Evaluating Consumer Behaviour, Attitudes, and Emotions Surrounding Environmental Aspects of the Canadian Animal and Plant-based Dairy Industries

by

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Abstract

Across Canada, there are approximately 3 million people that identify as vegan or vegetarian. Though reasons for this diet vary across individuals and groups, a major motivator found in recent research is that consumers are concerned about their environmental footprints and are seeking diets and lifestyles to reduce their impact on the planet. Specifically, the dairy industry is one that requires a variety of inputs including heat and electricity, feed and space for animals, and significant amounts of water; while creating a number of serious environmental impacts throughout the production process. Additionally, individuals are expressing their concern for animal welfare and seek to reduce their personal impact on animals.

In this research project, I analyze the ways that the Canadian public demonstrate their understandings of pro-environmental and pro-animal welfare behaviors, and the ways that emotions impact their decision-making processes. Utilizing data from a general population survey, my research analyzes the ties between the sociology of emotions and the theory of planned behaviour in the context of Canadian animal and plant-based dairy consumption. Exploring these concepts allows for a better understanding of the context behind current and future consumption trends, supporting players in the dairy and dairy-alternative industries in creating products that meet the environmental and welfare expectations of consumers.

Preface

This thesis is an original work by Katherine Louisa Rogers. The research project, of which this thesis, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Evaluating Consumer and Producer Behaviour and Attitudes Surrounding Environmental Aspects of the Canadian Dairy Industry”, Pro00115693, September 2020-December 2022.

Dedication

For little Wesley Mac and Wynn Violet, and their mothers. May the rest of us take on the same lens that you experience the world through; filled with optimism, enthusiasm, and giggles.

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With gratitude,

Katherine Louisa Rogers

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Chapter One: Introduction

Around the world, countries and nations are evaluating the impacts of climate change and making decisions on how to adapt and mitigate. This decision-making process will have large ranging consequences for the health of the planet and its inhabitants, who will face the realities of climate change within the next few decades. At a smaller but equally relevant scale, individuals and businesses are also making decisions on how they are to adapt and mitigate climate change, often through pro-environmental behaviours. In this research project, I will examine the ways in which both consumers of dairy products make decisions, the factors that contribute to these decisions, and the impacts that these decisions, through actions, have on an individual and collective level. By examining the consumer side, I perform a quantitative analysis of consumer behaviour through a survey. The survey examines the attitudes, values, and norms of consumers in their process of decision making for consumption of dairy and plant-based dairy products. Specifically, the survey puts a focus on the emotional responses of consumers, to help to provide context to their decision-making. These results indicate the factors that guide and drive consumer decision making, including impacts of attitudes towards the environment and animal welfare, as well as social norms and emotions. This study increases the understanding of pro-environmental and pro-animal behaviour at individual and industry levels, broadening the understandings of consumer trends surrounding dairy, and consumer concerns. Additionally, this project takes a unique sociological perspective to understand the role of emotions in consumer decision making and producer operations.

Organization of Thesis

This thesis is organized into four chapters. Chapter One acts as an introduction to the research project, topic, and some of the important background that shaped and guided the entire project. Chapter Two is the first of two separate papers, with Chapter Three being the second. Chapter Two explores the major empirical findings of the research, utilizing the theory of planned behaviour with additional elements from the sociology of emotions to perform regression analysis to see the impact of various factors in predicting dairy and dairy substitute consumption behaviour. Chapter Three serves as a paper more specifically on the methodology of the research project, going in depth on one portion of the consumer-side survey that is used in this project, which measured and evaluated emotions. In Chapter Four, a summarizing conclusion is expanded on by reviewing the major findings and key points of the entire thesis, and putting

forth suggestions for future research to build upon in the areas of animal and plant-based dairy consumption, environmental and animal welfare attitudes, and sociological methodology.

Background

This project has an important context within the research areas of agriculture, environment, and sociology. To provide background information for this project, there are three main areas of focus. First, the economic aspects of dairy production and consumption are relevant to understand the impact that the dairy sector has on Canada's economy. Secondly, the environmental and health impacts should be considered in conjunction as both are relevant to dairy producers and consumers in Canada and across the world. Finally, a social perspective must be considered when discussing dairy production and consumption. The social context in which these products are produced and consumed within is also considered. These background understandings contribute to the development of the research questions and goals for this project and provide context to the later literature review section.

Economic Aspects of Dairy Production/Consumption

Canada has long taken pride in its agricultural industry. Agriculture and agri-food systems are key economic drivers in Canada. In 2018, the sector generated $143 billion which equated to 7.4% of Canada's GDP (Government of Canada, 2020). Amongst this, the Canadian dairy industry shines particularly. The Dairy Farmers of Canada's (DFC) report entitled, Canadian Dairy Sector Overview, speaks to the contributions and impacts of the Canadian dairy industry. In this report, they cite Eco-Resources (2015) and state they found that "nationwide, the dairy sector sustains approximately 221,000 full-time equivalent jobs, and contributes roughly $19.9 billion a year to Canada's Gross Domestic Product (GDP)" (Dairy Farmers of Canada, 2018). This situates the Canadian dairy industry in an important and integral role in the Canadian economy, with the opportunity to contribute largely to national wealth. As of 2020, there are 10,095 dairy farms across Canada, 503 of which are in Alberta, with 79,900 cows and 39,400 heifers in the province (Canadian Dairy Information Centre, 2021). In terms of the number of dairy farms, Alberta ranks third in Canada, behind Quebec and Ontario.

Though, as important as the supply-side is of the industry, equally important is the consumer side. In Canada, consumers currently consume approximately 64.2 litres of fluid milk per capita,

which is shown to be on a downward trend over the last 20 years (Statistics Canada, 2021). The United States consumption falls closely behind with a total fluid milk consumption in 2019 being 61.9 litres per capita. In contrast to those that consume dairy, there is a rising trend of veganism across the world, a diet that eliminates products from animals – including dairy products. Research conducted by Sylvain Charlebois at Dalhousie University has found that in Canada there are an estimated 2.3 million vegetarians (up from 900,000 just 15 years ago) and 850,000 vegans, making up 9.4% of Canadians (CTV, 2018). This rising trend has been shown to concern some farmers around the world, as veganism becomes more popular and wide-spread. In an attempt to counter a popular annual promotion known as "Veganuary", where individuals try out vegan diets for the month of January, some dairy producers began "Februdairy" to encourage dairy consumption and promote the "message that cow's milk is healthy, ethically produced, and ecologically benign" (Beard, 2020). These contrasting dietary preferences are having impacts on the Canadian and world dairy markets, as consumer choices guide the supply and demand of dairy and plant-based dairy products. The impacts that this may have on the economy, and how those economic impacts will manifest, are of concern to producers, manufacturers, and government policy makers. This research project will seek to understand the background and sociological influences on these trends to assist in quantifying and expecting the impacts of these trends in future years.

Environmental and Health Aspects of Dairy Production/Consumption

As described, shifting preferences for dairy alternatives and reduction in dairy consumption is prevalent in North America. These changes in behaviour could be seen as a change in attitude and values of Canadian consumers, of whom are finding new ways to reduce their environmental footprint and consume based on their personal values. As dairy preferences have changed over the years, plant-based dairy alternatives have also increased in availability, reflecting the changing attitudes towards to the environmental impact of the dairy industry. Rising trends in veganism can be linked to concern for the environment and for personal health, which can be considered both as separate issues as well as intersecting and overlapping issues.

A recent study conducted by Domingo et. al. (2021) investigates air quality-related health damages from the production of food in the United States, considering the negative impacts to human health generated through increasing atmospheric fine particulate matter. The researchers

found that due to health complications associated with particulate matter, 17,900 annual air quality-related deaths may be attributed to the agricultural industry, with 89% (15,900) of total deaths linked to food production. Of those 15,900 deaths, 80% are due to animal-based foods, both directly through animal production and indirectly through feed for those animals. These unsettling results show the impact that animal agriculture may have on human and environmental health, and how these impacts overlap and intersect. The researchers propose interventions aimed to lower annual air quality-related mortality that could be achieved by action on the producer and consumer-side. These actions range from on-farm interventions (i.e., improved livestock waste management and fertilizer applications) to larger consumer interventions (i.e., dietary shifts to reduce consumption of animal products). In alternative terms, one could consider the greenhouse gas emissions (GHG emissions) of the dairy industry. New research finds that the dairy industry is responsible for 2.9% of total greenhouse gas emissions created by humans (Sentient Media, 2022). This thesis research builds off the foundation of the scientific evidence discussed above to explore the consumers' understandings of the environmental impacts created through the production of dairy products, and how their own decision-making contributes to these larger-scale impacts. I will consider the interventions established above and examine how consumers are currently and plan to respond to these important decisions about their personal health and environmental footprints.

Across the world, vegans promote their plant-based diets as an ecologically-preferential option, as many plant-based products have lower impacts on the environment than animal products such as dairy products, with PETA arguing that "vegans are *de facto* environmentalists" (PETA, 2021). Poore and Nemecek (2018) show that cow's milk creates much more carbon emissions and requires more land and water than plant-based substitutes (see Figure 1 for display of data adapted from a chart by Danielle Haake of Datawrapper, 2019). Though there are high water use needs for some plant-based dairy substitutes, for example with almond milk or rice milk, these are much lower than for cow's milk (Poore & Nemecak, 2018). In this sense, consumption of dairy products can at times increase one's ecological footprint, and realization of this could be a driver for a reduced consumption of those products.

Table 1.1. Chart comparing environmental impacts of dairy substitutes

Data by Poore and Nemecak, 2018. Chart based on infographic: Daniela Haake - Datawrapper, 2019

Type of Milk	Carbon Emissions (kg CO2 equivalent)	Land use (m2)	Water Use (L)
Cow's milk	3.2	9.0	628
Rice milk	1.2	0.3	270
Soy milk	1.0	0.7	28
Oat milk	0.9	0.8	48
Almond milk	0.7	0.5	371

Some plant-based food companies are taking advantage of these types of statistics and are using the lower environmental impacts of their products as part of their marketing material. For example, Earth's Very Own, a plant-based dairy alternative company, packages their Oat Milk with the statement "grown using 7x less water than almond or cow's milk" right on the front of the carton (Earth's Very Own, 2021). This signals to consumers the environmental footprint of their decisions right at the store[1]. This is a concept that I will explore more in-depth throughout my methodology section and consumer questionnaire.

Farmers are not blind to the impacts of the production of their products on the environment, with some demonstrating an acute sense of their farming operation's environmental consequences. For example, one UK-based dairy producer, Olly Lee, noticed the environmental impacts of dairy production, and chose to act in ways that would counter these impacts. In an interview with Stephan Beard of Marketplace (2020), Lee explains that his farm is trying to introduce practices that reduce their environmental impact (i.e., compostable packaging). Lee argues that the pasture on which his cattle graze is able to capture greenhouse gases that his cows emit. He also uses electric vehicles to locally deliver his organic milk. Lee is one example of innovation occurring at the farm-level in an attempt to make a difference within the dairy industry, and its

[1] It is important to note that included comparisons stop at the "farm level" emissions, and do not include the entire supply-chain environmental footprints associated with plant-based dairy alternatives, including the processing of products. The processing of products also has significant greenhouse gas contributions to consider (FAO, 2021; Grant & Hicks, 2018). Other forms of analysis that could compare the impacts of various products could include Life Cycle Assessments, which considers the impacts the environment over the entire period of its life (European Environment Agency). The dairy industry is considering this approach already in recent research in the area (DFC, 2019). This concept, and shortfall of the plant-based and traditional dairy comparisons, is elaborated more on in the "Limitations" section in Chapter 4 of this thesis.

environmental contribution. Lee, and other producers like him, are making these farm-level decisions that translate into larger actions that have real environmental consequences. Through the adoption of innovative practices, Lee is transforming his beliefs and values for the environment into decisions and actions. Unfortunately, not clear in his interview is his deeper values and beliefs that motivate his decisions, which is partially what my research will attempt to explore and understand, only from a consumer perspective instead.

In Canada, the DFC have created the "proAction program" which "aims to provide an efficient and co-ordinated national framework for dairy farmers to continue their business leadership in producing some of the safest, highest quality milk on the planet" (Dairy Farmers of Canada, 2018). With a focus on on-farm sustainability, the program seeks to ensure that Canadian dairy farmers are adhering to best practices. The six module topics include: milk quality, food safety, animal care, livestock traceability, biosecurity, and environment. In particular, the environment module encourages farmers to "embrace innovation" in an effort to reduce the environmental impact of dairy farming, and writes that this proAction module "will capitalize on existing provincial Environmental Farm Plans (EFP)". In their report, *Canadian Dairy Sector Overview*, DFC further affirms the role of dairy farmers in the environment through stating that "Sustainability Matters to Canadian Dairy Farmers". This highlights the ways in which industry works towards sustainability by investing in research, which they describe as "designed to help improve our environmental footprint by increasing productivity, reducing our inputs where we can, and increasing feed efficiency, which also includes reducing methane emitted during rumination" (Dairy Farmers of Canada, 2018). Finally, the DFC report utilizes data from Environment Canada stating that "emissions from dairy production represent less than 1% of total national emissions" (Dairy Farmers of Canada, 2018). These steps towards sustainability and transparency indicate the ways in which the industry is attempting to capture the impacts created through dairy production, as well as address the concerns that consumers may have. The actions of the industry are relevant to this project, as consumers may refer to this type of information in building their understandings of the environmental impacts from dairy products, which in turn impact their purchasing decisions.

Social Aspects of Dairy Production/Consumption

As the above sections confirm, agriculture has a strong role in Canada's economy, but also in Canadian identity and culture. Much of Alberta, where this thesis originates, has been shaped by agriculture. This is both in a physical sense through the literal farming of the land and a cultural sense through the historical ties and significance of agriculture in Albertan culture. The land now known as Alberta has had many stewards, with the First Nations that traditionally occupied this space before colonization being the first of those that tended to and cared for this land. Alberta is subject to Treaties 6, 7, and 8, and was traditionally home to the Blackfoot Confederacy – Kainai, Piikani, and Siksika – the Cree, Dene, Saulteaux, Nakota Sioux, Stoney Nakoda, and the Tsuu T'ina Nation and the Métis People of Alberta (Law Society of Alberta). Once settled, the land here has been used by settlers for natural resource extraction through the development of fossil fuel extraction, forestry, and agriculture. Over the centuries since colonization of so-called Canada, extractive relationships with the land have occurred, encouraged by the free-market capitalistic nature of the current Western World. This included the migration of many European families to Canada over the centuries and decades to establish homesteads and farms that were passed down through generations to present day. An in depth discussion could be had about the ways that dairy consumption and production contributes to the existing colonial structure of Canada, but due to space constraints those aspects will unfortunately be left out from further analysis in this current project.

As described in previous sections, the dairy industry comprises a large part of the overall agriculture industry within Alberta and Canada. Organizations, such as the DFC, work to promote Canadian dairy within the country and around the world. These organizations have a role in society as a messenger of dairy products to consumers. This organization, and other similar producer-groups, use various marketing techniques to engage with consumers and ensure that dairy products, specifically milk, find their way to consumers. A prominent example of this is the 1993 California Milk Processor Board campaign, "Got Milk?", which promoted the benefits of cow's milk in one's diet. The campaign highlighted the nutritional benefits of the product and paying specific attention to the benefits of milk in children's diets (California Milk Processor Board). This culturally significant campaign included the use of celebrities in advertisements to spread awareness and encourage milk consumption. A further analysis could be done on the ways that this influenced dairy consumption over the years of the campaign, but for the purposes of this discussion it serves as an example of the ways that milk and dairy

products hold significant cultural value in North America. Other similar campaigns have taken place over the years to influence the cultural significance of agriculture in consumers' lives. For example, recently Alberta Milk has launched a campaign including Hanna Holstein, a millennial-style approach to marketing dairy (Alberta Milk, 2021). Other initiatives include "support local" marketing, which for Albertans would mean supporting Albertan-based farmers, including dairy farmers. Though, this may be contradictory for individual's trying to consume plant-based diets, either for environmental or animal welfare reasons. These consumers are left to decide which type of local producers they want to support based on their dietary and lifestyle preferences.

Research Goals and Objectives

As the background of this project highlights, there are a multitude of diverse, sometimes contradictory, elements that complicate the consumer experience of the dairy industry. This project aims to take a new lens to the complexities of this industry by using a sociological approach to environmental issues. The primary goal of this project is three-fold. Firstly, I aim to gain insight on consumer beliefs and attitudes surrounding the dairy industry. Secondly, I aim to gain insight on consumer beliefs and attitudes surrounding plant-based alternatives. Thirdly, with emotions as a key factor in my study, I explore several ways to measure and evaluate the emotions of consumers. In addition, I seek to understand the ways that industry currently or could capture these aspects in their production of dairy and dairy substitute products, as they have the power to make these changes at their level, and begin a discussion that can be continued into the future.

The research question guiding my project asks:

"How do Canadian dairy consumers demonstrate their views on pro-environmental and pro-animal behaviours?

How do emotions impact their decision-making processes?"

Furthermore, I ask a more specific sub-question in structuring the project:

"What are the implications of these findings for the dairy sector, and for the dairy-alternatives sector?"

And, finally, towards the end of this thesis, a final question emerges:

"How are emotions measured in research? How does this impact the outcomes of the research?"

The premise of these questions considers that if industries, both dairy and dairy-alternative industries, could quantify and display these efforts to brand itself as more sustainable, would this change the consumption of their products? Additionally, my research methods focus primarily on the consumer-side aspects of dairy, while leaving room for the exploration of producer-side concepts more broadly.

Literature Review

This literature review is broken down into three main themes that contribute to the research question. First, I explore current research and understandings in the field of animal agriculture and its ties and contributions to climate change. Second, I review scholarship on the role of emotions in decision making and the sociology of emotions with specific regard to food consumption and choices. Finally, I review the main theoretical frameworks that will be guiding this research project as a whole, paying specific attention to the way that the theory of planned behaviour can be applied to food choices by consumers.

Animal Agriculture and Climate Change

In recent years, a growing area of research is focused on the impacts that agriculture, and specifically animal agriculture, has on the environment and its contribution to climate change. The IPCC Special Report, Global Warming of 1.5ºC*,* outlines the impacts that could be experienced on a global-level and the importance of limiting increasing "global mean surface temperature" (GMST) to 1.5ºC. The report states that:

> "impacts that occur when GMST reaches 1.5°C could be very different depending on the pathway to 1.5°C. CO_2 concentrations will be higher as GMST rises past 1.5°C (transient warming) than when GMST has stabilized at 1.5°C, while sea level and, potentially, global mean precipitation (Pendergrass et al., 2015) would both be lower (see Figure 1.4). These differences could lead to very different impacts on agriculture, on some forms of extreme weather (e.g., Baker et al., 2018), and on marine and terrestrial ecosystems (e.g., Mitchell et al., 2017 and Boxes 3.1 and 3.2). Sea level would be higher still if GMST returns to 1.5°C after an overshoot (Figure 1.4 d), with potentially significantly different

> impacts in vulnerable regions. Temperature overshoot could also cause irreversible impacts."

These often-irreversible impacts are projected to have large and far-ranging consequences, that will vary across time and space. The report discusses the ways that some of these impacts could manifest in many regions, including "substantial increases in the occurrence and/or intensity of some extreme events" which will result in different impacts across spaces, but create severe damage in many spaces. Some impacts to consider are those that changing climate will have on natural ecosystems, which may struggle to adapt to such drastic changes. The report draws attention to the response of the world's forests and seagrass ecosystems, which function as carbon sinks and could be threatened or eliminated through changes in climate. Furthermore, humans may also struggle to adapt to the changing climate due to a multitude of factors. The report highlights the differences that humans across sectors and space have different access to "water supply, public health, infrastructure, ecosystems and food supply" that would impact their abilities to adapt to climate change. These issues raise social justice and vulnerability issues that would be further magnified through the changing climate, including vulnerabilities due to age, gender, and education levels. Even in the case of climate change adaptation, some individuals and communities will be at larger disadvantage, which is why climate change mitigation is key in preventing these impacts from taking place.

Current research shows that animal agriculture plays a significant role in contributing to global warming and climate change, through emissions of greenhouse gases associated with the production, transportation, and distribution of animal agriculture products. Lynch et. al (2021) discuss the unique contribution that agriculture has in climate change, highlighting the different impacts of and differences between carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which are the major greenhouse gases emitted from agricultural production. The authors demonstrate that CO_2 emissions occur both directly and indirectly from agricultural production, through application of urea and lime as well as energy-use on the operation and embedded inputs. The authors also explain that CO_2 emissions occur through the ongoing land-use, and clearing of land for production of crops and space for pasture with this type of CO_2 emissions accounting for 14% of annual anthropogenic CO_2. In discussing the other non-CO_2 greenhouse gases that are emitted through the agriculture industry, including methane, the authors argue for

the importance of understanding the lifetime of different greenhouse gases and the equivalent impacts of these gases. Specifically, the authors recognize that statements about the "strength" of a greenhouse gas such as methane in contrast to CO_2 cannot capture the full scope of the impacts of the gas. While methane gas has a stronger impact than a nominally equivalent amount of CO_2 on warming, methane also has a shorter lifetime allowing for the possible advantage that the impacts caused could be reversed if there is a reduction of methane emissions paired with CO_2 emissions reduction. The same cannot be said for the impacts of CO_2. In the case of CO_2 emission reductions, "stopping emissions ends the ongoing temperature increases that result from any non-zero emissions, and we end with a relatively fixed level of long-term warming" (Lynch et. al., 2021). Therefore, the authors posit that "[r]educing CO_2 emissions to zero is therefore necessary to prevent further warming, but for methane, completely eliminating emissions goes beyond what is required for temperature stabilization" (Lynch et. al., 2021). This presents agricultural producers with a unique and challenging opportunity to work towards emission reductions, where it is "still climatically beneficial to reduce methane emissions as much as [they] can, provided this is not at the expense of stopping CO_2 emissions" (Lynch et. al., 2021).

Many solutions are being worked on to reduce and eliminate CO_2 emissions created across sectors including the agricultural industry. While a lengthy discussion on the various ways that producers could reduce CO_2 emissions on their operation would be valuable, it is beyond the scope of this project. Rather, this research seeks to more broadly understand the work that individuals are doing to reduce their personal environmental footprint given the information that they currently have, and the ways that they interpret their own role in climate change mitigation. This research project will investigate the behavioural understandings that lead to climate change action on the consumer and producer side, which will allow for larger understandings of how to engage with industry and individuals to foster and inspire large-scale environmental action that is needed to reduce the emissions noted above.

Of importance to the conversation of greenhouse gas emissions reduction, this research project considers the understandings of consumers on the use of selective breeding to reduce the environmental footprint of the dairy industry. Selective breeding can be used as a method for reducing emissions, as there are ways to use genomic information to undertake selective breeding to increase feed efficiency, reduce methane emissions, increase disease resilience,

and/or increase fertility in cattle. These interventions allow farmers to reduce the methane emissions of the operation, which, as illustrated above, is key in the process of reducing the impacts of greenhouse gas emissions.

Emotionally Driven Decisions

Emotions are part of the nature of being human, yet they remain a mystery to many. Scholarship on emotions can be considered as a sub-section of psychological research but has a growing influence in sociology as well. Turner (2009) asserts the difficulty of not only studying emotions, but of defining it, noting that emotions operate on "many different levels of reality" from biological to cultural. Specifically, there is an argument that emotions are "inherently social", but that does not imply that there is not a biological element to them as there are some physiological expressions of emotion as well. These distinctions have created divides within the sociology of emotions, and additionally there are disagreements on the cognition of emotions as well as the effects of repressing emotions and the existence of unconscious emotions. Turner posits that there are many specific theories of emotions to consider, that are backed up by research that attempt to resolve some of the issues in the sociology of emotions. These theories include: evolutionary/biological theories, symbolic interactionist theories, dramaturgical theories, ritual theories, power and status theories, stratification theories, and exchange theories (Turner, 2009). Turner argues that that there is a need for more integrative theories rather than the continued distinction between these theories above in order to move the sociology of emotions forward. In the consideration of this research project, I explore the ways that emotions exist culturally (understanding that a biological element exists and is present especially in regard to food choices), and how this impacts the decisions made and actions taken on a consumer level.

Bericat (2016) reviews the sociology of emotions and work and research in the field over the last four decades in his paper "The sociology of emotions: Four decades of progress". He, like Turner, asserts the complexity of this area of research and literature, which can be broken down into various theories for understanding emotions. To summarize the theories, Bericat argues that "we can state that emotions constitute the bodily manifestation of the importance that an event in the natural or social world has for a subject". Further, he continues to state that emotions function as "a bodily consciousness that signals and indicates this importance, regulating in this way the relationships that a specific subject has with the world" (Bericat, 2016). Before

reviewing the ways that emotions manifest and can be studied, some theories on the ways that emotions are created are relevant for consideration. Bericat describes the appraisal theory of emotions where emotions function as a signal of our evaluation of an environment or event. These signals may create anxiety when we are faced with potential danger, which has evolutionary benefits. In contrast, the attribution theory of emotions indicates that emotions that are experienced are not only based on the event, but also due to the subject's understandings of the cause of the event. Tying to Tuner's description of power and status theories, expectation states theory describes that the emotional experience that an individual has will be affected by the prior expectations of the subject. Specifically important in this theory is the individual's assessment of meeting the expectations of others based on their power or status. This brings the social context of emotions to the forefront for consideration of their emotional experiences, which in the context of this project, may impact an individuals' decision-making processes in consumption choices and pro-environmental behaviour.

In considering the ways that emotions can be a driving force in consumption choices, recent research shows a connection between emotions and consumption. Specifically, diet choices can be a form of emotional expression and an indicator of emotions felt. Yao (2016) investigated the role of emotions in consumption of various dairy products in the Gauteng Province of South Africa. The findings of this research showed that dairy consumption is emotionally-driven. Yao approached the participants of this study using the Product Emotion Measurement (PrEmo) tool, asking to choose one of the following emotions in relation to various dairy products (i.e. Milk, cheese, yoghurt, etc.): Desire, Satisfaction, Pride, Hope, Joy, Disgust, Dissatisfaction, Shame, Fear, Sadness and Boredom. Further, the participants were also asked to express the intensity of the emotion on a 5-point scale. The results show, that in general, there was a lean towards positive emotions by those that consume the products in question.

This research indicates that there are specific emotions elicited by dairy products, which can vary between specific dairy products. This research and its findings are an indication that consumption is guided in part by emotions, and that emotions are generated through consumption as well. As this research took place in South Africa, and as discussed above that there is a cultural element to emotions, there is sufficient reasoning to incorporate this research into my own methods, by including similar questions in my consumer survey to apply this to a Canadian context.

This research project considers the role of emotions in deciding where to take environmental action as well as action for animal welfare, and how to take this action, including at the consumer-level through consumption choices. The role of emotions and environmental action is explored in environmental sociology, specifically in recent research by Davidson and Kecinski (2022). In considering the individual and collective responses to climate change, the researchers note that there are various ways that these emotions manifest and exist. This new area of research directly ties emotions to environmental action, and asserts the need for considering the emotional "elements of decision-making", an area of research that typically puts focus on the "cognitive" or "rational" elements of human decision-making.

As will be discussed further in the Methodology, emotion-based questions are incorporated into the consumer-side survey to determine the emotions elicited by consumption and purchasing of dairy and plant-based products, and investigate how correlations exist between these emotions and consumption behaviour.

Theoretical Framework

Researchers have examined ways in which individuals make decisions about the items and products that they purchase and consume, focusing on predictive factors that may guide these decisions. One popular theory in the understanding of food consumption decisions is the Theory of Planned Behaviour (TPB), specifically the Theory of Planned Behaviour in Food. Described by McDermott et. al. (2015) TPB, "asserts that the most proximal determinant of behaviour is the *intention* to perform that behaviour". The authors state that "intentions" indicate the amount of effort an individual would devote to a specific behaviour. This is determined by a series of factors including: attitudes, their overall evaluation of the behaviour, subjective norms, an evaluation of what the individual believes significant others think about them engaging in that behaviour, and perceived behavioural control (which is how the individual perceives their control over the behaviour) (McDermott et. al., 2015). In the case of deciding whether to consume dairy products, including specific types of dairy products, or choosing plant-based alternatives instead, these factors all come into play. Through this theory, it could be understood that depending on whether there are positive attitudes, and a social expectation that consuming certain products is considered to be "good" behaviour, and if the individual has the control of whether to consume these items, that will impact the outcome of their decisions. This research

attempts to identify and understand the attitudes and possible social influences that are responsible for motivating an individual to consume dairy products or their alternatives through asking questions that link directly to the factors that make up *intentions*.

To specify how the TPB applies to food, Shepherd et. al. (1995) discusses the theory of reasoned action (TRA) and TPB through food choices. The authors expand on these theories to consider moral and ethical obligations that are relevant to research into the dairy industry. The authors posit that, "[a]lthough food choice is a less obvious domain within which such factors might operate there are nonetheless particular instances where moral or ethical issues might be important. These might include the use of animals in food production and issues of animal welfare or the application of new techniques to food production, such as genetic engineering" (Shepard et. al, 1995). Further, the authors describe that there are additional moral concerns felt by consumers when making decisions on behalf of others, such as their children, who they are obligated to care for and make the "right choice" for. In dairy consumption, this can be especially influential due to concern surrounding balanced diets for children and the consumer themselves. Using TPB as the anchoring theoretical framework for this framework, and applying it specifically to food choice, I consider all of the factors that make up *intentions* both in this consumer-side survey.

Another important aspect to this research is the environmental impact of dairy production and consumption, which can be considered in part of the TPB through analyzing participants' attitudes and subjective norms. To frame this aspect though, a look into pro-environmental behaviour theories is necessary. Onwezen et. al. (2013) discuss the function of the Norm Activation Model (NAM) which was originally developed by Schwartz (1977) within the context of altruistic behaviour, and looked into the role of personal norms as a prediction of individual behaviour. The authors argue the benefits of an integrative model that includes NAM with TPB, as personal norms "increase the explained variance of behavioural intentions and behaviour in the TPB" (Onwezen et. al., 2013). Further, the authors argue that "an integrated NAM-TPB model can best explain pro-environmental behaviour", which is relevant to my own research for improving explanations of pro-environmental behaviour, including decisions around food choices and on-farm decision-making. In addition to these arguments, their research considers the role of anticipated emotions of pride and guilt in pro-environmental behaviour, where these

emotions are evoked by the evaluation of oneself through following (or failing to follow) personal or social standards, which incorporates understandings of one's moral obligations (i.e. altruism). This further supports the need for emotion-based research on the topic of dairy consumption specifically, as a means of understanding where individuals believe they are following or adverting from pro-environmental behaviour set through the expectations they have of themselves, which may in turn be guided by the expectations they believe others have for them.

Methodology

Consumer-Side Survey

To explore consumer preferences, a survey was administered in early 2022 by Alchemer (formerly known as SurveyGizmo). Canadians across the country, aged 18 and above, were recruited in the general population survey. The age of the respondents are taken in groups. For example, respondents are grouped by ages: 18-29; 30-55; and, 56+. This allows for analysis of differences between age groups. In addition, this allows for direct research into the preferences of the up and coming "Gen Z" group (i.e., those born after 1997) who are now entering the consumer space and have been the specific target of various advertising campaigns by the dairy industry in recent years. The survey questions include demographic questions, scaled/rating questions about preferences, and some choice-experiment-style questions. These questions are applied to various dairy and plant-based product traits based on the genomic traits discussed earlier. The topics of the questions include: dairy preferences, changes to dairy consumption, feelings towards dairy products and emotions elicited by specific products, and scales of trust towards agriculture and current practices. Upon data collection, analysis is conducted using SPSS and other relevant statistical software.

In addition to the survey producing important and relevant results, the construction and use of the survey provides some valuable contributions to larger sociological methodology literature. This is due to the structure of some of the emotion-based questions within the survey, which will incorporate image-based questions to elicit emotions, similar to the methods used in the Yao (2016) study discussed earlier. The use of this structure shows how people respond to this form of survey question and help to contribute to a wider range of survey research.

This research project relies on the United States-based company, Alchemer, to collect survey data. This group is also the main agent in gathering participants, using their panels. Their panel service has access to "more than 100 million respondents worldwide in 100 countries" (Alchemer, 2021). Using the parameters of the survey, the panel respondents are selected to fit the criteria of a person that lives in Canada over the age of 18. The survey remained open for responses until approximately 2000 responses are acquired, with a 50:50 ratio of male to female respondents, and at least 250 people per age group to ensure a diversity of demographics are included. Additionally, as there are multiple versions of the survey due to the emotion-based questions, there is an even split of participants between the versions to allow for statistical validity, which is expanded upon in detail in Chapter 3.

The use of online surveys and survey panels to collect data has various benefits and drawbacks, including potential bias in the respondents. Arguments against the use of online survey panels include possible under-coverage of the target demographic as only those with internet will be able to respond. self-selection that may create a bias as only certain individuals that would like to participate will participate, as well as personality biases (Scherpenzeel, 2021; Valentino et al., 2020). Additionally, selection bias can create issues within the data sets that are collected (Verbeek & Nijman, 1996). Some options exist to reduce and/or eliminate these biases, including weighted adjustments and random selection within the panel as well as statistical methods to verify and correct data (Scherpenzeel, 2021; Verbeek & Nijman, 1996). In an attempt to correct for under-coverage, this survey has response requirements across demographics to ensure that under-representation of certain groups does not occur. With the ability to correct for errors and biases where possible, and due to the nature of this study attempting to collect data across the entire country of Canada, Alchemer was chosen to be a valid tool for data collection for the survey responses for this study.

Additionally, there was a significant amount of pre-testing and discussion of the survey questions that were included in this process before implementing the full survey. Through the use of the Alchemer platform, "pre-test" participants were recruited within the Department of Resource of Economics and Environmental Sociology as well as through social connections to gather preliminary testing data. This data and feedback was used to ensure that any necessary changes

were made before the survey was put into full implementation, helping to verify that the methods used were the most accurate, and to validate the data even further.

Ethical Considerations

Due to the nature of this study having an element of human participation, an information and consent sheet for participants is included for participants to review and consent to (found in Appendix A). This sheet is for the survey participants, who are required to read and agree with the terms and conditions of participating in the study before beginning the survey. Survey respondents are free to exit the survey at any time during its completion. Due to the anonymous nature of the survey, and given that names and contact information will not be taken, there is no opportunity for respondents to withdraw after their submission.

The participants' identities are protected and anonymized in the project. Currently, there are no known risks to participants. Though there are no known benefits to participating, our hope is that participants will find enjoyment in the experience and in contributing to a larger understanding of pro-environmental and pro-animal behaviour and dairy consumption.

Research Significance/Implications

This research project offers several contributions. The climate crisis is impending upon human civilization, and the time to act is now. But in order to take action, important decisions are ahead. By exploring the factors that impact decision-making at the individual level, we can come to understand the ways in which consumers and producers may be expected to act in the coming years. As shown through current and ongoing research, people are concerned about themselves and their environment, and looking to make changes to protect themselves and the planet. By analyzing the various actions that individuals are taking in the consumer and producer-spheres, policy makers can begin to consider legislation that reflects these concerns and values. The findings of this research project demonstrate the ways that consumers think and respond to various internal and external factors, and can help to guide those that work in the dairy and plant-based dairy industries to better understand the concerns and values of consumers, allowing these businesses to respond and capture their consumers values.

Additionally, by asking questions about the emotional elements of dairy consumption, this research can be used as a template for surveying individuals on emotions to understand the

influence of emotions on environmental behaviour. Furthermore, this research takes a unique perspective on examining the topic of genomics and the understandings and concerns of Canadian citizens. These findings will be relevant to various levels of government and other researchers in the environmental sociology realm.

Reflexivity/Standpoint

In conducting sociological research, especially that which considers the attitudes, beliefs, and emotions of participants, it is also important to consider the possible influences on the project from the researcher. Although conducting research via a quantitative approach allowed for distance between myself and the participants, there were many ways in which my own influence may have been captured and experienced by participants. Most notably, in the creation of questions and selection of various measurement scales. In attempt to remain neutral and have valid research methods, there was a reliance on already published and verified research methods and psychological scales. This allowed for me to explore concepts such an environmental attitudes and animal welfare attitudes without inserting my own perspective directly into the questions. Additionally, in reviewing the data, it was important to keep to a structure that allowed for direct analysis with as minimal of personal input on "what is important" to look at. Therefore, throughout the project there is a heavy reliance and importance placed on the theory of planned behaviour.

While maintaining structure, there remained many opportunities for myself as a graduate student to exert creativity and innovation, which included the use of the emotions-based questions. While using measurement tactics that have been built on by others, I was able to ask questions that were completely creative in the development of the survey, with the guidance and support of my co-supervisors. This unique process allowed for self-reflection on my own habits, and how I express my own pro-environmental behaviour, and influenced the ways that I consider my attitudes towards animal welfare.

Through reviewing the aggregate data of the participants, stories begun to be painted for me on the diverse experiences and choices of Canadians across the country. This opportunity is one that I am grateful for, and one that I reflect on when considering my own food choices and actions in the present and in my future.

Additionally, I reflect on my privilege to take part in this experience, as a settler to Canada and first-generation Canadian, I am appreciative of the ways that research is able to be conducted in such a thorough manner, allowing me to work on topics of my own interests and work towards building knowledge that ideally will help to benefit humans, the environment, and animals.

References

Alberta Milk. 2021. Hanna Says Moo. Retrieved on October 15, 2021 from https://albertamilk.com/hanna-says-moo/

Alchemer LLC. 2021. Panel Services. https://www.alchemer.com/panel-services/

Allen, M.R., O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld, 2018: Framing and Context. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Beard, S. 2020, Mar 2. As veganism grows more popular in the U.K., dairy industry fights back. *Marketplace*.

Bericat, E. 2016. The sociology of emotions: Four decades of progress. *Current Sociology*, *64*(3), 491–513. https://doi.org/10.1177/0011392115588355

California Milk Processor Board. About us – Got Milk. Retrieved on October 15, 2021 from https://www.gotmilk.com/about-us/

Dairy Farmers of Canada. 2018. 2018 Canadian Dairy Sector Overview.

Dairy Farmers of Canada. 2019. AGECO study results reveal improved environmental impact and efficiency of Canadian milk production. Retrieved on November 15, 2022 from https://dairyfarmersofcanada.ca/en/dairy-in-canada/news-releases/ageco-study-results-reveal-improved-environmental-impact-and-efficiency-canadian-milk-production

Davidson, D. J., & Kecinski, M. 2022. Emotional pathways to climate change responses. WIREs Climate Change, 13(2). https://doi.org/10.1002/wcc.751

Domingo, N. G. G., Balasubramanian, S., Thakrar, S. K., Clark, M. A., Adams, P. J., Marshall, J. D., Muller, N. Z., Pandis, S. N., Polasky, S., Robinson, A. L., Tessum, C. W., Tilman, D., Tschofen, P., & Hill, J. D. 2021. Air quality–related health damages of food. *Proceedings of the National Academy of Sciences*, *118*(20). https://doi.org/10.1073/pnas.2013637118

Earth's Very Own. 2021. Products, Oat. Retrieved on October 15, 2021 from https://earthsown.com/product_ingredients_base/oat/

European Environment Agency. n.d. Life cycle assessments. Retrieved on November 15, 2022 from https://www.eea.europa.eu/help/glossary/eea-glossary/life-cycle-assessment

FAO. 2021. *The share of food systems in total greenhouse gas emissions*. Global, regional and country trends, 1990–2019. FAOSTAT Analytical Brief Series No. 31. Rome

Flanagan, R. 2018, July 25. More than 3 million Canadians vegetarian or vegan: study. CTV News.

Government of Canada. 2020. Overview of the Canadian agriculture and agri-food sector 2018. Retrieved October 15, 2021 from https://agriculture.canada.ca/en/canadas-agriculture-sectors/sector-overviews-data-and-reports/overview-canadian-agriculture-and-agri-food-sector-2018

Grant, C. A., & Hicks, A. L. 2018. Comparative Life Cycle Assessment of Milk and Plant-Based Alternatives. *Environmental Engineering Science*, *35*(11), 1235–1247. https://doi.org/10.1089/ees.2018.0233

Hussain, G. 2022, September 14. What Are the Environmental Impacts of Dairy Farming? *Sentient Media*. Retrieved October 7, 2022, from https://sentientmedia.org/the-dairy-industry-environment/

Laurans, G., & Desmet, P. M. A. 2017. Developing 14 animated characters for non-verbal self-report of categorical emotions. *Journal of Design Research*, *15*(3–4), 214–233. https://doi.org/10.1504/JDR.2017.089903

Law Society of Alberta. 2021. Indigenous Land Acknowledgements. Retrieved on October 15, 2021 from https://www.lawsociety.ab.ca/about-us/key-initiatives/indigenous-initiatives/indigenous-land-acknowledgements/

Lynch, J., Cain, M., Frame, D., & Pierrehumbert, R. 2021. Agriculture's Contribution to Climate Change and Role in Mitigation Is Distinct From Predominantly Fossil CO2-Emitting Sectors. *Frontiers in Sustainable Food Systems*, *4*, 300. https://doi.org/10.3389/fsufs.2020.518039

McDermott, M.S., Oliver, M., Svenson, A. et al. 2015. The theory of planned behaviour and discrete food choices: a systematic review and meta-analysis. Int J Behav Nutr Phys Act 12, 162 https://doi.org/10.1186/s12966-015-0324-z

Onwezen, M. C., Antonides, G., & Bartels, J. 2013. The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology*, *39*, 141–153. https://doi.org/10.1016/j.joep.2013.07.005

PETA. 2021. Veganism and the Environment. Retrieved on October 15, 2021 from https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/

Poore, J., & Nemecek, T. 2018. Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Scherpenzeel, A. 2021. How to cover the general population by Internet interviewing: Problems of coverage and selection and possible solutions.

Shepherd, R., Sparks, P., & Guthrie, C. A. 1995. The Application of the Theory of Planned Behaviour to Consumer Food Choice. *ACR European Advances*, *E-02*. https://www.acrwebsite.org/volumes/11624/volumes/e02/E-02/full

Statistics Canada and the International Dairy Federation; Compiled by Agriculture and Agri-Food Canada, Animal Industry Division, Market Information Section. Printed 2021-11-16. Table can be found: https://aimis-simia-cdic-ccil.agr.gc.ca/rp/index-eng.cfm?action=gR&r=264&signature=D87CD8649F87E0F19E0FBF5457DF6359&pdctc=&pTpl=1#wb-cont

Turner, J. H. 2009. The Sociology of Emotions: Basic Theoretical Arguments. *Emotion Review*, *1*(4), 340–354. https://doi.org/10.1177/1754073909338305

Valentino, N. A., Zhirkov, K., Hillygus, D. S., & Guay, B. 2020. The Consequences of Personality Biases in Online Panels for Measuring Public Opinion. Public Opinion Quarterly, 84(2), 446–468. https://doi.org/10.1093/poq/nfaa026

Verbeek, M., & Nijman, T. 1996. Incomplete Panels and Selection Bias. In L. Mátyás & P. Sevestre (Eds.), The Econometrics of Panel Data: A Handbook of the Theory with Applications (pp. 449–490). Springer Netherlands. https://doi.org/10.1007/978-94-009-0137-7_18

Yao, V. Y. 2016. Investigating Consumption-Related Emotions Elicited by Selected Dairy Products Using Product Emotion Measurement. *International Journal of Marketing Studies*, *8*(1), 86. https://doi.org/10.5539/ijms.v8n1p86

Chapter Two: Applying the theory of planned behaviour to dairy consumption: The role of norms and emotions

Introduction

Dairy production has been noted as having one of the largest environmental footprints amongst Canada's agricultural industry, with impacts being seen and felt globally. Major effects of this industry include air quality impacts (Domingo et. al., 2021), creating methane and CO_2 emissions (Lynch et. al., 2021) that contribute to climate change, and requiring large areas of land and water use (Poore & Nemecak, 2018). Although work is being done on the production side to reduce impacts, consumers are also taking actions of their own to reduce their personal environmental footprints. Additionally, the use of animals in livestock poses various animal welfare issues, with more individuals choosing to live plant-based lifestyles in order to mitigate harm to animals. This chapter explores the application of several sociological theories in predicting dairy consumption behaviour for Canadian consumers, attempting to answer questions about the ways that individuals conceptualize their environmental and animal welfare attitudes and apply those to their behaviour. This research builds from the work of others in the discipline that have explored the ways that attitudes, social norms, and emotions influence behaviour, with specific regard to consumption behaviour (McDermott et al., 2015; Yao, 2016). Following the theory of planned behaviour (TPB), this approach follows the ways that attitudes, norms, sense of behavioural control, and emotions impact action and behavior. This approach adds a new dimension to TPB by integrating a theory of emotions into our understandings of key drivers of behaviour. Through this, there may be a distinct role of emotions in decision-making that can be explored, while controlling for the effects of attitudes and social norms.

Background

As outlined in Chapter One, there are various economic, environmental, and social factors to consider when studying Canadian dairy consumption and production. Economically, there are large impacts from the agricultural, and specifically the dairy industry, onto the Canadian economy. This includes a significant share of Canada's GDP, with some reports indicating that the dairy industry contributes "$19.9 billion a year to Canada's Gross Domestic Product (GDP)" (Dairy Farmers of Canada, 2018). This large and profitable industry is not without its

environmental impacts though, as outlined above there are various climate impacts due to the land and water usage requirements, as well as emissions of carbon dioxide and methane gas. Although some of these environmental damages may seem abstract, reports show the impacts to human life by quantifying the 17,900 annual air quality-related deaths that may be attributed to the agricultural industry (Domingo et. al., 2021). Additionally, the social context of which dairy production and consumption exists within Canada is quite significant. This is due to the cultural and historical impact that agriculture has had within Canada, and the ways that dairy consumption can be contributed to treasured habits and traditions. With these concepts in mind, this chapter seeks to answer the following research question:

"How do Canadian dairy consumers demonstrate their understanding of pro-environmental and pro-animal behaviours through their preferences for dairy and plant-based products? How do the characteristics of the theory of planned behaviour as well as emotions appear to be relevant for dairy and plant-based dairy product choices?"

Literature Review

The exploration of these types of questions have long been studied in sociology and psychology, as researchers attempt to categorize and predict the societal and individual behaviours. A dominant theory guiding this study is the theory of planned behaviour. As discussed in Chapter 1, the theory has a series of elements that are used to predict the behaviour of individuals and can be applied to many circumstances. Additionally, this project attempts to import concepts from the sociology of emotions to measure the ways that emotions influence consumption behaviour of dairy products and dairy substitutes.

Theory of Planned Behaviour

McDermott et. al. (2015) explain that the theory of planned behaviour (TPB), "asserts that the most proximal determinant of behaviour is the *intention* to perform that behaviour". The authors state that "intentions" indicate the amount of effort an individual would devote to a specific behaviour. This is determined by a series of factors including: attitudes, their overall evaluation of the behaviour, subjective norms, an evaluation of what the individual believes significant others think about them engaging in that behaviour, and perceived behavioural control (which is how the individual perceives their control over the behaviour) (McDermott et. al., 2015). Throughout this research project, TPB is applied to understand and predict dairy consumption

behaviour, by considering the ways that attitudes – both environmental attitudes and attitudes towards animals and animal welfare, social norms (as measured by the consumption habits of the participants' friends and family members), and perceived behavioural controls such as involvement in regular grocery shopping and importance of price in choosing food items all come together to guide consumption behaviour. These elements are proxies for the more general statements usually included in the TPB, as a person that does the grocery shopping would have more control over the food going into the house and being eaten. Price can eliminate various foot products from a person's choice set, particularly in inflationary periods, which affects behavioural control.

Attitudes

Much work has been done in the field of environmental sociology to uncover the ways that attitudes shape a person's actions, beliefs, and behaviours. One such area of research on this topic is the New Ecological Paradigm. Dunlap and Van Liere conceptualized the New Environmental Paradigm (NEP) in the mid-1970s that "focused on beliefs about humanity's ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity's right to rule over the rest of nature" (Dunlap, 2000). The NEP became a popular scale to measure environmental, or "ecological", worldviews, as well as a measure for environmental concern. The scale was used in this survey by asking participants to rate how strongly they agreed with various NEP statements developed by Dunlap, along a Likert scale of 15 statements. Though used in this survey, the scale was found to not have as much predictive value in our analysis as other attitudinal scales, and was therefore left out from later analysis.

Another way that researchers have attempted to understand the various ways that individuals conceptualize nature and their role within the environment is through the Myths of Nature scale. The myths of nature are defined through "cultural theory", which "assumes that the relationship between environmental beliefs and preferences for environmental risk management strategies" are "complex" (Poortinga et al., 2003). As such, cultural theory states that there are "four archetypal views on the vulnerability of nature" that are distinguishable and known as the "myths of nature". These include: nature benign, nature tolerant, nature ephemeral, and nature capricious. Poortinga et al. (2003) explain these concepts by considering a structure that holds a ball, where the "ease with which the ball can roll away represents the vulnerability of nature".

Steg and Sievers (2000) also write on cultural theory and myths of nature, and conceptualize a measurement scale as the following, which was also used in this study:

- Nature Ephemeral: “Environmental problems can only be controlled by enforcing radical changes in human behaviour in society as a whole”.
- Nature Tolerant: “Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed”.
- Nature Benign: “We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions”.
- Nature Capricious: “We do not know whether environmental problems will [magnify] or not”.

These categories for the myths of nature have a robust background, and are “embedded and rooted into an individualistic, hierarchical, egalitarian, and fatalistic way of life”. Additionally, cultural theory creates a link between the view of nature, the level of environmental concern, and the preferred management strategy for the individual. In order to measure and assess a respondent’s attitudes via the myths of nature, participants in these types of studies are asked to indicate which of four statements about the vulnerability of nature match their viewpoint the best. The statements are explained by Poortinga et al. (2003) are as follows:

- Nature Ephemeral (Egalitarian): “We have to be very careful with the environment, the slightest change may be catastrophic”.
    - Those in this category view nature as “fragile” or “precarious”, with a high level of environmental concern. Their preferred management strategy is “behavioural change”.
- Nature Tolerant (Hierarchist): “Environmental problems will not easily run out of control, but we must not exceed the limits of the environment”.
    - Those that identify with this statement view nature as “moderately vulnerable”, with an “average” level of environmental concern. The preferred management strategy for this group is regulation by government.
- Nature Benign (Individualist): “We do not need to worry about environmental problems; the environment is not easily disturbed”.

    - These individuals consider nature to be “robust” and “resilient”, with a “low” level of environmental concern. This individualistic perspective prefers a management strategy of a free market and the use of technology.
- Nature Capricious (Fatalist): “We do not know whether environmental problems will aggravate or not”.
    - This group has no known view on nature, as it is not something they consider at all. Therefore, their concern for the environment is “low” and there is no “obvious” preferred management strategy in comparison to the other three groups.

Utilizing the concepts from the above authors, we can begin to paint a picture about the environmental attitudes of Canadians using verified and valid research techniques to measure.

Another aspect to this research is the role of attitudes towards animals in predicting consumption behaviour. In considering the role of attitudes towards animals, there is no simple way to ask participants “what do you think of animals?” In aide of this, we can turn to the Animal Attitude Scale. First developed in the 1990’s, the Animal Attitude Scale (AAS) is a common way to measure an individual’s “general attitudes toward animal protection” (Herzog, 2015). Since its original version, which was created to measure sex role orientation and animal welfare attitudes, there have been various updates and changes over the years to integrate other aspects of the interactions and relationships between human beings and animals. In predicting food choices, Herzog et al. (2015) note that evidence has been found to support that “AAS predicts food choices, with vegetarians having significantly higher scores than nonvegetarians”. The statements that are used for this type of measurement vary in length, but the current 10-item version presented by Herzog was used in this study, and is as follows (with a 5-item scale from strongly disagree to strongly agree, with the order of statements randomized).

1. It is morally wrong to hunt wild animals just for sport
2. I do not think that there is anything wrong with using animals in medical research
3. I think it is perfectly acceptable for cattle and hogs to be raised for human consumption
4. Basically, humans have the right to use animals as we see fit
5. The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work

6. I sometimes get upset when I see wild animals in cages at zoos
7. Breeding animals for their skins is a legitimate use of animals
8. Some aspects of biology can only be learned through dissecting preserved animals such as cats
9. It is unethical to breed purebred dogs for pets when millions of dogs are killed in animal shelters each year
10. The use of animals such as rabbits for testing the safety of cosmetics and household products is unnecessary and should be stopped

Binnießer and Randler (2015) discuss the covariation of environmental attitudes, specifically "preservation" and "utilization", with pro-animal attitudes in school aged children. The authors explain the term "animal attitudes" are the beliefs and attitudes towards animals are those that are "related to farm animals, animals used for medical research and for developing cosmetics, as well as using animals for food, for leisure and some other aspects that are related to animal welfare" (Binnießer & Randler, 2015). In their paper they note the various correlations within the animal-attitude literature that describe links to pro-animal attitudes, including the consumption of meat products. They write that vegetarian diets are shown to be linked to higher levels of empathy towards pets, and lower acceptance of animals being utilized in settings like research. The researchers conducted an analysis utilizing the Animal Attitude Scale developed by Herzog et al., the Intermediate Attitude Scale, the 2-MEV model (2 Factor model of Environmental Values) developed by Bogner and Wiseman, as well as a measurement of animal-related activities. Their findings indicate that "[h]igh pro-animal attitudes scores were related to high preservation scores and to low utilization scores", indicating that there is a relationship between animal attitudes and environmental attitudes. This finding helps to provide some context for this study, but differs in that it was done to specifically analyze the link between attitudes rather than attitudes and consumption behaviour. In addition, this German study was conducted with school-aged children while our research is focussed on Canadians over the age of 18, with the focus on the ways that attitudes contribute to dairy consumption behaviour.

Social Norms

At some point in almost every person's life, there is a desire to fit in or to be "normal". These desires can shape the way that individuals act and create a standard for what might be considered

appropriate or the "right thing" to do. Social norms can be understood as "implicit codes of conduct that provide a guide to appropriate action" (Higgs, 2015). In the paper "Social norms and their influence on eating behaviours", Suzanne Higgs takes a close look at the role of social norms in eating behaviour. Higgs notes that there is evidence showing that social norms do in fact influence consumption of food, where dietary behaviours and food intake can be predicted by the "eating behaviour of others". Specifically related to food, Higgs posits that "social eating norms" are the "perceived standards" that an individual holds about the consumption of food, including "the amounts of foods or specific food choices" for the "members of a social group", which could refer to various levels of identify including nationality, peer groups, or family and friend groups (Higgs, 2015). In short, the habits of others that surround an individual shape the understandings that the individual holds regarding various food types and concepts related to food. In contextualizing *why* people follow social eating norms, Higgs presents two main reasons. The first is that the individual may follow a norm to have "enhanced affiliation" within the social group and to be liked by the group members (and members of other groups). Additionally, the individual might follow the norms for eating because they believe that it is "correct". There are a variety of other potential reasons why a person may follow these norms, many that may overlap and influence each other as well. Further, Higgs discusses the "selection of safe foods", in which individuals may look for signals from others about food that is nutritious and not dangerous for consumption, a concept that involves an evolutionary understanding of humans and their social behaviours. Another factor that cannot be overlooked is the power of sharing food in developing norms around food consumption, creating a cooperative nature to food consumption as well. Higgs notes that data is still lacking on the long-term impacts of social norms in eating behaviour, and this study attempts to understand how prevalent social norms are in predicting the consumption behaviour specifically for dairy and dairy substitute products. This research uses the foundational knowledge laid out by Higgs and others in the discipline of social norms and food to consider these impacts in short term and long term food decision making.

A 2008 study by Vermeir and Verbeke titled "Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values" expands on the role of social norms within the theory of planned behaviour (TPB) in consuming sustainable dairy products. In their use of TPB, the authors also consider the "confidence" that an

individual has in the sustainability of the product, and the "human value" of the product. The "human value" refers to "relatively stable beliefs about the personal or social desirability of certain behaviours and modes of existence". Vermeir and Verbeke reference various studies that link "sustainable or ethical behaviour to personal values", and the ways that these values have been conceptualized using words such as "honesty", "idealistic", and ones that are especially relevant to social norms such as "universalism", "equality", and "responsibility" that have been values associated with sustainable behaviour. This lays a framework to consider the ways that social norms also function as a value, or attitude, that a person holds themselves. In conducting a survey and analysis on the various components of the theory of planned behaviour for predicting the purchasing of sustainable dairy products, the researchers found mixed results. Correlations showed a lower mean for social norms than for attitudes with behavioural intention towards purchasing sustainable dairy products "which suggests that most respondents did not really experience high social norms in relation to purchasing sustainable dairy products" (Vermeir & Verbeke, 2008). The regression conducted shows that social norms guide individuals differently based on their personal values that were noted previously, where those that have high values for "universalism", "stimulation", "power" and "achievement" had social norms not as significantly predictive as those that scored lower. The findings also showed that those "who hold traditional values are especially guided by social norms", and are "more inclined to buy sustainable products" as they "want to steer a middle course". Further, the authors note that the "universalists – who are categorized as being broad-minded, loyal and wise" would "want to protect the environment and be one with nature" and would be more likely to "consider the consequences that their behaviour has for the environment", being less influenced by social norms and more by their own personal, "internal", values for the environment. Those that are the opposite of these "unselfish" values are more influenced by social norms, buying sustainable food based on the opinions that others may have of them, providing insight to their "external values". The results of their study go much deeper into the ways that attitudes, social norms, and perceived behavioural control can be analyzed through the application of TPB. Important to recognize is the ways that the authors conceptualize the values that are triggered by and, in return, trigger the social norms that an individual holds in the selection of sustainable food choices. This study was conducted in 2008, and progress has been made in the sustainability of dairy products and the ways that consumers value and understand these concepts. The main

relevant takeaways from their paper is that social norms are clearly closely linked to values and attitudes, and have important implications for food consumption, environmental behaviour, and specifically the consumption of dairy products.

Behavioural Control

Utilizing the same resource for explaining the social norms impacts to sustainable dairy choices, Vermeir and Verbeke also discuss the ways that behavioural control functions within the theory of planned behaviour. The authors state that behavioural control "indicates whether the consumer can easily consume a certain product or whether consumption is difficult or impossible", and further, it assumes reflection on past experiences as well as "anticipated difficulties or facilitating conditions". Explaining further, the authors posit that if or when "people feel they lack the resources or opportunities to perform behaviour", it makes the individual unlikely to form the "strong intentions" that are needed to perform the behaviour. In the case of this research project, behavioural control is considered by the ways that individuals are able to make decisions about their dairy consumption or dairy substitute consumption. Additionally, Vermeir and Verbeke argue that "perceived behavioural control is conceptualised to influence behaviour directly in that even if one intends to do something, [they] may be unable to do so if the behaviour is not under volitional control", wherein the control could be due to internal factors and/or "external perceived difficulty factors", such as product availability or "perceived consumer effectiveness". Perceived consumer effectiveness (PCE) refers specifically to "the extent to which the consumer believes that [their] personal efforts can contribute to the solution of a problem", which begins to tie behavioural control to the values and attitudes of the consumer. At times, perceived behavioural control can counter the attitudes that one might hold and create a situation where even positive attitudes to perform a behaviour may be "stopped" from performing due to the constraints created from the behavioural control. The authors explain this by noting that "consumers who are more convinced that sustainable products are easily available and/or who believe that their own behaviour has a positive influence on, for example, the environment, are more inclined to buy sustainable products". Therefore, this indicates a connection between the attitudes and perceived behavioural control of individuals. Overall, this indicates a complexity of understanding what perceived behavioural control may mean for various types of participants in research settings.

In evaluating the role of perceived behavioural control (PCB) in the outcome of behaviours, Sultan et. al. (2020) write on "Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: moderating roles of communication, satisfaction and trust in organic food consumption". The authors note that a gap exists between PCB and behaviour within the TPB, as well as a gap in literature to address the issue to "increase desirable behaviours". In their definition of perceived behavioural control the authors build from the work of Ajzen (1991), where PBC is "the perceived ease or difficulty related to personal control over resources, opportunities, desires, and motives to intend or to reach a behavioural outcome". Sultan et. al. attempt to uncover the moderating effects of awareness surrounding organic food by exploring the moderating effects of perceived communication, satisfaction, and trust; areas that they argue are missing from current literature. In further defining PBC, the authors distinguish between external barriers that individuals may face, such as price and availability of food products, and the internal factors for consumers, including "consumption pleasure versus disappointment and excitement versus regret" (Sultan et. al., 2020). In this sense, perceived behavioural control relies heavily on the *perception* of the individual about their beliefs over their influence, considering previous experiences and anticipated future barriers and experiences, similarly to the definitions provided by Vermeir and Verbeke. The authors also discuss the role of "behavioural intentions" which "signal whether consumers will continue to purchase" and is defined as "the consumer's readiness to perform particular behaviours and can encompass positive and negative attitudinal outcomes" including "positive word of mouth recommendations" and "a commitment" to repurchase the food items as well as pay increased prices for these products. In their findings, Sultan et. al. discovered positive and significant effects of attitude, subjective norm, and perceived behavioural control on behavioural intention, and found that perceived behavioural control and behavioural intention positively and significantly influence behaviour. They also found that there is a partial-mediation effect for PBC-behaviour relationships, supporting their hypothesis that "Behavioural intention mediates the relationship between PBC and behaviour". These important results show the validity of capturing perceived behavioural control in applying the theory of planned behaviour, but also indicate some challenges in conceptualizing how participants express this, and how the theory attempts to capture it in studies, both directly and indirectly.

Emotions

The above discussions display the overlapping, intersecting, and sometimes contradictory nature of applying the theory of planned behaviour to food choices. Somewhat expanded on but left with room to explore is the ways that emotions also influence the decision to purchase and consume various food items. To add to the theory of planned behaviour, and to create more of an interdisciplinary approach to this project, the sociology of emotions is also applied as an important theoretical framework. Chapter 3 delves more deeply into the ways that emotions were analyzed and used in the research project, but a brief review is included here as well. For more background on the scholarship guiding the emotions background for this project, refer to the Literature Review in Chapter 1. This research connects the ways that attitudes, social norms, perceived behavioural control, and emotions intersect with one another to guide the decision-making of consumers.

Recent studies in the area of emotions have considered the ways that emotions can be measured, including through the use of questionnaires (Harley, 2016; Laurans & Desmet, 2017) as well as the ways that emotions guide food choices, including dairy consumption (Yao, 2016). This study integrates the findings and knowledge of previous researchers as a foundation for analyzing emotions in a survey setting regarding food consumption. As noted, a more detailed description of the emotions literature and methods can be found in Chapter 3.

Methodology

This section describes the various steps and decisions that were made to create and analyse the data for this project. For a more in depth review of the methodology in this project, refer to Chapter One. In early 2022, a survey of over 60 questions was distributed to over 1,800 Canadians across the country, aged 18 and above. The survey was developed over the fall of 2021, and the questions were modified and chosen from previous surveys with similar topics. Survey development included pre-testing via social contacts to test the approaches used, and then full implementation occurred in early 2022. Survey questions included those from research areas of psychology, sociology, and economics, while also having a focus on concepts from environmental sociology. Questions ask participants to explain and consider the factors that might play a role in their decision-making, including attitudes, norms, and perceived control over their own behaviour. The survey questions include demographic questions, scaled/rating questions about preferences, and some choice-experiment-style questions. These questions are

applied to various dairy and plant-based products, as well as topics of genomics and selective breeding. The topics of the questions include: dairy preferences, changes to dairy consumption, feelings towards dairy products and emotions elicited by specific products, and scales of trust towards agriculture and current practices. As this survey took place during the COVID-19 pandemic, and during a time of inflating food prices, some questions also ask about participants thoughts and experiences of these topics. Upon data collection, analysis is conducted using SPSS and other relevant statistical software. A few important decisions were made in the construction and analysis of the survey data including: the construction and interpretation of attitudes, the conceptualization of social norms, measuring perceived behavioural control, and the use of emotions-based questions. In this section I discuss these items, but additionally, a further in-depth discussion of the emotions-based questions and analysis is found in Chapter Three.

Attitudes

In exploring the role of attitudes in decision-making, it is imperative that the work of psychologists and other researchers is captured in the survey and analysis. There are a few points in the survey that attempt to capture the participants' attitudes towards various topics and ideologies. The two main concepts explored include attitudes towards the environment, and attitudes towards animals.

As noted in the background section, environmental attitudes can be uncovered by utilizing environmental attitude scale questions such as the New Ecological Paradigm (NEP) scale or Myths of Nature statements. Although the NEP scale measurement showed to have some significance in predicting behaviour when used in correlations, the regression results did not show this variable as having very strong explanatory power. Due to this, the use of the Myths of Nature statements showed to be more useful in this analysis. The format of the Myths of Nature statements asks for participants to indicate which statement best matches their view on nature. In the analysis, these four statements were dummy coded to be included in the regression analysis, leaving out the fourth statement. In comparing the statements of the Myths of Nature, Statement 4 (which was left out from the equation for comparison) is the least strong environmental viewpoint and therefore all the statements that are included in the regression represent increasing environmental concerns and stronger "pro-environment" attitudes.

As equally important to the analysis as environmental attitudes are, the animal attitudes of individuals were also measured. The animal attitudes were, as mentioned previously, measured using the Animal Attitude Scale developed by Herzog. The original 20-item scale is a valid instrument for measuring attitudes about animals, but can be cumbersome to utilize in data analysis. As such, Herzog et al. explore the ways that the scale can be reduced and still create meaningful outcomes including a 5-item scale (AAS-5) and a 10-item scale (AAS-10). They argue that "the AAS-10 and the AAS-5 are psychometrically robust short measures of attitudes toward the use of animals. Both the 5- and 10-item versions correlate very highly with the 20 item AAS. And both versions have acceptable reliability (Cronbach's alphas > 0.80), though the reliability of the 10-item scale is somewhat better than that of the AAS-5" concluding that "the AAS-5 and the AAS-10 are reliable and valid measures of general attitudes toward the human use of other species". Utilizing the findings from our survey, Cronbach's alpha for AAS-5 = 0.527, while Cronbach's alpha for AAS-10 = 0.739. With the assurance of the robustness by the original developers of the scale, and the high Cronbach's alpha score, it was determined that the AAS-10 would be the best measure of animal attitudes for this sample. A variable was created for the means scale of the AAS-10, and is included in the regression analysis, where a higher score indicates a stronger "pro-animal" attitude, where that participant has indicated a higher level of care of animals and animal welfare.

Social Norms

In order to apply the theory of planned behaviour to this research, it is important to capture the theme of social norms and the role that these social norms play in the participants' consumption behaviour, through the influence of social norms on their decision to or to not consume dairy products. To capture this effect, participants are asked throughout the survey about the consumption behavior of their friends and family members. Specifically, in a 5 point-scale from "Strongly Disagree" to "Strongly Agree" participants answer "How strongly do you agree with the following statement? My friends and family members are reducing their consumption of dairy products." This allows for participants to report this behaviour, which contributes to the social norms that they experience. Later, this question acts as a means for analysis to see if there is a connection between this social norm and the consumption behaviour of the participant. Additionally, participants that respond that they had reduced their dairy consumption over the last two years are asked about factors that influenced this, including their friends and family

reducing their own consumption of dairy products. This gives room to look closer at what is influencing participants to reduce their dairy consumption directly.

Perceived behavioural control

Adding the third main element used in the theory of planned behaviour, two questions are used to measure the perceived behavioural control (PCB) of participants. As noted in the literature review, there is often a gap between PCB and behaviour, and even more of a gap in solutions to address this in research. In understanding the external barriers that may exist, the analysis looks at questions where participants are asked about the frequency of their involvement in regular grocery shopping and how important price is as a factor in choosing food products. The assumption made is that those that are more regularly involved in grocery shopping will have more perceived control over what it is that they purchase and consume, and those that are not as held to price as a constraint in choosing food products will have more control as well. This particular conceptualization of perceived behavioural controls assumes that the adults taking part in the survey have autonomy over what they consume, but we acknowledge that there are various reasons why adults may not have this control over what they consume or purchase. Additionally, although acknowledging that internal factors also contribute to one perceiving varying levels of control over their behaviour, our survey style method of data collection does not allow for further discussions by participants on this and therefore these factors may not be captured in this study completely.

Emotions

In capturing emotions in the survey, inspiration is used from previous studies in the discipline (Laurans & Desmet, 2017; Yao, 2016). The survey includes two versions of emotions-based questions, where one half of the participants see Version A, and the other half see Version B. Version A uses a words-based likert style system of questions to ask about emotions, while Version B utilizes an image-based format based on the PrEmo Tool developed by Laurans and Desemt (2017) (see Chapter 3 for more information). For the regression model, a variable for emotions is used that is built from the combined results of both versions of the survey. The question asks:

> In considering your emotional experience when thinking about dairy products in general, which of these emotions is the primary (strongest)?

a) Sadness b) Fear c) Shame d) Anger e) Disgust f) Joy

g) Admiration h) Pride i) Satisfaction j) Desire k) None of the above

The answers are then dummy-coded into binary variables where 1 represents positive emotions (Joy, Pride, Satisfaction, Desire) and 0 represents negative emotions (Sadness, Fear, Shame, Anger, Disgust). Those that selected "none of the above" are left out from the analysis. It was important to include a "none of the above" option so that participants did not select another emotion by default that did not represent their true feelings. In this way, answers reflect the most accurate emotion felt by participants. Further discussion on the implications of leaving a portion of participants out from the sample is expanded on in Chapter 3.

Additionally, since there are two versions of the emotions questions, we wanted to ensure that the version seen did not influence the positivity or negativity of the emotions selected. A variable was created to be included in the regression that tested this by multiplying the emotion dummy score by the version (which was also dummy scored for Version A = 1 and Version B =0). This added variable shows if there is a significant effect on the emotions by the question asked, which is shown to be insignificant for this question. In Chapter 3, the results show more in depth on the differences between the two versions as well as any differences in results due to the differences. These differences were not significant for this portion of the study shown below.

Results

Characteristics of the sample

Descriptive statistics for the characteristics of the participants are shown in Table 2.1. To compare the general population, the right-most column of the table includes comparative data from the 2021 and 2016 Census population. Note that some of the census data does not match up exactly to the survey data categories, limiting possibilities for exact comparisons.

Table 2.1. Descriptive statistics for sample

Variable	Description	# of Participants	% of Sample	Population (%)
Female	Female	1007	55.2	51.0
Age Group	18-29	357	19.3	12.9*
	30-45	557	30.1	19.6*
	46-65	620	33.5	28.3*
	65+	317	17.1	16.9*
Income Level	Annual household income (CAD$)			
	$24,999 or under	272	14.7	14.0
	$25,000-$39,999	307	16.6	12.4
	$40,000-$54,999	279	15.1	29.29
	$55,000-$64,999	182	9.8	($40,000-$79,999)
	$65,000-$79,999	200	10.8	
	$80,000-$99,999	220	11.9	11.2
	$100,000-$119,999	185	10.0	10.4 ($100,000-$124,999)
	$120,000 or more	205	11.1	22.0 ($125,000 or more)
Highest level of education received	Elementary School	47	2.5	-
	Secondary (high) school	567	30.6	26.5
	Technical/Business school/Community college	548	29.6	41.8
	University	515	27.8	18.4

	Post graduate students (Masters or PhD)	174	9.4	1.6
City	Lives in a city (>100,000 inhabitants)	1180	63.7	73.7 (within CMAs)
Town	Lives in a town (>10,000 inhabitants)	394	21.3	10.1 (within CAs)
Rural/Countryside	Lives in the countryside/rural district	277	15.0	16.1 (outside CMAs/CAs)
Maritimes	Resident of New Brunswick, Newfoundland and Labrador, Nova Scotia, or Prince Edward Island	163	8.8	6.5
Quebec	Resident of Quebec	229	12.4	23.0
Ontario	Resident of Ontario	822	44.4	38.5
Manitoba	Resident of Manitoba	83	4.5	3.6
Saskatchewan	Resident of Saskatchewan	71	3.8	3.1
Alberta	Resident of Alberta	222	12.0	11.5
British Columbia	Resident of British Columbia	256	13.8	13.5
Yukon, Northwest Territories, Nunavut	Resident of Yukon, Northwest Territories, or Nunavut	5	0.3	0.3
Employment status	Employed full-time	772	41.7	48.9
	Employed part-time	277	15.0	11.4
	Unemployed	358	19.3	4.8
	Other	444	24.0	-

*Statistics Canada reports age groups under the age of 15, as well as an age group 15 to 19, 20 to 24, etc. so the 15-19 age group was removed from this count and therefore the percentage is an underestimate. As well, the percentages of total ages are lower than in the survey since they include those under the age of 18.

Table 2.1 shows that the distribution of participants in the survey is similar to that of the general population of Canada, with a similar make up of females, distribution across age groups and geographically across the country. This allows for the results and findings of this study to be considered more generally and act as a sample population.

Some questions asked that were used for analysis later were not comparable to census data, and have been included in Table 2.2. It is important to see here that over 30% of the participants reported that they have reduced their consumption of dairy products over the last two years.

Table 2.2. Descriptive statistics of characteristics of the sample

Variable	Description	# of Participants	% of Sample
Farming	Participant is or is related to someone that owns or works on a farm/ranch	317	17.1
Grocery shopping	How often participant is involved in regular grocery shopping		
	Never	53	2.9
	Once in a while	109	5.9
	Occasionally	207	11.2
	Frequently	405	22.0
	Always	1068	58.0
Has reduced dairy consumption over the past 2 years	Yes	643	34.7
	No	1208	65.3

Consumption Behaviour

Throughout the survey, participants are asked about their consumption behaviour of various dairy products and dairy-substitute products. This consumption behaviour is shown in Table 2.3. This information was later used to create different "consumer groups" for analysis including: 'Consumes dairy products', 'Consumes dairy substitutes', 'Has reduced dairy consumption over the last 2 years', 'Consumes no dairy', and 'Consumes no dairy nor dairy substitutes'.

Table 2.3. Consumption behaviour of participants across various products.

Frequency of consumption	Products							
	Milk	*Cheese*	*Butter*	*Yogurt*	*Ice Cream*	*All Dairy Products*	*Dairy Substitutes*	*All Dairy and Dairy Substitutes*
Never	155	57	125	193	103	50	710	37
Rarely (A few times a year)	110	57	114	121	224	84	231	122
Infrequently (Less than once a month)	101	88	145	171	399	279	186	411
Sometimes (1-3 times a month)	207	253	261	369	585	627	260	772
Regularly (1-3 days per week)	388	643	507	456	329	600	210	389
Frequently (4-6 days per week)	352	487	377	303	149	192	134	112
Daily	537	264	321	238	61	19	114	8
Total	1850	1849	1850	1851	1850	1851	1845	1851
Mean (S.D.)	5.04 (1.886)	5.10 (1.387)	4.80 (1.717)	4.42 (1.781)	3.81 (1.401)	4.24 (1.162)	2.94 (1.975)	3.93 (1.073)

For these responses: Never = 1, Rarely = 2, etc., Daily = 7. Therefore, the higher the mean, the more often that these products are consumed by the participants.

Variables of the Model: Attitudes, Social Norms, and Emotions

As discussed in the Methodology section, various scales and questions are used to measure the attitudes of participants. In addition, some social norm measures are used as well as emotion-based questions. In measuring environmental attitudes, participants are asked to identify with one of the Myths of Nature statements described earlier, and results are shown in Table 2.4. The majority of individuals in this sample fall into the "nature ephemeral" and "nature tolerant" groups, with 39.8% and 38.8%, respectively.

Table 2.4. Frequency table displaying distribution of environmental concern via the myths of nature amongst participants.

Myths of Nature Statement	Frequency	Percentage of sample
Statement 1: Environmental problems can only be controlled by enforcing radical changes in human behaviour in society as a whole	737	39.8
Statement 2: Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed	718	38.8
Statement 3: We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions	156	8.4
Statement 4: We do not know whether environmental problems will magnify or not	240	13.0
Total	1851	100.00

Animal attitudes are captured by utilizing the Animal Attitude Scale, and are shown in full in Table A.3 in the Appendix. As shown in the table, it can be difficult to tell the trends as the statements can vary. As well, some are measured in the opposite direction, and were later reverse-coded (Statements 2, 3, 4, 7, 8 – indicated with a ^{R} in Table 2.5). Due to this, and as discussed in the methodology section, a means-scale was created and used for the regression models. Additionally, social norms are captured by asking participants about the consumption behaviour of their friends and family (full results shown in Appendix A). A summary of the descriptive statistics for the animal attitudes and social norms is found below in Table 2.5.

Table 2.5. Descriptive statistics of animal attitudes and social norm indicators.

Variable	Mean (S.D)
AAS-10 Statements	
It is morally wrong to hunt wild animals just for sport	4.02 (1.23)
I do not think that there is anything wrong with using animals in medical research [R]	2.80 (1.31)
I think it is perfectly acceptable for cattle and hogs to be raised for human consumption [R]	3.75 (1.18)
Basically, humans have the right to use animals as we see fit [R]	2.41 (1.30)
The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work	4.06 (1.14)
I sometimes get upset when I see wild animals in cages at zoos	3.55 (1.21)
Breeding animals for their skins is a legitimate use of animals [R]	2.50 (1.36)
Some aspects of biology can only be learned through dissecting preserved animals such as cats [R]	3.17 (1.20)
It is unethical to breed purebred dogs for pets when millions of dogs are killed in animal shelters each year	3.54 (1.22)
The use of animals such as rabbits for testing the safety of cosmetics and household products is unnecessary and should be stopped	3.81 (1.24)
Social Norm Statements	
My friends and family members are reducing their consumption of dairy products	2.78 (1.14)

Min: 1(Strongly Disagree), Max: 5 (Strongly Agree)

Emotions were captured through the survey in two different ways, which are discussed more in depth in Chapter 3, but briefly to understand the ways in which they were captured, one can turn to Table 2.6. For the majority of the questions, responses were in the more positive side, except for when participants were asked how they would be likely to feel if they were told they were never able to consume dairy products again, in which case the majority of participants responded

they would feel “sadness” and “anger”. Otherwise, common positive emotions include “satisfaction”, “joy”, “pride”, and “admiration”.

Table 2.6. Frequency of primary emotions elicited by various dairy products.

Emotion	Question					
	Dairy Products in General	*Cheese*	*Milk*	*Process to Create Dairy Products*	*Finished Consuming*	*Never Able to Consume Again*
Joy	232 (15.0%)	254	190	143	192	132
Admiration	90 (5.8)	106	92	227	97	74
Pride	129 (8.3)	100	124	165	98	75
Satisfaction	707 (45.7)	660	651	389	867	182
Desire	168 (10.9)	319	181	83	79	75
Sadness	78 (5.0)	47	68	155	61	678
Fear	27 (1.7)	29	31	41	28	48
Shame	44 (2.8)	27	37	77	52	23
Anger	21 (1.4)	16	21	34	6	278
Disgust	52 (3.4)	39	88	59	34	37
Total	1548	1597	1483	1373	1514	1602

To simplify the emotions scale for analysis, the variables were coded into binary variables of positive and negative for the question about dairy products in general. The positive emotions include: Joy, Admiration, Pride, Satisfaction, and Desire. The negative emotions include: Sadness, Fear, Shame, Anger, and Disgust. The mean of 0.86 (Table 2.7) indicates the mostly positive nature of responses.

Table 2.7. Frequency of positive and negative primary emotions to dairy products in general.

Emotion type	Emotions to dairy products in general
Negative Emotion	222
Positive Emotion	1326
Total	1548
Mean (S.D.)	0.86 (0.35)

Dairy Consumption Behaviour of Canadians

This study explores the various factors that can contribute to and guide the consumption behaviour of Canadians for dairy products and dairy substitutes. Following the theory of planned behaviour, binary logistic regressions were conducted to determine the strength of various factors and indicators. Regressions were conducted for the following dependent variables: Consumes dairy substitutes, Has reduced dairy consumption over the last 2 years, Consumes no dairy, and Consumes neither dairy nor dairy substitutes. Examples of two of these regression models are shown in Table 2.8 and 2.9 (and the other two can be found in Appendix Table A.1 and Table A.2).

Table 2.8. Binary logistic regression predicting consumption of dairy substitutes.

Predictor Variables	Regression 1 (Attitudes) β(OR)	Regression 2 (Norms) β(OR)	Regression 3 (Behavioural Control) β(OR)	Regression 4 (Emotions) β(OR)	Regression 5 (Everything with controls) β(OR)
Attitudes: Myths of Nature Statement 1 +	0.424 (1.528)**	0.340 (1.406)*	0.326 (1.386)	0.440 (1.552)*	0.217 (1.242)
Attitudes: Myths of Nature Statement 2 +	0.496 (1.641)**	0.455 (1.577)**	0.459 (1.582)**	0.562 (1.754)**	0.345 (1.413)
Attitudes: Myths of Nature Statement 3 +	0.952 (2.591)***	0.783 (2.189)***	0.755 (2.128)***	0.842 (2.320)***	0.475 (1.609)
Attitudes: Animal Attitude Scale 10	0.190 (1.209)*	0.214 (1.239)**	0.224 (1.251)**	0.146 (1.157)	0.202 (1.224)*
Norms: "My family and friends reducing their consumption of dairy products"		0.465 (1.592)***	0.464 (1.591)***	0.453 (1.573)***	0.425 (1.529)***
Behavioural control: how frequently involved in grocery shopping			-0.063 (0.939)	-0.065 (0.937)	0.074 (1.077)
Behavioural control: Price			-0.004 (0.996)	-0.042 (0.959)	-0.041 (0.960)
Emotions (1=positive, 0=negative)				-0.944 (0.389)***	-0.860 (0.423)***
Emotions x Version (To test if version had impact on positive emotion)				0.152 (1.164)	0.197 (1.218)
Gender (1=female)					0.147 (1.158)
Age group (1= 30 to 45)^					0.048 (1.049)

Age group (1= 46 to 65)^					-0.966 (0.381)***
Age group (1 = 65+)^					-1.851 (0.157)***
Income (1 = $65,000+, 0 = below $64,999)					0.017 (1.017)
Language responded in (1=English, 0=French)					0.208 (1.232)
Lives in town (1 = yes, 0 = no) ^^					-0.210 (0.811)
Lives in countryside/rural district) ^^					-0.447 (0.639)*
N	1845	1838	1829	1533	1511
Constant	-1.552	-2.891	-2.640	-1.562	-1.781
Nagelkerke R^2	0.019	0.097	0.099	0.135	0.242

[+] Reference Category: Myths of Nature Statement 4 (see all statements in Table 2.4)
^ Reference category: Age group 18-29; ^^ Reference category: Lives in a city
* $p < 0.05$, **< 0.01, *** < 0.001

The above Table 2.8 displays that those that have agreed that their friends and family members are reducing their consumption of dairy products are over 50% more likely to consume dairy substitutes. This model also shows that those that are in older age groups (over age 46) are much less likely to consume dairy substitutes than those that are in younger age groups. In addition, from this model we can see the impact that emotions play in predicting consumption habits of dairy substitutes, with those that experience positive emotions towards dairy products being over 50% (odds ratio = 0.423) less likely to consume dairy substitutes than those that have negative emotions towards dairy products in general.

Table 2.9. Binary logistic regression predicting reduced consumption of dairy products over the last 2 years.

Predictor Variables	Regression 1 (Attitudes)	Regression 2 (Norms)	Regression 3 (Behavioural Control)	Regression 4 (Emotions)	Regression 5 (Everything with controls)
	β(OR)	β(OR)	β(OR)	β(OR)	β(OR)
Attitudes: Myths of Nature Statement 1 [+]	0.868 (2.382)***	0.745 (2.107)***	0.758 (2.134)***	0.653 (1.921)**	0.548 (1.730)*
Attitudes: Myths of Nature Statement 2 [+]	0.515 (1.673)**	0.426 (1.531)*	0.443 (1.557)*	0.345 (1.412)	0.246 (1.279)
Attitudes: Myths of Nature Statement 3 [+]	1.000 (2.719)***	0.737 (2.090)**	0.764 (2.148)**	0.688 (1.989)*	0.550 (1.734)
Attitudes: Animal Attitude Scale 10	0.628 (1.874)***	0.732 (2.079)***	0.728 (2.071)***	0.513 (1.671)***	0.549 (1.731)***
Norms: "My family and friends reducing their consumption of dairy products"		0.592 (1.808)***	0.589 (1.803)***	0.613 (1.845)***	0.585 (1.795)***
Behavioural control: how frequently involved in grocery shopping			-0.002 (0.998)	0.009 (1.009)	0.059 (1.061)
Behavioural control: Price			0.032 (1.033)	0.038 (1.039)	0.032 (1.033)
Emotions (1=positive, 0=negative)				-1.472 (0.229)***	-1.472 (0.229)***
Emotions x Version				0.046 (1.047)	0.058 (1.060)
Gender (1=female)					0.012 (1.012)

Age group (1= 30 to 45)^					-0.120 (0.887)
Age group (1= 46 to 65)^					-0.492 (0.611)**
Age group (1 = 65+)^					-0.646 (0.524)**
Income (1 = $65,000+, 0 = below $64,999)					-0.025 (0.975)
Language responded in (1=English, 0=French)					-0.448 (0.639)
Lives in town (1 = yes, 0 = no) ^^					-0.035 (0.965)
Lives in countryside/rural district) ^^					-0.480 (0.619)*
N	1851	1844	1835	1537	1515
Constant	-3.463	-5.423	-5.516	-3.579	-2.932
Nagelkerke R^2	0.083	0.187	0.187	0.252	0.269

[+] Reference Category: Myths of Nature Statement 4 (see all statements in Table 2.4)
^ Reference category: Age group 18-29; ^^ Reference category: Lives in a city
* $p < 0.05$, **< 0.01, *** < 0.001

Table 2.9 shows the factors that predict whether a Canadian consumer has reduced their consumption of dairy products over the last 2 years. The model findings follow a similar trend as that for dairy substitute consumption, but there are few notable differences. Firstly, attitudes show to be more significant in this model, with those that hold strong pro-animal attitudes being 73% more likely to have reduced their consumption of dairy products over the last 2 years by some portion. Social norms play a highly significant role in predicting reduced dairy consumption, with those that report their friends and family having reduced consumption of dairy products being nearly 80% more likely to also reduce their consumption. Again, emotions

play a role in predicting this consumption behaviour, with those that experience positive emotions towards dairy products being over 75% (odds ratio = 0.229) less likely to reduce their dairy consumption over the last two years than those that experience negative emotions towards dairy. Other factors that have a significant role include the age of the individual, with those in older age groups having increasingly less likelihood of having reduced their dairy consumption, as well as those that are located in rural areas of country.

Discussion

This study experimented with the application of the theory of planned behaviour to report and understand the consumption of dairy among Canadian consumers, and incorporates knowledge founded in the sociology of emotions to further build on models based in TPB with emerging ideas about the role of emotions in human behaviour. In following this theory, the results found can be discussed in a similar format the way that the theory was applied, considering attitudes, norms, behavioural control, and in addition, emotions.

Attitudes

As discussed in previous sections, attitudes are a fundamental part of the theory of planned behaviour, and are shown to, at times, have a significant impact on the consumption behaviour of individuals (McDermott et al., 2015; Yao, 2016). Research in cultural theory asserts a link between the environmental view of an individual and the preferred resource management technique as well as the level of environmental concern (Poortinga et al., 2003). Therefore, it can be understood that there is a definite link between the viewpoint and the role that the individual feels towards their own responsibility and role within the environment via the preferred resource management technique. For example, a “nature capricious” individual that identifies with the statement “We do not know whether environmental problems will magnify or not” would be less likely to feel a personal responsibility to enact environmental change at an individual level than someone that is “nature ephemeral” that identifies with the statement “Environmental problems can only be controlled by enforcing radical changes in human behaviour and in society as a whole”, due to the nature of their preferred management strategy (Poortinga et al., 2003). This is validated by the regression models and findings, which show that “nature ephemeral” individuals are 73% more likely to have reduced their consumption of dairy products in the last 2 years than those that are “nature capricious”. This affirms that an individuals’ attitudes towards the

environment can impact their individual behaviour, and guide them to make decisions that may be considered more environmentally friendly such as reducing their consumption of dairy products.

Additionally, as found in the above regressions, an individual's values towards animals have a significant impact on their food choices of animal products or non-animal alternatives. These results are consistent with Herzog et al. (2015), whom note the evidence that "vegetarians have significantly higher scores than nonvegetarians" on the AAS-10 scale. Those that have a stronger pro-animal attitude, measured through the Animal Attitude Scale of 10-items (AAS-10) are shown to be 22.4% more likely to consume dairy substitutes than those that score lower on the AAS-10. As well, those that display higher pro-animal attitudes are 73% more likely to have reduced their consumption of dairy products over the last two years than others. This outcome demonstrates the important role of attitudes towards animals in decision-making in dairy consumption and provides insight to the ways that people who are plant-based dairy alternative consumers feel towards animals. This indicates that experiences with animals as well as information can shape the way that consumers behave.

Attitudes can be shaped by experiences and previous information that individuals have available to them, and therefore, decision-making can be predicted by understanding these attitudes. If the dairy and dairy-alternative industries would like to better capture the profits of Canadian consumers, it will be valuable for them to consider the attitudes and concerns of these consumers. In short, it would be valuable to capture and address environmental concerns of individuals that feel that they have an important role to play in reducing impacts to nature. To do this, producers and the industry as a whole would need to consider the ways that they impact the environment, as well as how they communicate this impact to dairy consumers. Secondly, producers and industry must address animal-welfare concerns if they wish to capture the growing number of Canadians reducing their dairy consumption. There may be space to not only improve the treatment of animals, but also to increase the transparency of information available to consumers. It is unsure whether attitudes would be changed, but by catering to attitudes at the producer and market level, it may influence the behaviour of consumers in the long run. From a non-dairy industry perspective, those that work in promoting plant-based options and dairy-substitutes can build on the attitudes that Canadians have and highlight the ways that their

products would assist individuals in reducing their impacts to nature and animals, but would need to ensure that the environmental footprints of the product are at the forefront of available information. Finally, those in policy-making can consider the concerns of the public and address them through implanting standards for industry to follow, including measures to ensure animal welfare and reduced environmental footprints. Increased information regarding animal welfare and environmental impacts of various products could result in changes to attitudes, as well as changes to behaviour. These factors would be important to measure and could be explored in future research in this area.

Social Norms

As shown in the above tables, social norms are shown to have a significant impact on the consumption behaviour of individuals. It is well-established that social norms act as an indicator of social and cultural sense of being, where most individuals seek to fit into the "norm" that is established within their groups and societies. The findings of this research are consistent with other research on social norms and food consumption (Higgs, 2015), finding that there is a link between the eating habits of others and the eating behaviour of the participant. The impact of social norms on the reduction of dairy consumption over the last 2 years is one of the most significant findings of this research, with those individuals that have noted their family and friends reducing their consumption of dairy products being 79.5% more likely (with a 0.001 p-value) to also be reducing their own consumption of these products. This is a figure that cannot be ignored by the dairy industry, which if this trend continues and expands could have significant impacts to the industry as a whole. As the cultural norms within Canada continue to evolve and more individuals continue to express their attitudes of pro-environmental and pro-animal welfare through environmental action, the norm within the country may shift as a whole in this direction. With this information in mind, there are a few ways to consider the ways that various producers and policymakers can work with this information. From the agriculture industry perspective, work is already underway to create and reinforce norms of consuming dairy products through various marketing techniques and campaigns to make dairy seem like an "everyday activity" that many partake in. This is demonstrated by the current 2022 campaign "Smash Milk" by Alberta Milk and the Dairy Farmers of Canada (Alberta Milk, 2022). Some agricultural marketing has focussed on the ways that food "bring people together", for example #EatTogether (Presidents Choice, 2021), and the "Eat Better, Eat Together with Real Dairy" campaign by various dairy

groups across the United States and Kroger (Kroger, 2021). These campaigns are working to reinforce the social element of food and creating norms within family and friend groups to consume the same products together. Those that are looking to continue to grow and spread norms of pro-environmental and pro-animal behavior could use similar techniques, including encouraging people to recommend products via social media campaigns and other mechanisms to enact the norms between and out of groups. For example, "Veganuary" acts as a way of creating a sense of community for those that are experimenting with becoming vegan. Community clearly helps to shape and form the social norms, especially with food. These trends will be very important to follow along with in the coming years.

Behavioural Control

To capture the concept of behavioural control amongst participants, the respondents were asked about their role in the grocery shopping for their household by how frequently they are involved in the regular grocery shopping. In addition, a variable was used for the value that price plays in the participants' food choices. Conceptualizing behavioural control in this study was a challenge, as whether or not someone is heavily involved in the purchasing of food in their household or is highly concerned about price are just two ways of conceptualizing external factors of perceived behavioural control. As well, this particular conceptualization of behavioural controls assumes that adults have autonomy over what they consume, but we acknowledge that there are various reasons why adults may not have this control over what they consume. At this stage in the research, it is challenging to definitively determine whether or not behavioural control is relevant to the consumption of dairy and dairy-alternative products, as it was a challenge to definitively measure in this study. As noted previously in reference to Vermeir and Verbeke (2008), there are also a variety of "internal factors" that can play into one's perceived behavioural control. A future study in this area may wish to take more of a qualitative approach to understand the barriers and opportunities that consumers face in the purchasing and consumption of dairy products and dairy substitutes.

Emotions

Using emotions as a predictor for consumption behaviour showed to have significant power across the regression models, displaying that emotions play a role in the way that individuals evaluate and determine their consumption choices. This is consistent with the findings of Yao

(2016), in unraveling the important ties that exist between emotions and consumption of various dairy products. Those that have positive emotions towards dairy products are 77.1% less likely to have reduced their consumption of dairy products over the last two years than those that have negative emotions towards dairy products. For dairy substitute consumption, those with positive emotions towards dairy products are 57.7% less likely to consume dairy substitutes than those with negative emotions towards dairy products.

These results demonstrate that emotions are a significant predictor of dairy and plant-based dairy alternative consumption, and create two important reflections. First, the theory of planned behaviour in its current form does not capture emotions directly, which could leave out important and distinct understandings of behavioural intention. Second, this again leaves space for producers of dairy and plant-based dairy products to capture consumers. Emotions can be evoked through advertising campaigns, and has been done by various pro-animal groups including the likes of PETA that use the images and descriptions of animals to evoke emotions of sadness in attempt inspire action by the individuals to rectify this treatment by not participating in actions that contribute to the abuse of animals.

Differentiating Emotions and Social Norms

As social norms and emotions both showed to have important power in predicting the consumption of dairy and dairy substitutes, there should also be a discussion on the possible overlaps of these two factors. This study considered the social and cultural embodiments of emotions (not ignoring the strong physiological and biological element that emotions also operate within), while also looking at social norms. Though not specifically investigated, consideration is given to the ways that social norms may impacts emotions and vise-versa, as well as the intersections with other factors such the relationships between social norms and perceived behavioural control. It is difficult at this stage of the research to deliberately separate or analyze how these impacts may overlap, but future research could take place in a few directions to investigate this further. First, it could be worthwhile to ask only one of these types of questions in a survey, either only on social norms or only on emotions to see if they still have the same strong predictive power in similar regressions. As well, it would be interesting to use a qualitative approach to ask participants more directly about the influence of those around them on their consumption habits. Questions could consider if participants believe that they are being

influenced by others, or if they are the ones doing the influencing in their circles, and the types of emotions that are present in these scenarios. An example of this type of work is shown through the thesis project of Emilie Bassi (2017), titled "Social Practices of Animal Husbandry in the Alberta Cattle Industry". In her work, Bassi considers the social influences on emotions for cattle ranchers, and the ways that there are intersections and overlaps between the two. Combining the findings of Bassi and this research project, future students and researchers could consider approaching consumers and producers with similar topics to understand this important interconnection of emotions, social norms, and behaviour.

Conclusion

In answering the original research question, this research finds that Canadian consumers demonstrate their pro-environmental and pro-animal attitude in various ways in their consumption. Canadian consumers that hold strong environmental attitudes and/or strong animal welfare attitudes are shown at times to be more likely to reduce their own impacts to these areas by reducing dairy consumption and/or choosing to consume dairy substitutes. The participants demonstrated the importance of social norms in influencing their own personal consumption behaviour, and show that emotions play an important role in guiding their decision-making processes. This research project applied a theory of planned behaviour and the sociology of emotions to build a hierarchical regression model that shows the cumulative effect of all predictors on selected outcome variables. A key contribution of this research involves the adaption and extension of theories and cross-disciplinary approaches to better understand problems such as climate change and animal welfare issues, and the ways that individuals are responding to the crises happening around them and across the world. Furthermore, through this experiment and the combination of the theory of planned behaviour and sociology of emotions, new methods can be utilized for both areas of research to improve the predictability and reliability of models. In a time of unprecedented climate impacts, economic and social challenges from the COVID-19 pandemic, and rising food costs due to inflation, there is an urgency to understand and act on issues that consumers face. These results are one step in ensuring a food-secure, healthy planet, with insights for the agri-food industry and policy-makers.

References

Alberta Milk. 2022. Smash Milk. Retrieved on August 26, 2022 from https://albertamilk.com/smash-milk/

Bassi, E. 2017. Social Practices of Animal Husbandry in the Alberta Cattle Industry. [Masters thesis, University of Alberta]. https://doi.org/10.7939/R31G0J793

Bericat, E. 2016. The sociology of emotions: Four decades of progress. *Current Sociology*, *64*(3), 491–513. https://doi.org/10.1177/0011392115588355

Binngießer, J., & Randler, C. 2015. *Association of the Environmental Attitudes "Preservation" and "Utilization" with Pro-Animal Attitudes*. 16.

Bryn B. & Dana C. n.d. Blog post for Nature Fresh Farms. What is President's Choice® #EatTogether Day? Retrieved on August 26, 2022 from https://www.naturefresh.ca/presidents-choice-eattogether-day/

Domingo, N. G. G., Balasubramanian, S., Thakrar, S. K., Clark, M. A., Adams, P. J., Marshall, J. D., Muller, N. Z., Pandis, S. N., Polasky, S., Robinson, A. L., Tessum, C. W., Tilman, D., Tschofen, P., & Hill, J. D. 2021. Air quality–related health damages of food. *Proceedings of the National Academy of Sciences*, *118*(20). https://doi.org/10.1073/pnas.2013637118

Dunlap, R. E. n.d. *Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale*. 18.

Eco-Resources, 2015. The Economic Impact of the Canadian Dairy Industry in 2013. A Report Submitted to Dairy Farmers of Canada, 2015.

Herzog, H., Grayson, S., & McCord, D. 2015. Brief Measures of the Animal Attitude Scale. *Anthrozoös*, *28*(1), 145–152. https://doi.org/10.2752/089279315X14129350721894

Higgs, S. 2015. Social norms and their influence on eating behaviours. *Appetite*, *86*, 38–44. https://doi.org/10.1016/j.appet.2014.10.021

Kroger Health. 2021. Eat Together, Eat Better with Real Dairy Booklet. Retrieved on August 26, 2022 from https://www.krogerhealth.com/images/2021-DairyBooklet-Online.pdf

Laurans, G., & Desmet, P. M. A. 2017. *Developing 14 Animated Characters for Non-verbal Self-Report of Categorical Emotions*. 20.

Lynch, J., Cain, M., Frame, D., & Pierrehumbert, R. 2021. Agriculture's Contribution to Climate Change and Role in Mitigation Is Distinct From Predominantly Fossil CO2-Emitting Sectors. *Frontiers in Sustainable Food Systems*, *4*, 300. https://doi.org/10.3389/fsufs.2020.518039

McDermott, M.S., Oliver, M., Svenson, A. et al. 2015. The theory of planned behaviour and discrete food choices: a systematic review and meta-analysis. Int J Behav Nutr Phys Act 12, 162 https://doi.org/10.1186/s12966-015-0324-z

Poore, J., & Nemecek, T. 2018. Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Poortinga, W., Steg, L., & Vlek, C. 2003. Myths of nature and environmental management strategies. A field study on energy savings in traffic and transport. *People, Place and Sustainability*, 280–290.

Statistics Canada. 2017. Canada [Country] and Canada [Country] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed August 26, 2022).

Statistics Canada. Table 98-10-0016-01 Population and dwelling counts by the Statistical Area Classification. https://doi.org/10.25318/9810001601-eng

Statistics Canada. Table 14-10-0287-03 Labour force characteristics by province, monthly, seasonally adjusted. https://doi.org/10.25318/1410028701-eng

Steg, L., & Sievers, I. 2000. Cultural Theory and Individual Perceptions of Environmental Risks. *Environment and Behavior*, *32*(2), 250–269. https://doi.org/10.1177/00139160021972513

Sultan, P., Tarafder, T., Pearson, D., & Henryks, J. 2020. Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: Moderating roles of communication, satisfaction and trust in organic food consumption. *Food Quality and Preference*, *81*, 103838. https://doi.org/10.1016/j.foodqual.2019.103838

Turner, J. H. 2009. The Sociology of Emotions: Basic Theoretical Arguments. *Emotion Review*, *1*(4), 340–354. https://doi.org/10.1177/1754073909338305

Vermeir, I., & Verbeke, W. 2008. Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological Economics*, *64*(3), 542–553. https://doi.org/10.1016/j.ecolecon.2007.03.007

Yao, V. Y. 2016. Investigating Consumption-Related Emotions Elicited by Selected Dairy Products Using Product Emotion Measurement. *International Journal of Marketing Studies*, *8*(1), 86. https://doi.org/10.5539/ijms.v8n1p86

Chapter Three: Different methods of identifying emotions towards dairy products

Introduction

"Don't cry over spilled milk." A phrase that is commonly used to comfort folks and encourage them to not worry about the things that they can not control. But what might it mean when someone literally cries about milk? Or about dairy products more generally? This chapter explores the ways in which people feel towards dairy products, and how there are different ways of measuring these feelings and emotions. As shown in Chapter 2, it is clear and statistically supported that emotions are associated with dairy and dairy substitute consumption behaviour of individuals, but what is left to be explored in this chapter is the way that emotions are measured. This chapter reviews the background and frameworks that guide this research project, reviewing some of the larger literary contributions to the sociology of emotions and measurements of emotions, specifically in food consumption. Later in the chapter, the methodology used is displayed, followed by empirical insights that verify the importance of how we measure emotions in survey research. Specifically, this chapter considers the ways that emotions are measured, and looks more deeply into the relationship between types of emotions and corresponding types of dairy consumption.

Background

As outlined in Chapter 1 and 2, there are various reasons to study dairy consumption and the attitudes and other factors that guide dairy consumption. A major motivator for this research project was to uncover the environmental aspects of dairy consumption, as understood by the consumer. This involved analyzing attitudes and values of the participants, and one aspect of that also includes the emotions that guide consumption. There are various theories that help to guide and support this research, including the theory of planned behaviour and the sociology of emotions.

As discussed in previous chapters, the primary theoretical framework guiding this project is the theory of planned behaviour (TPB). As a review, McDermott et. al. (2015) explain that the TPB, "asserts that the most proximal determinant of behaviour is the *intention* to perform that behaviour". The authors state that "intentions" indicate the amount of effort an individual would

devote to a specific behaviour. This is determined by a series of factors including: attitudes, their overall evaluation of the behaviour, subjective norms, an evaluation of what the individual believes significant others think about them engaging in that behaviour, and perceived behavioural control (which is how the individual perceives their control over the behaviour) (McDermott et. al., 2015). Throughout this research project, TPB has been applied to understand and predict dairy consumption behaviour, by considering the ways that attitudes – both environmental attitudes and attitudes towards animals and animal welfare, social norms as measured by the consumption habits of the participants' friends and family members, and perceived behavioural controls such as involvement in regular grocery shopping and importance of price in choosing food items all come together to guide consumption behaviour. As demonstrated in Chapter 2, TPB is valuable in predicting dairy and dairy substitute consumption. Also found in Chapter 2, is the important predictive power of emotions in guiding dairy consumption behaviour.

Emotions are a challenging subject to explore, and equally challenging to define, especially for those that work outside of the discipline of psychology. Though this research project places emotions at the forefront for reasoning the behaviour of consumers, it only begins to scratch the surface of the deep literature on the sociology of emotions as a whole. A larger literature review of the sociology of emotions, and guiding theories in the research area are included in Chapter 1.

The social influence on emotions, and the role of emotions in predicting behaviour has additionally been explored in recent research in the cow-calf industry (Bassi, Parkins, & Caine, 2019). In their qualitative research approach, the researchers tell the stories of individuals working in the cattle industry, and the ways that emotions guide their practices. Their research asserts the ways that emotions, experienced and expressed by producers in the industry, guide the decisions that happen on the farm. These emotions are formed by their social influences, their history and interactions with humans and livestock, and the values that they hold. Most notably, this research demonstrates that there are various ways that emotions are experienced, and even more variation in the ways that emotions might guide a person in their decision-making.

Guided by the above theories and understandings of the sociology of emotions, this research project primarily considers the social and cultural role of emotions, while understanding that biological elements exists and are present – especially with regard to food choices. This cultural

perspective of emotions used in this project considers the impacts of emotions on decisions made and actions taken by consumers, as well as the role that emotions play in guiding individuals on taking environmental and animal welfare actions. As seen with the regression models in Chapter 2, there is a clear role that attitudes, social norms, and emotions play in predicting and guiding dairy consumption behaviour of individuals. This phenomenon has been explored as well by other researchers in recent years, including the ways that emotions guide and contribute to the consumption behaviour of individuals. This literature is explored in the upcoming section.

Literature Review

Emotions and dairy consumption

In considering the ways that emotions can be a driving force in consumption choices, some research shows a connection between emotions and consumption. Specifically, diet choices can be a form of emotional expressional and an indicator of emotions felt. Yao (2016) investigated the role of emotions in consumption of various dairy products in the Gauteng Province of South Africa. The findings of this research showed that dairy consumption is emotionally-driven. Yao approached the participants of this study using the Product Emotion Measurement (PrEmo) tool, asking to choose one of the following emotions in relation to various dairy products (i.e. Milk, cheese, yoghurt, etc.): Desire, Satisfaction, Pride, Hope, Joy, Disgust, Dissatisfaction, Shame, Fear, Sadness and Boredom. Further, the participants were also asked to express the intensity of the emotion on a 5-point scale. Their study found that most typically, positive emotions were associated with milk, cheese, and yoghurt, while maas showed to have a relatively slightly more lean towards negative emotions.

This research indicates that there are specific emotions elicited by dairy products, which can vary between specific dairy products. This research and its findings are an indication that consumption is guided in part by emotions, and that emotions are generated through consumption as well. As this research took place in South Africa, and as discussed above that there is a cultural element to emotions, there is sufficient reasoning to incorporate this research into my own methods, by including similar questions in my consumer survey to apply this to a Canadian context. As will be discussed further in the methodology section of this chapter, emotion-based questions are incorporated into the consumer-side survey to determine the

emotions elicited by consumption and purchasing of dairy and plant-based products, to measure correlations between these emotions and other values, and decision-making.

Measuring emotions

As described in the background section, the defining of emotions is challenging. Additionally challenging is the ways that emotions are reported and measured. In his chapter on measurement, Harley (2016) reviews the "interdisciplinary methods used in research with computer-based learning environments (CBLEs) to measure learners' emotions". These methods include: automatic facial expression analysis software, electrodermal activation measurement devices, and self-report measures. Harley more specifically discusses the pros, cons, and implications of using self-reporting measurements like the ones used in this survey (Harley, 2016). Some of the benefits of this method include that they are generally easy to administer and analyze, requiring "little experience in terms of coding, scoring, and analyzing". Harley also notes that the technique is often considered the "gold standard" in the measurement of psychological phenomena, serving as a "valuable method for both measuring emotions and cross-validating the findings of other methods" (Harley, 2016). But this does not leave the method without its drawbacks. The major shortcoming of this method is that it asks participants to rate their "perception of having experienced an emotion" rather than capturing the true emotion itself. This may reduce the accuracy of the emotion as the participant may have not experienced that emotion before, might be unable to accurately remember having experienced the emotion, have a different understanding than the researcher of that emotion, be somewhat uneasy about reporting a negative emotion due to "social undesirability", be influenced by the time span existing between feeling the emotion and reporting the emotion, and that self-report measures might instead elicit other emotions (for example, boredom from participating) rather than the experienced emotion prior (Harley, 2016). In addressing these issues, Harley suggests a few remedies that researchers may implement, including providing definitions and ensuring that the research setting is stimulating. In general though, Harley describes that self-report measurements "offer a readily available and widely accepted approach to measuring emotions that, when implemented thoughtfully and recognized as an offline method of data collection" (Harley, 2016). For the purposes of this research study, and due to the limits that would otherwise prevent any other measurement technique from taking place, self-report measurements were decided to be the best tool for emotions measurement at this time.

To address some of the problems with recording and measuring emotions, researcher Dr. Pieter Desmet crafted the Product Emotion Measurement (PrEmo) Tool. Originally developed in 2002, and then updated with new measures in 2017, the self-report tool serves a web-application with 14 cartoon characters, where each cartoon serves as an emotion. This web-based tool allows for an animation to play and body movement into the emotion (Laurans & Desmet, 2017). The authors note that "reliable self-report requires items to convey the intended meaning to most research participants and not simply showing that some expressions are recognized more often than would be expected by chance" (Laurans & Desmet, 2017, p. 5), and that the identification of "basic" emotions is not as important in this type of research. The researchers argue that there has been little research attention to validate emotion self-report questionnaires, and that those that exist typically "put a list of words together" with the assumption that each of them "has the same meaning to all potential participants as it has to the researchers" and that each of the items "therefore measure a distinct emotion" (Laurans & Desmet, 2017, p. 5). Disagreeing with this strategy, Laurans and Desmot (2017) argue that these strategies are not as transparent in research as they may appear to the researchers using them and leave room for error and improvement. In attempting to create validity and empirical clarity about the measurement and self-reporting of emotions, the researchers present data from eight separate studies from across the world that helped to build what is now used as the PrEmo Tool (noted as PrEmo2 in their paper). The studies looked at the ways that research participants were able to understand and judge the emotion displayed in the image and animations. The findings create an important and difficult paradox:

> "The ability of research participants in such judgement studies to reliably describe non-verbal stimuli therefore depends on the availability of an appropriate label for each affective state. In effect, these methods work best when all participants perfectly understand all the words used to describe the moods or emotions of interest in the study. If they disagree on the precise meaning or nuances of the labels offered or are unable to understand or to produce the intended (or "correct") word, participants would appear to disagree on the meaning of the non-verbal stimuli even if they are in fact perfectly able to relate it to their own feelings or to specific appraisals, behaviours or eliciting conditions.

> This leads to the slightly paradoxical consequence that obtaining perfect recognition scores in judgement studies requires the availability of universally understandable and unambiguous labels. However, if such labels were indeed available, they would also make non-verbal representations unnecessary for measurement purposes, as a verbal scale based on these labels would presumably be entirely sufficient. If, on the other hand, non-verbal expressions are in fact natural representations for affective states and are easier to interpret than words describing these states for many people, one would expect recognition scores in judgement studies to be far from perfect, not because the non-verbal representations are deficient but because the participants in the judgement studies do not interpret the various labels in the same way." – Laurans & Desmet, 2017, p. 16

The researchers note that it is tempting to use the traditional self-report techniques over the non-verbal techniques but write that: "Using verbal scales, however, hardly makes the problem disappear as they also presuppose that research participants are able to understand the emotion names selected by the researchers and agree on their meaning. From this perspective, the development of non-verbal self-report tools does not so much create new problems as reveal fundamental issues that all self-report tools need to overcome." (Laurans & Desmet, 2017, p. 17). This echoes the drawbacks of self-report tools that were identified as well by Harley, and remain present even in this research as well, where we combined the knowledge and expertise of the above researchers by creating a verbal self-report tool with images as a prompt. We did this as researchers, and as emotion-bearing human-beings who had difficulties in fully understanding and articulating clear differences in emotions as revealed through the images alone. Additionally, in order to preserve statistical relevance and direct comparability to the non-verbal (text-based) descriptions of emotions, the use of verbal prompts for emotions were deemed necessary for this particular study. Overall, the PrEmo Tool provides a foundation for self-report and non-verbal emotion questionnaires, and builds the work of others, such as Yao (2016).

Methodology

The full methodology for this study is included in Chapters 1 and 2, which describes the survey used and the range of questions included. Refer to those chapters for more details on the entire survey. In reference to the emotion-type questions, the survey had two versions seen by participants. All other parts of the survey up to the emotion-section were identical, with the

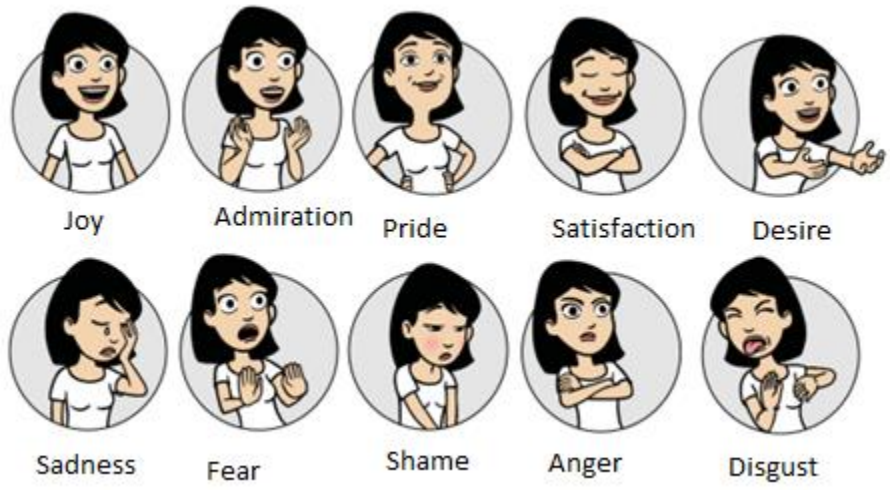
separation happening at Section D. Version A of the survey used a likert-scale for participants to identify where along the scale their emotions fell regarding the various dairy products and concepts. Following each question, participants were then asked to identify which of the emotions were the primary (or strongest) emotion. In Version B of the emotions questions, participants were asked the first question in a similar way, although the wording was changed slightly. Instead of seeing a likert scale and being able to answer along the scale, the participants of Version B were shown an image with 10 emotions, with the label for each of the emotions underneath, and asked to select up to three emotions that first come to mind when thinking about the various dairy products and concepts. The image and emotion definitions were used from the PrEmo Tool, which allows for use in academic settings for free, but was expanded on by adding a word at the bottom of the image to create more clarity about the emotion being expressed. We modified the Tool in this case because we did not seek to test the validity of the tool itself (or the use of completely non-verbal emotions), but to test the role of emotions in consumption behaviour and whether the format shown to participants impacts their selected emotional state. A reason for choosing to use words was due to the ambiguity of the images. As researchers, it was determined that in order to preserve as much integrity as possible it would be important to include the words so that the two versions could be compared side by side, and for direct statistical comparison to be more valid. Like Version A, the participants of Version B were then asked to identify the primary (strongest) emotion for each of the questions. Figure 3.1 shows the two versions for comparison for the first questions asked, about dairy products in general. Important to note for the two versions were that the exact same number of emotions and the same labels for emotions were used in both versions. Figure 3.1 illustrates these two ways that we asked about emotions in the survey.

Figure 3.1. Comparison of the two versions of the same question, Version A (word-based) on top, Version B (image-based) on bottom.

Please rate your emotional experience when thinking about dairy products in general:

		1	2	3	4	5	6	7	
1	Sadness								Joy
2	Fear								Admiration
3	Shame								Pride
4	Anger								Satisfaction
5	Disgust								Desire

When you think of dairy products in general, which three emotions come to mind first?



Version A asked the questions as follows: “Please rate your emotional experience when thinking about dairy products in general”. While, Version B asked the same question as: “When you think of dairy products in general, which three emotions come to mind first?”. Both versions asked the same follow up question:

Figure 3.2. Survey question on primary emotions.

> In considering your emotional experience when thinking about dairy products in general, which of these emotions is the primary (strongest)?
>
> a) Sadness b) Fear c) Shame d) Anger e) Disgust f) Joy
>
> g) Admiration h) Pride i) Satisfaction j) Desire k) None of the above

As it was the same identical follow-up question for each of the versions, it is possible to therefore do a direct comparison of the answers. This comparison is explored in the findings, to determine if there were any differences between the responses of the two versions. In order to control for additional factors that may have influenced the responses, it was necessary to compare the two samples for all other possible differences. This involved comparing the means of the two groups (defined by the different versions seen, Version A = Group A, Version B = Group B). Group A, the word-based-version group, and Group B, the image-based-version group, were compared against each other using a two-sample t-test to compare the means of various demographic information. The groups were found to have no statistical differences for the age, gender, language responded in, region of the country, whether they are urban/rural residents, education level, and household income. The groups are reflective of the entire sample, and even further, match most of the demographic expectations set by the general population data for the country of Canada.

Additionally, the two groups were compared for other factors that were shown to be related to emotions in the previous analysis in Chapter 2, including consumption behavior (that was shown to be guided by emotions). In comparing the consumption habits of the participants for dairy products and dairy substitutes, there were also no significant differences found between the two groups. And finally, in comparing the social norms and attitudes, there were also no significant differences found between the two groups. To see these results, see the findings section.

These findings allow for the analysis of this data to be done in comparing the two groups, ensuring that the factors that may be related to the emotion responses are all controlled and accounted for.

The next steps of analysis included creating dummy variables for each of the emotions questions. The 10 emotions were recoded into either positive (1) or negative (0) categories.. The positive emotion dummy variable includes: Joy, Admiration, Pride, Satisfaction, Desire. The negative emotion dummy variable includes: Sadness, Fear, Shame, Anger, Disgust.

The analysis for the emotions questions considered the following questions (which were identical for each of the two versions):

> In considering your emotional experience when thinking about dairy products in general/ cheese/milk/the process to create dairy products/when you've finished consuming dairy products/if you were told that you could not consume any dairy products again, which of these emotions is the primary (strongest)?

Results/Findings

As noted previously, the two groups (Version A – word-based, and Version B – image-based) were compared to ensure no major differences in the demographic makeup of the groups. Table 3.1 verifies that there were no statistical differences between the two groups, as shown by the p-values being greater than 0.05.

Table 3.1. Comparison of demographics for the participants of Version A and Version B of the sruvey.

Emotions questions	version	N	Mean	Std. Deviation	t-value	P-value
Language responded to survey in (English = 1, French =0)	Version A	907	0.94	0.23	-0.31	0.757
	Version B	944	0.95	0.22		
In which of the following age groups do you fall? [A]	Version A	907	5.30	2.05	-1.06	0.288
	Version B	944	5.40	2.05		
Which region do you live in?	Version A	907	3.68	1.87	-1.56	0.118
	Version B	944	3.81	1.86		
Do you live in a city, in a town or in the countryside?	Version A	907	1.52	0.75	0.66	0.511
	Version B	944	1.50	0.73		
What is the highest level of education you've achieved?	Version A	907	3.09	1.02	-0.91	0.365
	Version B	944	3.13	1.03		
What is your yearly household income?	Version A	907	4.17	2.32	0.02	0.984
	Version B	943	4.16	2.32		
Female	Version A	891	0.55	0.50	0.01	0.993
	Version B	933	0.55	0.50		

*p-value < 0.05, **p-value < 0.01, *** p-value < 0.001

[A] – Age group is measured from 1-8, and refers to if the participant is in the following age groups: 1 (18-20), 2 (21-24), 3(25-29), 4(30-36), 5(37-45), 6 (46-55), 7 (56-65), 8 (65+).

Using Table 2.2 to verify that there were no statistically significant differences between the demographic information of the two groups, the groups were also shown to have no statistical

differences in their consumption behaviour. This is verified by the p-values displayed in Table 3.2 all being greater than the threshold level of 0.05.

Table 3.2. Consumption behaviour for the participants of Version A and Version B of the survey.

Consumption of products, asked by "How often do you consume the following dairy products?"	Emotions questions version	N	Mean	Std. Deviation	t-value	P-value
Dairy substitute products (for example, milk beverage or yogurt products from soy, almonds, coconut, cashew or other plant bases)	Version A	904	3.00	2.00	1.21	0.226
	Version B	941	2.88	1.95		
Milk	Version A	906	5.00	1.95	-0.76	0.448
	Version B	944	5.07	1.82		
Cheese	Version A	905	5.08	1.43	-0.69	0.491
	Version B	944	5.12	1.34		
Butter	Version A	907	4.79	1.74	-0.23	0.815
	Version B	943	4.81	1.69		
Yogurt	Version A	907	4.37	1.81	-1.31	0.190
	Version B	944	4.48	1.75		
Ice cream	Version A	906	3.79	1.42	-0.72	0.475
	Version B	944	3.84	1.38		
All dairy product consumption	Version A	907	4.22	1.19	-0.86	0.388
	Version B	944	4.26	1.13		

*p-value < 0.05, **p-value < 0.01, *** p-value < 0.001

Additionally, as demonstrated in Chapter 2, attitudes and social norms can impact the consumption of dairy products and dairy substitutes, and have correlations with emotions variables as well. In Table 3.3, it is verified that there are no statistical differences between the two groups in their attitudes and social norms.

Table 3.3. Norms and attitudes for the participants of Version A and Version B of the survey.

Emotions questions	version	N	Mean	Std. Deviation	t-value	P-value
My friends and family members are reducing their consumption of dairy products :How strongly do you agree with the following statements:	Version A	903	2.78	1.16	-0.11	0.912
	Version B	941	2.78	1.11		
My friends and family members are reducing their consumption of meat products :How strongly do you agree with the following statements:	Version A	905	2.87	1.19	-0.61	0.542
	Version B	940	2.91	1.17		
Please indicate which one of the following statements corresponds most with your view on nature:	Version A	907	1.98	1.02	1.61	0.109
	Version B	944	1.91	0.98		
AAS-10	Version A	907	3.41	0.67	-1.41	0.158
	Version B	944	3.46	0.69		

*p-value < 0.05, **p-value < 0.01, *** p-value < 0.001

With the makeup of the groups compared and controlled for, analysis of the emotions questions and responses can be done by first looking at the range of emotions for each of the questions, and the dummy variables that were created. Figure 3.4 shows the results for Version A, while Figure 3.5 shows the results for Version B. As seen, the means at the bottom of each of the tables begin to show where differences may exist, but do not demonstrate whether these are significant or not.

Table 3.4. Emotions responses for Version A of the survey.

Emotion	Questions					
	Dairy Products in General	*Cheese*	*Milk*	*Process to Create Dairy Products*	*Finished Consuming*	*Never Able to Consume Again*
Joy	116	121	80	54	82	53
Admiration	31	43	40	96	44	39
Pride	73	50	68	82	51	47
Satisfaction	353	337	327	200	411	97
Desire	64	146	85	42	47	36
Sadness	42	26	33	98	31	336
Fear	14	20	20	20	15	24
Shame	24	15	16	32	27	13
Anger	10	7	11	17	2	122
Disgust	24	20	43	35	20	17
Total	751	785	723	676	730	784
Positive Emotions (1)	637	697	600	474	635	272
Negative Emotions (0)	114	88	123	202	95	512
Total	751	785	723	676	730	784
Mean (S.D)	0.85 (0.36)	0.89 (0.32)	0.83 (0.38)	0.70 (0.46)	0.87 (0.34)	0.35 (0.48)

Note: participants that responded “none of the above” were removed from the analysis

Table 3.5. Emotions responses for Version B of the survey.

Emotion	Question					
	Dairy Products in General	*Cheese*	*Milk*	*Process to Create Dairy Products*	*Finished Consuming*	*Never Able to Consume Again*
Joy	116	133	110	89	110	79
Admiration	59	63	52	131	53	35
Pride	56	50	56	83	47	28
Satisfaction	354	323	324	189	456	85
Desire	104	173	96	41	32	39
Sadness	36	21	35	57	30	342
Fear	13	9	11	21	13	24
Shame	20	12	21	45	25	10
Anger	11	9	10	17	4	156
Disgust	28	19	45	24	14	20
Total	797	812	760	697	784	818
Positive Emotions	689	742	638	533	698	266
Negative Emotions	108	70	122	164	86	552
Total	797	812	760	697	784	818
Mean (S.D.)	0.86 (0.34)	0.91 (0.28)	0.84 (0.37)	0.77 (0.42)	0.89 (0.31)	0.33 (0.47)

Note: participants that responded “none of the above” were removed from the analysis

To determine if there were any statistically significant differences between the responses of the two versions, a two-sided t-test was conducted to compare the means of the two groups. For each of the questions, a dummy variable was created for the entire sample where positive emotions

were coded as 1, and negative emotions were coded as 0. The following tables display the results for each of the questions. The p-value for the "process to create dairy products" is found to be significant on this table, but no others are.

Table 3.6. Comparison of means for "dairy products in general" emotional responses.

Emotions questions version		N	Mean	Std. Deviation	t-value	p-value
"Dairy products in general" emotions (1=positive)	Version A	751	0.85	0.36	-0.91	0.361
	Version B	797	0.86	0.34		
"Cheese" emotions (1=positive)	Version A	785	0.89	0.32	-1.73	0.083
	Version B	812	0.91	0.28		
"Milk" emotions (1= positive)	Version A	723	0.83	0.38	-0.50	0.619
	Version B	760	0.84	0.37		
"Process to create dairy products" emotions (1=positive)	Version A	676	0.70	0.46	-2.67	**0.008****
	Version B	697	0.76	0.42		
"Finished consuming" emotions (1=positive)	Version A	730	0.87	0.34	-1.22	0.221
	Version B	784	0.89	0.31		
"Never able to consume again" emotions (1=positive)	Version A	784	0.35	0.48	0.92	0.357
	Version B	818	0.33	0.47		

*p-value < 0.05, **p-value < 0.01, *** p-value < 0.001

Discussion

These findings show that there are a range of emotions that individuals might experience when thinking about and consuming dairy products. The emotions are more positive, where the means for these are all over 0.75, for: dairy products in general, cheese, milk, and when the individual is finished consuming. This is consistent with the findings of Yao (2016), finding positive emotions were associated with milk, cheese, and yoghurt. The emotions are found to be negative, where the mean is less than 0.50, for when the participant is asked to imagine how they would feel if they were told they could never consume dairy products again. And, finally, the participants are a little more mixed, although still on the positive side of the binary with means over 0.50, for how they feel when they consider the process to create dairy products. Consistent with Yao (2016), this displays the variability of emotions in relation to dairy products and to experiencing dairy

consumption, showing the overlapping ways that emotions guide consumption, and vise versa in consumption guiding emotions at times.

Understanding the difference

As shown in the above section, there were no statistical differences between the two versions of the survey, expect for one question. The question that showed a statistically significant difference ($p < .01$) between the emotional responses was: "In considering your emotional experience when thinking about the process to create dairy products, which of these emotions is the primary (strongest)?". Version A, the version of the survey that only showed emotions through the use of words, had a mean of 0.70, while Version B, the version of the survey that showed emotions through the use of images with corresponding words, had a mean of 0.76. This indicates that those that saw the image-based questions answered with more positive emotions than those that only saw words. In percentages, this translates to 70% of the Version A group providing a positive emotional response to the question, and 76% of the Version B group providing a positive emotional response to the same exact question. As demonstrated in the earlier analysis, all other factors were controlled for including demographics, consumption behaviour, and the attitudes and social norms of the participants. As a result, this indicates that the version seen **does** impact the emotional response given. Although the difference is only about 6%, this could be aggregated to create much larger impacts for interpretation. For example, if the means for the emotions were categorized further into "very negative" (0-0.25) to "negative" (0.26-0.50), and "positive" (0.51-0.75) and "very positive" (0.76-1.0), the differences begin to create different meanings.

As with many research projects, the results and answers to the initial questions often add more questions than answered. As this project has established that there is a difference in the way that individuals respond to emotions questions, the door of possibilities open to why this might be. A limitation to the quantitative nature of this project and the use of an anonymized survey, is that there is unfortunately no way to follow-up with the participants to ask *why* they selected more positive emotions in the image-based version of the survey than the word-based. As well, we are not able to re-run the survey, with the opposite versions used to compare if the same respondent would answer the exact same way. Although, there is perhaps an important distinction between the question that was found to have different results than the other questions. In asking about the

process to create dairy products, a definition was not given about what this meant. Participants were able to interpret the question on their own, and their interpretation could have included any part of the production process. Of all the questions of this series of emotions-questions, this was the one with the least number of responses, with more participants choosing "none of the above" than for the other questions. Version A (N=907) had 74.5% respond to the question, while Version B (N=944) had 73.8% of the group respond to the question. Do these factors also contribute to the outcome? Additionally, the higher selection of "none of the above" for this question could indicate that this is an area or process that people have very little knowledge of, and could be related to current-day lack of understandings on food and farm practices. If this is the case, does this make new products more easily understood by consumers, and make for easier selling of products that seem less "abstract" than farm processes that many everyday people are far removed from? Future research could consider the implications of these findings and incorporate more of a qualitative element to the research to ask why the emotions selected were selected. As noted previously in this chapter, Harley (2016) discusses remedies to the drawbacks of utilizing self-report emotion-measurement tools in surveys, by suggesting the use of definitions and stimulating research settings, which could be valuable in this type of research. Providing further definitions, prompts, or even images to help participants understand the "process to create dairy products" could in turn create different results, and could be explored more in future research.

What the differences mean for survey-methods

Understanding that a difference exists, a next step to consider is whether this difference really "matters" outside of this study, and what it means for future research. Reflecting on comments earlier from Harley (2016) there are several pros and cons of self-report measurement tools. In identifying drawbacks of self-report methods, Harley notes the issue that the emotion may not be measured, but rather the perception of the emotion instead. Since both versions of this used the same process, they would also have the same impacts and therefore are not considered as impactful to these results. Harley's research question considers whether it is "worth it" to use multimethod emotion classification, and conducted a meta-analysis of various emotional measurement techniques. In conclusion, Harley states that there has not been enough research "to draw definitive conclusions about which methods are most accurate in measuring emotions" but that there is a myriad of methods to use. The findings of this research project only add to the

various difficulties that researchers may have in selecting a method to measure emotions, but also add an important contribution to the literature. These findings indicate that there is in fact a difference in measurement techniques, and that thought should go into the method chosen. As well, it is important to note that even when one method is selected, the results could be impacted by the method chosen. In order to address this, future research should incorporate the use of multi-method analysis where appropriate.

By incorporating the use of the PrEmo Tool for the image-based questions in this survey, this study expanded on the previously mentioned work of Laurans and Desmet (2017). Although inconclusive whether the tool is "better" than word-based self-report measurements, it was proven to be effective in measuring emotions and the impact that emotions had in predicting consumption behaviour. This research project further validates the use of the PrEmo Tool, similarly to Yao (2016). Future studies could utilize the full 14-character version of PrEmo, and incorporate the animation-version for a full non-verbal tool that could expand on the ways that individuals consider their emotions towards dairy and dairy substitute products.

Conclusion

This research project has uncovered the ways that emotions function as a predictor of dairy and dairy substitute consumption, as well as the importance of the mode of measurement for emotions. By utilizing self-report measurements of emotions in two ways, it was found that the method does impact the results. Finding a statistical difference between the two versions of the survey for one of the questions indicates that there is more work to be done in the scholarly areas of sociology of emotions, emotionally-driven consumption habits, and survey methodology. In using multiple methods in one survey, it is shown that outcomes may differ due to the structure and nature of questions, and encourages researchers to consider all possible elements that may influence their research and findings. Additionally, these results may provide insight to those that work in marketing, where emotions may be a guiding factor to purchase or not purchase a specific product.

Future research should attempt to answer some of the questions created from this study about why possible differences might exist, and which method is "best" for various scenarios. Noting the important role that emotions play in guiding consumption behaviour, new research in this

area can attempt to test the ways that emotions can be guided as well, perhaps changing the outcomes for consumption.

References

Bassi, E. M., Parkins, J. R., & Caine, K. J. 2019. Situating emotions in social practices: empirical insights from animal husbandry in the cow-calf industry. *Sociologia Ruralis*, *59*(2), 275-293.

Bericat, E. 2016. The sociology of emotions: Four decades of progress. *Current Sociology*, *64*(3), 491–513. https://doi.org/10.1177/0011392115588355

Harley, J. M. 2016. Chapter 5 - Measuring Emotions: A Survey of Cutting Edge Methodologies Used in Computer-Based Learning Environment Research. In S. Y. Tettegah & M. Gartmeier (Eds.), *Emotions, Technology, Design, and Learning* (pp. 89–114). Academic Press. https://doi.org/10.1016/B978-0-12-801856-9.00005-0

Laurans, G., & Desmet, P. M. A. n.d. *Developing 14 Animated Characters for Non-verbal Self-Report of Categorical Emotions*. 20.

McDermott, M. S., Oliver, M., Svenson, A., Simnadis, T., Beck, E. J., Coltman, T., Iverson, D., Caputi, P., & Sharma, R. 2015. The theory of planned behaviour and discrete food choices: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 162. https://doi.org/10.1186/s12966-015-0324-z

Turner, J. H. 2009. The Sociology of Emotions: Basic Theoretical Arguments. *Emotion Review*, *1*(4), 340–354. https://doi.org/10.1177/1754073909338305

Yao, V. Y. 2016. Investigating Consumption-Related Emotions Elicited by Selected Dairy Products Using Product Emotion Measurement. *International Journal of Marketing Studies*, *8*(1), 86. https://doi.org/10.5539/ijms.v8n1p86

Chapter Four: Conclusion

Review of thesis

This thesis aimed to answer how consumers make decisions about their dairy and dairy substitute consumption. In attempting to uncover the roles of attitudes, social norms, and perceived behavioural control, the study followed the format of the theory of planned behaviour. Additionally, the role of emotions in predicting consumption was also held up to with a magnifying glass to understand not only how these emotions guide behaviour, but also how emotions can be measured.

In Chapter Two it was made clear that the theory of planned behaviour provides important context in evaluating the consumption behaviour of individuals, especially in the context of dairy and dairy substitute consumption. The sociology of emotions also provided an important foundation for understanding the ways that emotions can also influence the consumption of various products, and therefore impact the outcome of behaviour. The findings of Chapter 2 demonstrate that attitudes can matter, with those that hold stronger pro-environmental attitudes, that is those that have higher levels of concern for the environment and more stringent preferred environmental management strategies, are more likely to demonstrate this attitude through choosing more environmentally preferred behaviours, including reducing the consumption of dairy products or choosing to consume dairy substitutes. Additionally, consumption behaviour can be predicted at times by the attitudes that an individual holds towards animals and animal welfare, where those that are considered to be more pro-animal in their attitudes, demonstrating a higher level of concern for animal welfare, being more likely to reduce their impacts to animals by reducing their consumption of various dairy products and/or consuming plant-based dairy products. Further, the analytic exercise done in Chapter 2 indicates the important role of social norms in influencing consumption behaviour, where those that expressed that their friends and family are reducing their consumption of dairy products were more likely to have reduced their own consumption of these products and are more likely to consume dairy substitute products. Building upon the literature on the ways that perceived behavioural control (PBC) is explored, this study demonstrated the difficulties of measuring the impact of PBC on behaviour, and posed new questions about the ways that PCB can be measured in food studies. Closely following social norms, emotions also played a very influential role in decision-making, with those that

expressed negative emotions to dairy products in general being more likely to reduce their consumption of those products and more likely to consume dairy substitute products.

Chapter Three expanded the discussion of emotions, and the ways that emotions are measured in various research settings, as well as in this study. Utilizing findings and strategies by researchers and scholars in survey measurement and emotions-based surveys (Harley, 2016; Laurans & Desmet, 2017; Yao, 2016), Chapter 3 demonstrated the two ways that emotions were measured in this project. Finding that, in some cases, the mode of asking questions has a significant impact on the results of the questions, this chapter opens the door to new methods and mixed-methodology in survey settings.

Limitations

As discussed throughout the thesis document, the research performed is not without its limitations and imperfections. Primarily, this research acts as an exercise to explore possible connections between attitudes and behaviours by applying the long-standing theory of planned behaviour. Though the theory has been used by many researchers over the years, it is not without its critiques. By simplifying the components of decision-making, this application of the theory of planned behaviour leaves much out of the consideration of what goes into the day-to-day decision-making of consumers. The use of exploring animal welfare attitudes and environmental attitudes are only portions of the attitudes that an individual may hold, and therefore the findings of this research are not in any way prescriptive of the decisions that one *should* make to demonstrate their attitudes (i.e., this research does not mean to imply that those that hold strong attitudes towards animal welfare do not hold them any more or less because of their consumption behaviour). There are many other attitudes, internal and external factors, and belief systems that may attribute to one's consumption or purchasing of various food products.

Additionally, as described in Chapter Three, there are various ways of measuring and understanding emotions. The choices made in this study to include the set of emotions used, and not to use others, may have had impacts on the results found more broadly. The standpoint of this research is to perform analysis and data collection using various sociological theories, attempting to capture the, as some would describe, "irrational" nature of humans via emotions that is often left out of economical analysis and application of theories such as the theory of planned behaviour.

Finally, there are some aspects of these research findings that may be influenced by the information, or lack thereof, available to consumers in understanding some of the issues considered in this project. At the time of the survey, there was a decision to not include any type of information treatment approaches to see if the information that consumers were given would impact the responses shown. This approach therefore creates a situation where the knowledge of consumers is not able to be measured in the analysis. There are various areas of the understandings of dairy and plant-based dairy production that participants may have had differing understandings, experiences, and perhaps attitudes toward. Namely, as demonstrated in Table 1.1 in Chapter 1, plant-based dairy alternatives are currently understood to have lesser environmental footprints than cow's milk at the farm level. Current research in the life-cycle assessment (LCA) of products considers the impacts along the entire production process of various products. Depending on the participant's familiarity with this research and issues, there may be different assumptions made about the environmental impacts of these products which may guide their attitudes and consumption choices. This research project also did not include literature on LCA in its formulation and analysis, which means that there may be assumptions and biases included in the research that plant-based dairy alternatives are more environmentally sustainable than dairy products. As more research and data comes out about the plant-based dairy alternative industries, the knowledge levels of researchers and consumers may grow, which may have an influence on attitudes and therefore behavioural outcomes. This is an important area of research to consider moving forward.

Besides the environmental aspects of dairy and plant-based dairy products, there are other aspects that may be important in influencing consumer emotions and attitudes. Specifically, as discussed in Chapter 3 in the findings regarding the emotional experience of participants when considering "the process to create" dairy products, there are more questions left than answered in finding the statistical difference between the two versions. As no "information treatments" or definitions were provided to participants regarding the "process to create" dairy products, the question and analysis cannot make any assumptions about the level of knowledge held. A remedy to this may have been to either provide an information treatment outlining the various stages of the production process, or instead asking a knowledge question to gauge the knowledge level of the participants. Or, even further, there could have been an opportunity to expand the question to have a qualitative element.

Importance of the Research and Implications

By learning that there are significant drivers of dairy consumption behaviour, this research puts forth a few solutions for consideration. Those that work in the food industry, both in dairy and in the plant-based dairy substitute industry, have an opportunity to act on the values and concerns of Canadian consumers. As shown, attitudes towards the environment and to animal welfare can be very influential in determining the consumption of various products. To capture these attitudes, industry must "walk the walk" and "talk the talk", so to speak. The first step is ensuring that the products meet the preferences of consumers, by mitigating environmental impacts and ensuring animal welfare is at the forefront of products. This can be done, in part, by utilizing technologies such as selective breeding in cattle, or in using best management practices at the farm level. Throughout the production chain, there could be steps taken to further reduce the environmental impacts and maintain proper equity in the work spaces, both for humans and animals involved in the processing of products. The second step is to make sure that consumers are well aware of the steps being taken to capture their attitudes and values. This can include marketing campaigns, such as ones being currently used including the Dairy Farmers of Canada promoting the environmental considerations of producers or Earth's Very Own utilizing the packaging of their products to share environmental information about products (DFC, 2022; Earth's Very Own, 2021), reducing barriers for consumers to consider by placing the information in their hands. Additionally, in recognizing the important role of social norms in guiding consumption behaviour, organizations have the opportunity to explore the cultural impacts of their products and how they can build a sense of "community" to further consumption. Finally, emotions also present an opportunity for industry to better learn about the emotional needs of their consumers, and use techniques that speak to these aspects.

In furthering the role of social norms, as more Canadians shift to reducing their dairy consumption or increasing their consumption of dairy substitute products, this creates an inflated impact on social norms. These trends are important to follow, not only from the industry standpoint, but also from a policy and health standpoint. There are many economic reasons a government may want to engage in the following of food trends, especially with Canadian dairy being a large driver for the Canadian economy, but perhaps more important on a human-level is the health implications of food trends. Due to the highly regulated nature of dairy products, there

are important implications to consider if large masses of the Canadian population are choosing to consume alternative products instead. It is important for regulatory bodies and health practitioners to consider the role that changes to diets can impact citizens, and ensure that health recommendations are aware of and following these trends. An example of this can be seen in the more recent Canada Food Guide, which as BBC noted in January 2019 is missing the "daily dose of dairy", once considered as its own "food group" but is now included with various other proteins (BBC, 2019). The updated "interactive" food guide places importance on eating "a variety of healthy foods each day" (Government of Canada, 2022). As the BBC notes, this change to the food guide may not be so much of predicting trends, but "catching up" to the trends already happening (BBC, 2019). Regardless, this shows one example of the ways that regulatory bodies can maintain engaged with the health of the public through food consumption.

Additionally, the lasting research findings that were presented in this thesis project show that there is significant value in measuring emotions, and in utilizing various methods of measuring emotions. In employing two versions of the survey, ranging outcomes were found on the role that emotions play in decision-making, but also in the way that emotions can be measured. This verifies what is already known to many researchers, that there is more than one way to ask a question, and with that, also various ways to analyze questions.

Finally, in bringing together concepts from various areas of sociology and specifically environmental sociology, it is clear that concepts of the environment and climate change are influencing the choices of individuals. An important finding is that, in cases where environmental attitudes were shown be influential in predicting consumption behaviour, the individual may not even recognize that influence. For example, in the case of "reducing dairy consumption over the last 2 years" discussed in Chapter 2, the top three factors (found in Appendix Table A.5) that individuals that have reduced their consumption over the last 2 years selected were, in order: "Health Concerns", "Animal Welfare Concerns", and "Hormones". Environmental concerns, not listed in the top 3 factors for being "very important" to consumers, still play a role in predicting that behaviour. This indicates that environmental action may even be happening at a sub-conscious level for some consumers, which further supports the concept of not leaving environmental factors "out" from current and future research.

Future Research

This research project explored using theory and literature to build research questions, conduct research, and finally how to analyze and apply research. Further expansion in this area could take place in a variety of ways. Firstly, there could be a more in-depth analysis of the data already collected, in spending more time on analysis of the specific emotions captured and the ways that specific emotions can impact decision making. This could be done by exploring the specific primary emotions selected by participants, or by viewing the data of the initial emotions questions that were answered along a likert scale or selecting a top three emotions. Additionally, there are entire sections of the data set left to be explored, including the opinions of participants on things such as selective breeding, genomics, and even trust in government and public.

Another way that potential research could move from this research project, is in adding a qualitative research element, using focus groups, interviews, or a larger discourse analysis. Additionally, in building on the work of Bassi, future research could seek to blend this approach and hers, by conducting a survey specifically for producers.

Overall, there are a myriad of ways that this research could be applied and built upon further. The final takeaway of this thesis is to consider one's own consumption behaviour, and to see the links that emotions, attitudes, values, and social norms can have in one's life.

References

BBC News, US & Canada. 2019, January 22. Is milk healthy? Canada's new food guides says not necessarily. https://www.bbc.com/news/world-us-canada-46964549

Dairy Farmers of Canada. 2022. Our commitment to sustainability. Retrieved on September 19, 2022 https://dairyfarmersofcanada.ca/en/our-commitments/sustainability

Earth's Very Own. 2021. Products, Oat. Retrieved on October 15, 2021 from https://earthsown.com/product_ingredients_base/oat/

Government of Canada. 2022. Canada's food guide. https://food-guide.canada.ca/en/

Harley, J. M. 2016. Chapter 5 - Measuring Emotions: A Survey of Cutting Edge Methodologies Used in Computer-Based Learning Environment Research. In S. Y. Tettegah & M. Gartmeier (Eds.), *Emotions, Technology, Design, and Learning* (pp. 89–114). Academic Press. https://doi.org/10.1016/B978-0-12-801856-9.00005-0

Laurans, G., & Desmet, P. M. A. 2017. Developing 14 animated characters for non-verbal self-report of categorical emotions. *Journal of Design Research*, *15*(3–4), 214–233. https://doi.org/10.1504/JDR.2017.089903

Yao, V. Y. 2016. Investigating Consumption-Related Emotions Elicited by Selected Dairy Products Using Product Emotion Measurement. *International Journal of Marketing Studies*, *8*(1), 86. https://doi.org/10.5539/ijms.v8n1p86

References (Full Thesis)

Alberta Milk. 2021. Hanna Says Moo. Retrieved on October 15, 2021 from https://albertamilk.com/hanna-says-moo/

Alberta Milk. 2022. Smash Milk. Retrieved on August 26, 2022 from https://albertamilk.com/smash-milk/

Alchemer LLC. 2021. Panel Services. https://www.alchemer.com/panel-services/

Allen, M.R., O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld, 2018: Framing and Context. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Bassi, E. 2017. Social Practices of Animal Husbandry in the Alberta Cattle Industry. [Masters thesis, University of Alberta]. https://doi.org/10.7939/R31G0J793

Bassi, E. M., Parkins, J. R., & Caine, K. J. 2019. Situating emotions in social practices: empirical insights from animal husbandry in the cow-calf industry. *Sociologia Ruralis*, *59*(2), 275-293.

BBC News, US & Canada. 2019, January 22. Is milk healthy? Canada's new food guides says not necessarily. https://www.bbc.com/news/world-us-canada-46964549

Beard, S. 2020, Mar 2. As veganism grows more popular in the U.K., dairy industry fights back. *Marketplace*.

Bericat, E. 2016. The sociology of emotions: Four decades of progress. *Current Sociology*, *64*(3), 491–513. https://doi.org/10.1177/0011392115588355

Binngießer, J., & Randler, C. 2015. *Association of the Environmental Attitudes "Preservation" and "Utilization" with Pro-Animal Attitudes*. 16.

Bryn B. & Dana C. n.d. Blog post for Nature Fresh Farms. What is President's Choice® #EatTogether Day? Retrieved on August 26, 2022 from https://www.naturefresh.ca/presidents-choice-eattogether-day/

California Milk Processor Board. About us – Got Milk. Retrieved on October 15, 2021 from https://www.gotmilk.com/about-us/

Dairy Farmers of Canada. 2018. 2018 Canadian Dairy Sector Overview.

Dairy Farmers of Canada. 2019. AGECO study results reveal improved environmental impact and efficiency of Canadian milk production. Retrieved on November 15, 2022 from https://dairyfarmersofcanada.ca/en/dairy-in-canada/news-releases/ageco-study-results-reveal-improved-environmental-impact-and-efficiency-canadian-milk-production

Dairy Farmers of Canada. 2022. Our commitment to sustainability. Retrieved on September 19, 2022 https://dairyfarmersofcanada.ca/en/our-commitments/sustainability

Davidson, D. J., & Kecinski, M. 2022. Emotional pathways to climate change responses. WIREs Climate Change, 13(2). https://doi.org/10.1002/wcc.751

Domingo, N. G. G., Balasubramanian, S., Thakrar, S. K., Clark, M. A., Adams, P. J., Marshall, J. D., Muller, N. Z., Pandis, S. N., Polasky, S., Robinson, A. L., Tessum, C. W., Tilman, D., Tschofen, P., & Hill, J. D. 2021. Air quality–related health damages of food. *Proceedings of the National Academy of Sciences*, *118*(20). https://doi.org/10.1073/pnas.2013637118

Dunlap, R. E. n.d.. *Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale*. 18.

Earth's Very Own. 2021. Products, Oat. Retrieved on October 15, 2021 from https://earthsown.com/product_ingredients_base/oat/

Eco-Resources, 2015. The Economic Impact of the Canadian Dairy Industry in 2013. A Report Submitted to Dairy Farmers of Canada, 2015.

European Environment Agency. n.d. Life cycle assessments. Retrieved on November 15, 2022 from https://www.eea.europa.eu/help/glossary/eea-glossary/life-cycle-assessment

FAO. 2021. *The share of food systems in total greenhouse gas emissions*. Global, regional and country trends, 1990–2019. FAOSTAT Analytical Brief Series No. 31. Rome

Flanagan, R. 2018, July 25. More than 3 million Canadians vegetarian or vegan: study. CTV News.

Government of Canada. 2020. Overview of the Canadian agriculture and agri-food sector 2018. Retrieved October 15, 2021 from https://agriculture.canada.ca/en/canadas-agriculture-sectors/sector-overviews-data-and-reports/overview-canadian-agriculture-and-agri-food-sector-2018

Government of Canada. 2022. Canada's food guide. https://food-guide.canada.ca/en/

Grant, C. A., & Hicks, A. L. 2018. Comparative Life Cycle Assessment of Milk and Plant-Based Alternatives. *Environmental Engineering Science*, *35*(11), 1235–1247. https://doi.org/10.1089/ees.2018.0233

Harley, J. M. 2016. Chapter 5 - Measuring Emotions: A Survey of Cutting Edge Methodologies Used in Computer-Based Learning Environment Research. In S. Y. Tettegah & M. Gartmeier (Eds.), *Emotions, Technology, Design, and Learning* (pp. 89–114). Academic Press. https://doi.org/10.1016/B978-0-12-801856-9.00005-0

Herzog, H., Grayson, S., & McCord, D. 2015. Brief Measures of the Animal Attitude Scale. *Anthrozoös*, *28*(1), 145–152. https://doi.org/10.2752/089279315X14129350721894

Higgs, S. 2015. Social norms and their influence on eating behaviours. *Appetite*, *86*, 38–44. https://doi.org/10.1016/j.appet.2014.10.021

Hussain, G. 2022, September 14. What Are the Environmental Impacts of Dairy Farming? *Sentient Media*. Retrieved October 7, 2022, from https://sentientmedia.org/the-dairy-industry-environment/

Kroger Health. 2021. Eat Together, Eat Better with Real Dairy Booklet. Retrieved on August 26, 2022 from https://www.krogerhealth.com/images/2021-DairyBooklet-Online.pdf

Kroger Health. 2021. Eat Together, Eat Better with Real Dairy Booklet. Retrieved on August 26, 2022 from https://www.krogerhealth.com/images/2021-DairyBooklet-Online.pdf

Laurans, G., & Desmet, P. M. A. 2017. Developing 14 animated characters for non-verbal self-report of categorical emotions. *Journal of Design Research*, *15*(3–4), 214–233. https://doi.org/10.1504/JDR.2017.089903

Law Society of Alberta. 2021. Indigenous Land Acknowledgements. Retrieved on October 15, 2021 from https://www.lawsociety.ab.ca/about-us/key-initiatives/indigenous-initiatives/indigenous-land-acknowledgements/

Lynch, J., Cain, M., Frame, D., & Pierrehumbert, R. 2021. Agriculture's Contribution to Climate Change and Role in Mitigation Is Distinct From Predominantly Fossil CO2-Emitting Sectors. *Frontiers in Sustainable Food Systems*, *4*, 300. https://doi.org/10.3389/fsufs.2020.518039

McDermott, M.S., Oliver, M., Svenson, A. et al. 2015. The theory of planned behaviour and discrete food choices: a systematic review and meta-analysis. Int J Behav Nutr Phys Act 12, 162 https://doi.org/10.1186/s12966-015-0324-z

Onwezen, M. C., Antonides, G., & Bartels, J. 2013. The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology*, *39*, 141–153. https://doi.org/10.1016/j.joep.2013.07.005

PETA. 2021. Veganism and the Environment. Retrieved on October 15, 2021 from https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Poortinga, W., Steg, L., & Vlek, C. 2003. Myths of nature and environmental management strategies. A field study on energy savings in traffic and transport. *People, Place and Sustainability*, 280–290.

Scherpenzeel, A. 2021. How to cover the general population by Internet interviewing: Problems of coverage and selection and possible solutions.

Shepherd, R., Sparks, P., & Guthrie, C. A. 1995. The Application of the Theory of Planned Behaviour to Consumer Food Choice. *ACR European Advances*, *E-02*. https://www.acrwebsite.org/volumes/11624/volumes/e02/E-02/full

Statistics Canada and the International Dairy Federation; Compiled by Agriculture and Agri-Food Canada, Animal Industry Division, Market Information Section. Printed 2021-11-16. Table can be found: https://aimis-simia-cdic-ccil.agr.gc.ca/rp/index-eng.cfm?action=gR&r=264&signature=D87CD8649F87E0F19E0FBF5457DF6359&pdctc=&pTpl=1#wb-cont

Statistics Canada. 2017. Canada [Country] and Canada [Country] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed August 26, 2022).

Statistics Canada. Table 14-10-0287-03 Labour force characteristics by province, monthly, seasonally adjusted. https://doi.org/10.25318/1410028701-eng

Statistics Canada. Table 98-10-0016-01 Population and dwelling counts by the Statistical Area Classification. https://doi.org/10.25318/9810001601-eng

Steg, L., & Sievers, I. 2000. Cultural Theory and Individual Perceptions of Environmental Risks. *Environment and Behavior*, *32*(2), 250–269. https://doi.org/10.1177/00139160021972513

Sultan, P., Tarafder, T., Pearson, D., & Henryks, J. 2020. Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: Moderating roles of communication, satisfaction and trust in organic food consumption. *Food Quality and Preference*, *81*, 103838. https://doi.org/10.1016/j.foodqual.2019.103838

Turner, J. H. 2009. The Sociology of Emotions: Basic Theoretical Arguments. *Emotion Review*, *1*(4), 340–354. https://doi.org/10.1177/1754073909338305

Valentino, N. A., Zhirkov, K., Hillygus, D. S., & Guay, B. 2020. The Consequences of Personality Biases in Online Panels for Measuring Public Opinion. Public Opinion Quarterly, 84(2), 446–468. https://doi.org/10.1093/poq/nfaa026

Verbeek, M., & Nijman, T. 1996. Incomplete Panels and Selection Bias. In L. Mátyás & P. Sevestre (Eds.), The Econometrics of Panel Data: A Handbook of the Theory with Applications (pp. 449–490). Springer Netherlands. https://doi.org/10.1007/978-94-009-0137-7_18

Vermeir, I., & Verbeke, W. 2008. Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological Economics*, *64*(3), 542–553. https://doi.org/10.1016/j.ecolecon.2007.03.007

Yao, V. Y. 2016. Investigating Consumption-Related Emotions Elicited by Selected Dairy Products Using Product Emotion Measurement. *International Journal of Marketing Studies*, *8*(1), 86. https://doi.org/10.5539/ijms.v8n1p86

Appendix

Information Letter and Consent Form

Note: Full version showed University logos and additional features such as a link to download the form.

INFORMATION LETTER

Title of the study: Evaluating Consumer and Producer Behaviour and Attitudes Surrounding Environmental Aspects of the Canadian Dairy Industry (Pro00115693)

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Invitation to Participate: You are invited to participate in this research study consumption of dairy products and perspectives on the Canadian dairy industry.

Purpose of the Study: From this research we wish to examine the attitudes, values, and norms of consumers in their process of decision making for consumption of dairy and plant-based dairy

products. We want to understand the decision-making processes for dairy and non-dairy consumers, and the factors that impact these processes. This research will help us understand the traits that Canadian dairy consumers value in their products, which will help to guide producers and policy-makers to ensure that products on the market reflect these values and concerns.

Participation: If you wish to participate in this study, please complete the attached survey. The survey should take you approximately 20 minutes to complete. You do not have to answer any questions that you do not want to answer. Once you have completed the survey, please submit it by pressing the "submit" button.

Benefits: Our study will help consumers, producers, and manufacturers of dairy and plant-based dairy substitutes to better understand consumer preferences and motivations. Additionally, the research will assist decision-makers at the local, provincial, and federal government levels to better understand the social-impacts of the Canadian dairy industry, and concerns of citizens regarding environmental impacts of agriculture. This could allow for better policy-making surrounding agri-environmental issues, and in long-term planning for climate mitigation actions at the individual and collective levels.
There may not be any benefits for participating in this research, but we hope that participants will find enjoyment in the experience and contributing to a larger understanding of consumer preferences. There are no costs to being in this study.

Risks: Where available, participants can prefer not to answer or skip any questions that they do not wish to answer, and can withdraw or end the survey any time throughout their survey process. All survey responses will be anonymized in any public data presentation or publication, and participant identities will be protected. Participants will have the opportunity to review their survey responses at the end of the survey, to change or clarify answers. There are no known risks to participants in participating in this survey.

Confidentiality and Anonymity: The information that you will share will remain strictly confidential and will be used solely for the purposes of this research. The only people who will have access to the research data are the principal investigator and supervisors. Your answers to open-ended questions may be used verbatim in presentations and publications but neither you (nor your organization) will be identified. In order to minimize the risk of security breaches and to help ensure your confidentiality we recommend that you use standard safety measures such as signing out of your account, closing your browser and locking your screen or device when you are no longer using them / when you have completed the study. Results will be published in pooled (aggregate) format. Anonymity is guaranteed since you are not being asked to provide your name or any personal information.

Data Storage: The anonymized data will be encrypted and stored on secure computers and servers. According to University of Alberta policies, the anonymized responses will be stored for 5 years before being destroyed. Other researchers may use this data in future research projects, but if they do, they will get approval from the Research Ethics Board.

Voluntary Participation: You are under no obligation to participate and if you choose to participate, you may refuse to answer questions that you do not want to answer. Should you choose to withdraw midway through the electronic survey simply close the link and no responses will be included. Given the anonymous nature of the survey, once you have submitted your responses it will no longer be possible to withdraw them from the study.

Information about the Study Results: Research findings will likely be published at a later time, upon completion of the graduate degree of the principal investigator. To learn more, please contact klrogers@ualberta.ca.

Contact Information: If you have any questions or require more information about the study itself, you may contact the researcher or her supervisors at the numbers mentioned herein.

The plan for this study has been reviewed by a Research Ethics Board at the University of Alberta. If you have any questions regarding your rights as a research participant or how the research is being conducted you may contact the Research Ethics Office at 780-492-2615.

Please keep this form for your records, by printing a copy of this form or downloading a PDF here (insert link).

Completion and submission of the survey means your consent to participate.

Supplementary Tables

Table A.1. Binary logistic regression predicting no dairy consumption (N = 50)

Predictor Variables	Regression 1 (Attitudes)	Regression 2 (Norms)	Regression 3 (Behavioural Control)	Regression 4 (Emotions)	Regression 5 (Everything with controls)
	β(OR)	β(OR)	β(OR)	β(OR)	β(OR)
Attitudes: Myths of Nature Statement 1 +	-0.328 (0.721)	-0.260 (0.771)	-0.180 (0.835)	0.011 (1.011)	-0.052 (0.949)
Attitudes: Myths of Nature Statement 2 +	-1.277 (0.279)**	-1.195 (0.303)*	-1.027 (0.358)*	-1.021 (0.360)	-0.899 (0.407)
Attitudes: Myths of Nature Statement 3 +	-0.629 (0.533)	-0.571 (0.565)	-0.743 (0.476)	-0.543 (0.581)	-0.479 (0.619)
Attitudes: Animal Attitude Scale 10	0.588 (1.800)**	0.613 (1.846)**	0.994 (2.702)***	0.676 (1.965)*	0.715 (2.043)*
Norms: "My family and friends reducing their consumption of dairy products"		0.091 (1.095)	0.076 (1.079)	0.033 (1.033)	0.041 (1.042)
Behavioural control: how frequently involved in grocery shopping			-0.436 (0.647)***	-0.407 (0.665)**	-0.361 (0.697)*
Behavioural control: Price			-0.645 (0.525)***	-0.411 (0.663)*	-0.377 (0.686)
Emotions (1=positive, 0=negative)				-2.280 (0.102)***	-2.241 (0.106)***
Emotions x Version (To test if version had impact on positive emotion)				0.246 (1.279)	0.072 (1.075)
Gender (1=female)					0.012 (1.012)

Age group (1= 30 to 45)^					-0.112 (0.894)
Age group (1= 46 to 65)^					0.323 (1.382)
Age group (1 = 65+)^					-0.584 (0.558)
Income (1 = $65,000+, 0 = below $64,999)					-0.393 (0.675)
Language responded in (1=English, 0=French)					0.613 (1.846)
Lives in town (1 = yes, 0 = no) ^^					-0.204 (0.815)
Lives in countryside/rural district) ^^					0.890 (2.435)*
N	1851	1844	1835	1537	1515
Constant	-5.126	-5.551	-3.298	-1.661	-2.736
Nagelkerke R^2	0.047	0.048	0.130	0.224	0.240

[+] Reference Category: Myths of Nature Statement 4 "We do not know whether environmental problems will magnify or not"
^ Reference category: Age group 18-29; ^^ Reference category: Lives in a city
* p < 0.05, **< 0.01, *** < 0.001

Table A.2. Binary logistic regression predicting the consumption of neither dairy nor dairy substitutes (N = 37).

Predictor Variables	Regression 1 (Attitudes)	Regression 2 (Norms)	Regression 3 (Behavioural Control)	Regression 4 (Emotions)	Regression 5 (Everything with controls)
	β(OR)	β(OR)	β(OR)	β(OR)	β(OR)

Attitudes: Myths of Nature Statement 1 +	-0.660 (0.517)	-0.537 (0.585)	-0.448 (0.639)	-0.178 (0.837)	-0.257 (0.773)
Attitudes: Myths of Nature Statement 2 +	-1.651 (0.192)**	-1.533 (0.216)**	-1.361 (0.256)*	-1.302 (0.272)	-1.227 (0.293)
Attitudes: Myths of Nature Statement 3 +	-0.471 (0.625)	-0.314 (0.731)	-0.497 (0.608)	-0.139 (0.870)	-0.168 (0.846)
Attitudes: Animal Attitude Scale 10	0.124 (1.132)	0.140 (1.150)	0.555 (1.742)	0.470 (1.601)	0.530 (1.699)
Norms: "My family and friends reducing their consumption of dairy products"		-0.105 (0.901)	-0.167 (0.846)	-0.133 (0.876)	-0.106 (0.899)
Behavioural control: how frequently involved in grocery shopping			-0.510 (0.600)***	-0.537 (0.585)***	-0.506 (0.603)**
Behavioural control: Price			-0.656 (0.519)***	-0.357 (0.700)	-0.299 (0.742)
Emotions (1=positive, 0=negative)				-2.095 (0.123)***	-2.020 (0.133)***
Emotions x Version (To test if version had impact on positive emotion)				0.523 (1.687)	0.352 (1.421)
Gender (1=female)					0.000 (1.000)
Age group (1= 30 to 45)^					0.518 (1.679)
Age group (1= 46 to 65)^					0.567 (1.762)
Age group (1 = 65+)^					-1.007 (0.365)

Income (1 = $65,000+, 0 = below $64,999)					-0.460 (0.631)
Language responded in (1=English, 0=French)					0.103 (1.109)
Lives in town (1 = yes, 0 = no) ^^					0.376 (1.457)
Lives in countryside/rural district) ^^					0.625 (1.868)
N	1851	1844	1835	1537	1515
Constant	-3.544	-3.434	-0.871	-0.435	-1.422
Nagelkerke R^2	0.035	0.033	0.142	0.181	0.192

[+] Reference Category: Myths of Nature Statement 4 "We do not know whether environmental problems will magnify or not"
^ Reference category: Age group 18-29; ^^ Reference category: Lives in a city
* p < 0.05, **< 0.01, *** < 0.001

Table A.3. Animal attitude frequencies amongst participants, measured through the Animal Attitude Scale

Animal Attitude Statement	Agreement level frequency					
	Strongly Disagree	*Mildly Disagree*	Unsure	*Mildly Agree*	*Strongly Agree*	Mean (S.D)
It is morally wrong to hunt wild animals just for sport	109	146	285	361	950	4.02 (1.23)
I do not think that there is anything wrong with	425	325	486	420	195	2.80 (1.31)

using animals in medical research						
I think it is perfectly acceptable for cattle and hogs to be raised for human consumption	121	161	362	623	584	3.75 (1.18)
Basically, humans have the right to use animals as we see fit	646	369	390	325	121	2.41 (1.30)
The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work	75	136	290	455	895	4.06 (1.14)
I sometimes get upset when I see wild animals in cages at zoos	137	259	370	620	465	3.55 (1.21)
Breeding animals for their skins is a legitimate use of animals	647	302	396	339	167	2.50 (1.36)
Some aspects of biology can only be learned through dissecting preserved animals such as cats	255	185	647	516	248	3.17 (1.20)
It is unethical to breed purebred	123	265	468	475	520	3.54 (1.22)

dogs for pets when millions of dogs are killed in animal shelters each year						
The use of animals such as rabbits for testing the safety of cosmetics and household products is unnecessary and should be stopped	123	162	394	433	739	3.81 (1.24)

Table A.4. Descriptive statistics of social norm indicators.

Agreement level frequency		
	My friends and family members are reducing their consumption of dairy products	My friends and family members are reducing their consumption of meat products
Strongly Disagree	304	295
Mildly Disagree	394	360
Unsure	680	595
Mildly Agree	337	445
Strongly Agree	129	150
Total	1844	1845
Mean (S.D.)	2.78 (1.14)	2.89 (1.18)

Table A.5. Importance ranked for factors that impacted participants reduced dairy consumption over the last two years.

Importance	Factors										
	Allergies	*Cost of Dairy Products*	*Health Concerns*	*Environmental Concerns*	*Substitute availability*	*Animal Welfare Concerns*	*Friends and family reducing consumption*	*Fat content*	*Protein content*	*Antibiotics*	*Hormones*
1 (Not at all important)	106	43	31	36	54	33	112	67	67	64	61
2	34	41	28	47	44	34	59	47	53	34	37
3	107	119	106	133	128	108	142	129	129	96	107
4	111	174	163	173	182	160	140	170	158	163	132
5 (Very important)	211	244	290	234	206	284	123	208	200	245	276
Total	569	621	618	623	614	619	576	621	607	602	613
Mean (S.D.)	3.50 (1.49)	3.86 (1.21)	4.06 (1.13)	3.84 (1.18)	3.72 (1.24)	4.01 (1.16)	3.18 (1.40)	3.65 (1.30)	3.61 (1.32)	3.82 (1.31)	3.86 (1.32)

Full Questionnaire

The full questionnaire begins as an attachment, on the next page.

Evaluating Consumer and Producer Behaviour and Attitudes Surrounding Environmental Aspects of the Canadian Dairy Industry

Section A

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Please note that it possible to complete this survey in either English or French. You can change the language by selecting either English or Français (Canada) from the language menu (at the far right) on the black toolbar on the top of the page.

Veuillez noter qu'il est possible de répondre à ce sondage en anglais ou en français. Vous pouvez changer la langue en sélectionnant English ou Français (Canada) depuis le menu des langues (tout à droite) sur la barre d'outils noire en haut de la page.

(untitled)

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Information Letter

Title of the study: Evaluating Consumer and Producer Behaviour and Attitudes Surrounding Environmental Aspects of the Canadian Dairy Industry (Pro00115693)

Principal Investigator:
Katherine Rogers
Graduate Student
[redacted]

Supervisors:
Dr John Parkins

Professor
[redacted]

Dr Ellen Goddard
Professor
[redacted]

Invitation to Participate: You are invited to participate in this research study consumption of dairy products and perspectives on the Canadian dairy industry.

Purpose of the Study: From this research we wish to examine the attitudes, values, and norms of consumers in their process of decision-making for consumption of dairy and plant-based dairy products. We want to understand the decision-making processes for dairy and non-dairy consumers, and the factors that impact these processes. This research will help us understand the traits that Canadian dairy consumers value in their products, which will help to guide producers and policy-makers to ensure that products on the market reflect these values and concerns.

Participation: If you wish to participate in this study, please complete the attached survey. The survey should take you approximately 20 minutes to complete. You do not have to answer any questions that you do not want to answer. Once you have completed the survey, please submit it by pressing the “submit” button.

Benefits: Our study will help consumers, producers, and manufacturers of dairy and plant-based dairy substitutes to better understand consumer preferences and motivations. Additionally, the research will assist decision-makers at the local, provincial, and federal government levels to better understand the social impacts

of the Canadian dairy industry, and concerns of citizens regarding environmental impacts of agriculture. This could allow for better policy-making surrounding agri-environmental issues, and in long-term planning for climate mitigation actions at the individual and collective levels.

There may not be any benefits for participating in this research, but we hope that participants will find enjoyment in the experience and in contributing to a larger understanding of consumer preferences.

Risks: Where available, participants can prefer not to answer or skip any questions that they do not wish to answer, and can withdraw or end the survey any time throughout their survey process. All survey responses will be anonymized in any public data presentation or publication, and participant identities will be protected. Participants will have the opportunity to review their survey responses at the end of the survey, to change or clarify answers. There are no known risks to participants in participating in this survey.

Confidentiality and Anonymity: The information that you will share will remain strictly confidential and will be used solely for the purposes of this research. The only people who will have access to the research data are the principal investigator and supervisors. Your answers to open-ended questions may be used verbatim in presentations and publications but neither you (nor your organization) will be identified. In order to minimize the risk of security breaches and to help ensure your confidentiality we recommend that you use standard safety measures such as signing out of your account, closing your browser and locking your screen or device when you are no longer using them, and when you have completed the study. Results will be published in pooled (aggregate) format. Anonymity is guaranteed since you are not being asked to provide your name or any personal information.

Data Storage: The anonymized data will be encrypted and stored on secure computers and servers. According to University of Alberta policies, the anonymized responses will be stored for 5 years before being destroyed. Other researchers may use this data in future research projects, but if they do, they will get approval from the Research Ethics Board.

Voluntary Participation: You are under no obligation to participate and if you choose to participate, you may refuse to answer questions that you do not want to

answer. Should you choose to withdraw midway through the electronic survey, simply close the link and no responses will be included. Given the anonymous nature of the survey, once you have submitted your responses it will no longer be possible to withdraw them from the study.

Information about the Study Results: Research findings will likely be published at a later time, upon completion of the graduate degree of the principal investigator. To learn more, please contact klrogers@ualberta.ca.

Contact Information: If you have any questions or require more information about the study itself, you may contact the researcher or her supervisors at the numbers mentioned herein.

The plan for this study has been reviewed by a Research Ethics Board at the University of Alberta. If you have any questions regarding your rights as a research participant or how the research is being conducted you may contact the Research Ethics Office at [redacted]@ualberta.ca.

Please keep this form for your records, by printing a copy of this page.

Completion and submission of the survey means your consent to participate.

(untitled)

3

1. In which of the following age groups do you fall? *

- 18-20
- 21-24
- 25-29
- 30-36
- 37-45
- 46-55
- 56-65
- 65+

4

2. Which region do you live in? *

- Maritimes
- Quebec
- Ontario
- Manitoba
- Saskatchewan
- Alberta
- British Columbia
- Yukon, Northwest Territories, Nunavut

5

3. Please indicate your gender:

*

- Male
- Female
- Other
- Prefer not to answer

6

4. Please describe your ethnic or cultural background:

Section B

15

5. How often do you consume the following products?*

	Never	Rarely (A few times a year)	Infrequently (Less than once a month)	Sometimes (1-3 times a month)	Regularly (1-3 days per week)	Frequently (4-6 days per week)	Daily
Beef (meat from cows)	○	○	○	○	○	○	○
Pork (meat from pigs)	○	○	○	○	○	○	○
Poultry (e.g. chicken)	○	○	○	○	○	○	○
Seafood (e.g. lobster, clams)	○	○	○	○	○	○	○
Fish	○	○	○	○	○	○	○
Eggs	○	○	○	○	○	○	○
Plant-based meat substitutes	○	○	○	○	○	○	○

VALIDATION **Min. answers = 6** *(if answered)*

ID 26

6. How often do you consume the following dairy products?*

	Never	Rarely (A few times a year)	Infrequently (Less than once a month)	Sometimes (1-3 times a month)	Regularly (1-3 days per week)	Frequently (4-6 days per week)	Daily
Milk	○	○	○	○	○	○	○
Cheese	○	○	○	○	○	○	○
Butter	○	○	○	○	○	○	○
Yogurt	○	○	○	○	○	○	○
Ice cream	○	○	○	○	○	○	○
Dairy substitute products (for example, milk beverage or yogurt products from soy, almonds, coconut, cashew or other plant bases)	○	○	○	○	○	○	○
Enter a	○	○	○	○	○	○	○
Enter a	○	○	○	○	○	○	○

40

7. Have you ever decided to not purchase a particular food product for any of the reasons listed below: (check all that apply)

- [ ] You were concerned that the food was unsafe to eat
- [ ] You heard about environmental damage caused through production of the food
- [ ] You were concerned about the treatment of animals in production of the product
- [ ] You were concerned about the labour practices of the product
- [ ] For religious reasons
- [ ] You were concerned that it was a genetically engineered food
- [ ] You were concerned that the food had been found to cause health problems related to diet (chronic disease)
- [ ] None of the above
- [ ] Other - Please Describe

(untitled)

VALIDATION **Min. answers = 8** *(if answered)*

ID 41

8. When choosing a food product, how often do you think about the following factors? *

	Never	Some of the time	Most of the time	Always
Taste	○	○	○	○
Place of production of the product	○	○	○	○
Ethical implications of the product	○	○	○	○
Health aspects of product	○	○	○	○
Whether the product is free from antibiotics	○	○	○	○
Price	○	○	○	○
Nutrient content	○	○	○	○
Whether the product is considered to be organic	○	○	○	○
Enter another option	○	○	○	○

52

9. How strongly do you agree or disagree with the following statements?*

	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
I do not think that there is anything wrong with using animals in medical research	○	○	○	○	○
Basically, humans have the right to use animals as we see fit	○	○	○	○	○
The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work	○	○	○	○	○
I sometimes get upset when I see wild animals in cages at zoos	○	○	○	○	○
It is unethical to breed purebred dogs for pets when millions of dogs are killed in animal shelters each year	○	○	○	○	○
Some aspects of biology can only be learned through dissecting preserved animals such as cats	○	○	○	○	○
It is morally wrong to hunt wild animals just for sport	○	○	○	○	○
Breeding animals for their skins is a legitimate use of animals	○	○	○	○	○
The use of animals such as rabbits for testing the safety of cosmetics and household products is unnecessary and should be stopped	○	○	○	○	○
I think it is perfectly acceptable for cattle and hogs to be raised for human consumption	○	○	○	○	○

65

10. Rate how important you think it is for humans to consume dairy products, such as milk from a cow, in their regular diet for their health. *

Not important	Slightly important	Moderately important	Important	Very important
○	○	○	○	○

(untitled)

66

11. Which of the following dairy substitute products (for example, products from soy, almonds, coconut, cashew, or other plant bases) have you tried? (check all that apply) *

- ☐ Milk
- ☐ Yogurt
- ☐ Cheese
- ☐ Ice cream
- ☐ Butter
- ☐ I have never tried a dairy substitute product
- ☐ Other - Write In

67

12. How strongly do you agree with the following statements:

	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
I am aware of the impact that my food choices have on the environment.	○	○	○	○	○
My friends and family members	○	○	○	○	○

are reducing their consumption of dairy products.					
I feel guilty about the impact that my food choices have on greenhouse gas emissions.					
I believe that animals are treated fairly in the dairy industry.					
I believe that agriculture is a major driver of climate change					
My friends and family members are reducing their consumption of meat products.					
I believe that farmers could do more to reduce their environmental impact.					
I am proud of the impact that my food choices have on greenhouse gas emissions.					
I believe that farmers take great care to reduce the environmental impact of their operations.					
I trust farmers in my country to make the right choices on their operation that will impact my health.					
I feel like I don't do enough to protect the environment.					
I feel like I do a lot to protect the environment.					
I believe that agriculture has a very small environmental footprint.					
I am not sure of the impact that my food choices have on the environment.					

Section C

84

13. In your opinion, which of the following do you think has a larger environmental impact? *

- Almond milk
- Oat milk
- Cow's milk
- Unsure

85

14. How often do you think about your impact on the environment?

- Never
- Rarely (A few times a year)
- Infrequently (less than once a month)
- Sometimes (1-3 times a month)
- Regularly (1-3 days per week)
- Frequently (4-6 days per week)
- Daily

87

15. How would you rate your level of concern for climate change?

- Extremely concerned
- Very concerned
- Moderately concerned
- Slightly concerned
- Not at all

88

16. How strongly do you agree with the following statements?*

	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
If things continue on their present course, we will soon experience a major ecological catastrophe	○	○	○	○	○
Despite our special abilities humans are still subject to the laws of nature	○	○	○	○	○
The balance of nature is very delicate and easily upset	○	○	○	○	○
We are approaching the limit of the number of people the earth can support	○	○	○	○	○
Human ingenuity will insure that we do NOT make the earth unlivable	○	○	○	○	○
Humans have the right to modify the natural environment to suit their needs	○	○	○	○	○
Plants and animals have as much right as humans to exist	○	○	○	○	○
The so-called “ecological crisis” facing humankind has been greatly exaggerated	○	○	○	○	○
The earth has plenty of natural resources if we just learn how to develop them	○	○	○	○	○
The earth is like a spaceship with very limited room and resources	○	○	○	○	○
Humans will eventually learn enough about how nature works to be able to control it	○	○	○	○	○
Humans are severely abusing the environment	○	○	○	○	○
The balance of nature is strong					

The balance of nature is strong enough to cope with the impacts of modern industrial nations	○	○	○	○	○
When humans interfere with nature it often produces disastrous consequences	○	○	○	○	○
Humans were meant to rule over the rest of nature	○	○	○	○	○

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17. Please indicate which one of the following statements corresponds most with your view on nature: *

- ○ Environmental problems can only be controlled by enforcing radical changes in human behaviour in society as a whole.
- ○ Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed.
- ○ We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions.
- ○ We do not know whether environmental problems will magnify or not.

107

18. Who do you think is responsible for taking action on climate change? *

- ○ Individuals
- ○ Government institutions
- ○ Both

108

19. Do you take actions to reduce your environmental impact?

- ○ Yes
- ○ No
- ○ Unsure

(untitled)

109

20. Thinking about things you might do in order to limit your own contribution to climate change, which of the following changes do you think that you would be likely to make during the next year? (check all that apply)

- ☐ No flying or replacing some flights with train or bus journeys
- ☐ Eating less meat or replacing the meat in some meals with alternatives such as beans/pulses
- ☐ Avoiding buying new things by, for example, mending what you have or buying used products instead
- ☐ Recycling materials such as glass, paper or plastic
- ☐ Walking, cycling or using public transport instead of driving a car or motorbike
- ☐ Saving energy at home, for example, by installing insulation or switching off lights
- ☐ Eating fewer dairy products or replacing some dairy products with alternatives such as soy milk
- ☐ Avoiding products that have a lot of packaging

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21. *

Over the past two years, have you lowered your consumption of dairy products?

- Yes
- No

LOGIC Hidden unless: Question "Over the past two years, have you lowered your consumption of dairy products?" is one of the following answers ("Yes")

ID 118

22. Please rate the importance of the following factors on your decision to reduce dairy product consumption. (Please check (√) the appropriate number, 1 = Not At All Important to 5 = Very Important or = 6 Not Applicable) *

	1 (Not At All Important)	2	3	4	5 (Very Important)	6 (N/A)
Health concerns	○	○	○	○	○	○
Availability of substitute dairy products (made from plants such as soy, almond)	○	○	○	○	○	○
Concerns about animal welfare	○	○	○	○	○	○
Use of hormones in livestock production	○	○	○	○	○	○
Fat Content	○	○	○	○	○	○
Use of antibiotics in livestock production	○	○	○	○	○	○
Cost of dairy products	○	○	○	○	○	○
Concerns about the environmental footprint of dairy production	○	○	○	○	○	○
My friends and relations are all reducing their dairy product consumption	○	○	○	○	○	○
Allergies	○	○	○	○	○	○
Protein Content	○	○	○	○	○	○

Action: Percent Branch

New Percent Branch

Section D

132

23. Please rate your emotional experience when thinking about dairy products in general: *

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

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24. In considering your emotional experience when thinking about dairy products in general, which of these emotions is the primary (strongest)? *

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

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25. Please rate your emotional experience when thinking about cheese:

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

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26. In considering your emotional experience when thinking about cheese, which of these emotions is the primary (strongest)?

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

(untitled)

231

27. Please rate your emotional experience when thinking about milk:

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

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28. In considering your emotional experience when thinking about milk, which of these emotions is the primary (strongest)?

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

151

29. Which product are you most likely to consume of the following?

- Milk
- Cheese
- Butter
- Yogurt
- Ice cream
- Other - Write In

153

30. Which product of the following brings you the most satisfaction?

- Milk
- Cheese
- Butter
- Yogurt
- Ice cream
- Other - Write In

(untitled)

241

31. Please rate your emotional experience when you think about the process used to create dairy products: *

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

259

32. In considering your emotional experience when thinking about the process used to create dairy products, which of these emotions is the primary (strongest)? *

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

247

33. After you've finished consuming dairy products, where do your emotions typically reside:

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

260

34. In considering your emotional experience after you've finished consuming dairy products, which of these emotions is the primary (strongest)?

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

(untitled)

253

35. Rate the emotional experience you think that you would be likely to have if you were told that you could never consume any dairy products again: *

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

262

36. In considering your emotional experience that you think you would be likely to have if you were told that you could not consume any dairy products again, which of these emotions is the primary (strongest)? *

○ Joy ○ Admiration ○ Pride ○ Satisfaction ○ Desire

○ Sadness ○ Fear ○ Shame ○ Anger ○ Disgust

○ None of the above

VALIDATION Max. answers = 3 *(if answered)*

ID 269

37. When you think of dairy products in general, which **three emotions come to mind first**?

*

- [ ] Joy
- [ ] Admiration
- [ ] Pride
- [ ] Satisfaction
- [ ] Desire
- [ ] Sadness
- [ ] Fear
- [ ] Shame
- [ ] Anger
- [ ] Disgust
- [ ] None of the above

VALIDATION Max. answers = 3 *(if answered)*

ID 331

38. Copy of When you think of dairy products in general, which **three emotions come to mind first**?

*

- [ ] Joy
- [ ] Admiration
- [ ] Pride
- [ ] Satisfaction
- [ ] Desire
- [ ] Sadness
- [ ] Fear
- [ ] Shame
- [ ] Anger
- [ ] Disgust
- [ ] None of the above

270

39. In considering your emotional experience when thinking about dairy products in general, which of these emotions is the primary (strongest)?

*

- ○ Joy
- ○ Admiration
- ○ Pride
- ○ Satisfaction
- ○ Desire
- ○ Sadness
- ○ Fear
- ○ Shame
- ○ Anger
- ○ Disgust
- ○ None of the above

VALIDATION Max. answers = 3 *(if answered)*

271

40. When you think of cheese, which **three emotions come to mind first**?

- ☐ Joy
- ☐ Admiration
- ☐ Pride
- ☐ Satisfaction
- ☐ Desire
- ☐ Sadness
- ☐ Fear
- ☐ Shame
- ☐ Anger
- ☐ Disgust
- ☐ None of the above

ID 277

41. In considering your emotional experience when thinking about cheese, which of these emotions is the primary (strongest)?

- ○ Joy
- ○ Admiration
- ○ Pride
- ○ Satisfaction
- ○ Desire
- ○ Sadness
- ○ Fear
- ○ Shame
- ○ Anger
- ○ Disgust
- ○ None of the above

(untitled)

VALIDATION Max. answers = 3 *(if answered)*

ID 276

42. When you think of milk, which **three emotions come to mind first**?

- ☐ Joy
- ☐ Admiration
- ☐ Pride
- ☐ Satisfaction
- ☐ Desire
- ☐ Sadness
- ☐ Fear
- ☐ Shame
- ☐ Anger
- ☐ Disgust
- ☐ None of the above

278

43. In considering your emotional experience when thinking about milk, which of these emotions is the primary (strongest)?

- Joy
- Admiration
- Pride
- Satisfaction
- Desire
- Sadness
- Fear
- Shame
- Anger
- Disgust
- None of the above

279

44. Which product are you most likely to consume of the following?

- Milk
- Cheese
- Butter
- Yogurt
- Ice cream
- Other - Write In

ID 280

45. Which product of the following brings you the most satisfaction?

- ○ Milk
- ○ Cheese
- ○ Butter
- ○ Yogurt
- ○ Ice cream
- ○ Other - Write In

(untitled)

VALIDATION Max. answers = 3 *(if answered)*

ID 275

46. When you think of the process used to create dairy products, which **three emotions come to mind first**?

*

- ☐ Joy ☐ Admiration ☐ Pride ☐ Satisfaction ☐ Desire
- ☐ Sadness ☐ Fear ☐ Shame ☐ Anger ☐ Disgust
- ☐ None of the above

ID 281

47. In considering your emotional experience when thinking of the process used to create dairy products, which of these emotions is the primary (strongest)?

*

- ○ Joy
- ○ Admiration
- ○ Pride
- ○ Satisfaction
- ○ Desire
- ○ Sadness
- ○ Fear
- ○ Shame
- ○ Anger
- ○ Disgust
- ○ None of the above

VALIDATION Max. answers = 3 *(if answered)*

ID 274

48. After you've finished consuming dairy products, which **three emotions remain present for you**?

- ☐ Joy
- ☐ Admiration
- ☐ Pride
- ☐ Satisfaction
- ☐ Desire
- ☐ Sadness
- ☐ Fear
- ☐ Shame
- ☐ Anger
- ☐ Disgust
- ☐ None of the above

ID 282

49. In considering your emotional experience after you've finished consuming dairy products, which of these emotions is the primary (strongest)?

- ○ Joy
- ○ Admiration
- ○ Pride
- ○ Satisfaction
- ○ Desire
- ○ Sadness
- ○ Fear
- ○ Shame
- ○ Anger
- ○ Disgust
- ○ None of the above

(untitled)

VALIDATION Max. answers = 3 *(if answered)*

ID 273

50. If you were told you could never consume any dairy products again, which **three emotions do you think you would be likely to experience**?

*

- ☐ Joy
- ☐ Admiration
- ☐ Pride
- ☐ Satisfaction
- ☐ Desire
- ☐ Sadness
- ☐ Fear
- ☐ Shame
- ☐ Anger
- ☐ Disgust
- ☐ None of the above

283

51. In considering your emotional experience if you were told you could never consume any dairy products again, which of these emotions is the primary (strongest)?

*

- Joy
- Admiration
- Pride
- Satisfaction
- Desire
- Sadness
- Fear
- Shame
- Anger
- Disgust
- None of the above

(untitled)

263

52. When you hear the word “genomic modification”, what is your emotional experience? *

	1	2	3	4	5	6	7	
Joy	○	○	○	○	○	○	○	Sadness
Admiration	○	○	○	○	○	○	○	Fear
Pride	○	○	○	○	○	○	○	Shame
Satisfaction	○	○	○	○	○	○	○	Anger
Desire	○	○	○	○	○	○	○	Disgust

179

53. If you are aware that a product is genetically modified, are you more or less likely to consume them?

- More likely
- Less likely
- About the same
- Unsure

(untitled)

180

Selective Breeding

Farmers have made choices to selectively breed dairy cows and bulls for years. By selecting certain animals they hope that the calves will have characteristics that improve the quality or quantity of milk produced or improve animal characteristics (feet, legs, fertility). Genomics is the study of the genes and genetic characteristics of organisms like plants, animals, and humans. The study of genomics in dairy cattle can allow for:

- the identification of specific genes that are linked to disease susceptibility (there are a number of current diseases within the dairy industry, such as Johnes disease, for example),
- the identification of specific genes that could be linked to enhanced feed efficiency,
- the identification of specific genes that could be linked to reduced greenhouse gas emissions (methane) or
- the identification of genes linked to fertility in dairy cows.

With knowledge of the presence (absence) of any of these genes, selective breeding (selecting particular bull semen and particular cows that genetics suggest would produce progeny with the desired traits) could produce dairy cows with significantly lower probabilities of contracting disease, higher probabilities of reduced methane emissions, higher probabilities of increased feed efficiency or

higher probabilities of increased fertility.

Dairy Disease

Johne's disease (JD) is a contagious chronic progressive bacterial infection of the digestive tracts of cattle. The disease causes abnormal thickening of the lining of the intestinal tract in infected animals restricting the absorption of nutrients. Clinical signs of animals infected with JD are long lasting diarrhea and extreme weight loss despite maintaining appetite. The disease has serious health implications for individual cows and cows in the rest of the herd. Economic costs can be very high for dairy producers.

Feed Efficiency

Feed is one of the largest inputs (biggest costs) in any livestock operation. Producing dairy cows with higher levels of feed efficiency would reduce the feed required per pound (KG) of animal being fed. With knowledge of the presence (absence) of feed efficiency genes, selective breeding can produce cows that are more efficient converters of feed into milk, indirectly reducing greenhouse gases (reduced methane emissions per unit of milk produced) and improving farm profitability.

Methane Emissions

Methane emissions from cows are seen to be a major contributor to global greenhouse gas emissions. By measuring the natural animal variation in methane emissions, selective breeding of animals with lower methane emissions could result in reduced GHG emissions for the entire dairy herd.

Enhanced Fertility

Dairy cow fertility, the ability to conceive and maintain a pregnancy to term, is critical to the sustainable operation of dairy farms. Although fertility is a complex trait, it is possible through selective breeding to improve the fertility of the cows within a farmer's herd. Indirectly, this will also improve the environmental footprint of the dairy industry.

(untitled)

181

54. If selective breeding could be used to solve the environmental impacts of the dairy industry in Canada, do you think that you would be happy?

- Yes
- No
- Unsure

182

55. Would you consume Canadian dairy products that have been produced using selective breeding? *

- Yes
- No
- Unsure

183

56. Would you want products to be labeled to indicate that selective breeding was used? *

- Yes
- No
- Unsure

186

57. If it were up to you personally, which method would you prefer to be used in the dairy industry in Canada? *

- Traditional selective breeding, where cattle are selected for breeding given the visible traits that can be assessed by the farmer. This would be a solution that would take place over the long term and have results in the next decade or so.
- The use of genomic information to selectively breed. In this case, genomic information would be gathered to inform selective breeding. This would be a solution that would take a relatively medium-term amount of time to take place.
- The use of genetic editing. In this case, the genes of cattle would be modified to assist in ensuring certain traits. This is a solution that would have more immediate impacts and could be done in for shorter-term solutions.
- Unsure

(untitled)

187

58. Would you consider breeding selectively as a form of genetic modification? *

- Yes
- No
- Unsure

188

59. For you, the use of genomic information to undertake selective breeding to increase feed efficiency, reduce methane emissions, increase disease resilience or increase fertility in cattle is: *

	1	2	3	4	5	6	7	
Useless	○	○	○	○	○	○	○	Useful
Worthless	○	○	○	○	○	○	○	Valuable
Harmful	○	○	○	○	○	○	○	Beneficial
Foolish	○	○	○	○	○	○	○	Wise
Awful	○	○	○	○	○	○	○	Nice
Disagreeable	○	○	○	○	○	○	○	Agreeable
Unpleasant	○	○	○	○	○	○	○	Pleasant

196

60. How risky do you consider the use of genomics to be? *

- ○ Very low risk
- ○ Low risk
- ○ Moderate risk
- ○ High risk
- ○ Very high risk
- ○ Unsure

197

61. How risky do you consider it to be to consume products that have been genetically modified? *

- Very low risk
- Low risk
- Moderate risk
- High risk
- Very high risk
- Unsure

(untitled)

198

62. Which do you consider to be more risky, consuming animal products or consuming plant products?

- Animal products
- Plant products
- About the same
- Unsure

199

63. Do you consider yourself to be someone who enjoys taking risks? *

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

200

64. How strongly do you agree with the following statements?

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I believe that the government properly regulates genomic modification.					
I feel confident in my understanding of genomic modification.					
I feel that I have resources available to learn more about genomic modification.					
I am concerned about the use of genomic modification in Canada.					

207

65. Please rate your level of trust for the following entities:*

	Not Trust At All	Very Low Level of Trust	Moderate Level of Trust	High Level of Trust	Complete Trust
Your provincial government	○	○	○	○	○
Your federal government	○	○	○	○	○
The United Nations	○	○	○	○	○
Canadian farmers	○	○	○	○	○
The food-processing sector	○	○	○	○	○
Food retailers	○	○	○	○	○

(untitled)

216

66. Would you say that your trust in government has increased or decreased in the last 2 years?

- ○ Increased
- ○ Decreased
- ○ Remained the same
- ○ Unsure

217

67. Would you say that your trust in the food processing sector has increased or decreased in the last 2 years?

- Increased
- Decreased
- Remained the same
- Unsure

218

68. Would you say that your trust in the general public/society has increased or decreased in the last 2 years?

- Increased
- Decreased
- Remained the same
- Unsure

219

69. Would you say that your trust in the scientific community has increased or decreased in the last 2 years?

- Increased
- Decreased
- Remained the same
- Unsure

(untitled)

LOGIC Show/hide trigger exists.

ID 285

70. Do you think that the pandemic has impacted your food consumption?*

- Yes
- No
- Unsure

LOGIC Hidden unless: #70 Question "Do you think that the pandemic has impacted your food consumption?" is one of the following answers ("Yes")

ID 286

71. If yes, do you think that once the pandemic ends, you will continue with these new habits?

- Yes
- No
- Unsure

ID 287

72. Are you noticing an increase in prices for your regular grocery shopping?

- Yes
- No
- Unsure

288

73. Do you expect that an increase in food prices will change your food consumption choices (for example, adjusting the amount or types of products that you would have normally purchased)?

- Yes
- No
- Unsure

(untitled)

328

74. Do you live in a city, in a town or in the countryside?

- In a city (>100,000 inhabitants)
- In a town (> 10,000 inhabitants)
- In the countryside/rural district

7

75. What is the highest level of education you've achieved?*

- Elementary school
- Secondary (high) school
- Technical/Business school/Community college
- University
- Post graduate studies (Masters or PhD)

8

76. What is your yearly household income?

- $ 24,999 or under
- Between $ 25,000 and $ 39,999
- Between $ 40,000 and $ 54,999
- Between $ 55,000 and $ 64,999
- Between $ 65,000 and $ 79,999
- Between $ 80,000 and $ 99,999
- Between $ 100,000 and $ 119,999
- $ 120,000 or more

9

77. What is your employment status? *

- Employed full-time
- Employed part-time
- Unemployed
- Other (please specify)

10

78. How many children do you have? *

- None
- 1
- 2-3
- More than 4
- Prefer not to say

(untitled)

329

79. How often are you involved in the regular grocery shopping for your household?

Never	Once in a while	Occasionally	Frequently	Always

11

80. In politics one often speaks of the “left wing” and “right wing”. Below is a scale where 1 represents those who are at the far left politically, while 10 represents those who are at the far right. Where would you place yourself on such a scale?

1	2	3	4	5	6	7	8	9	10	Don't know

13

81. Where is your place of birth? *

- Within Canada
- Outside of Canada - Specify Country

14

82. Do you, or someone you are related to, own or work on a ranch or farm? *

- Yes
- No

Thank You!

1

Thank you for taking our survey. Your response is very important to us.

[redacted]

Action: URL Redirect

New URL Redirect