreed with statement two. Also, an additional 94 participants disagreed with statement two compared to statement one and another 11 more participants above what strongly disagreed with the first statement, now strongly disagreed with the second statement.

The shift in responses from a very strong agreement for statement one to a significantly less certain level of agreement for statement two was quite interesting, especially since the responses to the two statement should have been the same. When the results from statement one were gathered together, assuming the sample population was fairly representative of the actual population, then the aggregate data from statement one illustrated how the average Canadian felt about animal welfare, which was exactly what the responses for statement two were measuring.

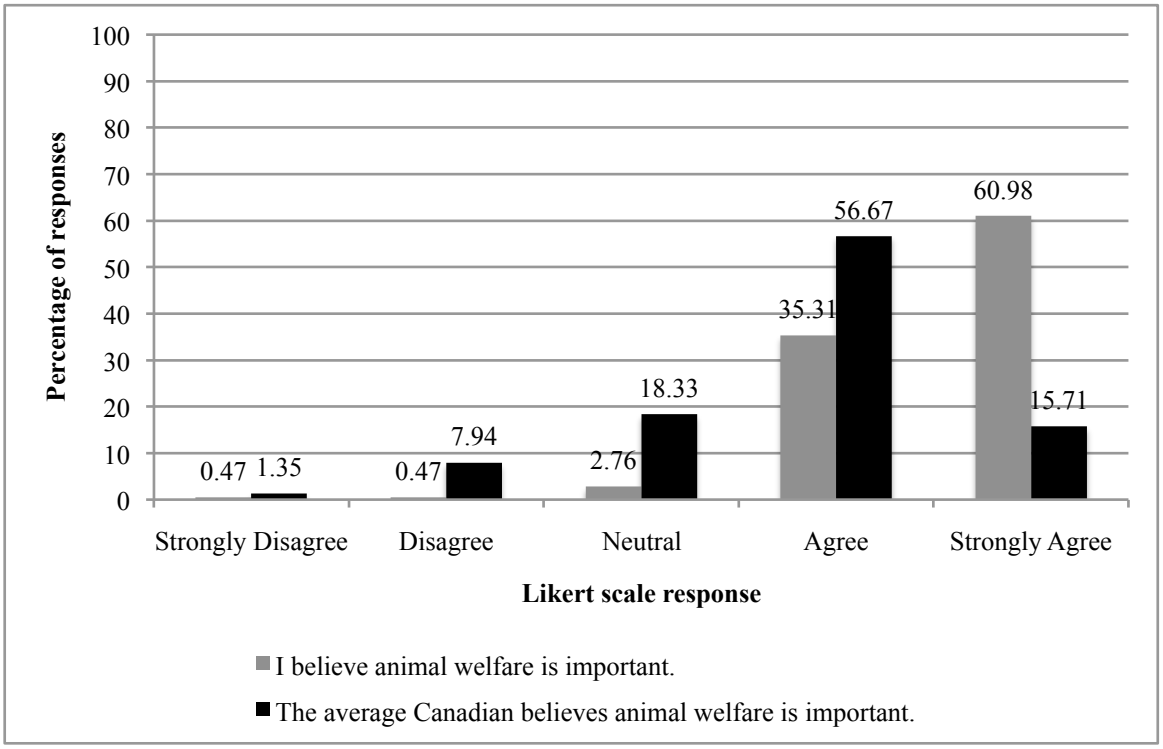
Figure 2. Consumer responses to the second animal welfare statement: "The average Canadian believes animal welfare is important".



The stronger level of agreement for individuals (statement one) compared to their opinion of the average Canadian (statement two) may have potentially indicated that the participant responses in this study were affected by social desirability bias, where they attempted to provide the more socially acceptable response in order to make themselves seem like more caring people and perhaps better than the average Canadian. This bias was also found to have been present in previous studies, such as Lusk and Norwood (2010) and Olynk et al (2010). In the Lusk and Norwood (2010) study, the researchers discovered that 78% of respondents changed their responses when asked the question indirectly, rather than directly. They concluded that this likely meant that social desirability bias was present in the direct questioning. In this thesis, 60.04% changed their responses from the first statement (direct questioning) to the second statement (indirect questioning). While this percentage that changed was lower than that of the Lusk and Norwood (2010) study, it was still well above fifty percent and likely indicated social desirability bias. Figure 3 depicted the comparison between these two statements.

According to Lusk and Norwood (2010), the indirect line of questioning, which was utilized in the second animal welfare statement, usually provided a more realistic view of how the individual consumer actually felt. Therefore, in this study, it was likely that the responses for how the average Canadian viewed animal welfare were more realistic than the responses for how the participants said they themselves felt about animal welfare. Even taking this into account though, there was still a large amount of agreement (over 70% either agree or strongly agree with statement two) that indicated Canadians believed animal welfare to be important.

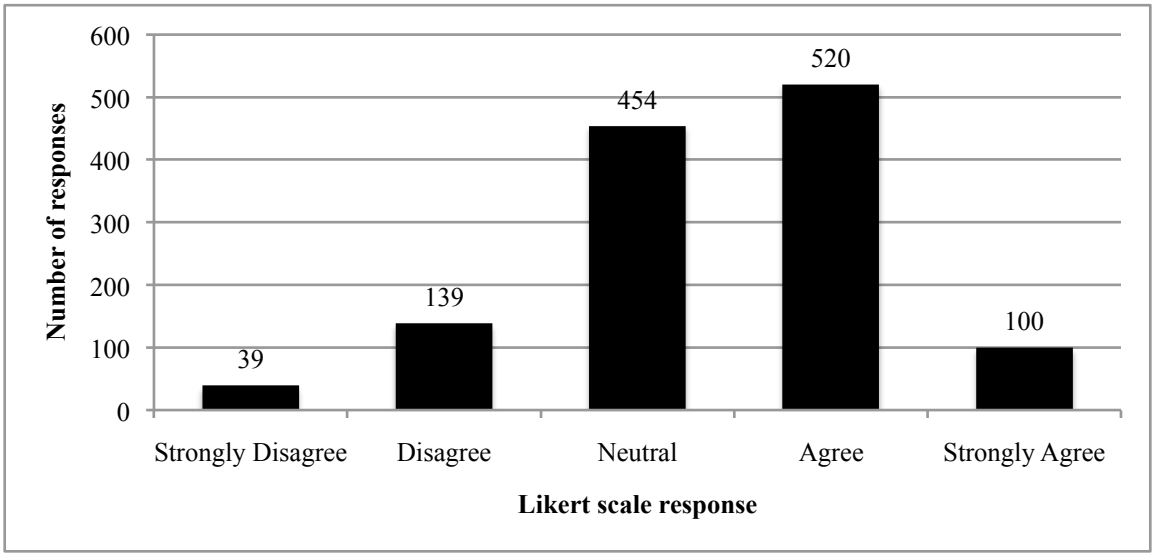
Figure 3. Comparing consumer responses (on a percentage basis) for the first and second animal welfare statements.



5.2.2 Consumer Perceptions of Canadian Dairy Animal Welfare

Statement three in Table 11 examined how Canadian consumers felt about the current level of animal welfare on Canadian dairy farms. To do this, the participants were asked whether or not they agreed that animal welfare on dairy farms in Canada was acceptable. The responses indicated that consumers generally believed that dairy animal welfare in Canada was acceptable. Of the 1,252 participants that responded to this question, 520 indicated that they agreed with this statement (41.53%) and an additional 100 strongly agreed (7.99%). Alternatively, 11.10% disagreed and 3.12% strongly disagreed that Canadian dairy animal welfare was acceptable. Figure 4 depicted the proportion of participants that chose each response for statement three.

Figure 4. Consumer responses to the third animal welfare statement: "I believe the current level of animal welfare on Canadian dairy farms is acceptable".

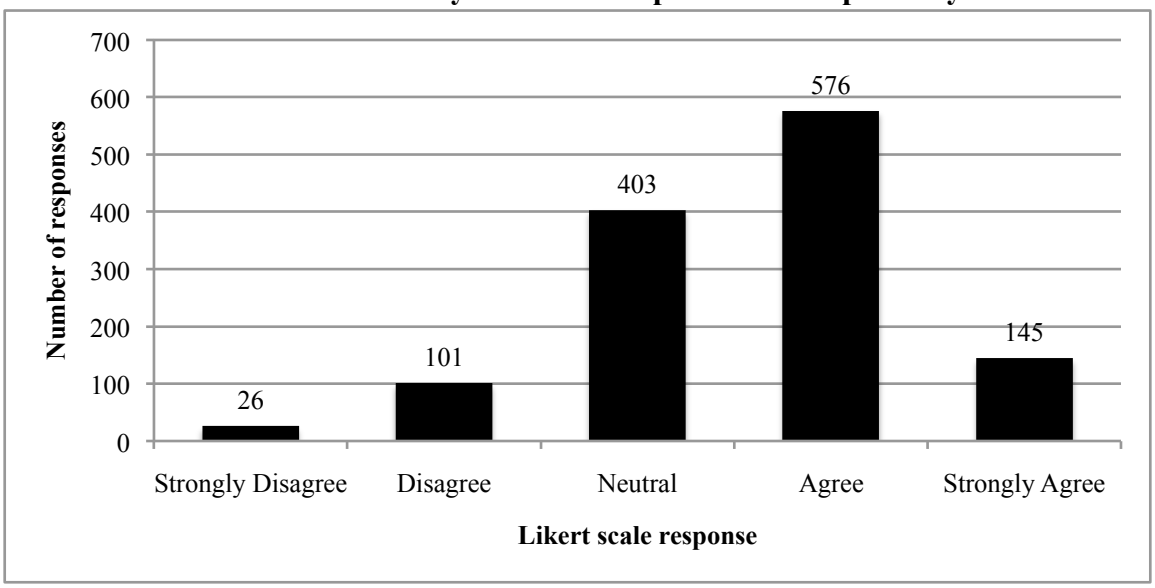


Compared to the previous two statements, statement three had a relatively large number of participants indicate that they were neutral (36.26%). This could have indicated that this group of consumers believed animal welfare on dairy farms was neither good nor bad or did not feel strongly one way or another. Perhaps they viewed the current state of dairy animal welfare as just "average" and in need of further improvement. It could have also potentially indicated that they did not know how they felt and, wanting to fill in an answer, chose to select the "neutral" choice. Multiple participants chose to write a note on the returned survey that indicated that they did not possess enough knowledge on the subject to say that they agreed or disagreed and therefore they marked the neutral column. This may have happened with numerous other participants, as well, and illustrated a lack of knowledge towards dairy animal welfare by the participants.

5.2.3 Animal Welfare Over the Past Twenty Years

The fourth statement asked about consumer opinion on the change in the quality of dairy animal welfare over the past twenty years. The statement read: "I believe animal welfare on Canadian dairy farms has improved over the past twenty years". Again, the general consensus was that this statement was true, with 46.04% merely agreeing and 11.59% strongly agreeing with the statement. Similar to statement three, approximately one third of those that chose an answer for this statement indicated that they were neutral. In total, just over 10% indicated disagreement with this statement.

Figure 5. Consumer responses to the fourth animal welfare statement: "I believe animal welfare on Canadian dairy farms has improved in the past 20 years".



The results for this statement were not particularly surprising. In the past twenty years, dairy farms in Canada have become larger in size and fewer in numbers. Dairy

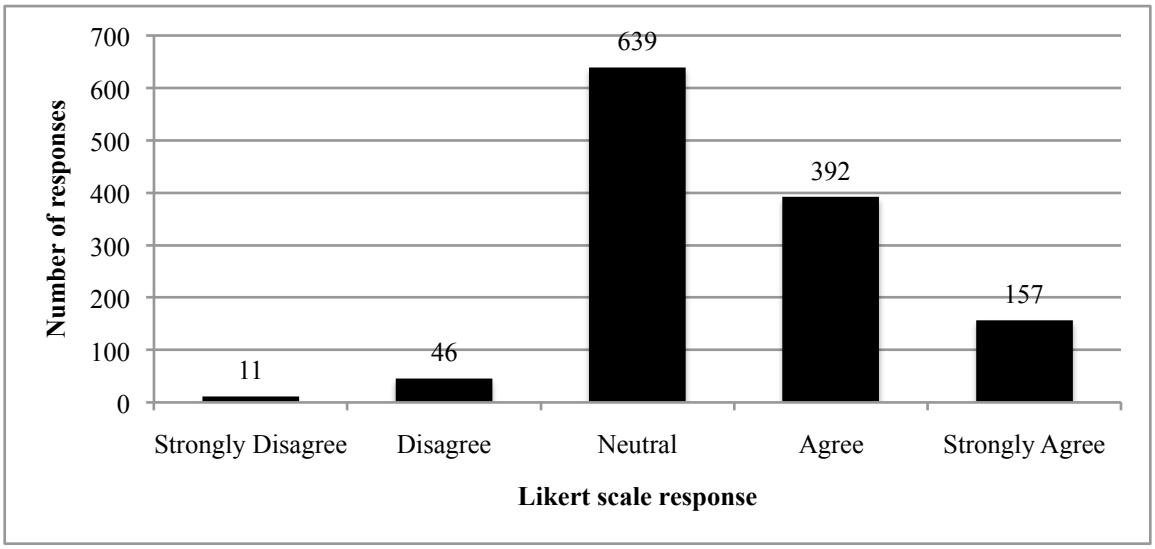
cattle are now more likely to stay indoors all year, which could be seen as worsening animal welfare, but the new housing facilities that have been built in recent years also provide a much higher level of comfort for the cows, which some consumers may have viewed as making up for the animals not being allowed outdoors. Looking at the results in Figure 5, it appeared as if Canadian consumers were more in agreement with the latter observation, or perhaps they did not care about the former. However, results from the second section of the survey indicated that consumers placed a relatively high level of importance on allowing the dairy cows to go outside and have access to pasture, so perhaps consumers were not aware of this shift in the housing of dairy cattle.

5.2.4 Comparing Canadian and American Dairy Animal Welfare

For the next statement, survey participants were asked whether they agreed with the notion that animal welfare provided to Canadian dairy cattle was superior to the animal welfare provided to dairy cattle in the United States. As the results in Table 11 illustrated, over half of the participants (51.33%) indicated that they were neutral to this statement. This was perhaps somewhat surprising because the results from part two of the consumer survey, which will be provided later in Section 6.3, indicated that consumers placed a strong importance on dairy animals not being administered growth hormones, which are currently not allowed for use in Canada but are used on dairy operations in the United States. So, perhaps Canadian consumers were not aware of this difference in production methods for the two countries, yet were aware of their preference for growth hormone-free dairy products.

It should be noted that, while a majority were neutral to this statement, there was also a substantial level of agreement that there existed superior animal welfare on Canadian dairy farms, with 31.49% in agreement and 12.61% in strong agreement with statement five. The level of disagreement with this statement was minimal, which indicated that an overwhelming majority (over 95%) of Canadian consumers were confident that Canadian dairy cattle were treated with at least as much care as dairy cattle in the United States, as illustrated in Figure 6.

Figure 6. Consumer responses to the fifth animal welfare statement: "I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States".

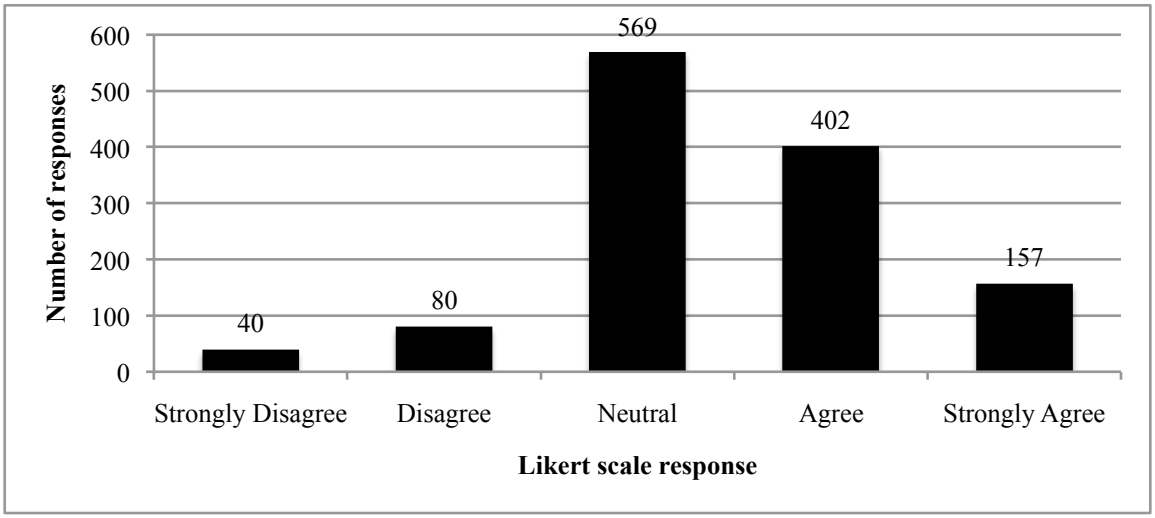


5.2.5 Animal Welfare on Dairy Farms Compared to Other Livestock Industries

The next series of statements examined how consumers viewed the animal welfare provided to Canadian dairy cattle in comparison to other livestock industries in Canada.

Specifically, these statements included the hog (statement six), poultry (statement seven) and beef (statement eight) sectors. Section 6.2.5 begins by examining the responses to each individual industry and then concludes by comparing the responses of each industry to each other.

Figure 7. Consumer responses to the sixth animal welfare statement: "I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs".



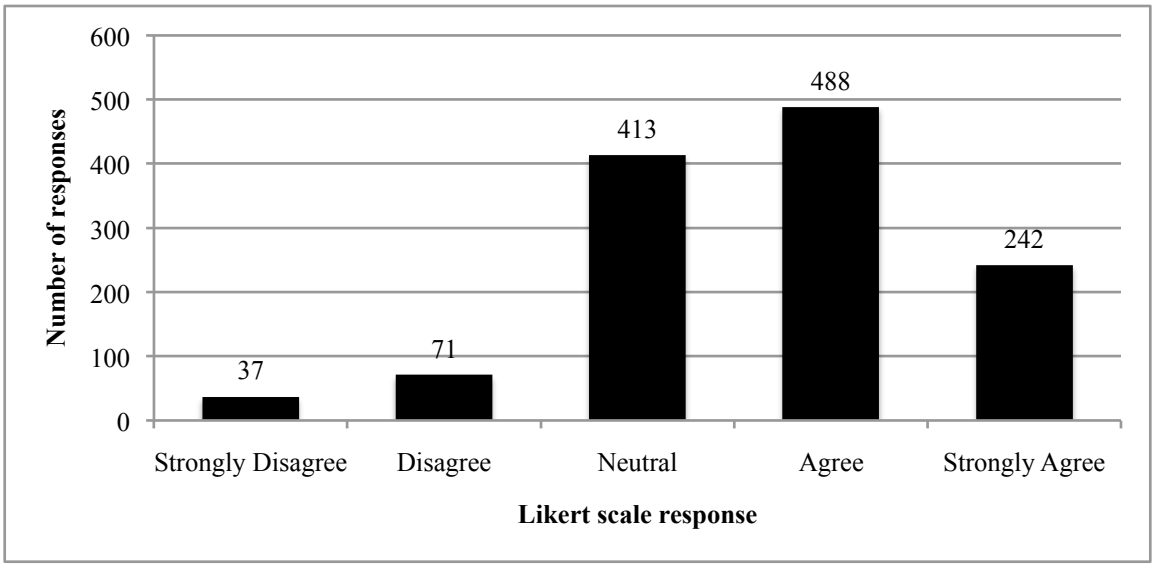
When asked to compare the animal welfare of the Canadian dairy industry to the Canadian hog industry, as seen in Figure 7, 32.21% of respondents indicated that they agreed that Canadian dairy cattle were provided with superior animal welfare to Canadian pigs, while 12.58% of respondents strongly agreed with this statement. A total of 45.59% of participants indicated that they were neutral to this statement, meaning that they neither agreed nor disagreed with statement six. This could have indicated that they either: (1) believed that the animal welfare provided in both industries was quite similar

or (2) did not know because they were not familiar enough with the industries to indicate whether they agreed or disagreed.

A total of 6.41% disagreed with statement six, while 3.21% strongly disagreed. The relatively large amount of agreement in comparison to disagreement for this statement was not necessarily surprising, since sow gestation crates have received a fair amount of negative attention as a poor animal welfare practice from animal welfare groups in recent years.

The next question asked the Canadian consumers whether they agreed or disagreed with statement seven (I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens). The responses were presented in Table 11 and illustrated in Figure 8. For this statement, there was a high level of agreement that Canadian dairy cows ere provided with better care than Canadian chickens, as indicated by the fact that 39.01% agreed and 19.34% strongly agreed with statement, as compared to only 5.68% that disagreed and 2.96% that strongly disagreed. This was perhaps to be expected since the issue of housing chickens in battery cages has been seen as a negative animal welfare practice and has been talked about in the media recently. A much smaller number of participants indicated that they were neutral (33.01%) than for either of the other livestock comparison statements, which potentially revealed that consumers were more certain of their perception of the Canadian poultry industry than they were of the beef or hog industries.

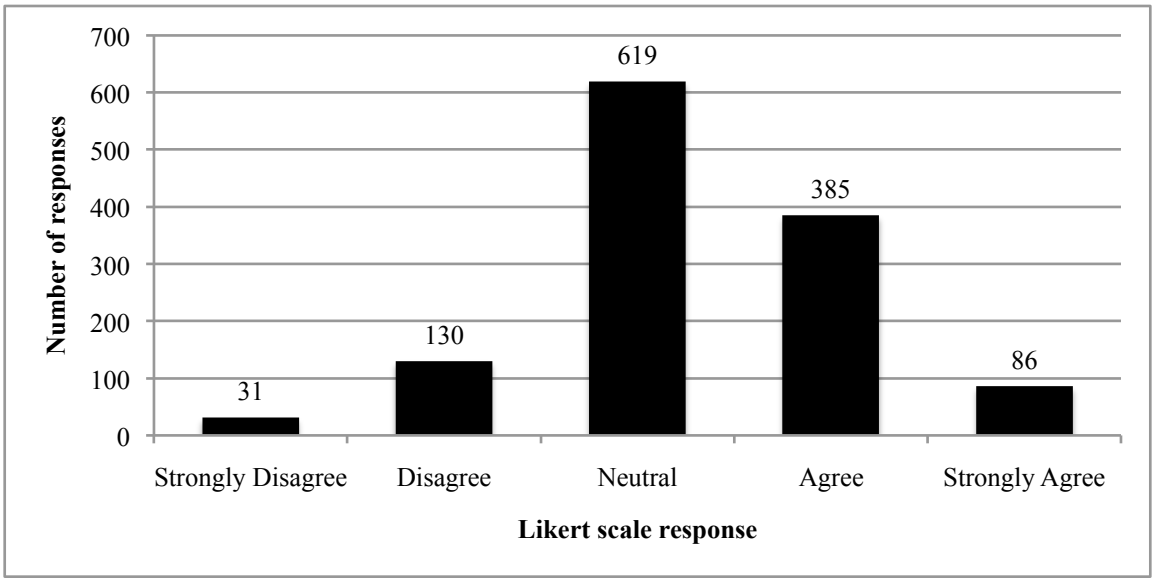
Figure 8. Consumer responses to the seventh animal welfare statement: "I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens".



The final Canadian livestock industry examined was the Canadian beef industry in statement eight. Of the three livestock industries that were being compared to the dairy industry, the animal welfare of beef cattle was perhaps the most interesting because of the lack of negative attention associated with the industry compared to hogs (gestation crates) and poultry (battery cages). Therefore, it was of interest to discover how consumers compared this industry to the dairy industry with little or no media attention on so-called "negative" aspects of beef production.

As was shown in Figure 9, the distribution of responses, as compared to the previous two statements, turned out to be quite similar. Like statements 6 and 7, the "neutral" option received the most responses of any one option (49.48%), while those who agreed (30.78%) or strongly agreed (6.87%) outnumbered those who disagreed (10.39%) or strongly disagreed (2.48%).

Figure 9. Consumer responses to the eighth animal welfare statement: "I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle".



These results were slightly surprising because of results found in the second section of the survey. In that section, consumers indicated that they placed importance on dairy cattle being provided with access to grazing and the outdoors. However, a much larger percentage of beef cattle are given this treatment than dairy cattle, so assuming that consumers believed that outdoor grazing access was important for both dairy and beef animals, then it would stand to reason that they might believe that beef cattle were being provided with superior animal welfare to dairy cattle. Due to the space limitations of the one page survey instrument though, there was no room for participants to give reasons as to why they answered the way they did, so it was difficult to determine the reason for these results. It could be argued that dairy cattle were provided with better quality feed and superior housing facilities that increased cow comfort, though it may be difficult to determine whether the Canadian public was aware of these differences. It should be

pointed out however, that of the three animal industries, the beef cattle comparison had the largest percentage of consumers that disagreed with the statement.

There were a few similarities and differences that could be examined from the three livestock industry comparison questions. By ranking the statements in terms of agreement (including both agree or strongly agree), it could be reported that Canadians agreed the most with the notion that Canadian dairy animal welfare was superior to Canadian poultry animal welfare (over 58% agreed), while the lowest level of agreement was for the notion that Canadian dairy animal welfare was superior to Canadian beef cattle (less than 38% were in agreement). The animal welfare of the hog industry was seen as closer to the beef industry than the poultry industry at around a 44% level of agreement. The highest level of disagreement belonged to the beef industry (over 12%), with pigs coming in second (just under 10%) and chickens in last place (between 8% and 9%). A relatively large proportion of participants were neutral, ranging from 33% (chickens) to just under 50% (beef cattle). This was the most favoured individual response for the comparisons of both the beef (49.48%) and hog (45.59%) industries, while the most common response for the poultry industry statement was “agree”, at 39.01%. In summary, the results indicated that Canadians ranked the level of animal welfare of these three industries as: (1) beef cattle, (2) hogs, and (3) chickens.

It should be pointed out that a couple of the participants indicated that they thought the question was asking them whether they believed dairy animal welfare was *more important* than these other livestock industries, rather than having animal welfare that was *better than* the other livestock industries and therefore, there may have been other participants that completed the question in this manner, as well, which was not how

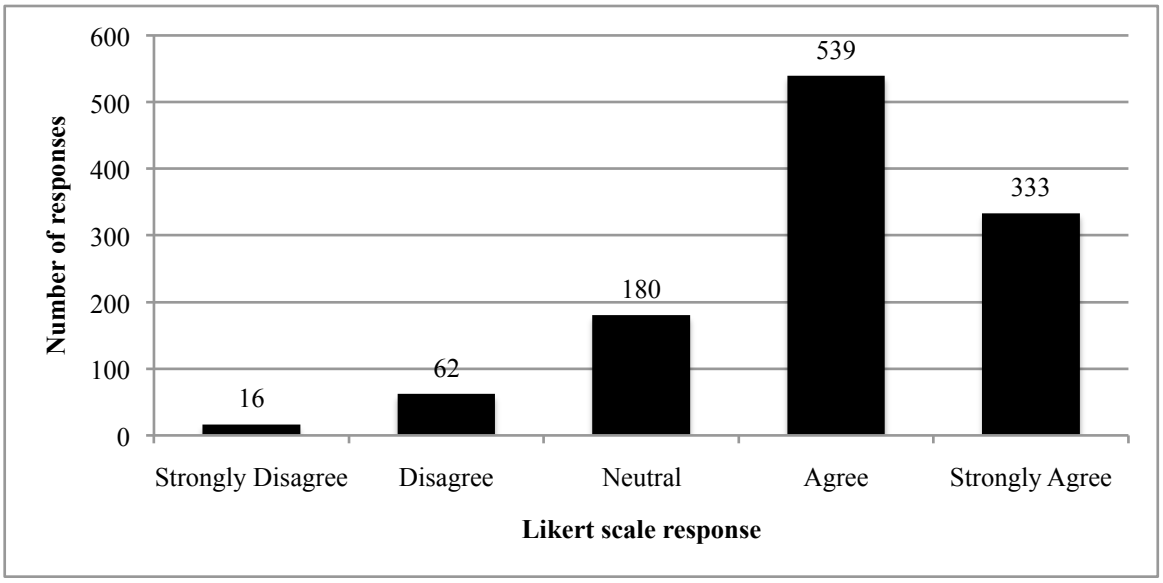
the question was meant to be interpreted. This may have skewed the responses, depending on how many participants interpreted the statements in this way. Also, 36.51% of survey respondents gave the same response on the Likert scale for all three of the statements related to comparing dairy animal welfare to other animal industries in Canada. This result indicated that perhaps the participants were not putting quite as much thought into their responses as they could have.

5.2.6 The Importance of Animal Welfare in Comparison to Low Milk Prices

The final pair of Likert scale statements in the first section of the survey instrument examined how Canadians felt about the importance of providing proper animal welfare in comparison to having low milk prices. The first of these statements (statement nine) read: "I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices". As shown in Figure 10, the majority of participants were in agreement with this statement, with 47.70% indicating that they agreed on the Likert scale and 29.47% indicating that they strongly agreed. This was an interesting result because it showed that consumers placed a higher level of importance on ensuring that farm animals were well taken care of in comparison to milk prices.

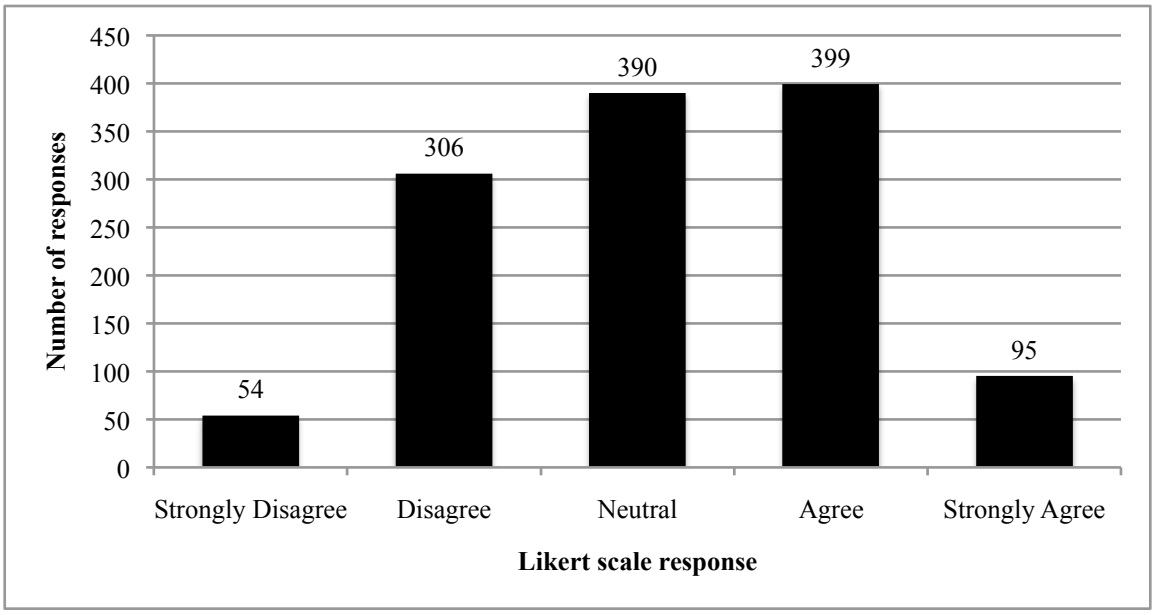
However, the wording of statement nine left the results susceptible to social desirability bias, similar to the first animal welfare statement in this section. By asking respondents how they felt as an individual, the resulting responses could be less truthful because the participants wanted to make themselves look better by giving a more socially acceptable answer, which was previously shown to be present by Lusk and Norwood (2010).

Figure 10. Consumer responses to the ninth animal welfare statement: "I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices".



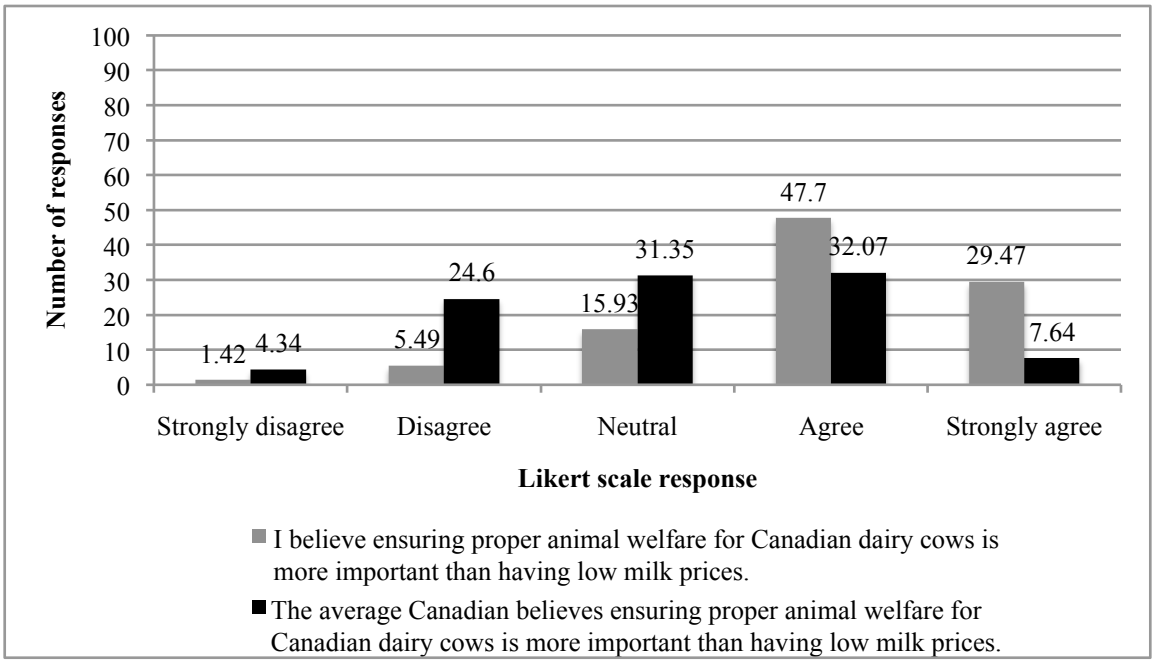
In the Lusk and Norwood (2010) study, it was discovered that 78% of respondents changed their answer when asked the question indirectly instead of directly, which indicated the likely presence of social desirability bias in the direct questioning responses. In this study, 61.41% of Canadian consumers changed their responses between statements nine and ten, which was lower than the Lusk and Norwood (2010) study but still quite high and likely indicative of social desirability bias in the results to statement nine. According to Lusk and Norwood (2010), it was more useful to then look at how the participants believed the average Canadian felt, which was the purpose of statement ten. The authors indicated that this was because when the participants answered this question, they were really indicating their own true perception.

Figure 11. Consumer responses to the tenth animal welfare statement: "The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices".



As shown in Figure 11, a comparatively smaller proportion of respondents agreed that the average Canadian believed that ensuring proper animal welfare for Canadian dairy cows was more important than having low milk prices (32.07% agreed and 7.64% strongly agreed). Statement ten also received a much larger share of the responses indicating that the participants disagreed with the assertion (24.60% disagreed and 4.34% strongly disagreed). This was illustrated in Figure 12, where the results of statement nine were skewed to the right of the bar chart (indicating a higher level of agreement) and the responses for statement ten were distributed more evenly, with a definite increase in the level of disagreement compared to statement nine.

Figure 12. Comparing participant responses, as a percentage, to how they (statement 9) and the average Canadian (statement 10) feel about the idea that providing proper animal welfare is more important than low milk prices.



However, it should be pointed out that both statement nine and statement ten received more responses in agreement than in disagreement with the notion that dairy animal welfare was more important than having low milk prices. This was an important, if somewhat surprising result, as it showed that even when the question was asked in a way that reduced socially desirability bias (as in statement ten), Canadian consumers still indicated strong support for ensuring proper animal welfare on dairy farms and even go as far as to indicate that they believed that ensuring proper dairy animal welfare was more important to them than having the opportunity of low purchase prices for milk products.

5.2.7 Examining Alternative Forms of Summary

An alternative method of viewing the aggregate data was to combine the "strongly disagree" and "disagree" categories together and to do the same with the "agree" and "strongly agree" categories. This allowed for the more simplistic categorization of: (1) disagree, (2) neutral, and (3) agree, as shown in Table 12. This categorization allowed for a clearer examination of the three distinct views that consumers could choose.

Since the level of agreement or disagreement was largely subjective, with no definitive means of measuring merely agreeing or strongly agreeing, it was perhaps best to look at the aggregate number of participants who either agreed or disagreed with each statement. In other words, what one participant may have viewed as merely agreeing with a statement, another may have viewed as strongly agreeing, even though they may have had the exact same feeling towards the same statement. The adjusted results for each of the ten animal welfare statements are shown in Table 12 on the next page as both a percentage basis and total number who gave each response, as well as the total number of observations compiled for each animal welfare statement.

When the responses were grouped into these three categories, it could be seen that for every statement, there was a larger percentage of participants that agreed with the animal welfare assertion than disagreed with it. There were also certain statements where consumers were perhaps less certain with their perception and therefore indicated that they were neutral. These neutral responses may have indicated that the participant had no strong feeling one way or another but it was evident that they were less sure about comparing dairy animal welfare to that of other livestock industries and the United States.

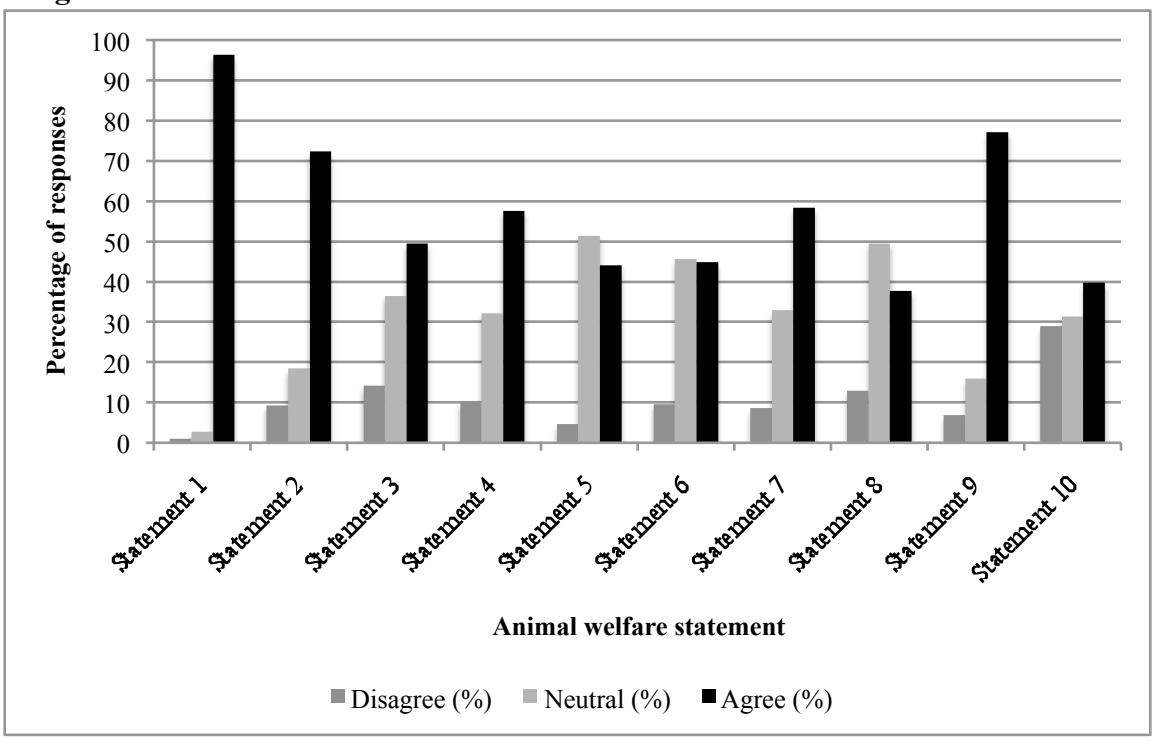
Table 12. Animal welfare statement responses combined into three categories.

	Disagree 1 or 2	Neutral 3	Agree 4 or 5	Total Obs.
I believe animal welfare is important.	0.95% 12	2.76% 35	96.29% 1,220	1,267
The average Canadian believes animal welfare is important.	9.28% 117	18.40% 232	72.32% 912	1,261
I believe the current level of animal welfare on Canadian dairy farms is acceptable.	14.22% 178	36.26% 454	49.52% 620	1,252
I believe animal welfare has improved on Canadian dairy farms in the past 20 years.	10.15% 127	32.21% 403	57.63% 721	1,251
I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States.	4.58% 57	51.33% 639	44.10% 549	1,245
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs.	9.62% 120	45.59% 569	44.79% 559	1,248
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens.	8.63% 108	33.01% 413	58.35% 730	1,251
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle.	12.87% 161	49.48% 619	37.65% 471	1,251
I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	6.90% 78	15.93% 180	77.17% 872	1,130
The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	28.94% 360	31.35% 390	39.71% 494	1,244

The strongest levels of agreement were seen when participants were asked how they felt about animal welfare being important (statements 1 and 9, with agreement of 96.29% and 77.17%, respectively). These results were similar to the Chilton et al (2006) study, where 90% of participants indicated that animal welfare was important, and the Prickett et al (2010) study, where approximately 77% of respondents disagreed that low

meat prices were more important than the well being of farm animals. Table 12 also showed the effect of changing the beginning of statements 1 and 9 from "I" to "The average Canadian", as in statements 2 and 10. The level of agreement decreased in these instances by around 24% and 38%, respectively. This indicated that social desirability bias was likely present in the responses to the first and ninth statements. Also, the level of disagreement for statement ten was by far the largest of any statement (28.94%), being over twice as large as the next highest level of disagreement, as shown in Figure 13.

Figure 13. Illustrating the proportion of participants that agreed, were neutral and disagreed with each animal welfare statement.



Alternatively, it was also possible to simply delete the "neutral" responses to the animal welfare statements and thus, closely examine the ratio of consumers who agreed and disagreed with each statement. The reason for deleting the neutral responses for the animal welfare statements was that the participants who chose this response may have been part of one of the following three categories: (1) they may have had no opinion on the matter or simply did not care about the statement, (2) they truly were neutral and therefore neither agreed nor disagreed, or (3) they felt they did not have enough knowledge in order to be confident enough to give a response in agreement or disagreement with the statement. Judging by these categories, for some statements participants may have chosen to take the "easy" road and indicate that they were neutral without giving much thought to their response. Therefore, those who actually took the time to consider their true perceptions provided a more thoughtful response and it was important to look at these responses alone in order to examine Canadian consumer perceptions.

Therefore, it was useful to present Likert scale responses by removing the neutral responses from the results and presenting the data as purely a percentage of those who either agreed or disagreed to some degree with each statement. The assumption for this method as that those participants that indicated they were neutral were not certain of their opinions and therefore, if the researcher wanted to just look at those who responded in agreement or disagreement, those neutral responses could just be removed. This presentation helped to illustrate clearly whether each animal welfare statement had either a high level of agreement or disagreement associated with it.

Table 13 depicted the number of responses and the percentage of responses that were in agreement or disagreement with each animal welfare statement, as well as the total number of responses included in this method. The total number of responses could be viewed as the level of certainty that Canadian consumers had in their opinion on each statement. For example, a statement that had a high number of responses, such as "I believe that animal welfare is important", would have indicated that the participants had a clear, strong opinion associated with this statement. However, a statement with relatively few responses, such as "I believe animal welfare on Canadian dairy farms is superior to that of the United States", perhaps indicated that consumers were unsure of their opinion, which may be due to a lack of familiarity with the subject matter of the statement.

The responses in Table 13 illustrate that Canadian consumers, whether answering for themselves or for the average Canadian, had a very strong belief that animal welfare was important, with agreement levels at around 99% and 88%, respectively. Over three quarters of Canadians believed that animal welfare on Canadian dairy farms was currently at an acceptable level, while 85% believe that animal welfare had improved in the past twenty years. While consumers may have had less certainty with their opinion on Canadian dairy animal welfare in comparison to the United States, the results of those consumers that did answer one way or another indicate that over 90% believed that animal welfare was superior on Canadian dairy farms. Participants are also slightly less certain of how the Canadian dairy animal welfare compares to other Canadian animal industries.

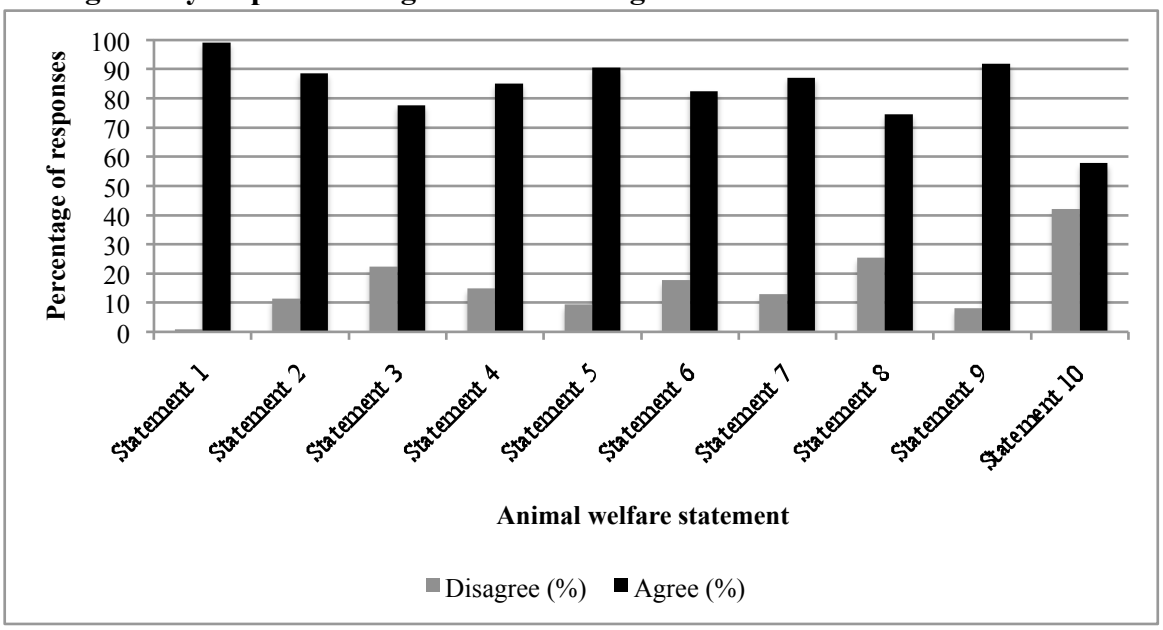
Table 13. Animal welfare statement responses after removing neutral choice.

	Disagree 1 or 2	Agree 4 or 5	Total Obs.
I believe animal welfare is important.	0.97% 12	99.03% 1220	1232
The average Canadian believes animal welfare is important.	11.37% 117	88.63% 912	1029
I believe the current level of animal welfare on Canadian dairy farms is acceptable.	22.31% 178	77.69% 620	798
I believe animal welfare has improved on Canadian dairy farms in the past 20 years.	14.98% 127	85.02% 721	848
I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States.	9.41% 57	90.59% 549	606
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs.	17.67% 120	82.33% 559	679
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens.	12.89% 108	87.11% 730	838
I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle.	25.47% 161	74.53% 471	632
I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	8.21% 78	91.79% 872	950
The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.	42.15% 359	57.85% 494	854

In comparison to pigs, chickens and beef cattle, survey participants agreed that dairy animal welfare was superior, with 82%, 87% and 75% agreeing, respectively. One area that could potentially have affected these results though was the fact that the ordering of the industries may have influenced the responses. By placing the dairy industry first in each statement, participants may have been influenced to be more likely to indicate that animal welfare was superior in the dairy industry than if dairy animal

welfare had been placed at the end of the statement (for example: I believe poultry animal welfare is superior to dairy animal welfare). Finally, participants placed more importance on animal welfare than low milk prices, with over 90% in agreement. However, when asked whether the average Canadian also felt this way, only around 58% of participants agreed.

Figure 14. Percentages of agreement for each animal welfare statement when looking at only responses in agreement or disagreement with that statement.



With the exception of the last animal welfare statement, participants in this survey agreed with every statement by a ratio of around 3:1 or higher (75% in agreement). All statements had a higher level of agreement than disagreement, as illustrated in Figure 14, indicating that Canadian consumers believed animal welfare to be both important and well maintained in Canada's dairy industry.

5.2.8 Animal Welfare Statement Results by Demographic Variables

Another method for examining the results from the Likert scale animal welfare statements was to view the responses by the demographic groups. Similar to Prickett et al (2010), for each demographic group, the number of participants that agreed and disagreed with each statement were tabulated and displayed as a percentage, as seen in the subsequent tables.

Tables 14 – 16 illustrated the results for the first three animal welfare statements (the importance Canadians placed on animal welfare and how they viewed animal welfare in the Canadian dairy industry). Following these, Tables 17 – 19 examined the next pair of animal welfare statements (dairy animal welfare in the past 20 years and Canadian dairy animal welfare in comparison to the United States). Tables 20 - 22 examined how the various demographic groups felt about Canadian dairy animal welfare in comparison to other Canadian animal industries. Finally, Tables 23 – 25 depicted how different groups of Canadians felt about the importance of animal welfare in comparison to low milk prices.

5.2.8.1 Demographic Results for Animal Welfare Statements 1, 2, and 3

The following tables (tables 14 – 16) show the level of support that each of the first three animal welfare statements received, as well as the number of observations for each demographic group, which may have varied due to the removal of neutral responses. By splitting the Canadian population into these groups, it could be illustrated how different groups of Canadians felt about animal welfare in comparison to other levels of that demographic.

Table 14. Responses to animal welfare statements 1-3 by demographics (part one).

	Likert #1: I believe animal welfare is important.			Likert #2: The average Canadian believes animal welfare is important.			Likert #3: I believe the current level of animal welfare on Canadian dairy farms is acceptable.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
Male	99.0%	1.0%	727	90.6%	9.4%	605	82.9%	17.1%	479
Female	98.9%	1.1%	472	85.5%	14.5%	394	68.6%	31.4%	296
< $39,999	98.3%	1.7%	119	81.0%	19.0%	105	77.5%	22.5%	89
$40,000 - $69,999	99.1%	0.9%	345	89.8%	10.2%	285	81.1%	18.9%	244
$70,000 - $99,999	99.6%	0.4%	274	90.9%	9.1%	239	73.7%	26.3%	175
$100,000 - $129,999	99.0%	1.0%	197	88.4%	11.6%	164	72.2%	27.8%	115
>$130,000	98.5%	1.5%	195	87.8%	12.2%	164	80.0%	20.0%	120
BC	98.5%	1.5%	198	84.3%	15.7%	166	75.6%	24.4%	119
AB	99.1%	0.9%	116	95.9%	4.1%	98	81.5%	18.5%	81
SK	97.1%	2.9%	34	90.3%	9.7%	31	77.8%	22.2%	27
MB	100.0%	0.0%	65	92.2%	7.8%	51	91.7%	8.3%	36
ON	99.5%	0.5%	436	91.2%	8.8%	354	80.6%	19.4%	284
PQ	99.3%	0.7%	276	85.0%	15.0%	233	69.2%	30.8%	198
MT	97.7%	2.3%	87	86.1%	13.9%	79	80.0%	20.0%	45
<9,999 population	98.8%	1.2%	84	86.1%	13.9%	72	77.4%	22.6%	53
10,000 – 49,999	98.6%	1.4%	281	87.6%	12.4%	241	78.4%	21.6%	199
50,000 – 99,999	98.9%	1.1%	179	86.9%	13.1%	160	78.4%	21.6%	111
100,000 – 499,999	98.8%	1.2%	250	89.9%	10.1%	208	74.0%	26.0%	169
> 500,000	99.6%	0.4%	268	88.5%	11.5%	208	78.3%	21.7%	161

Table 15. Responses to animal welfare statements 1-3 by demographics (part two).

	Likert #1: I believe animal welfare is important.			Likert #2: The average Canadian believes animal welfare is important.			Likert #3: I believe the current level of animal welfare on Canadian dairy farms is acceptable.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
1979 or later	98.3%	1.7%	59	83.0%	17.0%	53	57.8%	42.2%	45
1969 to 1978	99.3%	0.7%	135	91.7%	9.3%	109	72.2%	27.8%	79
1959 to 1968	99.2%	0.8%	245	87.8%	12.2%	196	76.2%	23.8%	151
1949 to 1958	98.7%	1.3%	314	86.3%	13.7%	271	76.4%	23.6%	199
1948 or earlier	99.3%	0.7%	404	89.9%	10.1%	337	83.7%	16.3%	283
No high school	100.0%	0.0%	52	89.4%	10.6%	47	87.5%	12.5%	40
High school	98.8%	1.2%	161	84.9%	15.1%	139	81.5%	18.5%	119
Some post secondary	98.1%	1.9%	158	84.7%	15.3%	131	79.8%	20.2%	104
Complete post secondary	99.3%	0.7%	672	90.7%	9.3%	561	77.9%	22.1%	420
Complete graduate school	99.3%	0.7%	152	87.7%	12.3%	122	63.7%	36.3%	91
In agric.	97.4%	2.6%	117	90.5%	9.5%	95	79.4%	20.6%	102
In dairy	100.0%	0.0%	20	88.9%	11.1%	18	100.0%	0.0%	15
Visited a dairy	99.0%	1.0%	808	88.7%	11.3%	693	78.9%	21.1%	551
Consume dairy	99.2%	0.8%	1,192	89.0%	11.0%	998	77.8%	22.2%	772

Table 16. Responses to animal welfare statements 1-3 by demographics (part three).

	Likert #1: I believe animal welfare is important.			Likert #2: The average Canadian believes animal welfare is important.			Likert #3: I believe the current level of animal welfare on Canadian dairy farms is acceptable.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
Purchase animal welfare friendly products	99.3%	0.7%	743	87.7%	12.3%	617	71.3%	28.7%	480
Boycott products due to animal welfare concerns	99.4%	0.6%	521	85.5%	14.5%	422	61.4%	38.6%	319
Donate to animal welfare groups	100.0%	0.0%	251	87.0%	13.0%	207	59.0%	41.0%	156
Vegan or vegetarian	97.8%	2.2%	45	73.5%	26.5%	34	36.4%	63.6%	33
Volunteer for animal welfare or humane societies	100.0%	0.0%	109	87.2%	12.8%	94	58.1%	41.9%	74
Read labels for animal welfare assurance	99.6%	0.4%	465	87.2%	12.8%	384	60.9%	39.1%	294
Willing to pay for improved dairy animal welfare	99.4%	0.6%	956	88.7%	11.3%	795	73.1%	26.9%	591
Not WTP	97.4%	2.6%	230	87.9%	12.1%	199	91.6%	8.4%	178

Starting with the first animal welfare statement ("I believe animal welfare is important"), it was very apparent that Canadians across all demographic groups believed animal welfare was important. In fact, every group of Canadians examined in this analysis had at least 97% of its members in agreement with this statement.

However, when looking at the second animal welfare statement ("The average Canadian believes that animal welfare is important"), some variations in the responses became evident. While 90.6% of male respondents agreed with this statement, only 85.5% of females indicated the same support. Additionally, both of these values were much lower than those of the first animal welfare statement, which were at 99.0% and 98.9%, respectively.

Similarly, there was also a wide range in responses to the second animal welfare statement for the different annual household income groups. These values ranged from 81.0% supporting the belief that the average Canadian believed animal welfare was important (the $39,999 or less annual household income group) to 90.9% agreeing with this statement (the $70,000 to $99,999 annual household income group). This variability was also seen among participants in different provinces. Consumers from Alberta were more likely to agree with this statement (95.9%) than those in British Columbia (84.3%), Quebec (85.0%) or the Maritimes (86.1%). This illustrated that, in different parts of the country, there were different views of how the average person felt about animal welfare. Younger consumers were also less likely to agree with this statement, with only 83.0% of those born 1979 or later in agreement, compared to the other age groups, which ranged from 86.3% (born 1949 to 1958) to 91.7% (born 1969 to 1978).

Another outlier that was found, though perhaps not surprisingly, was that consumers who indicated they were either a vegan or a vegetarian had the lowest level of agreement with the second animal welfare statement. Only 73.5% of people in this group agreed that the average Canadian believed animal welfare was important. While this was still almost three quarters of this group, it was almost ten percent lower than any other demographic group for this question. As indicated before though, this was not unexpected as vegans/vegetarians may have chosen their lifestyle in part due to animal welfare concerns and therefore, may have held a lesser view of other Canadians who did not take part in their dietary habits.

The final animal welfare statement included in Tables 14 – 16 asked Canadians whether they agreed that the current level of animal welfare on Canadian dairy farms was acceptable. The responses to this statement were of particular importance because they illustrated whether animal welfare in the Canadian dairy industry was viewed positively or negatively by the different demographic categories. The results for this question demonstrated that, while there was a general consensus that Canadian dairy animal welfare was acceptable, there was also a high level of variability, especially among certain demographic groups. These variations could then be compared to the importance score results to be presented later in this paper in an attempt to discover why certain groups believed or did not believe animal welfare was acceptable on Canadian dairies.

Similar to the second statement, males in this study indicated a higher level of agreement with the third statement (82.9%) compared to females (68.6%). So, while the two genders had very similar support for the belief that animal welfare was important (99.0% and 98.9%, respectively), it was apparent that they viewed what goes on in the

Canadian dairy industry very differently. It will therefore be quite interesting to examine the practices that each group believed to be more important for providing proper animal welfare, as these may shed some light on why females held a lesser view of Canadian dairy animal welfare than males did.

Provincially, it was interesting to see that Quebec consumers revealed a much lower level of support for the notion that dairy animal welfare was acceptable (69.2%) than other provinces, which mostly fell in a range from 75 to 82%. Alternatively, 91.7% of Manitoba participants indicated that they felt dairy animal welfare was acceptable in Canada. The reasons for these outliers were not immediately apparent, though some reasons may have been that they may hold a more positive or negative view of dairy animal welfare in their own province or, perhaps in the case of lower agreement values, felt that other provinces had poorer animal welfare and thus, resulted in a lesser view for all of Canada.

There was a definite trend present in the results of the age demographic. Respondents who were in the younger age brackets tended to agree less with the third animal welfare statement, while respondents who were older had a higher level of agreement that animal welfare was acceptable. This occurrence was also seen in the education groups, where those of lesser education tended to agree more with the statement than those with a higher education level.

Around seventy nine percent of those who had actually visited a dairy operation believed that animal welfare on these types of farms was acceptable. This was slightly higher than the average for the whole survey (77.69%) and around five percent higher

than the response of those who had not visited a dairy farm (74.12%). In other words, those who had visited a dairy farm were more likely to think that animal welfare was acceptable than those who had not visited one before, though in both cases the level of support for this statement was three times larger than the level of disagreement.

The participants that chose to indicate that they had experience with animal welfare groups predictably had the lowest levels of agreement with this statement. However, all of these groups, except for the vegan/vegetarian group (36.4% agreed), still had a majority indicating that they believed animal welfare was acceptable on Canadian dairy farms. These values ranged from 58.1% to 71.3%. Interestingly, 91.6% of the participants who indicated that they would not purchase milk with improved animal welfare characteristics agreed that dairy animal welfare was acceptable in Canada. This result signifies that this group still believed animal welfare was important but that they would not purchase the animal welfare friendly milk because they believed the animal welfare currently provided was already acceptable. On the other hand, only 73.1% of participants that indicated that they would purchase the animal welfare friendly milk believed dairy animal welfare was acceptable, perhaps leading them to indicate that they would purchase the product. So, the decision to purchase dairy products with superior animal welfare characteristics may lie in that person's perception of the Canadian dairy industry.

5.2.8.2 Demographic Results for Animal Welfare Statements 4 and 5

The next trio of tables (Tables 17 – 19) presented the responses to the next pair of animal welfare statements (4 & 5) included in the survey instrument. These statements attempted

Table 17. Responses to animal welfare statements 4-5 by demographics (part one).

	Likert #4: I believe animal welfare has improved on Canadian dairy farms in the past 20 years.			Likert #5: I believe animal welfare on Canadian dairy farms is superior to dairy animal welfare in the United States.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
Male	86.2%	13.8%	506	89.1%	10.9%	348
Female	83.0%	17.0%	317	93.5%	6.5%	246
< $39,999	88.0%	12.0%	92	90.6%	9.4%	64
$40,000 - $69,999	87.7%	12.3%	261	90.6%	9.4%	160
$70,000 - $99,999	85.9%	14.1%	185	90.7%	9.3%	140
$100,000 - $129,999	75.4%	24.6%	138	89.9%	10.1%	99
>$130,000	82.8%	17.2%	116	91.0%	9.0%	100
BC	83.3%	16.7%	126	91.8%	8.2%	97
AB	87.2%	12.8%	86	89.4%	10.6%	47
SK	84.6%	15.4%	26	95.0%	5.0%	20
MB	91.3%	8.7%	46	95.5%	4.5%	22
ON	85.2%	14.8%	298	91.8%	8.2%	244
PQ	82.5%	17.5%	200	87.9%	12.1%	132
MT	87.3%	12.7%	55	89.7%	10.3%	39
<9,999 population	91.8%	8.2%	61	87.5%	12.5%	40
10,000 – 49,999	83.7%	16.3%	209	89.9%	10.1%	139
50,000 – 99,999	89.5%	10.5%	124	86.6%	13.4%	97
100,000 – 499,999	81.1%	18.9%	175	94.0%	6.0%	134
> 500,000	84.6%	15.4%	169	90.5%	9.5%	116

Table 18. Responses to animal welfare statements 4-5 by demographics (part two).

	Likert #4: I believe animal welfare has improved on Canadian dairy farms in the past 20 years.			Likert #5: I believe animal welfare on Canadian dairy farms is superior to dairy animal welfare in the United States.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
1979 or later	73.7%	26.3%	38	88.9%	11.1%	36
1969 to 1978	77.8%	22.2%	90	98.6%	1.4%	72
1959 to 1968	80.7%	19.3%	166	89.2%	10.8%	130
1949 to 1958	82.0%	18.0%	206	91.3%	8.7%	172
1948 or earlier	92.8%	7.2%	306	88.2%	11.8%	170
No high school	97.6%	2.4%	41	95.8%	4.2%	24
High school	90.6%	9.4%	128	88.1%	11.9%	84
Some post secondary	86.7%	13.3%	113	93.6%	6.4%	78
Complete post secondary	83.4%	16.6%	452	91.5%	8.5%	328
Complete graduate school	77.4%	22.6%	93	88.0%	12.0%	75
In agric.	85.3%	14.7%	95	92.1%	7.9%	63
In dairy	88.2%	11.8%	17	100.0%	0.0%	14
Visited a dairy	86.2%	13.8%	593	91.3%	8.7%	403
Consume dairy	85.1%	14.9%	826	91.0%	9.0%	587

Table 19. Responses to animal welfare statements 4-5 by demographics (part three).

	Likert #4: I believe animal welfare has improved on Canadian dairy farms in the past 20 years.			Likert #5: I believe animal welfare on Canadian dairy farms is superior to dairy animal welfare in the United States.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
Purchase animal welfare friendly products	84.3%	15.7%	516	91.3%	8.7%	391
Boycott products due to animal welfare concerns	78.6%	21.4%	336	90.9%	9.1%	263
Donate to animal welfare groups	78.2%	21.8%	165	90.5%	9.5%	126
Vegan or vegetarian	46.7%	53.3%	30	79.2%	20.8%	24
Volunteer for animal welfare or humane societies	74.0%	26.0%	77	87.5%	12.5%	48
Read labels for animal welfare assurance	78.9%	21.1%	313	89.1%	10.9%	238
Willing to pay for improved dairy animal welfare	82.4%	17.6%	630	91.9%	8.1%	472
Not WTP	92.6%	7.4%	190	87.5%	12.5%	112

to discover the views of Canadian consumers towards the direction that animal welfare had taken on Canadian dairy operations in the past twenty years, as well as how the Canadian dairy industry compared to its closest neighbour, the United States, in terms of providing proper animal welfare. These results showed a demographic breakdown of whether Canadians believed dairy animal welfare had been improving and whether it was seen to be better than in other countries.

The fourth animal welfare statement ("I believe animal welfare has improved on Canadian dairy farms in the past twenty years") received a strong level of agreement (85.02%) overall in this survey. When looking at the gender category, there appeared to be a much closer consensus for this question than for the previous statement, with 86.2% of males and 83.0% of females agreeing. In general, participants in lower annual household income brackets tended to have a higher level of agreement than those in the higher income brackets ($39,999 or less being the highest at 88.0% and $100,000 to $129,999 being the lowest at 75.4%), though support was also fairly strong in the highest income bracket (over $130,000 annual household income) at 82.8%. Manitobans agreed the most with this statement at 91.3%. Otherwise, the other provincial responses were fairly close, ranging from 82.5% (Quebec) to 87.3% (the Maritimes).

People who lived in the lowest population density areas (population of 9,999 or less) indicated that they believed animal welfare had improved on dairy farms recently (91.8% agreed), whereas those who lived in larger cities of 100,000 people or more had slightly lower ratings (between 81.1% and 84.6%). Once again, younger participants were less likely to agree with the fourth statement than older participants, as the percentages ranged from 73.7% in the youngest age group to 92.8% in the eldest age

group. Similarly, there was also a very clear trend in the education categories, which ranged from 77.4% agreeing in highest education category to 97.6% agreeing in the lowest education level category.

Of those with some sort of experience with animal welfare groups or concerns, vegans and vegetarians had the lowest level of agreement at 46.7%, while those who had volunteered for animal welfare groups or humane societies had the second lowest at 74.0%. Similar to the previous statement, 92.6% of those who would not purchase animal welfare certified dairy products believed dairy animal welfare had improved over the past twenty years, while 82.4% of those who would purchase those dairy products agreed with this sentiment.

For the fifth animal welfare statement, Canadians were asked straight up whether they agreed that dairy animal welfare was better in Canadian than in the United States. Over the entire survey population, 90.59% agreed with this statement. It was important to remember that one of the practices that will be examined later on is the use of growth hormones in milk production. These growth hormones are currently used in the United States, but not in Canada. Therefore, demographic groups that placed more importance on not using growth hormones should have agreed more with this statement (participants were notified in the information sheet that growth hormones were not allowed in Canada). This was one aspect that had to be kept in mind while examining these results and then also later on when viewing the dairy farming practice importance scores.

Looking at the differences in the responses between males and females for this statement, it was shown that 93.5% of females agreed, while 89.1% of males agreed.

This could potentially have indicated that females placed more importance on growth hormones than males did. Each of the five household income groups had a remarkably similar agreement level with this statement, at around 90%. It was interesting though that the number of observations for this statement were quite a bit lower than for the previous statement, indicating that there may have been less certainty among the participants.

Approximately 95% of participants from both Saskatchewan and Manitoba agreed that dairy animal welfare was better in Canada than in the United States. The remaining provinces ranged from 87.9% (Quebec) to 91.8% (British Columbia and Ontario). Examining the results for the various population density categories, over ninety percent of participants in the two highest density categories (those that lived in cities with a population above 100,000) agreed with the fifth animal welfare statement. There was no definite trend in the age or education demographic variables, however it was noteworthy that 98.6% of those born between 1969 and 1978 agreed, which was much higher than most other demographic groups.

Alternatively, while the categories related to animal welfare knowledge or experience (purchased AW friendly products, boycotted due to FAW concerns, donated to AW groups, etc.) had comparatively lower levels of agreement pertaining to the current acceptability of Canadian dairy animal welfare, these categories displayed strong support for the assertion that Canadian dairy farms had superior animal welfare over those in the United States. The majority of these categories fell within a range of 87.5% agreeing (those who had volunteered for animal welfare groups or humane societies) to 91.3% (those who had purchased animal welfare friendly products). The lowest score belonged to the vegan/vegetarian groups, where 79.2% agreed with the statement, which

comparatively speaking was a huge increase over the 36.4% in this group that agreed that animal welfare was acceptable on Canadian dairies. A slightly higher percentage of those who would purchase animal welfare friendly milk (91.9%) indicated that they agreed with the fifth statement compared to those who would not purchase this product (87.5%).

5.2.8.3 Demographic Results for Animal Welfare Statements 6, 7 and 8

The following group of tables (Tables 20 – 22) explored how the various demographic groups rated dairy animal welfare in comparison to other animal industries in Canada. Overall, 82.3%, 87.1% and 74.5% of survey participants agreed that dairy animal welfare was currently better than that of hog, poultry and beef cattle, respectively. For this series of tables, how each category within each demographic responded compared to the results of the other categories was discussed, as well as how those responses compared to that of the other animal industries.

Both males and females had the highest level of agreement with the assertion that dairy animal welfare was superior to that of chickens (89.0% and 84.3%, respectively) and the lowest for the notion that dairy animal welfare was superior to that of beef cattle (76.9% and 70.9%, respectively). For each of these three statements, a larger proportion of the males agreed than the females, similar to all of the previous animal welfare statements except when comparing to American dairies.

Similar to the trend found in the gender category, four out of the five income groups had the highest proportion agree to the seventh statement (poultry) and the lowest agree to the eighth statement (beef cattle). However, the lowest household income group ($39,999 annual income or less) actually had the highest percentage of its members say

Table 20. Responses to animal welfare statements 6-8 by demographics (part one).

	Likert #6: Canadian dairy animal welfare is superior to that of Canadian pigs.			Likert #7: Canadian dairy animal welfare is superior to that of Canadian chickens.			Likert #8: Canadian dairy animal welfare is superior to that of Canadian beef cattle.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
Male	84.8%	15.2%	427	89.0%	11.0%	520	76.9%	23.1%	389
Female	77.9%	22.1%	235	84.3%	15.7%	299	70.9%	29.1%	227
< $39,999	80.6%	19.4%	72	84.3%	15.7%	83	85.7%	14.3%	70
$40,000 - $69,999	83.3%	16.7%	210	88.5%	11.5%	243	74.6%	25.4%	193
$70,000 - $99,999	79.9%	20.1%	159	87.2%	12.8%	196	69.3%	30.7%	137
$100,000 - $129,999	85.7%	14.3%	91	87.6%	12.4%	129	73.0%	27.0%	89
>$130,000	83.5%	16.5%	97	88.9%	11.1%	126	76.1%	23.9%	92
BC	80.4%	19.6%	97	90.0%	10.0%	130	75.6%	24.4%	90
AB	88.3%	11.7%	60	88.0%	12.0%	83	79.0%	21.0%	62
SK	76.0%	24.0%	25	82.8%	17.2%	29	75.0%	25.0%	24
MB	95.7%	4.3%	46	97.6%	2.4%	41	85.0%	15.0%	40
ON	82.8%	17.2%	232	84.9%	15.1%	292	72.7%	17.3%	220
PQ	80.0%	20.0%	160	88.2%	11.8%	195	76.6%	23.4%	137
MT	77.6%	22.4%	49	82.5%	17.5%	57	62.0%	38.0%	50
<9,999 population	81.6%	18.4%	49	84.5%	15.5%	58	68.8%	31.2%	48
10,000 – 49,999	81.0%	19.0%	168	90.4%	9.6%	187	73.7%	26.3%	152
50,000 – 99,999	75.0%	25.0%	96	82.3%	17.7%	124	74.2%	25.8%	89
100,000 – 499,999	82.8%	17.2%	134	89.1%	10.9%	183	75.2%	24.8%	133
> 500,000	85.9%	14.1%	142	86.1%	13.9%	173	78.0%	22.0%	127

Table 21. Responses to animal welfare statements 6-8 by demographics (part two).

	Likert #6: Canadian dairy animal welfare is superior to that of Canadian pigs.			Likert #7: Canadian dairy animal welfare is superior to that of Canadian chickens.			Likert #8: Canadian dairy animal welfare is superior to that of Canadian beef cattle.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
1979 or later	63.0%	37.0%	27	77.8%	22.2%	36	59.3%	40.7%	27
1969 to 1978	74.6%	25.4%	59	84.7%	15.3%	72	64.8%	35.2%	54
1959 to 1968	76.7%	23.3%	129	82.6%	17.4%	172	63.4%	36.6%	123
1949 to 1958	81.4%	18.6%	167	85.7%	14.3%	210	74.7%	25.3%	166
1948 or earlier	89.1%	10.9%	257	94.0%	6.0%	298	83.5%	16.5%	230
No high school	91.4%	8.6%	35	94.1%	5.9%	34	87.9%	12.1%	33
High school	88.0%	12.0%	100	90.9%	9.1%	110	78.4%	21.6%	97
Some post secondary	80.2%	19.8%	96	85.0%	15.0%	113	67.1%	32.9%	82
Complete post secondary	80.4%	19.6%	352	86.3%	13.7%	453	74.3%	25.7%	327
Complete graduate school	85.1%	14.9%	74	89.4%	10.6%	104	71.2%	28.8%	73
In agric.	86.1%	13.9%	72	85.2%	14.8%	88	73.9%	26.1%	69
In dairy	92.3%	7.7%	13	100.0%	0.0%	12	100.0%	0.0%	7
Visited a dairy	84.3%	15.7%	470	88.6%	11.4%	586	75.3%	24.7%	434
Consume dairy	82.6%	17.4%	661	87.3%	12.7%	816	74.4%	25.6%	613

Table 22. Responses to animal welfare statements 6-8 by demographics (part three).

	Likert #6: Canadian dairy animal welfare is superior to that of Canadian pigs.			Likert #7: Canadian dairy animal welfare is superior to that of Canadian chickens.			Likert #8: Canadian dairy animal welfare is superior to that of Canadian beef cattle.		
	Agree	Disagree	Obs	Agree	Disagree	Obs	Agree	Disagree	Obs
Purchase animal welfare friendly products	80.4%	19.6%	408	87.3%	12.7%	512	74.6%	25.4%	389
Boycott products due to animal welfare concerns	77.7%	22.3%	282	86.3%	13.7%	364	72.8%	27.2%	268
Donate to animal welfare groups	78.5%	21.5%	135	86.2%	13.8%	127	74.6%	25.4%	134
Vegan or vegetarian	65.0%	35.0%	20	71.4%	28.6%	28	51.9%	48.1%	27
Volunteer for animal welfare or humane societies	81.4%	18.6%	59	88.2%	11.8%	76	73.7%	26.3%	57
Read labels for animal welfare assurance	78.9%	21.1%	261	83.3%	16.7%	324	73.1%	26.9%	242
Willing to pay for improved dairy animal welfare	81.0%	19.0%	516	87.1%	12.9%	637	73.2%	26.8%	477
Not WTP	87.2%	12.8%	141	86.5%	13.5%	170	77.3%	22.7%	132

that they agreed that dairy animal welfare was superior to that of beef cattle in Canada (85.7%) compared to pigs (80.6%) and chickens (84.3%). Nonetheless, 69% or more in each individual income category agreed that Canadian dairy animal welfare was superior to that of other animal industries.

For each province, the statement that Canadian dairy animal welfare was superior to that of Canadian beef cattle received the least support (ranging from 62.0% in agreement to 85.0% in agreement), with support for the other two statements being much stronger. It was important to point out that over every single demographic category, each statement had a majority of the survey population agreeing with it, indicating that all groups of Canadians perceived dairy animal welfare to be superior to that of other animal industries. The lowest level of support a statement garnered was in the vegan/vegetarian groups, where only 51.9% agreed that dairy animal welfare was superior to that provided to beef cattle. Otherwise, almost every demographic group had the same trend where the highest percentage agreed that dairy animal welfare was superior to that of chickens, followed by pigs and the comparison to beef cattle receiving the lowest percentage of agreement, comparatively, among the three animal industries in this comparison.

5.2.8.4 Demographic Results for Animal Welfare Statements 9 and 10

The final pair of animal welfare statements aimed to discover the preferences of Canadians towards the importance of dairy animal welfare in comparison to low milk prices. This relation was important because even if consumers believed that dairy animal welfare was important, they may not have necessarily been willing to pay a premium for it, as they believed a low milk price was more important to them.

Table 23. Responses to animal welfare statements 9-10 by demographics (part one).

	Likert #9: I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.			Likert #10: The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
Male	91.0%	9.0%	555	63.4%	36.6%	492
Female	93.3%	6.7%	372	48.7%	51.3%	337
< $39,999	86.8%	13.2%	91	65.8%	34.2%	79
$40,000 - $69,999	95.1%	4.9%	267	63.6%	36.4%	247
$70,000 - $99,999	92.7%	7.3%	219	52.8%	47.2%	180
$100,000 - $129,999	94.8%	5.2%	153	58.3%	41.7%	144
>$130,000	87.6%	12.4%	145	50.0%	50.0%	138
BC	93.3%	6.7%	149	54.3%	45.7%	138
AB	88.0%	12.0%	83	61.5%	38.5%	78
SK	83.3%	16.7%	24	66.7%	33.3%	24
MB	89.6%	10.4%	48	62.5%	37.5%	40
ON	92.9%	7.1%	336	57.6%	42.4%	290
PQ	92.9%	7.1%	226	57.6%	42.4%	205
MT	90.1%	9.9%	71	54.7%	45.3%	64
<9,999 population	92.3%	7.7%	65	64.4%	35.6%	59
10,000 – 49,999	91.5%	8.5%	213	58.3%	41.7%	204
50,000 – 99,999	92.1%	7.9%	139	61.4%	38.6%	127
100,000 – 499,999	92.5%	7.5%	201	57.1%	42.9%	184
> 500,000	92.4%	7.6%	211	56.8%	43.2%	169

Table 24. Responses to animal welfare statements 9-10 by demographics (part two).

	Likert #9: I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.			Likert #10: The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
1979 or later	91.5%	8.5%	47	37.0%	63.0%	46
1969 to 1978	93.6%	6.4%	94	57.3%	42.7%	96
1959 to 1968	91.3%	8.7%	196	54.3%	45.7%	184
1949 to 1958	90.6%	9.4%	244	54.1%	45.9%	220
1948 or earlier	93.9%	6.1%	313	67.6%	32.4%	259
No high school	100.0%	0.0%	36	86.1%	13.9%	36
High school	94.6%	5.4%	129	65.3%	34.7%	118
Some post secondary	87.9%	12.1%	124	58.3%	41.7%	115
Complete post secondary	92.0%	8.0%	511	55.4%	44.6%	453
Complete graduate school	91.0%	9.0%	122	49.5%	50.5%	107
In agric.	92.0%	8.0%	88	56.1%	43.9%	82
In dairy	100.0%	0.0%	16	80.0%	20.0%	15
Visited a dairy	91.8%	8.2%	622	58.3%	41.7%	556
Consume dairy	91.9%	8.1%	919	57.8%	42.2%	827

Table 25. Responses to animal welfare statements 9-10 by demographics (part three)

	Likert #9: I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.			Likert #10: The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.		
	Agree	Disagree	Obs	Agree	Disagree	Obs
Purchase animal welfare friendly products	94.6%	5.4%	591	57.2%	42.8%	533
Boycott products due to animal welfare concerns	95.3%	4.7%	425	52.2%	47.8%	383
Donate to animal welfare groups	96.2%	3.8%	213	47.3%	52.7%	186
Vegan or vegetarian	95.0%	5.0%	40	40.5%	59.5%	37
Volunteer for animal welfare or humane societies	95.3%	4.7%	86	56.3%	43.7%	80
Read labels for animal welfare assurance	96.4%	3.6%	386	55.9%	44.1%	349
Willing to pay for improved dairy animal welfare	94.2%	5.8%	764	58.3%	41.7%	681
Not WTP	79.5%	20.5%	151	52.8%	47.2%	144

For this final pair of statements, participants were asked how they felt and how they believed the average Canadian felt towards the idea of animal welfare being more important than low milk prices, as shown in Tables 23 to 25. In total, 93.3% of females agreed that they believed ensuring proper animal welfare for Canadian dairy cows was more important than having low milk prices compared to 91.0% of males. Conversely, only 48.7% of females believed the average Canadian felt this way compared to 63.4% of males. This showed that, while females indicated a personal belief in the importance of dairy animal welfare relative to low milk prices, they had less faith that the average consumer felt the same way.

This result was evident amongst most of the demographic groups, yet may have been more of an indication that the responses given for the first of these two statements were likely to be less truthful due to a desire to give the socially acceptable response. According to Lusk and Norwood (2008), it was likely more realistic to examine how the average person felt. In that case, it was evident that in actuality, most demographic categories only had 50 to 65% of their members agree that dairy animal welfare was more important than having low milk prices. While this still constituted a small majority, it was much lower than the 80 to 95% who indicated that they agreed when they were asked if they believed this rather than if the average Canadian believed this.

Consumers in the prairie provinces (Alberta, Saskatchewan and Manitoba) had a higher opinion of the average Canadian (over 60% agreed with the tenth animal welfare statement) than those elsewhere in Canada, whose responses ranged from 54 to 57%. Participants born 1979 or later had a much lower level of agreement than the other age groups, with only 37.0% agreeing that the average Canadian valued dairy animal welfare

over low milk prices. However, when asked how they as an individual felt, their responses were remarkably similar to the other age groups, with all age groups having between 90 and 94% of their members agreeing.

Those who did not completed high school had a much higher level of support for these final two statements than the other education categories. Meanwhile, slightly less than half of consumers who had completed a graduate degree (49.5%) agreed that the average Canadian cared more about dairy animal welfare. Approximately ninety-five percent of participants who had experience of some form with animal welfare friendly products or groups indicated that they agreed that animal welfare was more important to them than low milk prices. Predictably, these participants also held a lesser view of other Canadians, with only 40 to 57% of them indicating that they thought that the average Canadian believed animal welfare was more important than low milk prices. Another intuitive result came from those who indicated they would purchase animal welfare friendly milk. This group had 94.2% of its members indicate that they valued proper dairy animal welfare over low milk prices, whereas only 79.5% of those who did not want to purchase the animal welfare friendly milk agreed. This result made sense because those who wished to pay for animal welfare certified milk were more likely to say that the animal welfare of dairy cattle was more important to them than the price of the milk.

5.2.9 Logistic Regression Results and Analysis

The results from the ordered logit regressions performed on the ten individual animal welfare statements are presented in Tables 26 – 30. The coefficient estimates were shown

Table 26. Ordered logit regression results for animal welfare statements 1 & 2.

	I believe animal welfare is important.	The average Canadian believes animal welfare is important.
Intercept	**4.940 (1.080)	**4.029 (0.825)
Female	**0.531 (0.171)	-0.167 (0.148)
$40,000-$69,999	0.118 (0.283)	0.173 (0.244)
$70,000-$99,999	0.149 (0.301)	*0.444 (0.262)
$100,000-$129,999	-0.075 (0.314)	0.321 (0.274)
Above $130,000	-0.145 (0.315)	0.354 (0.279)
British Columbia	*-0.697 (0.413)	-0.146 (0.356)
Alberta	-0.141 (0.414)	*0.672 (0.362)
Saskatchewan	-0.960 (0.604)	0.403 (0.536)
Ontario	-0.285 (0.369)	0.094 (0.319)
Quebec	-0.068 (0.386)	-0.369 (0.334)
Maritimes	-0.107 (0.465)	0.132 (0.400)
Pop 10,000-49,999	-0.424 (0.317)	0.126 (0.269)
Pop 50,000-99,999	-0.255 (0.343)	0.207 (0.290)
Pop 100,000-499,999	-0.271 (0.327)	0.088 (0.276)
Pop above 500,000	-0.356 (0.326)	-0.150 (0.276)
Born 1969-1978	-0.352 (0.422)	0.203 (0.342)
Born 1959-1968	0.088 (0.402)	0.093 (0.321)
Born 1949-1958	-0.393 (0.451)	0.026 (0.320)
Born 1948 or earlier	0.297 (0.402)	0.356 (0.323)
High school	-0.393 (0.451)	**-1.087 (0.397)
Some post secondary	**-1.054 (0.463)	**-0.995 (0.411)
Complete post second	-0.506 (0.425)	*-0.703 (0.374)
Complete grad school	-0.390 (0.471)	*-0.787 (0.414)
In agriculture	-0.238 (0.291)	-0.068 (0.247)
In dairy farming	*1.101 (0.634)	0.885 (0.567)
Visited a dairy farm	0.154 (0.167)	0.106 (0.145)
Consume dairy	0.088 (0.763)	0.629 (0.556)
Purchase animal welfare (AW) goods	*0.311 (0.176)	0.142 (0.162)
Boycott due to AW concerns	**0.769 (0.198)	0.003 (0.171)
Donate to AW groups	**0.674 (0.234)	-0.168 (0.180)
Vegan/Vegetarian	**1.522 (0.656)	**-0.684 (0.330)
AW group volunteer	0.228 (0.308)	0.216 (0.242)
Read labels for AW	**0.408 (0.201)	-0.649 (0.171)
Willing to pay for improved dairy AW	**0.785 (0.193)	0.238 (0.175)
Strongly disagree (= 0)	$X < 0$	$X < 0$
Disagree (= 1)	$0 < X < 0.806$	$0 < X < 2.426$
Neutral (= 2)	$0.806 < X < 2.188$	$2.426 < X < 3.696$
Agree (= 3)	$2.188 < X < 5.139$	$3.696 < X < 6.367$
Strongly agree (= 4)	$X > 5.139$	$X > 6.367$

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

with the standard error in parenthesis. Coefficients that were statistically significant at the five (**) and ten (*) percent level were indicated in the table. According to Prickett et al (2010), the magnitudes of the coefficients did not reveal anything significant. The signs of these coefficients were informative but unless they were statistically significant, the authors determined that it could not be said whether being a part of that demographic category definitely caused the consumer to have a higher (or lower) level of agreement with that specific statement pertaining to animal welfare.

5.2.9.1 Ordered Logit Results for Animal Welfare Statements 1 and 2

The ordered logit regression results for the first pair of animal welfare statement were shown in Table 26. These results revealed that the coefficients for the intercepts of both of these statements were statistically significant and positive at the five percent level. The intercepts in the ordered logistic regressions included the following categories: males, annual household income of $39,999 or less, living in Manitoba, living in an area of 9,999 people or less, being born 1979 or later, did not finish high school, was not employed in or did not have family employed in the dairy or any agricultural industry, had not visited a dairy, did not consume dairy products, did not purchase any animal welfare friendly products, did not boycott any products due to animal welfare concerns, did not donate to any animal welfare groups, was not a vegan or a vegetarian, did not volunteer for animal welfare groups or humane societies, did not read labels for animal welfare information and was not willing to purchase a dairy product with improved animal welfare characteristics.

For the first statement presented, “I believe animal welfare is important”, there were seven demographic categories that were statistically significant at the five percent level, in addition to the intercept. The coefficient for females was statistically significant and positive, indicating that females tended to choose a higher number on the Likert scale. This meant that a higher percentage of females agreed that animal welfare was important. Those who had taken some, but did not completed, trade school, college or university revealed a statistically significant negative coefficient, meaning that they were likely to have placed less importance on animal welfare.

As one would expect, there were several animal welfare demographic groups that indicated they cared more about the importance of animal welfare and whose results were statistically significant. These included those who boycotted due to animal welfare concerns, donated to animal welfare groups, were a vegan or vegetarian, read labels for animal welfare assurances and, also, those who indicated they would purchase a dairy product certified to have been produced using animal welfare friendly production practices.

In addition to the intercept, statistically significant variables at the five percent level for the statement “the average Canadian believes animal welfare is important” included those who had completed high school and those who had only completed some post secondary education, as well as the vegan/vegetarian variable. All three of these variables had negative signs, indicating that participants in these groups were less inclined to agree that the average Canadian believed animal welfare was important.

5.2.9.2 Ordered Logit Results for Animal Welfare Statements 3 and 4

The responses for the third and fourth animal welfare statements ("I believe the current level of animal welfare on Canadian dairy farms is acceptable" and "I believe animal welfare on Canadian dairy farms has improved in the past twenty years") were found in Table 27. Similar to the previous pair of animal welfare statements, the intercepts and the coefficients of the animal welfare experience categories made up the majority of the more statistically significant variables (ie five percent level). The intercepts were significant and positive in both cases.

For whether participants agreed that Canadian dairy animal welfare was acceptable, in addition to the intercept, there were four other statistically significant variables. Each of these coefficients were negative, indicating that these variables corresponded with a lesser opinion of Canadian dairy animal welfare. These included the coefficients for consumers that boycotted due to animal welfare concerns, were a vegan or a vegetarian, or those who had read labels for assurance of proper animal welfare. The fact that these variables had a negative sign and were statistically significant made sense intuitively because consumers that showed concern for animal welfare (through boycotting, reading labels or abstaining from consuming animal products) should have been more likely to hold a negative view towards animal welfare in agriculture.

The final statistically significant category included the group of participants that indicated they would be willing to purchase a milk product that had been certified to have been produced using animal welfare friendly dairy practices. This variable was also negative, which was reasonable because respondents that would feel the need to purchase

Table 27. Ordered logit regression results for animal welfare statements 3 & 4.

	Current level of animal welfare on Canadian dairies is acceptable.	Animal welfare has improved on Canadian dairies in past 20 years.
Intercept	**4.182 (0.832)	**3.380 (0.791)
Female	-0.183 (0.144)	0.160 (0.144)
$40,000-$69,999	0.103 (0.238)	0.123 (0.236)
$70,000-$99,999	-0.215 (0.254)	-0.022 (0.253)
$100,000-$129,999	-0.288 (0.265)	-0.079 (0.269)
Above $130,000	0.293 (0.271)	-0.089 (0.267)
British Columbia	-0.397 (0.350)	-0.338 (0.347)
Alberta	-0.148 (0.355)	-0.159 (0.351)
Saskatchewan	-0.041 (0.581)	-0.133 (0.556)
Ontario	-0.014 (0.315)	0.016 (0.313)
Quebec	-0.214 (0.327)	0.036 (0.325)
Maritimes	-0.399 (0.388)	-0.093 (0.393)
Pop 10,000-49,999	0.236 (0.264)	-0.037 (0.262)
Pop 50,000-99,999	0.118 (0.285)	0.152 (0.285)
Pop 100,000-499,999	0.246 (0.273)	-0.045 (0.273)
Pop above 500,000	-0.077 (0.271)	-0.216 (0.270)
Born 1969-1978	0.031 (0.359)	0.331 (0.342)
Born 1959-1968	0.005 (0.336)	0.285 (0.322)
Born 1949-1958	0.157 (0.335)	0.302 (0.318)
Born 1948 or earlier	0.301 (0.338)	**0.695 (0.320)
High school	-0.159 (0.387)	-0.539 (0.389)
Some post secondary	-0.135 (0.402)	*-0.740 (0.403)
Complete post second	-0.228 (0.366)	**-0.803 (0.370)
Complete grad school	-0.440 (0.404)	**-1.056 (0.408)
In agriculture	0.381 (0.257)	*0.449 (0.252)
In dairy farming	0.807 (0.531)	-0.050 (0.527)
Visited a dairy farm	0.137 (0.141)	*0.277 (0.142)
Consume dairy	0.456 (0.617)	*1.100 (0.584)
Purchase animal welfare (AW) goods	*0.290 (0.159)	**0.495 (0.159)
Boycott due to AW concerns	**-0.373 (0.170)	*-0.319 (0.168)
Donate to AW groups	-0.263 (0.175)	-0.107 (0.177)
Vegan/Vegetarian	**-1.574 (0.350)	**-1.352 (0.351)
AW group volunteer	-0.142 (0.237)	-0.272 (0.233)
Read labels for AW	**-0.519 (0.166)	-0.122 (0.166)
Willing to pay for improved dairy AW	**-0.664 (0.179)	**-0.497 (0.175)
Strongly disagree (= 0)	X < 0	X < 0
Disagree (= 1)	0 < X < 1.730	0 < X <
Neutral (= 2)	1.730 < X < 3.760	1.730 < X < 3.760
Agree (= 3)	3.760 < X < 6.434	3.760 < X < 6.434
Strongly agree (= 4)	X > 6.434	X > 6.434

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

this product likely were concerned about the current state of animal welfare in the Canadian dairy industry.

The second animal welfare statement shown in Table 27 stated that the participant believed animal welfare on Canadian dairy farms had improved in the past twenty years. Including the intercept, there were seven variables that were statistically significant at the five percent level in the results of the ordered logistic regression. Similar to the previous animal welfare statement, those that were willing to purchase an animal welfare friendly dairy product were both significant and negative. In other words, if they wanted to purchase a product of superior animal welfare characteristics then they were most likely concerned about dairy animal welfare and how it had progressed in the past twenty years.

The coefficient for respondents that were born in 1948 or earlier was statistically significant and had a positive sign associated with it. Therefore, older consumers were more likely to believe animal welfare had improved on Canadian dairies in the past twenty years. Alternatively, participants who had completed the two highest levels of education (completed trade school, college or university and completed a Master's degree or a Ph.D.) tended to respond with lower numbers on the Likert scale, indicating that they agreed less with the notion that dairy animal welfare had improved in the past 20 years.

Interestingly, the coefficient for consumers that had purchased animal welfare friendly products was both significant and positive. So far, consumers who indicated they fell into one of the animal welfare experience categories have had lesser (statistically significant and negative) views of the dairy industry. So, the result of this category of respondents believing that dairy animal welfare in Canada was improving was

particularly interesting. The vegan or vegetarian category was once more statistically significant and negative, which again was to be expected if they had made their decision to not eat animal products based on animal welfare concerns.

5.2.9.3 Ordered Logit Results for Animal Welfare Statements 5 and 6

Included in Table 28 are the ordered logistic regression results for the fifth and sixth animal welfare statements. Similar to previous results, the intercept was both significant and positive for both of these statements at the five percent level. While there were only two additional statistically significant results at this level for the fifth animal welfare statement ("I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States"), there were eleven other statistically significant variables for the sixth animal welfare statement ("I believe the animal welfare of Canadian dairy cows is superior to that of Canadian pigs") at the five percent level.

Starting with the fifth animal welfare statement that compared Canadian and American dairy animal welfare, the oldest age category was both significant and negative at the five percent level. This result indicated that older consumers were less likely to believe animal welfare on dairy farms was superior in Canada. Alternatively, participants that purchased animal welfare friendly products were more likely to believe dairy animal welfare was better in Canada than in the United States, as the coefficient for this variable was both positive and statistically significant.

The sixth animal welfare statement was the first of three statements that compared the animal welfare of Canadian dairy cows to the animal welfare of other Canadian farm

Table 28. Ordered logit regression results for animal welfare statements 5 & 6.

	Canadian dairy animal welfare is superior to the United States.	Canadian dairy animal welfare is superior to that of Canadian pigs.
Intercept	**4.846 (0.856)	**3.931 (0.753)
Female	0.198 (0.147)	-0.179 (0.145)
$40,000-$69,999	*-0.463 (0.242)	*0.451 (0.236)
$70,000-$99,999	-0.303 (0.257)	0.346 (0.253)
$100,000-$129,999	-0.318 (0.271)	0.367 (0.265)
Above $130,000	-0.374 (0.273)	**0.597 (0.270)
British Columbia	-0.225 (0.377)	**-0.928 (0.352)
Alberta	-0.422 (0.385)	**-0.761 (0.353)
Saskatchewan	-0.236 (0.550)	**-1.344 (0.563)
Ontario	-0.072 (0.342)	**-0.837 (0.316)
Quebec	-0.482 (0.354)	**-0.644 (0.327)
Maritimes	-0.206 (0.416)	*-0.723 (0.391)
Pop 10,000-49,999	-0.052 (0.271)	0.200 (0.262)
Pop 50,000-99,999	-0.142 (0.296)	-0.121 (0.289)
Pop 100,000-499,999	0.010 (0.280)	0.229 (0.271)
Pop above 500,000	-0.088 (0.282)	0.053 (0.271)
Born 1969-1978	-0.092 (0.355)	-0.185 (0.350)
Born 1959-1968	-0.261 (0.333)	0.057 (0.329)
Born 1949-1958	-0.256 (0.333)	0.186 (0.329)
Born 1948 or earlier	**-0.680 (0.335)	**0.723 (0.329)
High school	-0.240 (0.384)	-0.549 (0.375)
Some post secondary	-0.134 (0.395)	**-0.975 (0.391)
Complete post second	-0.207 (0.359)	**-0.882 (0.355)
Complete grad school	-0.246 (0.398)	**-0.849 (0.393)
In agriculture	0.002 (0.261)	-0.026 (0.244)
In dairy farming	*0.991 (0.511)	0.350 (0.502)
Visited a dairy farm	0.223 (0.147)	**0.316 (0.142)
Consume dairy	0.505 (0.578)	0.637 (0.528)
Purchase animal welfare (AW) goods	**0.496 (0.163)	-0.052 (0.159)
Boycott due to AW concerns	-0.091 (0.171)	-0.019 (0.169)
Donate to AW groups	0.078 (0.178)	0.132 (0.178)
Vegan/Vegetarian	-0.387 (0.356)	-0.461 (0.353)
AW group volunteer	-0.385 (0.244)	0.293 (0.239)
Read labels for AW	-0.253 (0.173)	0.041 (0.167)
Willing to pay for improved dairy AW	*0.305 (0.182)	-0.191 (0.173)
Strongly disagree (= 0)	$X < 0$	$X < 0$
Disagree (= 1)	$0 < X < 1.602$	$0 < X < 1.371$
Neutral (= 2)	$1.602 < X < 4.991$	$1.371 < X < 3.994$
Agree (= 3)	$4.991 < X < 6.872$	$3.994 < X < 5.867$
Strongly agree (= 4)	$X > 6.872$	$X > 5.867$

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

animals. This specific statement examined whether Canadians believed dairy cattle were better taken care of than pigs in their country. In addition to the significant and positive intercept value, the highest income category (greater than $130,000) was also statistically significant and positive, which showed that high income earners were more likely to believe animal welfare was superior on Canadian dairy farms.

There were five provincial categories that were both statistically significant and negative for this statement, meaning that consumers in these provinces were less likely than the consumers in the dummy provincial variable (Manitoba) to agree that Canadian dairy animal welfare was superior to that of pigs. These provinces included British Columbia, Alberta, Saskatchewan, Ontario and Quebec. This result may have been misleading though as Manitobans may have just had an exceptionally high level of agreement (approximately 95% of Manitobans agreed) with the sixth animal welfare statement.

The category of participants that fell into the oldest age bracket (born 1948 or earlier) was both significant and positive, while the three highest level of education categories (Some or completed post secondary and grad school) were all significant and negative. Also, interestingly enough, consumers that had visited a dairy operation believed that Canadian dairy animal welfare was better than the animal welfare provided to Canadian pigs.

5.2.9.4 Ordered Logit Results for Animal Welfare Statements 7 and 8

Table 29 contained the results of the ordered logistic regression performed on the Likert scale responses provided for the seventh and eighth animal welfare statements. These

Table 29. Ordered logit regression results for animal welfare statements 7 & 8.

	Canadian dairy AW is superior to that of Canadian chickens.	Canadian dairy AW is superior to that of Canadian beef cattle.
Intercept	**3.578 (0.748)	**4.436 (0.765)
Female	**-0.298 (0.141)	-0.161 (0.145)
$40,000-$69,999	0.340 (0.231)	-0.250 (0.232)
$70,000-$99,999	0.303 (0.246)	-0.299 (0.249)
$100,000-$129,999	0.113 (0.259)	*-0.474 (0.260)
Above $130,000	0.399 (0.262)	0.017 (0.263)
British Columbia	-0.289 (0.348)	-0.498 (0.352)
Alberta	-0.342 (0.351)	-0.335 (0.354)
Saskatchewan	-0.734 (0.546)	-0.625 (0.544)
Ontario	*-0.597 (0.313)	*-0.530 (0.317)
Quebec	-0.303 (0.325)	-0.264 (0.328)
Maritimes	-0.596 (0.393)	-0.640 (0.401)
Pop 10,000-49,999	0.285 (0.262)	0.190 (0.266)
Pop 50,000-99,999	-0.108 (0.284)	0.014 (0.290)
Pop 100,000-499,999	0.397 (0.269)	0.314 (0.275)
Pop above 500,000	-0.153 (0.268)	0.195 (0.271)
Born 1969-1978	-0.244 (0.345)	-0.159 (0.349)
Born 1959-1968	0.010 (0.327)	0.024 (0.330)
Born 1949-1958	0.092 (0.326)	0.446 (0.331)
Born 1948 or earlier	0.370 (0.326)	0.494 (0.329)
High school	-0.453 (0.373)	-0.337 (0.384)
Some post secondary	-0.550 (0.387)	-0.616 (0.399)
Complete post second	-0.516 (0.354)	-0.540 (0.363)
Complete grad school	-0.601 (0.392)	-0.658 (0.402)
In agriculture	-0.074 (0.244)	0.165 (0.254)
In dairy farming	-0.143 (0.483)	0.238 (0.495)
Visited a dairy farm	**0.363 (0.139)	0.137 (0.143)
Consume dairy	0.147 (0.521)	0.185 (0.547)
Purchase animal welfare (AW) goods	0.203 (0.155)	0.078 (0.159)
Boycott due to AW concerns	0.176 (0.166)	0.120 (0.171)
Donate to AW groups	0.099 (0.172)	0.217 (0.178)
Vegan/Vegetarian	-0.511 (0.358)	**-0.782 (0.369)
AW group volunteer	0.276 (0.230)	0.156 (0.244)
Read labels for AW	-0.139 (0.165)	0.061 (0.168)
Willing to pay for improved dairy AW	0.018 (0.171)	*-0.294 (0.175)
Strongly disagree (= 0)	$X < 0$	$X < 0$
Disagree (= 1)	$0 < X < 1.148$	$0 < X < 1.897$
Neutral (= 2)	$1.148 < X < 3.232$	$1.897 < X < 4.387$
Agree (= 3)	$3.232 < X < 5.110$	$4.387 < X < 6.627$
Strongly agree (= 4)	$X > 5.110$	$X > 6.627$

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

statements continued to study how Canadian consumers perceived dairy animal welfare compared to that of other farm animals. The seventh statement looked at the comparison to Canadian chickens and the eighth statement studied the comparison to Canadian beef cattle. The number of statistically significant variables at the five percent level for these two statements was relatively low compared to previous regressions.

Beginning with the comparison to Canadian chickens (statement seven), it was apparent that females were less likely than males to agree that dairy animal welfare was superior in Canada to that of chickens. Alternatively, the coefficient estimate for the group of survey participants that had visited a dairy farm was both significant and positive at this level, indicating they were more likely to agree with this statement.

When comparing dairy animal welfare to that of Canadian beef cattle, the only statistically significant result was related to the group of consumers that considered themselves to be a vegan or a vegetarian. This coefficient was both statistically significant and negative, which indicated vegans or vegetarians were less likely to agree that Canadian dairy animal welfare was superior to that of beef cattle. This was not surprising because they may have viewed the beef industry as being more natural with animals that were more likely to go outside and therefore, provided with superior animal welfare.

5.2.9.5 Ordered Logit Results for Animal Welfare Statements 9 and 10

The ordered logistic regression results for the final pair of animal welfare statements were contained in Table 30. The first of these statements asked whether the survey participants agreed that providing proper animal welfare was more important than having

Table 30. Ordered logit regression results for animal welfare statements 9 & 10.

	I believe AW is more important than having low milk prices.	Avg Canadian believes AW is more important than low milk prices.
Intercept	**4.465 (0.923)	**4.079 (0.771)
Female	*0.274 (0.156)	**-0.388 (0.140)
$40,000-$69,999	0.169 (0.259)	-0.086 (0.226)
$70,000-$99,999	0.262 (0.278)	-0.345 (0.241)
$100,000-$129,999	0.053 (0.290)	-0.188 (0.254)
Above $130,000	-0.056 (0.299)	-0.345 (0.257)
British Columbia	-0.411 (0.382)	-0.266 (0.329)
Alberta	-0.114 (0.400)	-0.048 (0.333)
Saskatchewan	-0.636 (0.585)	-0.139 (0.518)
Ontario	0.013 (0.346)	-0.099 (0.295)
Quebec	-0.071 (0.359)	0.064 (0.309)
Maritimes	-0.186 (0.430)	-0.276 (0.374)
Pop 10,000-49,999	0.158 (0.274)	-0.209 (0.253)
Pop 50,000-99,999	0.018 (0.302)	0.019 (0.274)
Pop 100,000-499,999	-0.080 (0.285)	-0.102 (0.262)
Pop above 500,000	0.081 (0.282)	-0.168 (0.257)
Born 1969-1978	-0.487 (0.393)	*0.613 (0.341)
Born 1959-1968	0.182 (0.371)	*0.602 (0.323)
Born 1949-1958	-0.318 (0.368)	0.513 (0.320)
Born 1948 or earlier	-0.156 (0.369)	**0.637 (0.318)
High school	-0.664 (0.408)	-0.506 (0.366)
Some post secondary	**-1.059 (0.427)	-0.592 (0.381)
Complete post second	**-0.869 (0.388)	*-0.634 (0.345)
Complete grad school	**-0.849 (0.427)	**-0.791 (0.384)
In agriculture	-0.002 (0.267)	-0.253 (0.235)
In dairy farming	*1.003 (0.566)	*0.912 (0.498)
Visited a dairy farm	0.054 (0.156)	0.055 (0.137)
Consume dairy	-0.614 (0.686)	-0.603 (0.567)
Purchase animal welfare (AW) goods	0.223 (0.169)	*0.286 (0.150)
Boycott due to AW concerns	**0.465 (0.181)	-0.161 (0.161)
Donate to AW groups	0.296 (0.190)	**-0.392 (0.174)
Vegan/Vegetarian	**0.945 (0.411)	-0.496 (0.353)
AW group volunteer	0.173 (0.269)	0.125 (0.232)
Read labels for AW	**0.530 (0.177)	-0.037 (0.161)
Willing to pay for improved dairy AW	**1.069 (0.192)	**0.406 (0.164)
Strongly disagree (= 0)	$X < 0$	$X < 0$
Disagree (= 1)	$0 < X < 1.558$	$0 < X < 2.341$
Neutral (= 2)	$1.558 < X < 3.105$	$2.341 < X < 3.689$
Agree (= 3)	$3.105 < X < 5.606$	$3.689 < X < 5.871$
Strongly agree (= 4)	$X > 5.606$	$X > 5.871$

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

low milk prices. In addition to the statistically significant and positive intercept coefficient, there were seven more variables that were significant at the five percent level.

The three highest levels of education that were included in the demographic section of the survey (completed some of or all of trade school, college or university, as well as completed a Master's degree or Ph.D.) were all significant and negative. This result showed that higher educated respondents placed a lower importance on dairy animal welfare compared to having low milk prices. Alternatively, participants who had some form of experience with animal welfare products or organizations, specifically those who boycotted products due to animal welfare concerns, read labels for animal welfare assurances or were a vegan or a vegetarian, had a positive and significant coefficient. This made sense intuitively because these consumers obviously placed importance on animal welfare and thus, would be much more likely to consider animal welfare as being more important than having low milk prices. For similar reasons, the group of consumers that were willing to purchase animal welfare friendly milk would also be expected to agree more with the ninth animal welfare statement, which was backed up by its positive and statistically significant estimate value.

The tenth animal welfare statement asked participants whether they agreed that the average Canadian believed animal welfare was more important than having low milk prices. Variables that were both significant (at the five percent level) and negative were females, completed graduate schooling and donated to animal welfare organizations. These groups held a lesser view towards other Canadians in terms of their preferences for animal welfare and low milk prices. Certain demographic categories were both significant and positive, including born 1948 or earlier and willing to purchase animal

welfare friendly milk. Consumers in these groups agreed more than others in the survey population that the average Canadian cared more about dairy animal welfare than having low milk prices in Canada.

5.3 Ranking of Dairy Farming Practices

The second section of the consumer survey examined the dairy farming practices that Canadians believed to be most important for ensuring that dairy cows were being properly cared for. Participants were provided with nine questions, each of which asked them to choose between a pair of production practices based on their importance for ensuring proper animal welfare. The results for these questions were tabulated and used to create a ranking through the use of importance scores.

5.3.1 Total Survey Importance Score Results

According to Prickett et al (2010), importance scores indicate the percentage of participants that considered that practice to be most important for ensuring proper animal welfare. The importance scores calculated using responses from the entire survey population are found in Table 31. Also included were the total number of pairs a practice was included in, the number of times each practice was chosen by a respondent as being more important for animal welfare, and the percentage of the time a practice was chosen as more important than another.

Table 31. Results from the pair wise comparison questions (by importance score).

	Total number of times the practice was chosen as more important	Total number of times the practice was used in a pairing	Percentage of the time the practice was chosen	Importance Score*
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	1,786	2,480	72.02%	16.01%
Milk cows are provided with time outdoors and access to grazing.	1,592	2,493	63.86%	14.19%
Milk cows are not administered growth hormones.	1,537	2,485	61.85%	13.75%
Milk cows are provided with proper shelter that offers protection from severe weather.	1,509	2,486	60.70%	13.49%
Milk cows are always given room to turn around, walk and lie down.	1,297	2,495	51.98%	11.55%
Milk cows are milked in a safe and calm environment.	1,195	2,479	48.20%	10.71%
Milk cows are provided with clean bedding material to lay on.	1,034	2,481	41.68%	9.26%
Male calves are raised for beef purpose and not for veal.	629	2,479	25.37%	5.64%
Milk cows are allowed to interact with other animals.	602	2,484	24.24%	5.39%

*The importance score indicated the percentage of respondents who believed that this dairy farming practice was most important for ensuring proper animal welfare.

These importance scores were calculated using Microsoft Excel and, as expected, added up to one hundred percent. If each of the practices were chosen fifty percent of the time, then that would indicate that they were all seen as equally important and as such, each production practice would have had the same importance score. In this case, the importance score for all practices would have been 11.11% (ie 11.11% x 9 practices = 100.00%). This could also be interpreted as the importance score if the participants were indifferent between the various dairy farming practices. So, any practice that was above 11.11% for this study could be interpreted as being more important than the average practice for ensuring proper dairy animal welfare. Likewise, any practice with an importance score below 11.11% could be interpreted as being less important than the average practice.

Another interpretation of the importance score resided in its magnitude. If the importance score of one practice was twice as large as the importance score of another, then the first practice was said to be perceived as twice as important in terms of animal welfare than the second practice (Prickett et al 2008).

The range of pairings that a practice was present in was remarkably similar across the nine production practices used in this research. In total, each practice was included in the range of 2,479 to 2,495 pairs. The importance scores ranged from 5.39% (least important) to 16.01% (most important).

Through the pair wise comparison questions, participants revealed that providing milk cows with a prompt response to all health problems, including those that did not affect milk production was the most important thing that dairy farmers could do to

provide proper animal welfare. This practice was chosen as most important by 16.01% of the survey participants. This corresponded to this practice being chosen as most important in approximately 72% of the pairs that it was present in.

The second most important dairy practice, as chosen by respondents, was providing milk cows with time outdoors and pasture access. 14.19% of respondents indicated that this was most important to them. Not administering growth hormones was also seen to be quite important, with 13.75% of the survey population indicating it was most important for providing dairy cows with proper animal welfare. At 13.49%, providing proper shelter was viewed as the fourth most important practice.

At the other end of the spectrum, raising male calves for beef and not for veal was seen as relatively unimportant by the survey participants, with only 5.64% indicating that it was the most important animal welfare practice. However, the practice seen to be least important for ensuring proper animal welfare turned out to be allowing the cows to interact with other animals, with an importance score of only 5.39%.

It appears as if Canadian consumers were more concerned about practices that were directly related to a milk cow's health (prompt response to health problems) or to natural production (provide time outdoors, do not use growth hormones), whereas the actual milking procedure was not seen as being as important. Perhaps most surprisingly was the lack of support that not using male calves for veal production received, as this was one of the more visible animal welfare issues commonly linked to the dairy industry.

When looking at the magnitudes of the important scores, it could be said that taking care of all health problems was around three times more important to consumers

than not using male calves for veal or allowing interaction between animals. In fact, the top five most important practices in terms of providing proper animal welfare could be seen as being at least twice as important as these two lowest scoring practices. However, compared to the Prickett et al (2010) study, the range in practices for this research was far smaller. In that study, importance scores ranged from 1.72% to 38.43%, compared to 5.39% to 16.01% for this research. So, the Canadian consumers in this study ranked the practices much closer and perhaps believed that all of the practices included were much closer in terms of importance (closer to the average), than previous work with animal welfare pair wise comparisons and importance scores. It should be noted that the Prickett et al (2010) importance scores were generated using a conditional logit model, compared to an Excel formula for the importance scores found in Table 31.

In Prickett et al (2010), receiving ample food and water and receiving treatment for injury and disease were rated the most important by consumers. A practice similar to receiving ample food and water was not included in this survey, however receiving treatment for injury and disease was quite similar to the most important practice found in Table 31. This result showed that consumers in both Canada and the United States placed a high level of importance on treating health problems in farm animals. Also, in the Prickett et al (2010) research, being allowed to socialize with other animals (2.76%) was ranked relatively low, similar to the participants in this survey. Other practices that received relatively high importance scores in both surveys included allowed to exhibit natural behaviours (ie walk, stand up, and turn around) and allowed to exercise outdoors. Similar to both studies was also the relatively low importance placed on providing proper bedding. It was obvious from these two studies that consumers in both Canada and the

United States ranked the relative importance of farming practices in terms of animal welfare in a very similar manner.

It should be noted that survey participants found this section of the survey most difficult to complete. Numerous participants included a note on the returned survey that they had difficulty choosing between practices and indicated that they believed them all to be important. One specific example of difficulty experienced by participants included understanding whether interacting with other animals meant other milk cows or other farm animals (chickens, pigs, etc.). This misunderstanding may have potentially reduced the magnitude of the importance score for the allowing milk cows to interact with other animals practice.

5.3.2 Importance Score Results by Demographic Groups

The next series of tables examined how the importance scores for each demographic category compared to that of the whole survey. Both the magnitudes of the importance scores and the order in which they are ranked were compared among the different groups within each demographic category and also to the magnitudes and rankings found for the whole survey. In other words, the following sections looked at whether a certain demographic group placed more or less importance on certain production practices. After this was completed, previous sections of this paper were then examined to determine whether those results may have been affected by the importance score results of each demographic.

Table 32. Comparison of importance scores by gender.

	Male	Female	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	16.13% n = 1,493	15.84% n = 927	16.01% n = 2,480
Milk cows are provided with time outdoors and access to grazing.	14.36% n = 1,494	13.97% n = 933	14.19% n = 2,493
Milk cows are not administered growth hormones.	13.38% n = 1,493	14.41% n = 929	13.75% n = 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.38% n = 1,494	13.53% n = 929	13.49% n = 2,486
Milk cows are always given room to turn around, walk and lie down.	11.06% n = 1,478	12.37% n = 942	11.55% n = 2,495
Milk cows are milked in a safe and calm environment.	10.99% n = 1,490	10.16% n = 926	10.71% n = 2,479
Milk cows are provided with clean bedding material to lay on.	9.59% n = 1,490	8.65% n = 928	9.26% n = 2,481
Male calves are raised for beef purpose and not for veal.	5.38% n = 1,502	6.19% n = 920	5.64% n = 2,479
Milk cows are allowed to interact with other animals.	5.72% n = 1,494	4.88% n = 926	5.39% n = 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

5.3.2.1 Comparison of Importance Scores by Gender

The importance score results for both males and females were found in Table 32. Also, the importance scores from the previous section for the whole survey were included for ease of comparison. The sample sizes for each gender were of sufficient size.

The order of the practices in terms of importance scores did not change from the whole survey results for males. Compared to females, the males placed a higher level of importance on responding to health problems, access to outdoors, a safe milking environment, clean bedding material and interaction with other animals. On the other hand, females were more likely to believe that growth hormones and veal production were much larger issues than males did. The importance scores for proper shelter and adequate space were also larger for females than males. In addition to these, the order of the importance score ranking for females was slightly different than males, with having no growth hormones being placed as the second most important practice for ensuring proper animal welfare for dairy cattle, dropping access to the outdoor and pasture to the third highest ranked dairy practice.

It was interesting to note that, compared to males, a much smaller percentage of females agreed that animal welfare on Canadian dairy farms was acceptable (68.6% for females compared to 82.9% for males). By looking at the importance scores for each gender, it can be seen that there were three dairy farming practices that received an importance score that was quite a bit larger for females than males. These practices included having no growth hormones (1.03% higher for females), giving cows room to turn around, walk and lie down (1.31% higher for females) and male calves being raised

for beef and not for veal (0.81% higher for females). It could be inferred that females believed that many or all of these aforementioned practices may have been lacking in Canada's dairy industry for them to have a lower level of agreement than males that animal welfare was acceptable on dairy operations. Since growth hormones are not allowed on Canadian dairy farms, it stood to reason that females likely had a lower opinion of Canadian dairy animal welfare because they believed that the animals were not being allowed to move properly or that veal production was resulting in poor animal welfare (though this practice still ranked quite low by females compared to other dairy practices).

5.3.2.2 Comparison of Importance Scores by Household Income

Table 33 revealed the importance scores for each of the annual household income level categories, as well as those of the whole survey. All income groups had providing a prompt response to all health problems as the dairy practice considered to be most important by largest proportion of the income group's population. There was, however, some variability in the magnitudes and rankings of the importance scores for the practices amongst individual income groups.

For example, in the lowest income category ($39,999 or less annual household income), a larger proportion of the participants (12.02%) felt that a safe and calm milking environment was important. This was the highest importance score that this practice received from any of the household income categories. It resulted in the participants of this income category revealing that a safe milking environment was more important than allowing the milk cows to stand up, walk and lie down, which was also contrary to each

Table 33. Comparison of importance scores by annual household income level.

	$39,999 or less	$40,000 to $69,999	$70,000 to $99,999	$100,000 to $129,999	Greater Than $130,000	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	14.33% n = 245	15.94% n = 696	16.69% n = 554	15.95% n = 401	16.48% n = 388	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.18% n = 246	13.78% n = 702	13.62% n = 547	15.20% n = 399	14.87% n = 394	14.19% n= 2,493
Milk cows are not administered growth hormones.	13.94% n = 247	13.35% n = 698	13.82% n = 552	14.01% n = 401	13.77% n = 390	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.87% n = 245	14.10% n = 697	13.01% n = 552	13.01% n = 401	13.25% n = 390	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	10.65% n = 242	11.79% n = 696	12.09% n = 543	11.27% n = 396	11.58% n = 406	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	12.02% n = 244	10.84% n = 695	10.40% n = 552	10.36% n = 401	9.94% n = 390	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	10.16% n = 245	9.62% n = 696	9.62% n = 551	8.86% n = 401	7.90% n = 389	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.76% n = 247	5.36% n = 697	6.00% n = 565	5.54% n = 405	5.78% n = 374	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.08% n = 245	5.23% n = 693	4.75% n = 560	5.79% n = 399	6.41% n = 389	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

of the other income groups, as well as, the results from the aggregate survey population. This income group also placed a slightly higher importance on having no growth hormones, providing proper shelter and not using male calves for veal production than the whole survey results. However, providing a prompt response to all health problems was given the lowest importance score of the income groups (14.33%) showing that, compared to other income groups, a comparatively small proportion of the people in the lowest income group considered this to be the most important dairy farming practice for ensuring proper animal welfare, though it still remained the highest ranked.

Those in the second lowest annual household income group ($40,000 to $69,999 annually) revealed a much higher preference for milk cows being provided with proper shelter than other income groups (14.10% compared to 13.49% for the whole survey). In fact, a higher percentage of consumers in this income category indicated proper shelter was the most important practice than both allowing animals outside and not using growth hormones. The $70,000 to $99,999 income group had the highest importance score for providing a prompt response to all health problems (16.69%), giving cows room to turn around, walk and lie down (12.09%) and not using male calves for veal (6.00%). Consumers in this income class also indicated that having no growth hormones was more important than allowing milk cows to go outside. However, only 4.75% of these respondents believed that allowing milk cows to interact with other animals was the most important for ensuring proper animal welfare, which was the lowest importance score of any income category.

Consumers that fell into the $100,000 to $129,999 annual household income group revealed that allowing the animals to go outside was of high importance (15.20%)

relative to other income classes. They also placed the highest importance of any income group on having no growth hormones (14.01%) and a higher proportion of this income group indicated that they believed animal interaction (5.79%) to be of more importance than not using male calves for veal purposes (5.54%). The highest income class ($130,000 annually or higher) placed more importance on animals interacting with each other (6.41%) than using male calves for beef instead of veal (5.78%).

Overall, there was a definite trend where the higher income consumers tended to care more about animal interaction, taking care of health issues and allowing animals to go outside. On the other hand, lower income consumers cared more about proper bedding, a safe milking environment and proper shelter. In terms of their responses to whether they believed animal welfare was acceptable on Canadian dairies, the third ($70,000 to $99,999) and fourth ($100,000 to $129,999) had slightly lower approval ratings (73.7% and 72.2%, respectively). It appeared that the third income groups may have had a lower rating because they placed a relatively higher level of importance on not having veal production than other income groups, while the fourth income group gave access to the outdoors the highest importance score of any income group. Therefore, it may have been the case that respondents in these two income groups gave current dairy animal welfare in Canada a lower approval rating because they were concerned about the use of male calves for veal production and the fact that many dairy cows were not allowed outdoors.

5.3.2.3 Comparison of Importance Scores by Province

The importance score results for each province were included in Table 34 (western provinces) and Table 35 (eastern provinces). The variations in preferences for consumers from each province were quite stark and rather interesting to examine. While examining these results, it was important to remember that 91.7% of Manitobans agreed that dairy animal welfare in Canada was acceptable, while only 69.2% from Quebec and 75.6% from British Columbia agreed with this statement. These statistics were compared to the importance scores in an attempt to discover why consumers from different provinces had different opinions on Canadian dairy animal welfare.

Starting with survey participants from British Columbia, these consumers tended to place a higher level of importance on not using male calves for veal (6.13% - second highest among the provinces), animal interaction (6.04%), allowing the animals to move around (12.00% - highest among the provinces), as well as looking after health problems, providing outdoor access and not using growth hormones, compared to the average survey participant. The reasons for British Columbia having the second lowest approval rating for Canadian dairy animal welfare appear to be centered around an above average concern over veal production and providing freedom of movement for milk cows.

Alternatively, consumers in British Columbia placed a lower level of importance on proper shelter (perhaps due to a warmer climate than say Saskatchewan or Manitoba, which generally have more severe winters), a safe milking environment and proper bedding. However, the order that these dairy production practices were ranked did not change for this province compared to the whole survey results.

Table 34. Comparison of importance scores by province (Western Canada).

	BC	AB	SK	MB	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	16.15% n = 396	16.10% n = 239	14.80% n = 71	16.68% n = 135	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.52% n = 396	13.73% n = 235	15.20% n = 75	13.67% n = 126	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.05% n = 395	14.11% n = 238	12.96% n = 69	12.19% n = 134	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	12.92% n = 397	13.83% n = 238	14.48% n = 71	15.05% n = 135	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	12.00% n = 392	11.08% n = 245	11.78% n = 74	10.64% n = 137	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	9.83% n = 393	11.64% n = 237	10.87% n = 72	10.55% n = 136	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	8.35% n = 396	10.42% n = 239	11.49% n = 72	10.55% n = 136	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	6.13% n = 402	5.40% n = 230	4.54% n = 69	5.00% n = 137	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	6.04% n = 397	3.68% n = 243	3.89% n = 69	5.67% n = 144	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

Table 35. Comparison of importance scores by province (Eastern Canada).

	ON	PQ	Maritimes	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	16.00% n = 880	16.04% n = 554	15.84% n = 172	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.25% n = 882	14.09% n = 558	14.52% n = 183	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.09% n = 883	13.47% n = 554	13.57% n = 176	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.08% n = 878	13.74% n = 556	13.78% n = 175	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	11.34% n = 891	11.99% n = 539	11.56% n = 170	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	10.98% n = 877	10.86% n = 552	9.44% n = 175	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	8.94% n = 876	9.44% n = 553	8.39% n = 173	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.59% n = 867	5.93% n = 565	7.57% n = 177	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.73% n = 878	4.43% n = 551	5.34% n = 163	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

Alberta was another province with residents that were concerned about the use of growth hormones, along with proper shelter, a safe milking environment for the cows, and clean bedding material to lay on. The order of the importance scores derived from the responses of Albertans revealed a few changes from that of the overall Canadian population. First off, they placed more importance on not having growth hormones (14.11%) and having proper shelter (13.83%) than allowing the animals outside on pasture (13.73%), which ranked ahead of those two production practices on a country-wide basis. Second, more Albertans believed that providing a safe and calm milking environment (11.64%) was more important than freedom to turn around, walk and lie down (11.08%). This province also had the lowest importance score for any practice for allowing milk cows to interact with other animals, at a mere 3.68%.

Consumers in Saskatchewan indicated a preference for allowing the animals to go outdoors and on pasture (15.20% - highest among the provinces), providing the milk cows with proper shelter (14.48% - second highest among the provinces) and providing proper bedding (11.49% - highest among the provinces). However, similar to neighbouring Alberta, there was little importance placed on using male calves for beef instead of veal and for allowing interaction between animals. Residents also placed a low level of importance on having growth no hormones (12.96% - second lowest in Canada) compared to other provinces.

Manitobans, who had the most positive view of Canadian dairy animal welfare, placed a high priority on caring for health problems (16.68% - highest in Canada) and providing proper shelter (15.05% - also the highest in Canada) but had the lowest concern over growth hormones (12.19%) of any Canadian province. Veal production also

appeared to be relatively unimportant for Manitobans, with the second lowest importance score of any province in Canada (5.00%). It appeared as if a consumer's view of veal production had a large impact on how they viewed Canadian dairy animal welfare, as provinces like Manitoba, who had residents that cared less about veal, were more inclined to have a higher opinion of dairy animal welfare compared to those that cared more about veal production (relatively speaking, as veal was still always one of the lowest rated practices in terms of importance scores).

In Ontario, respondents tended to view the use of growth hormones negatively, as 14.09% of participants (second highest in Canada) from Ontario believed having no growth hormones was most important for ensuring proper dairy animal welfare. Additionally, consumers in Ontario placed more importance on interacting with other animals than other provinces did, with participants ranking it ahead of veal production in terms of importance. Having a safe and calm milking environment was also deemed to be more important in Ontario than in other provinces. However, there was less concern for proper shelter and bedding from consumers in this province.

Quebec was another province that had a lower approval rating for Canadian dairy animal welfare. Therefore, it was not surprising that consumers from Quebec placed a higher importance on not having veal production than most consumers in other provinces. Additionally, Quebec participants indicated they were concerned about the animals being able to move around with ease. The only practice that moved up in the ranking for Quebec though was providing proper shelter, which was seen as more important than having no growth hormones.

Respondents from the Maritime provinces revealed the highest concern over veal production (7.57%), though it was still ranked as the second least important dairy production practice. There was less concern for a safe milking environment and proper bedding but providing proper shelter, as well as providing outdoor access, were seen as more important than what the average Canadian felt in this survey.

5.3.2.4 Comparison of Importance Scores by Population

Table 36 illustrated the preferences for different dairy production practices based on the responses of participants from areas with varying levels of population. A few overall trends stuck out in the results within this table. First, consumers that lived in lower population areas were more likely to reveal higher importance scores for providing a prompt response to all health problems and providing clean bedding material. Alternatively, consumers that lived higher population areas tended to care more about providing the animals with room to move around relative to those in the lower populated areas.

Looking at the individual population categories, those that lived in an area with less than 10,000 people recorded the highest importance scores of any population category for responding promptly to all health problems (16.29%), not administering growth hormones (14.88%) and providing clean bedding (10.38%). There were two changes in the order of the dairy practice ranking in comparison to the overall survey's ranking. Participants in this group chose to rank a calm milking environment as being

Table 36. Comparison of importance scores by population level.

	9,999 or less	10,000 to 49,999	50,000 to 99,999	100,000 to 499,999	Greater than 500,000	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	16.29% n = 168	16.12% n = 570	15.98% n = 365	15.76% n = 507	15.76% n = 543	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.44% n = 171	13.35% n = 570	14.35% n = 374	14.25% n = 309	14.78% n = 528	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.88% n = 166	12.91% n = 574	14.07% n = 364	13.24% n = 506	14.13% n = 543	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.04% n = 169	14.92% n = 571	13.54% n = 365	13.08% n = 507	12.87% n = 541	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	10.65% n = 155	11.80% n = 566	11.07% n = 360	12.13% n = 512	11.91% n = 542	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	10.73% n = 168	11.25% n = 572	10.15% n = 364	10.20% n = 504	10.90% n = 541	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	10.38% n = 165	9.37% n = 573	9.27% n = 365	8.99% n = 505	9.00% n = 542	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.27% n = 169	5.10% n = 579	6.64% n = 369	6.63% n = 500	5.01% n = 540	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	4.32% n = 165	5.17% n = 575	4.94% n = 356	5.72% n = 502	5.62% n = 556	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

more important than being given room to turn around, walk and lie down. Also, not using growth hormones was seen as more important than allowing animals to go outside.

The 10,000 to 49,999 population category revealed a relatively higher preference for providing proper shelter (14.92%), which made it more important than both outdoor access and growth hormone usage. Participants in this group also felt that allowing animal interaction was of more importance than not having veal production. The third population group (50,000 to 99,999) had the same ranking order as the overall survey but placed a relatively high importance level on not using male calves for veal production (6.64% - highest of these categories).

The fourth population category (100,000 to 499,999) also placed a comparatively high level of importance on using male calves for beef instead of veal (6.63%). Additionally, they had the highest importance score for allowing animals to turn around, walk and lie down (12.13%), though, similar to the third population category, the order in which they ranked these practices remained the same as the overall survey ranking.

The final population category (over 500,000) indicated that 14.78% of its respondents believed that providing milk cows with time outdoors and grazing access to be most important, which was the highest importance score that this practice received. Allowing animals freedom of movement was seen as quite important (11.91%), as well as not administering growth hormones (14.13%). However, the only change in the order of the production practices came at the bottom of the ranking with allowing animal interaction being seen as most important by more of that category's population than not allowing male calves to be used for veal production.

Table 37. Comparison of importance scores by year of birth.

	1979 or later	1969 to 1978	1959 to 1968	1949 to 1958	1948 or earlier	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	17.31% n = 116	16.21% n = 270	14.86% n = 496	16.56% n = 630	15.98% n = 830	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	13.20% n = 120	14.49% n = 279	15.14% n = 493	13.98% n = 635	13.87% n = 825	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.81% n = 116	13.66% n = 270	13.94% n = 494	14.02% n = 636	13.33% n = 827	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	12.80% n = 115	13.55% n = 269	12.82% n = 497	13.23% n = 632	14.15% n = 832	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	11.15% n = 116	12.68% n = 261	11.97% n = 499	11.31% n = 643	11.30% n = 826	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	10.00% n = 116	10.24% n = 269	10.52% n = 498	11.07% n = 631	10.77% n = 825	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	9.03% n = 116	8.09% n = 269	8.96% n = 498	8.89% n = 630	10.08% n = 827	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.72% n = 113	4.68% n = 280	5.82% n = 492	5.68% n = 627	5.76% n = 826	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.97% n = 112	6.38% n = 261	5.96% n = 503	5.30% n = 630	4.75% n = 832	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

5.3.2.5 Comparison of Importance Scores by Participant Age

The importance score results for survey participants born in five different ranges of birth years were presented in Table 37. A brief overview of these results showed that younger consumers tended to place comparatively more importance on allowing milk cows to interact with other animals than older individuals, whereas older consumers tended to place relatively more importance on having a safe milking environment for the cows. However, due to the fact that there were a greater number of older consumers than younger consumers in this study, it was important to look at the individual preferences of each individual age bracket.

When examining the importance scores of individual age brackets, the youngest group of consumers (born 1979 or later) had the highest importance scores of any age bracket for providing milk cows with a prompt response to all health problems (17.31%) and not allowing growth hormones (14.81%), while also placing a relatively high level of importance on allowing animal interaction and not using male calves for veal. On the other hand, compared to other age groups, outdoor access, proper shelter, a safe milking environment and enough space to move around were seen as less important by this age bracket. In contrast to the whole survey's importance score ranking, the 1979 or later age group placed more importance on animal interaction than not using male calves for veal production and also, growth hormones were viewed as a bigger issue than outdoor access for the milk cows. This age bracket also had the lowest level of agreement (57.8%) pertaining to the current acceptability of Canadian dairy animal welfare compared to other age groups. The practices indicated as being relatively more important to respondents in this age group showed that fewer of them believed animal welfare was

acceptable in Canada due to a belief that either health problems were not being treated immediately or a belief that growth hormones were actually being used on dairy farms.

The second youngest age bracket (born from 1969 to 1978) had relatively high importance scores for allowing milk cows to have outdoor and pasture access (14.49%) and providing milk cows with room to turn around, walk and lie down (12.68%). Another practice that was seen as more important relative to other age brackets was allowing animals to interact with each other (6.38%), which resulted in this practice being ranked as more important than not using male calves for veal, which was given the lowest importance score of any age group at 4.68%. There were no other changes in the order of the perceived importance of these dairy farming practices by the 1969 to 1978 age bracket compared to the overall survey ranking.

The next age bracket (born 1959 to 1968) also ranked animal interaction (5.96%) as being more important for ensuring proper animal welfare than not using male calves for veal (5.82%), though both of these importance scores were higher than most other age groups. Additionally, allowing cows to spend time outdoors grazing, with an importance score of 15.14%, was seen as more important by respondents in this age bracket than providing a prompt response to all health problems. Likewise, providing proper shelter (12.82%) was seen as comparatively less important by participants from this age group than the views of the average survey respondent (13.49%).

The fourth age group included those participants that were born between 1949 and 1958. The only change in the ranking of dairy practices from that of the whole survey population came from growth hormones being seen as more important (14.02%) than

allowing cows outside and on pasture (13.98%), though these importance scores were quite close in magnitude. This group did have relatively high preferences for responding to health problems (16.56%) and providing a safe milking environment (11.07%) compared to other age brackets.

The oldest consumers (those born in 1948 or earlier) made up the largest proportion of the survey population and therefore, their results had a large impact on the final importance scores. As a group, they believed that offering proper shelter was very important for ensuring proper dairy animal welfare, with an importance score of 14.15%. This ranked this practice as second most important, behind only providing a prompt response to all health problems and ahead of both outdoor access and not using growth hormones. Also, they were the only age bracket to have an importance score above ten percent (10.08%) for providing clean bedding to milk cows.

5.3.2.6 Comparison of Importance Scores by Education Level

Table 38 illustrated the responses of consumers to the pair wise comparison question based on the highest level of education that they had obtained. In general, participants that were higher educated tended to place more importance on allowing the milk cows to go outside, not allowing the use of growth hormones, and not using male calves for veal production than those that had a lower level of education. Alternatively, participants that had received a lower level of education were more likely to place a comparatively greater level of importance on having a safe and calm milking environment and providing proper shelter.

Table 38. Comparison of importance scores by education level.

	No High School	High School	Some University/ College/ Trade	Complete University/ College/ Trade	Grad School	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	16.10% n = 105	14.96% n = 323	16.74% n = 334	16.06% n= 1,353	16.51% n = 296	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	12.92% n = 105	13.94% n = 329	13.67% n = 329	14.39% n= 1,365	14.80% n = 294	14.19% n= 2,493
Milk cows are not administered growth hormones.	11.02% n = 105	12.95% n = 325	13.67% n = 336	14.27% n= 1,353	13.16% n = 297	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	14.06% n = 106	14.57% n = 327	13.32% n = 333	13.10% n= 1,355	13.88% n = 296	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	10.50% n = 108	12.41% n = 330	10.17% n = 325	11.75% n= 1,355	11.21% n = 299	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	13.43% n = 306	12.53% n = 325	11.19% n = 331	10.17% n= 1,351	9.38% n = 296	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	12.80% n = 106	8.51% n = 327	9.19% n = 333	9.31% n= 1,350	8.52% n = 297	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.02% n = 102	4.54% n = 319	6.51% n = 341	5.69% n= 1,352	6.04% n = 294	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	4.16% n = 107	5.58% n = 323	5.51% n = 338	5.25% n= 1,342	6.49% n = 301	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

Participants that did not complete high school revealed very interesting importance scores that ran somewhat contrary to those of other groups in this research. While the most important practice remained providing a prompt response to all health problems, providing proper shelter ranked second (14.06%) as opposed to fourth for the whole survey population. Likewise, a safe and calm milking environment was ranked third most important (13.43%) compared to sixth for the whole survey population and clean bedding material ranked fifth (12.80%), just behind allowing the animals access to the outdoors and grazing, which was previously ranked second. Not administering growth hormones was ranked substantially lower (11.02% for sixth) than its position as the third most important practice for the whole survey population.

There was similar variability in the second education category, which included those that had completed high school. Like the first category, these participants placed a relatively high level of importance on providing proper shelter (14.57%) and ranked it as the second most important practice for ensuring proper dairy animal welfare. Similarly, a safe milking environment was seen as more important than allowing the animals to move around with ease. However, unlike the previous category, providing proper bedding was seen as being relatively unimportant (8.51%).

The three higher level of education categories revealed significantly less variability among the ordering of the dairy production practices compared to the first pair of categories. The few changes included valuing outdoor access and growth hormones as equals by the third education category (completed some, but not all, of a post secondary program). Also, proper shelter was ranked as being more important than not using growth hormones by the highest education category (completed a Master's degree or Ph.D.).

This category also ranked allowing animal interaction as being more important than not using male calves for veal production. Only 63.7% of the highest level of education category agreed that animal welfare on Canadian dairy farms was acceptable. The reasons for this appeared to be centered around a heightened concern for allowing cows to go outside over other education groups, as well as concern of treatment of health problems and providing the opportunity for cows to interact with other animals. This group also placed a comparatively high level of importance on not using male calves for veal.

5.3.2.7 Comparison of Importance Scores by Farming Background and Experience

In Table 39, the importance score results were presented for various categories of agricultural backgrounds, consumption and experiences. These aimed to discover whether consumers who had experience with dairy farming were more or less likely to place importance on certain dairy farming practices than other participants in this study. It should be pointed out that the last category included in Table 39 had some practices that received less than 30 observations for creating its importance score.

Participants that were involved, or had family involved, in agriculture tended to place more importance on providing proper shelter (13.85%), which ranked it as the second most important practice. Also, a safe and calm milking environment and providing clean bedding were seen as more important than allowing the animals to have freedom of movement. Alternatively, participants that were involved, or had family involved, in dairy farming placed relatively low importance (11.71%) on not using growth hormones, ranking this practice as only the sixth most important dairy practice.

Table 39. Comparison of importance scores by backgrounds and consumption.

	They or family in agric.	They or family in dairy	Have visited a dairy	Consume dairy products	Does not consume dairy**	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	15.07% n = 238	14.50% n = 40	16.26% n= 1,639	16.03% n= 2,410	18.20% n = 32	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	13.84% n = 243	13.98% n = 40	14.11% n= 1,649	14.20% n= 2,414	16.00% n = 35	14.19% n= 2,493
Milk cows are not administered growth hormones.	13.23% n = 239	11.71% n = 40	13.79% n= 1,642	13.76% n= 2,412	11.20% n = 32	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.85% n = 238	13.38% n = 40	13.46% n= 1,642	13.45% n= 2,414	14.70% n = 32	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	10.68% n = 242	11.15% n = 42	10.88% n= 1,656	11.54% n= 2,416	8.67% n = 31	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	11.32% n = 238	12.82% n = 40	10.81% n= 1,638	10.65% n= 2,407	11.90% n = 32	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	11.00% n = 237	12.82% n = 40	9.75% n= 1,635	9.30% n= 2,409	8.40% n = 32	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	5.50% n = 235	4.11% n = 38	5.68% n= 1,625	5.67% n= 2,406	4.75% n = 33	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.52% n = 234	5.58% n = 40	5.25% n= 1,634	5.42% n= 2,414	6.18% n = 29	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice) **indicated less than 30 observations for some practices

Veal production was also seen as quite unimportant, with an importance score of only 4.11%, while proper bedding and a safe milking environment were again viewed as relatively more important than they were by the average Canadian.

Respondents that had previously visited a dairy farm revealed importance scores that were remarkably similar to that of the overall survey population, with responding to health problems given a slightly higher importance score and room to turn around, walk and lie down given a slightly lower importance. Perhaps these consumers saw first hand how animals that were tied in a stall were treated and because of this, any concerns that they may have had were lessened.

Seeing as over ninety eight percent of the survey participants consumed dairy products, it was not surprising that the results for this category were extremely similar to those of the whole survey population. However, those that indicated that they did not consume dairy products provided a few interesting results. Over eighteen percent of participants in this category believed that providing a prompt response to all health problems was the most important dairy practice for ensuring proper animal welfare, while exactly sixteen percent believed providing outdoor access to be most important. This group of consumers was less concerned about growth hormones and veal production than the average survey participant, which was a slightly surprising result seeing as many previous groups that revealed a comparatively low view of Canadian dairy animal welfare tended to place higher levels of importance on not using male calves for veal. Perhaps the participants that did not consume dairy chose to do so for reasons other than animal welfare concerns.

Table 40. Comparison of importance scores by animal welfare experience (part one)

	Purchase animal welfare friendly products	Boycott products due to animal welfare concerns	Have donated to animal welfare organizations	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	15.96% n = 1,470	15.56% n = 1,011	15.91% n = 486	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.43% n = 1,495	14.74% n = 1,022	14.32% n = 492	14.19% n= 2,493
Milk cows are not administered growth hormones.	13.73% n = 1,477	13.96% n = 1,014	12.77% n = 489	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.33% n = 1,472	12.32% n = 1,015	13.07% n = 488	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	11.66% n = 1,483	11.89% n = 1,031	13.12% n = 481	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	10.52% n = 1,471	9.73% n = 1,011	9.56% n = 486	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	8.68% n = 1,471	8.44% n = 1,012	8.08% n = 487	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	6.21% n = 1,465	7.70% n = 997	7.93% n = 496	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.48% n = 1,454	5.65% n = 1,005	5.25% n = 483	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

Table 41. Comparison of importance scores by animal welfare experience (part two)

	Vegan or vegetarian	Volunteer for animal welfare groups	Read labels for animal welfare assurances	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	15.63% n = 80	16.59% n = 209	15.08% n = 901	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	13.50% n = 86	15.03% n = 207	14.73% n = 921	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.52% n = 80	12.19% n = 206	13.73% n = 913	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	11.31% n = 81	13.02% n = 210	12.36% n = 906	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	11.43% n = 84	12.25% n = 205	12.22% n = 926	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	9.49% n = 80	9.28% n = 206	10.13% n = 906	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	8.55% n = 81	7.91% n = 208	8.56% n = 905	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	8.12% n = 77	7.12% n = 209	7.26% n = 890	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	7.44% n = 75	6.62% n = 208	5.93% n = 894	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

5.3.2.8 Comparison of Importance Scores by Animal Welfare Experience

Tables 40 and 41 included the importance scores results of survey participants that had varying experiences with respect to animal welfare products and organizations. The first group included participants that had purchased a good or product with animal welfare friendly characteristics. While the order of the dairy practices for this group were the same as that of the whole survey, they did tend to reveal a higher importance score (14.43%) on allowing the animals to go outside and graze on pasture and not using male calves for veal production (6.21%) than the whole survey population. A similar situation was seen for consumers that boycotted products due to animal welfare concerns. Again, the order was the same but outdoor access (14.74%) and veal production (7.70%) were rated much higher than that of the overall survey population.

There was a slightly different preference among respondents that donated to animal welfare organizations. While outdoor access and veal production also received higher than average importance scores, this category ranked the ability to move around and providing proper shelter, in that order, as being more important than not administering growth hormones. This result was slightly surprising because growth hormones and veal production were usually seen as the larger animal welfare issues associated with the dairy industry and therefore, consumers that had experience with animal welfare products and organizations should have been more likely to know about these perceived issues and thus, placed more importance on them. This expectation was met in the vegan/vegetarian category, where not using growth hormones ranked as the second most important dairy practice at 14.52% and not using male calves for veal received an importance score of 8.12%.

Respondents that volunteered for animal welfare groups placed much more importance on going outdoors (15.03%) than not using growth hormones (12.19%), which was a little unexpected. Again, not using males for veal production ranked high (7.12%) compared to the whole survey population but was not placed any higher in the ranking of production practices. Consumers that read labels for assurances of animal welfare revealed the same ordering of the dairy practices as the whole survey population and, similar to other animal welfare experience categories, placed a relatively high level of importance, 7.26%, on veal production. It was interesting to note that, although consumers in these categories obviously believed that male calves should not be used for veal, they placed relatively little importance on this practice compared to other dairy practices and no category had it ranked higher than the eighth most important (or second least important) dairy practice for ensuring proper animal welfare on dairy farms.

5.3.2.9 Comparison of Importance Scores by Willingness to Pay Decision

In Table 42, the importance scores for respondents that indicated that they would or would not purchase animal welfare friendly milk were displayed. It was important to remember that not all participants answered this question. Therefore, this may have affected the cumulative sample sizes and importance scores for these two categories.

The order of the dairy practices of those that would purchase this product was the exact same as the overall survey ranking. However, those that would not purchase this product had proper shelter as being more important than both outdoor access and not using growth hormones. Also, having a safe and calm milking environment was seen as

Table 42. Comparison of importance scores by willingness to pay decision.

	Would pay for improved dairy animal welfare.	Would not pay for improved dairy animal welfare.	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	15.89% n = 1,897	16.54% n = 498	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.44% n = 1,903	13.57% n = 496	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.06% n = 1,905	12.43% n = 495	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	13.24% n = 1,901	14.20% n = 499	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	11.65% n = 1,912	10.77% n = 491	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	10.19% n = 1,896	12.29% n = 497	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	8.74% n = 1,897	11.28% n = 498	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	6.16% n = 1,888	3.86% n = 500	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	5.62% n = 1,899	5.06% n = 500	5.39% n= 2,484

(n represents the number of times a participant was given a pair that contained that specific farming practice)

more important than giving cows room to turn around, walk and lie down, while allowing animal interaction was given more importance than not using male calves for veal.

In terms of comparing these two categories of consumers, it was evident that those that would purchase animal welfare friendly milk put relatively more importance on the same practices as previous demographic groups that revealed a higher concern for animal welfare. These practices included outdoor access, growth hormones and veal production. The importance scores for each of these practices were quite a bit higher for those that would purchase the animal welfare friendly milk product than those that would not, indicating that they were more concerned about dairy animal welfare.

5.3.3 Comparing Importance Scores by Opinion on Canadian Dairy Animal Welfare

Table 43 illustrated one final way to examine the dairy production practice importance score results. Reported in this table were the importance scores of participants that responded with one of the five levels of agreement to the third animal welfare statement: "I believe animal welfare on Canadian dairy farms is acceptable". This section analyzed the trends that were present for certain practices based on whether the respondents agreed or disagreed with this animal welfare statement, as well as whether those that agreed or disagreed had different rankings for the order of the dairy production practices in terms of their importance for providing proper animal welfare.

In general, there was a definite trend in the importance scores for providing cows with a prompt response to all health problems that showed an increase in the magnitude of the importance score as the level of agreement increases with the statement. That is to

Table 43. Comparing importance scores by view of Canadian dairy animal welfare.

	Strongly disagree (#1)	Disagree (#2)	Neutral (#3)	Agree (#4)	Strongly agree (#5)	Whole Survey
Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.	12.46% n = 71	14.38% n = 268	15.99% n = 885	16.46% n= 1,043	17.13% n = 196	16.01% n= 2,480
Milk cows are provided with time outdoors and access to grazing.	14.20% n = 67	15.51% n = 280	14.71% n = 891	13.65% n= 1,028	12.97% n = 192	14.19% n= 2,493
Milk cows are not administered growth hormones.	14.44% n = 72	12.67% n = 269	13.41% n = 899	14.34% n= 1,033	13.07% n = 194	13.75% n= 2,485
Milk cows are provided with proper shelter that offers protection from severe weather.	10.14% n = 72	12.87% n = 270	13.59% n = 887	13.73% n= 1,033	14.14% n = 195	13.49% n= 2,486
Milk cows are always given room to turn around, walk and lie down.	14.54% n = 70	12.93% n = 267	11.60% n = 892	10.85% n= 1,027	11.06% n = 203	11.55% n= 2,495
Milk cows are milked in a safe and calm environment.	8.72% n = 71	9.32% n = 270	10.15% n = 881	11.65% n= 1,033	11.12% n = 196	10.71% n= 2,479
Milk cows are provided with clean bedding material to lay on.	7.79% n = 71	9.44% n = 269	8.52% n = 885	9.59% n= 1,033	11.29% n = 195	9.26% n= 2,481
Male calves are raised for beef purpose and not for veal.	11.21% n = 73	7.07% n = 274	5.94% n = 877	5.08% n= 1,035	3.77% n = 189	5.64% n= 2,479
Milk cows are allowed to interact with other animals.	6.49% n = 75	5.80% n = 261	6.10% n = 883	4.64% n= 1,043	5.45% n = 200	5.39% n= 2,484

say, consumers that agreed that dairy animal welfare was acceptable in Canada placed more importance on this production practice than those that disagreed with the above statement. Alternatively, participants that disagreed with this statement placed more importance on allowing the milk cows to graze on pasture than those that agreed.

As the level of agreement with the acceptability of Canadian dairy animal welfare rose, the importance scores for providing milk cows with proper shelter, a safe and calm milking environment and providing them with proper bedding consistently rose, as well. Meanwhile, those that held a lesser view of Canadian dairy animal welfare placed more importance on allowing the animals to turn around, walk and lie down, as well as interacting with other animals. They also reported a much higher level of importance for not using male calves for veal than those that agreed that Canadian dairy animal welfare was acceptable.

Looking at these trends, it could be concluded that the reasons that some consumers disagreed with the notion that animal welfare was acceptable on Canadian dairy farms was due to the fact that they were against certain practices, such as veal production, restricting animal movement and not allowing animals to go outdoors. These practices received comparatively lower importance scores by consumers that believed Canadian dairy animal welfare was acceptable, which meant that this segment of the population (which outnumbered those that disagreed by a margin of 3:1) placed considerably less importance on these practices. Instead, they were more likely to believe that treating health problems, providing proper shelter and bedding, as well as a safe milking environment, were more important than those that disagreed with the third animal welfare statement.

One practice where the trend in importance scores was inconclusive was that of not allowing the use of growth hormones. While there were some categories of consumers that placed a higher level of importance on this practice than others, they did not consistently rise or fall with the level of agreement with the third animal welfare statement. It should be pointed out that the highest importance score for not using growth hormones was seen among the category of consumers that strongly disagreed that Canadian dairy animal welfare was acceptable.

Looking at the order of the importance scores for those that strongly disagreed, it was interesting to see that not using male calves for veal production ranked as the fifth most important dairy production practice by this group. This result was noteworthy because in all the other demographic rankings that were previously examined, this practice always ranked near the bottom and never rose above the eighth most important practice. This ranking then showed that consumers in this category placed a much higher level of importance and concern on this production practice than other participants.

5.4 Willingness to Pay for Animal Welfare Friendly Milk Results

This next section explored the results of the last segment of the survey instrument, which asked participants whether they were willing to purchase milk that had been certified to have been produced using animal welfare friendly production practices. The participants were told that the practices that were certified to have been used were the ones utilized in the pairing question earlier in the survey. A list of these dairy practices was also provided in the information sheet (seen in Appendix B). This question was then followed up by asking the participants to choose a premium that they would be willing to pay from five

Table 44. Willingness to pay premiums for animal welfare certified milk.

	0% Premium 1	10% Premium 2	25% Premium 3	50% Premium 4	100% Premium 5	Total that would purchase
WTP for milk certified to have been produced using animal welfare friendly production practices:	19.71% 191	52.22% 506	21.05% 204	3.61% 35	3.41% 33	971* out of 1222 (79.46%)

*Two of the respondents that indicated they would purchase animal welfare friendly milk did not indicate a premium level and therefore, while a total of 971 indicated they would purchase the product, only 969 responses were shown for the individual premium levels.

choices that were provided: 0% (the same price as the current, conventional milk), 10%, 25%, 50% and 100%. The tabulated responses for each of these two questions were displayed in Table 44.

Out of the 1,222 participants that chose to respond to the first question (Would they be willing to purchase this product?), a total of 971 indicated that they were willing to purchase the animal welfare certified milk. This corresponded to just under eighty percent (79.46%) of those that answer this question, indicating there was a large amount of support amongst consumers for animal welfare certified milk. Caution must be taken when interpreting these results, however, due to the fact that this was a hypothetical purchase question and the participants did not have to actually purchase the product or make any form of payment. Therefore, the results may not have been completely accurate due to social desirability bias (Olynk et al 2010).

Of the 971 respondents that indicated they were willing to purchase the animal welfare certified milk, 969 chose a premium level that they would be willing to pay in

order to buy this product. A total of 191 participants (19.71%) said that they would not pay any more than they currently did for milk. The other 778 participants (80.29%) chose a premium of at least ten percent. This corresponded to 63.67% of all 1,222 participants that chose to respond to the first question (whether or not they would purchase animal welfare friendly milk) indicating that they would purchase this milk and pay at least a ten percent premium level. The premium that received the most support was the ten percent premium level, chosen by 52.22% of those that were willing to purchase this milk product. The twenty five percent premium level was chosen second most frequently at 21.05%. The higher premium levels of fifty and one hundred percent were chosen relatively less frequently by consumers, at 3.61% and 3.41%, respectively. However, according to Olynk et al (2010), these premium choices were likely grossly overestimated and, in a real shopping situation, unlikely to actually be paid by these consumers.

While the results found in this study seemed quite high, they compared favourably to at least one previous study. While around eighty percent of Canadian consumers in this survey indicated that they would purchase the product and 63.67% would pay some sort of premium in this survey, a study of Greek consumers saw 79.25% of respondents indicate they would purchase a new animal welfare friendly milk product in Tsakiridou et al (2010) and 63.58% said they would still purchase the same product if they had to pay a premium.

One common comment that would be left on the survey by some consumers was that some participants were unsure whether they would purchase the animal welfare certified milk product and that their decision would be dependent on what type of agent was carrying out the certification. Future research could look at which agent, whether it

would be by producers, government or a consumer group, was most supported by consumers and would result in them trusting the certification process enough in order to purchase the animal welfare friendly product.

5.4.1 Willingness to Purchase Decision Logistic Regression

The results in Table 45 revealed the logit regression values for the decision on whether or not participants were willing to purchase the animal welfare certified milk product. In addition to the intercept coefficient, which was statistically significant at the five percent level and had a negative sign associated with it, there were five other statistically significant demographic variables at this level.

The first of these demographic categories that was statistically significant at the five percent level was that of participants that were employed in, or had family employed in, an agricultural industry. The sign on the coefficient of this variable was negative, which indicated that participants in this category were less willing to purchase animal welfare friendly milk than those that were not in this category. Interestingly, respondents that consumed dairy were more likely to say that they would purchase this milk product. This result revealed that there was apparently a high demand among survey participants, as most of those that took part in this study consumed dairy products, for animal welfare certified milk. However, due to the hypothetical nature of this question, it was quite difficult to determine whether these participants would actually want to purchase this milk product in a real life scenario.

Table 45. Logit regression results for willingness to pay decision.

	Would you pay for milk certified to have been produced using the nine animal welfare friendly dairy farming practices?
Intercept	**-3.935 (1.025)
Female	0.346 (0.224)
$40,000-$69,999	0.494 (0.327)
$70,000-$99,999	0.102 (0.355)
$100,000-$129,999	0.264 (0.379)
Above $130,000	*0.643 (0.388)
British Columbia	-0.092 (0.473)
Alberta	-0.070 (0.461)
Saskatchewan	0.543 (0.753)
Ontario	0.509 (0.417)
Quebec	*0.804 (0.444)
Maritimes	0.743 (0.562)
Pop 10,000-49,999	0.357 (0.368)
Pop 50,000-99,999	0.113 (0.398)
Pop 100,000-499,999	0.292 (0.385)
Pop above 500,000	0.234 (0.379)
Born 1969-1978	-0.029 (0.558)
Born 1959-1968	-0.311 (0.525)
Born 1949-1958	0.003 (0.530)
Born 1948 or earlier	-0.763 (0.519)
High school	0.333 (0.478)
Some post secondary	*0.996 (0.518)
Complete post second	0.322 (0.449)
Complete grad school	0.221 (0.523)
In agriculture	**-0.766 (0.327)
In dairy farming	0.974 (0.741)
Visited a dairy farm	-0.268 (0.220)
Consume dairy	**3.488 (0.718)
Purchase animal welfare (AW) goods	*0.395 (0.211)
Boycott due to AW concerns	**1.590 (0.303)
Donate to AW groups	**0.787 (0.364)
Vegan/Vegetarian	0.230 (0.671)
AW group volunteer	0.201 (0.429)
Read labels for AW	**0.918 (0.283)

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

A number of animal welfare associated demographic categories also had statistically significant and positive coefficients. These included those that boycotted animal products due to animal welfare concerns, donated to animal welfare groups and those that read labels for animal welfare assurances. None of these categories were particularly unexpected because these same groups indicated a desire for improved animal welfare earlier in this research. In other words, it was expected that people who read labels for animal welfare assurances would be more likely to buy this product.

5.4.2 Willingness to Pay Premium Ordered Logistic Regression

Table 46 contained the results of the ordered logistic regression carried out on the WTP premium levels. There were a total of six demographic categories that were statistically significant at the five percent level in this model. This meant that consumers in these demographic categories were more likely to choose a higher (if positive) or lower (if negative) premium level than the other demographic categories. A special note of these variables was made in Table 46.

The coefficient estimate for the female gender category was both positive and statistically significant at this level, meaning that females were more likely than males to pay a higher premium for animal welfare certified milk. Likewise, those participants that had completed graduate school (either a Master's degree or a Ph.D.) tended to indicate that they would pay a higher premium for this milk product, as well.

There were also four animal welfare experience categories that were both positive and statistically significant at the five percent level, indicating that participants in these categories were willing to pay a higher premium level than others. These categories

included those respondents that boycotted animal products due to animal welfare concerns, those that donated to animal welfare organizations, those that were either a vegan or a vegetarian, as well as participants that read product labeling for assurances of proper animal welfare practices.

Table 46. Ordered logit regression results for willingness to pay premium levels.

	What premium would you pay for milk certified to have been produced using the nine animal welfare friendly dairy farming practices?
Intercept	*1.780 (1.064)
Female	**0.436 (0.164)
$40,000-$69,999	-0.372 (0.284)
$70,000-$99,999	-0.028 (0.302)
$100,000-$129,999	0.255 (0.318)
Above $130,000	0.105 (0.318)
British Columbia	-0.019 (0.434)
Alberta	0.506 (0.445)
Saskatchewan	-0.770 (0.671)
Ontario	0.007 (0.396)
Quebec	-0.104 (0.407)
Maritimes	-0.183 (0.472)
Pop 10,000-49,999	0.109 (0.316)
Pop 50,000-99,999	-0.121 (0.347)
Pop 100,000-499,999	0.075 (0.326)
Pop above 500,000	0.046 (0.329)
Born 1969-1978	0.123 (0.394)
Born 1959-1968	-0.031 (0.373)
Born 1949-1958	-0.088 (0.369)
Born 1948 or earlier	0.052 (0.373)
High school	0.459 (0.505)
Some post secondary	0.732 (0.505)
Complete post second	0.326 (0.475)
Complete grad school	**1.112 (0.508)
In agriculture	0.408 (0.308)
In dairy farming	0.165 (0.699)
Visited a dairy farm	*-0.281 (0.163)
Consume dairy	-1.131 (0.800)
Purchase animal welfare (AW) goods	-0.209 (0.194)
Boycott due to AW concerns	**0.743 (0.187)
Donate to AW groups	**0.373 (0.187)
Vegan/Vegetarian	**0.907 (0.367)
AW group volunteer	0.051 (0.265)
Read labels for AW	**0.718 (0.185)
0% Premium (= 0)	$X < 0$
10% Premium (= 1)	$0 < X < 2.848$
25% Premium (= 2)	$2.848 < X < 4.751$
50% Premium (= 3)	$4.751 < X < 5.582$
100% Premium (= 4)	$X > 5.582$

Indicated are the results that are statistically significant at the 5% (**) and 10% (*) levels.

Chapter 6: Conclusions

6.1 Summary of Findings

This research focused on the issue of discovering how Canadian consumers felt about animal welfare and the Canadian dairy industry. It utilized a mail survey of 5,000 Canadian consumers across the ten Canadian provinces. In total, 1,268 surveys were completed in some manner and sent back to be included in the final results.

This research discovered that Canadians believed animal welfare to be quite important, however, when compared to having low milk prices, they put relatively less importance on the issue of dairy animal welfare. This was particularly evident when 72.32% of survey respondents indicated that the average Canadian believed animal welfare was important but only 39.71% thought that the average Canadian believed dairy animal welfare to be of more importance than having low milk prices.

When looking at only the responses of participants that either agreed or disagreed with the animal welfare statements, it was evident that a large majority of Canadians viewed dairy animal welfare in Canada positively, with 77.69% of respondents agreeing that Canadian dairy animal welfare was acceptable. Furthermore, survey participants agreed that Canadian dairy animal welfare was superior to that in the United States, as well as that of the Canadian hog, poultry and beef industries by a 3:1 margin.

High importance was placed on identifying and caring for health problems in dairy cows by Canadian consumers, with allowing the milk cows to go outdoors and on pasture and not using growth hormones also being seen as quite important for ensuring proper animal welfare. Most participants did not feel that banning veal production or

allowing milk cows to interact with other animals was all that important for ensuring proper animal welfare for Canadian dairy cows. However, a few of the categories of consumers that had experience with animal welfare groups or products tended to voice a larger concern for veal production. Adding to that, participants that did not believe animal welfare was acceptable on Canadian dairies provided higher importance scores for not allowing veal production and allowing the animals to go outdoors than other respondents in this study. Therefore, it appeared that these would seem to be the reasons for why this small group of consumers disagreed with the acceptability of Canadian dairy animal welfare.

When the survey participants were asked whether they would be willing to purchase an animal welfare friendly milk product that had been certified to have been produced using all of the production practices outlined in the information sheet, a large majority (79.46%) revealed that they would purchase this product. This illustrated a rather high demand for milk with animal welfare characteristics. Further proving that these animal welfare characteristics had value, of the participants that indicated they would purchase this milk, 80.29% of them divulged that they were willing to pay some form (at least 10%) of a premium for this milk. However, since this was a hypothetical WTP question, the results were likely overstated and further research will need to be carried out in order to come up with a more reliable and accurate estimation of Canadian consumer WTP for animal welfare certified milk.

One interesting note that many participants felt the need to leave somewhere on the survey instrument was that they did look for assurances of animal welfare on animal products but that these could usually not be found. Perhaps this indicated that there was a

sizable concern among Canadian consumers over the well being of farm animals but that retailers were not providing them with the information that they desired.

One take away from this research could be centered around the fact that Canadian consumers have indicated that they do actually care about how dairy animals are treated. This was illustrated by over 96% of survey respondents indicating that animal welfare was important to them. This result showed that Canadians do care about dairy animal welfare and that those working in the industry need to ensure that dairy cows are cared for properly and find a way to show consumers that this is the case.

6.2 Limitations

While the response rate was close to twenty seven percent and the returned surveys were, for the most part, fully completed, there were also some instances where this research could have been better and therefore, provided more accurate and useful results. This section examined the limitations that were present in this study and leads into the suggestions for what could have been done differently and the possibilities for further future research.

One limitation present in this study was the fact that only Canadians that could speak English were questioned for this research survey. This may not have been that large of an issue in most provinces, however, in Quebec, where a large part of the population spoke French, the survey population may not have been representative of that province's actual population. In order to receive responses from a sample population that was truly representative of the Canadian population, the survey should have been sent out in both French and English. Another limitation that was perhaps unexpected and may

have been partly due to the all-English mailing list was the fact that the survey population was not very ethnically diverse and therefore not representative of the Canadian population.

The mailing list may have been quite old and outdated due to the fact that the sample population included a much larger proportion of older Canadians than the actual population. Additionally, there were many survey packages that were returned uncompleted because the intended recipient was deceased. This further caused the survey population to be unrepresentative based on the largely skewed age distribution of the respondents. The mailing list also contained a much larger number of male respondents than female respondents, causing males to outnumber females in this study by a margin of almost 2:1.

Due to space limitations in the survey instrument brought on by postage costs, the WTP question utilized in this research was quite simple and the information gathered from it may not have been all that reliable. Case in point, according to Carlberg and Froehlich (2011), even when a cheap talk script was included with a WTP question, the valuation responses were still much larger (over estimated) than they would have been in a real market setting. To do a better job of this, a more complex written WTP question, such as a choice experiment, or an in person interview, using an experimental auction, should have been used to receive better data.

The type of survey used in this research, specifically mail surveys, was not without weaknesses. While the mail survey worked well enough for this study and had many positive aspects in terms of providing written questions and receiving a strong

response rate, these types of surveys also presented several challenges that were difficult to overcome and may have reduced the overall effectiveness of the survey. The previously mentioned space limitation due to weight restrictions on single postage stamped envelopes resulted in a very condensed survey instrument that did not provide much room for instructions, additional questions or space for participants to leave written comments or explanations for their responses. Having the respondents provide explanations to their responses would have made figuring out why they answered certain questions the way they did a much easier task. For example, why did certain participants not agree that dairy animal welfare was acceptable? The responses to these would have been quite enlightening. These limitations would have all been lessened with the use of an online survey, though the response rate for older consumers likely would have suffered. Also, the amount of time that it took for the surveys to be sent to and from the participants meant that some surveys were being received four months after the initial send out period.

Some survey recipients thought that certain parts of the survey instrument, especially the pair wise comparison questions, were quite complex and extremely difficult to fill out. This may have reduced the response rate or resulted in the participants giving up and not properly thinking the questions through. Perhaps fewer pair wise comparison questions should have been included in order to reduce the mental stress of filling out the survey. Likewise, for the Likert scale questions, many participants likely indicated that they were "neutral" when they did not know how they felt. Perhaps it would have been more proper to provide a "I don't know" response to separate these responses from the neutral participants.

Some respondents seem to have read the comparison questions to other livestock sectors as saying that dairy animal welfare was *more important* than those industries, rather than the intended meaning of that dairy cattle were *provided with better care* than those livestock. This may have resulted in some participants answering the question incorrectly due to them misunderstanding the meaning of the question. This was likely a weakness caused by space limitations and using a mail survey rather than a survey type where the respondent was conversing with the researcher (ie telephone, in-person, etc.).

A surprisingly large number of people indicated they had visited a dairy farm before. This in itself may not have been a limitation, however, when one respondent noted that it had been 70 years since they had visited one, perhaps the question should have asked if it was in the last five years so then the participants would have been indicating that they had recent knowledge of animal care on dairy operations.

It would have been interesting to change the order of the animal industries within each question when asking respondents to compare the dairy industry to other livestock industries. Perhaps there was an ordering bias and consumers would have answered differently if the animal welfare of Canadian dairy cows were not always the first industry mentioned in each question.

Lastly, people that were more opinionated were more likely to respond to this survey. Therefore, survey recipients that saw that the survey was related to animal welfare and were highly opinionated towards this subject would have been more likely to complete the survey than those without a strong opinion either way. This may have resulted in the responses not being representative of those of the actual Canadian

population, assuming that the majority of the Canadian population was not extremely opinionated on this subject. The mailing list was randomly selected, however the choice to participate was still optional. So, were the responses to this survey skewed by the fact that some recipients were more likely to respond than others? Perhaps an alternative survey method could have been utilized where participants were selected without providing them with knowledge on what the survey would be about until they agreed to do the survey and began giving responses. Then, this would have resulted in less of an over representation of certain types of Canadians.

6.3 Ideas for Future Research

While the results of this investigation into the opinions and preferences of Canadian consumers were valuable, they could also act as a starting point for future research. This section begins by examining the ways in which the current study could have been improved and continues by detailing the different directions that this research could take in the future.

Building upon the ideas presented in the limitations section of this paper, it was important that future research find a way to utilize a sample population that was more representative of the actual Canadian population. This could mean spending more time and money finding a more suitable mailing list, translating the survey so that both French and English Canadians could complete it or choosing a better survey method to better fit the needs of the research. It was also apparent that a shorter, more focused survey instrument may have been more appropriate because it would be able to both reduce the workload on participants while also allowing the researchers to zero in on and receive

accurate and honest responses for one specific research goal. A shorter survey would also have allowed for more room for respondents to explain their answers.

Another idea would be to give different information packages out to different groups of participants and to see how the type of information affected their responses. If the type of information resulted in biased responses then it would indicate that the perceptions of consumers were not well formed. This would tell researchers that consumers really did not know that much about the subject matter. However, if the opinions of respondents were similar across all information treatments, then perhaps the researchers could conclude that consumers had a definite opinion or perception of what was happening in the dairy industry.

Social desirability bias and hypothetical bias were two problems that may have reduced the honesty of the participants in this research. By asking how the average Canadian felt, instead of how the individual felt, the survey was able to extract answers that were more honest and this could probably have been extended to the WTP question. In other words, instead of asking how much they would pay, the survey could have asked how much they thought the average Canadian would pay. Another option would be to utilize a real life, shopping scenario where participants would have to pay what they indicated their premium level was and thus, would have to be more honest about what they would be willing to pay because there would be an actual payment attached to their decision.

It would also be interesting to determine the importance that Canadians placed on animal welfare in comparison to other societal issues, similar to Prickett et al (2010) and

Lusk and Norwood (2008). This would have provided a clearer view on the relative importance that Canadians placed on animal welfare. In other words, now that it is known that Canadians believed animal welfare was important, researchers could try to discover how that importance compared to other subject areas.

Some participants indicated that they would only be willing to purchase animal welfare friendly milk if they were aware of what the certification process or agent was. So, future research could set out to discover what type of certification would be preferred by consumers and what their WTP would be for the different kinds of certification agents.

Finally, it would have been interesting to carry out a study on consumer views of the dairy industry and their preferences for dairy animal welfare across a pair of or multiple countries. In this type of study, consumers in two different countries would be sent the exact same survey instrument and be asked to complete it. Therefore, when the results were received and analyzed, an easy comparison could have been made between consumers from the different countries rather than trying to compare two different studies that took place at different times, with different researchers asking different questions and giving different information packages.

6.4 Conclusion

This research accomplished its objective of discovering what the opinions and preferences of Canadians were towards animal welfare on Canadian dairy farms. Canadians indicated that they placed importance on animal welfare and that providing proper dairy animal welfare was more important than low milk prices, though there was

slightly more opposition to the second notion than the first. The research revealed that consumers read labels for assurances of animal welfare practices and that a demand for animal welfare products existed in Canada. This research can now be utilized by the dairy industry to better produce and market its products, retailers to provide labeling on animal products and consumers to illustrate that they want, and are willing to pay for, dairy products produced using animal welfare friendly practices. It can also be used as a starting point for future studies on animal welfare in the dairy industry and in Canada.

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Appendices

Appendix A: Cover Letter

January 2, 2013

Dear (Name),

Researchers at the University of Manitoba are studying Canadian consumer perceptions of dairy animal welfare, and have received sponsorship from the Consumer and Market Demand (CMD) policy network to carry out research on this topic. We are interested in discovering whether consumers believe animal welfare is important, how consumers believe the dairy industry performs in terms of ensuring animal welfare (especially in comparison to other livestock industries), and which dairy farming practices consumers believe are most important for ensuring proper animal welfare.

We would very much appreciate your assistance with our research. The enclosed questionnaire will take approximately fifteen minutes of your time to complete. Your **voluntary** participation by completing the enclosed **confidential** questionnaire is critical to the success of our study. Your response is confidential because we have no way to associate a returned questionnaire with any individual. Nevertheless, the surveys we receive will be securely stored and kept only for as long as necessary to carry out our data analysis, which is normally less than a year.

Since not much is currently known about how consumers view animal welfare in the Canadian dairy industry, survey participants will benefit by helping shape how the dairy industry, researchers, government officials and animal welfare groups approach this issue in the future. Your responses will also be useful in determining whether there are certain animal needs that dairy farmers should be paying closer attention to in order to improve dairy animal welfare.

We would greatly appreciate it if you would fill out the enclosed questionnaire and return it to us using the postage-paid business reply envelope included with this letter. To ensure confidentiality, do not put your return address on the envelope. If you would like to obtain a copy of the results of this research (which should be available by June 2013) or if you have any questions about the questionnaire, I can be reached by phone at (XXX) XXX-XXX or by email at XXXX@umanitoba.ca. This study has been approved by the Joint-Faculty Research Ethics Board of the University of Manitoba, and any concerns can be reported to the Ethics Secretariat at (XXX) XXX-XXXX.

Please accept the $1 coin we have enclosed with this letter as a small token of our appreciation for completing the questionnaire.

Thank you very much for your time,

Dr. J.G. (Jared) Carlberg

Associate Professor

Appendix B: Information Sheet

INFORMATION SHEET: please read carefully before filling out the survey

The goal of this study is to examine how Canadian consumers perceive animal welfare in the Canadian dairy industry. The first section of the survey asks you to report how strongly you agree or disagree with 10 statements related to animal welfare. When indicating whether you agree or disagree with a statement, note that a "1" indicates you strongly disagree with the statement and a "5" indicates you strongly agree with the statement. Please place a check mark in the box that corresponds to how strongly you agree or disagree with each statement. If you are neutral about a statement or have no opinion, then check "3".

The second section of the survey will ask for your views on the importance of various dairy farming practices as they relate to animal welfare. This is done in a comparative context by pairing various dairy farming practices and asking you to check the box associated with the practice you believe is more important for ensuring adequate animal welfare. For the purpose of this study, "good", "adequate" or "proper" animal welfare means that the animal's needs are being taken care of and the animal's well-being is not being unduly negatively affected. Therefore, when asked to indicate which dairy farming practice you believe is more important for ensuring proper animal welfare, you are indicating which practice you believe is more important for making sure that the animal is receiving adequate care.

The third and final section of the survey requests demographic information about you to allow the researchers to compare responses of different groups based on a variety of factors such as gender, income level and education. We understand that people are sometimes hesitant to provide personal information about themselves, but remember that your information is confidential and we have no way of associating your returned survey with you. A better understanding of how consumers' perceptions of animal welfare are influenced by demographic characteristics will allow for a more meaningful interpretation of research results. The third section of the survey also seeks to discover your experiences and habits as they relate to dairy farming, dairy product consumption and animal welfare groups. These are posed as "Yes" or "No" questions, so please circle the appropriate response.

The survey's final question asks whether you would purchase milk that has been certified to have been produced using animal welfare friendly practices. You may wonder what the "animal welfare friendly practices" are that this product was produced with. On the back side of this information sheet, a list of nine animal welfare friendly practices covering a variety of ways that animal welfare could potential be improved or sustained in Canada's dairy industry. For the purpose of this study, the milk that you are asked about purchasing would be produced using all nine of these practices, so please decide upon your purchasing decision and premium estimate accordingly. Past research has shown that consumers tend to overestimate the amount they would pay for products in situations like this where they are not actually making a purchase decision. Accordingly, please think carefully about how much of a premium you really would be willing to pay for milk that has been certified as being produced using animal welfare friendly practices.

To ensure that we are being clear about the various dairy farming practices mentioned in our survey, what follows is a short description of each:

1. *Milk cows are always given room to turn around, walk and lie down.*

Cows are able get up and lie down without difficulty while also being housed in spacious areas that enable them to move around freely and avoid crowded areas. Also, being able to turn around means that the cows are not tied in a stall and can engage in all natural behaviours.

2. *Milk cows are allowed to interact with other animals.*

Cows are housed in groups and are able to exhibit natural interactions towards other animals as part of a herd.

3. *Milk cows are provided with time outdoors and access to grazing.*

Dairy farmers allow their animals to go outside in times of good weather to walk around and eat grass, their natural diet.

4. *Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.*

Sick or injured cows are cared for as soon as any illness or injury is detected by the farmer. They are given treatment, if needed, and promptly provided with veterinary care if required.

5. *Milk cows are provided with proper shelter that offers protection from severe weather.*

Cows are kept sheltered from the outdoors in situations where poor weather would negatively affect their well-being. Examples of this may include heavy rain causing excessive mud, cold temperatures resulting in ice covered ground, snow storms and overly hot temperatures.

6. *Milk cows are provided with clean bedding material to lay on.*

Regularly providing the cows with new bedding material allows them to stay clean and reduces the occurrences of infections due to dirty bedding. This helps ensure good dairy cow health.

7. *Milk cows are milked in a safe and calm environment.*

The milking process is carried out quickly and safely and cows are provided with a stable, secure surface to walk on in order to reduce the likelihood of falling and injury.

8. *Milk cows are not administered growth hormones.*

Farmers do not inject their animals with growth hormones (such as rbST) to artificially enhance milk production. This practice is currently not allowed in Canada.

9. *Male calves are raised for beef purposes and not for veal.*

Male dairy calves are not kept on dairy farms because they cannot produce milk. They are therefore usually raised for beef production. If instead used for veal production, the male dairy calves would be kept in small pens that restrict the calf's movement. No such restrictions are placed on the calf when raised for beef production.

Appendix C: Survey Instrument

UNIVERSITY OF MANITOBA

Faculty of Agricultural and Food Sciences

Department of
Agribusiness &
Agricultural Economics

After reading the cover letter and information sheet, please fill out the following survey examining:

Consumer Preferences For Dairy Animal Welfare In Canada

Version 1

Please indicate your level of agreement with each of the following statements, where:

Strongly Disagree = 1	Disagree = 2	Neutral = 3	Agree = 4	Strongly Agree = 5

I believe animal welfare is important.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

The average Canadian believes animal welfare is important.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

I believe the current level of animal welfare on Canadian dairy farms is acceptable.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

I believe animal welfare has improved on Canadian dairy farms in the past 20 years.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

I believe animal welfare on Canadian dairy farms is superior to animal welfare in the United States.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian pigs.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian chickens.

☐ ☐ ☐ ☐ ☐
1 2 3 4 5

I believe the animal welfare of Canadian dairy cows is superior to the animal welfare of Canadian beef cattle.

☐ ☐ ☐ ☐ ☐
1 2 3 4 5

I believe ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.

☐ ☐ ☐ ☐ ☐
1 2 3 4 5

The average Canadian believes ensuring proper animal welfare for Canadian dairy cows is more important than having low milk prices.

☐ ☐ ☐ ☐ ☐
1 2 3 4 5

For <u>each</u> pair of farming practices used in the dairy industry, indicate which practice you believe is <u>more</u> important for helping ensure proper animal welfare:

Pairing #1 (select one of these two)

☐ Milk cows are always given room to turn around, walk and lie down.

or

☐ Milk cows are allowed to interact with other animals.

Pairing #2 (select one of these two)

☐ Milk cows are provided with time outdoors and access to grazing.

or

☐ Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.

Pairing #3 (select one of these two)

☐ Milk cows are provided with proper shelter that offers protection from severe weather.

or

☐ Milk cows are provided with clean bedding material to lay on.

Pairing #4 (select one of these two)

☐ Milk cows are milked in a safe and calm environment.

or

☐ Milk cows are not administered growth hormones.

Pairing #5 (select one of these two)

☐ Male calves are raised for beef purposes and not for veal.

or

☐ Milk cows are always given room to turn around, walk and lie down.

Pairing #6 (select one of these two)

☐ Milk cows are allowed to interact with other animals.

or

☐ Milk cows are provided with time outdoors and access to grazing.

(continue on other side)

Pairing #7 (select one of these two)

☐ Milk cows are afforded a prompt response to all health problems, including those that do not affect milk production.

or

☐ Milk cows are provided with proper shelter that offers protection from severe weather.

Pairing #8 (select one of these two)

☐ Milk cows are provided with clean bedding material to lay on.

or

☐ Milk cows are milked in a safe and calm environment.

Pairing #9 (select one of these two)

☐ Milk cows are not administered growth hormones.

or

☐ Male calves are raised for beef purposes and not for veal.

Please provide the following information about yourself: (optional but helps us understand why people identify certain types of animal welfare practices as more important than others)

Gender: ☐ Male
☐ Female

What is your annual household income?

☐ Less than $39,999
☐ Between $40,000 and $69,999
☐ Between $70,000 and $99,999
☐ Between $100,000 and $129,999
☐ Greater than $130,000

Which province do you live in? _____

What is your postal code? _____

What year were you born? _____

What country were you born in? _____

If you were born in Canada, please indicate any ethnic groups that you consider yourself to be a part of:

_____

What is the highest level of education you completed?

- ☐ Did not complete high school.
- ☐ Completed high school.
- ☐ Some, but did not complete, trade school, college or university.
- ☐ Completed trade school, college or university.
- ☐ Completed Master's degree or Ph.D.

Are you or a family member currently engaged in agriculture? (Please Circle) YES NO

Are you or a family member currently engaged in dairy farming? YES NO

Have you ever visited a dairy farm? YES NO

Do you consume dairy products? YES NO

If no, briefly list your reasons: _____

_____

_____

Do you ever purchase products that are considered animal welfare friendly? YES NO

Do you ever boycott products because of animal welfare concerns? YES NO

Do you ever donate to any animal welfare organizations, such as People for the Ethical Treatment of Animals (PETA)? YES NO

Are you a vegan or a vegetarian? YES NO

Do you volunteer for animal welfare groups or humane societies? YES NO

Do you read the labels of animal products to look for assurances of proper animal welfare? YES NO

Would you purchase milk that was certified to have been produced using animal welfare friendly production practices over regular milk? YES NO

If yes, how much of a premium would you pay for the milk that had been certified to have been produced using animal welfare friendly production practices?

- ☐ 0% (ie the same price as regular milk)
- ☐ 10%
- ☐ 25%
- ☐ 50%
- ☐ 100% (ie double the price of regular milk)

Thank you for completing this survey!