**ENCOURAGING SUSTAINABLE FOOD CHOICES:
THE ROLE OF INFORMATION AND VALUES IN THE REDUCTION OF
MEAT CONSUMPTION**

Thomas Graham

Thesis

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Encouraging Sustainable Food Choices: the role of information and values in the reduction of meat consumption

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THOMAS GRAHAM

School of Geography, Environment and Earth Sciences, Victoria University of Wellington, New Zealand

Abstract

Meat production for human consumption has serious environmental implications, including contributing significantly to climate change. People's behaviour about food choice, particularly meat, plays a key role in determining the future direction of food production. Meat production, in most cases, is more resource intensive and environmentally more expensive than plant based food production. For this reason, a shift in attitude about meat consumption needs to take place to reduce the environmental impact agriculture has on the planet (i.e. moving toward less meat intensive diets), particularly in developed countries. Attitudes and behaviour are influenced by values, which are guiding principles in people's lives, making them important in the decision making process.

This research explores the role of information as a means of changing attitudes towards meat consumption and environmental concern and whether this effect depends on an individual's values. Survey participants were assigned randomly to a no-information control group, a message targeting self-enhancement values, or a message targeting self-transcendence values. Results indicate that information can significantly increase concern about an environmental issue but did not change attitudes towards meat consumption. Furthermore, the framing of a message can play a role in how people respond to the information provided, given their predisposing values. Implications of this research can be applied to future environmental information campaigns, through the increased effectiveness of targeted information.

Keywords

Sustainable food choice, information provision, values, meat consumption, attitude change, environmental concern

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List of Abbreviations

AC – Awareness of consequences
 AFOLU – Agriculture, Forestry and Other Land Use
 AR – Ascription of responsibility
 CH₄ – Methane
 CO₂ – Carbon Dioxide
 CO_{2-eq} – Carbon Dioxide equivalent
 ESS – European Social Survey
 FAO – Food and Agriculture Organisation of the United Nations
 GHG – Greenhouse Gas
 Gt – Gigatonne
 GWP – Global warming potential
 IPCC – Intergovernmental Panel on Climate Change
 LCA – Life Cycle Analysis
 MEA – Millennium Ecosystem Assessment
 MfE – Ministry for the Environment
 N₂O – Nitrous Oxide
 NEP – New Ecological Paradigm
 PCE – Parliamentary Commissioner for the Environment
 PVQ – Portrait Value Questionnaire
 TPB – Theory of Planned Behaviour
 VBN – Value, Belief, Norm theory
 WHO – World Health Organisation

Chapter 1: Introduction

“When we think about threats to the environment, we tend to picture cars and smokestacks, not dinner. But the truth is, our need for food poses one of the biggest dangers to the planet.”

~ Foley J., National Geographic, May 2014, page 35 ~

1.1 Preamble

Throughout the world’s history there has never been the need to produce so much food for human consumption as of now. The human population is has reached over 7.2 billion, with everyone naturally wanting access to food or nourishment (Gerber et al., 2013). The pressure of the population, rising dietary expectations and the finite limit of the earth’s resources provide a myriad of intersecting problems that need to be addressed if we as humans want to live in a world that can sustain our needs into the future.

Since the agricultural revolution approximately 12,000 years ago humans have dramatically changed the environment they live in to provide the sustenance needed to feed a growing population (Smil, 2001). During most of human history the global population has been relatively low and had little impact on the planet. As the population has increased, so has the demand for agricultural space. Currently, over one third of ice-free land and between a half and three quarters of available fresh water is used for food production (Aiking, de Boer, & Vereijken, 2006; FAO, 2013; Tilman et al., 2001).

As the opening quote from the National Geographic alludes to, this issue has not gained the traction or concern of other environmentally damaging human behaviours. As this thesis proceeds it will become clear how much of a problem providing food for humanity is and why this issue needs to be addressed alongside, not separately from, other problems such as, climate change, deforestation and biodiversity loss;

principally due to the fact that the former heavily influences the latter. Yet this problem has not gone unnoticed. The Food and Agriculture Organisation (FAO) of the United Nations has released a flurry of reports in the past few years and have emphasised the role livestock is playing in global environmental degradation. Additionally, public awareness may be growing; as an indication, the National Geographic magazine, which is published worldwide, ran an eight month long special from May 2014 about the sustainability of the world's food resources (Foley, 2014).

1.2 A Changing World

Over time humans have spanned the globe looking for new resources and arable lands, created new technologies to increase crop yields and pushed up food production to support an ever growing population. The move towards an industrial society in the 18th century intensified farming practices, which were extended further in the mid 20th century with the Green Revolution and the creation of synthetic fertilizers (Godfray et al., 2010; Tilman et al., 2001; Trewavas, 2002). Industrial shifts have allowed greater production and with the removal of forests and drying up of wetlands the available farmland has increased (Godfray et al., 2010; MacLeod & Moller, 2006; Tilman et al., 2001). Nevertheless, these changes have had significant negative impacts on the environment all over the world. The reduction of natural landscapes, deforestation and habitat destruction has led to the loss of ecosystems and a decrease in biodiversity; water catchments have dried up and salinization has occurred; pollutants have leached into water ways and dispersed into the atmosphere; and biogeochemical systems have been negatively affected in their capacity to provide a cycling and breakdown of pollutants (Gerber et al., 2013; Marlow et al., 2009; Reijnders & Soret, 2003; Tilman et al., 2001). These impacts have been exacerbated by the increasing pressure placed on ecosystems through the rising demand for food all over the world.

There is no denying the need to feed the world's population; it would be unethical to stop production or withhold food from anyone, so as a society we have to find better ways of providing for ourselves that fall within the earth's means. To achieve greater

sustainability within agriculture it would be prudent to reduce the demand for more environmentally destructive goods. One suggested resolution is to shift diets away from being primarily animal based to be more plant orientated (Aiking et al., 2006; Garnett, 2008; Gold & Porritt, 2004). Meat production, in most cases, is environmentally and ecologically more expensive than plant production. Essentially, this is because of the transfer of energy up the food chain, where converting plant protein into animal protein is inherently inefficient (Aiking et al., 2006; Gerber et al., 2013). Direct human consumption of plant matter is less resource intensive and requires only a fraction of the inputs needed to produce the equivalent energy provided by animal products (Marlow et al., 2009; Pimentel & Pimentel, 2003). As a result, meat production has a disproportionate impact on the environment, therefore it can be argued that a greater number of people could be fed more efficiently and with less impact if they were vegetarians (Carlsson-Kanyama & González, 2009; Godfray et al., 2010; Gold & Porritt, 2004; Reijnders & Soret, 2003). Exchanging at least some, if not a significant portion, of the protein source in people's diets from meat to plant matter would be beneficial in reducing agriculture's ecological footprint. Jonathon Porritt, co-founder and programme director of the Forum for the Future and former chairman of the UK Sustainable Development Commission comments:

"As far as food is concerned, the key determinant of sustainability is the overall efficiency with which we use our natural capital (soil, water, energy and so on) to produce the food that we need. As is now well understood, the more meat we eat, the less efficient that ratio becomes." (Gold & Porritt, 2004, p. 5)

Customer demand for meat is high in developed countries and is growing throughout the rest of the world (Steinfeld, Gerber, Wassenaar, Castel, & de Haan, 2006). The world population is expected to reach 9.6 billion people by 2050 and an emerging middle class in developing countries is increasing demand for animal products through an expectation of more diversified and richer diets (Gerber et al., 2013). The FAO is predicting that the demand for meat will increase by 73% from the 2010 level in the next 40 years (FAO, 2011b). Considering the pressure already on the environment to support meat production, there is debate about whether this ever increasing demand can be met. Developing new arable land is one solution, another is through

technological gains and farming efficiency, but both have limitations in their own right (Garnett, 2008; Godfray et al., 2010). Rebound effects, the unplanned outcome of improvements leading to an overall greater environmental impact, and increasing demand have tended to negate gains made through production efficiencies in the past (Mont & Bleischwitz, 2007). Intensification of farming practices can also lead to impoverished soils and nutrient overload (Tilman, Cassman, Matson, Naylor, & Polasky, 2002). Furthermore, the increasing competition for land use from other activities, such as growing biofuels, carbon storage and urbanisation, will make procuring new lands an expensive exercise (Godfray et al., 2010).

Among the multitude of environmental problems agriculture creates, livestock's contribution to greenhouse gas (GHG) emissions is considered a major threat to potential prosperity in the future. The total livestock supply chain contributes approximately 15% or 7.1 Gigatonnes (Gt) of carbon dioxide equivalent (CO₂-eq) per annum of anthropogenic GHGs (Gerber et al., 2013). A large portion of livestock emissions come from enteric fermentation, arising from ruminant digestion which creates methane (CH₄), making up about 44% of total livestock emissions; nitrous oxide (N₂O) from waste and fertilizer materials make up about 29%; and carbon dioxide (CO₂) contributes 27% (Gerber et al., 2013). Methane and N₂O are both far more powerful as GHGs than CO₂ and would not be produced so readily without animals present. Livestock has been attributed as the major cause of overall increasing levels of CH₄ and N₂O in the atmosphere (Carlsson-Kanyama & González, 2009; Cooper, Boston, & Bright, 2013; FAO, 2013; Steinfeld et al., 2006).

If a large share of this demand for meat can be shifted to plant based foods, it could be a move towards a more sustainable society. Understanding how this shift could be made more effective through the provision of information to raise awareness about the environmental impacts of meat production is the central theme of this research. A report by the FAO (2013) specifically states that the key reason for increased demand for animal products has arisen from a shift in dietary choice. Halting or reversing this change in mindset by making people (more) aware of the impacts of their food choices may be a key step in reducing this growing problem, particularly in developed

countries. However, at this point there appears to be a lack of initiative and relatively little research in this area to facilitate change.

1.3 Values, Dietary Choice and Information

There has been much research undertaken to investigate how people make decisions about food choice (Brunsø, Scholderer, & Grunert, 2004; Dietz, Frisch, Kalof, Stern, & Guagnano, 1995; Robinson & Smith, 2002). It is thought that psychosocial variables, such as values and attitudes have a much greater influence on food choice than other factors such as social structural variables, such as demographics (Kalof, Dietz, Stern, & Guagnano, 1999; Robinson & Smith, 2002).

A value is considered a broad ranging guiding principle in a person's life, influencing decision making and action through other antecedents of behaviour, like attitudes or personal norms (de Boer, Hoogland, & Boersema, 2007; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Values are an important aspect of behaviour to study, as there are a relatively small number of core values that are relatively stable over time, compared to other aspects of decision making, like beliefs and attitudes (Rokeach, 1973; Schwartz, 1992). Therefore, it is argued that the study of values is a relatively compact and robust way to describe differences between groups of people in regards to their behaviour (de Groot & Steg, 2007).

Meat consumption has been found to be related to people's values, in the sense that certain value types are related to the amount of meat a person is likely to eat (de Boer et al., 2007). For example, people who place importance on self-transcendent values (i.e. altruism, social justice) tend to eat less meat than those for whom these values are less important (Dietz et al., 1995). Self-transcendence has also been positively linked to environmental concern because these values encompass a care for other entities, including the environment. The opposite from self-transcendence values are self-enhancement values, which have the reverse association with environmental

concern (negative) and meat consumption (positive) (de Groot & Steg, 2007; Schultz & Zelezny, 1999).

Currently, relatively little information is provided to the public about the environmental impact of meat production, especially in New Zealand. If information campaigns were to be put into use, it is important to know how best to use the appropriate information to encourage a significant reduction in meat consumption. Past studies have shown that information alone is relatively ineffective in changing behaviour (Gardner & Stern, 2002). However, specifically targeting different groups with tailored information, that is information which purposely relates to a group or person's circumstances, is thought to be more effective in encouraging behaviour change (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Gardner & Stern, 2002). Given that values are related to an individual's meat consumption, it may well be that people with different values respond differently to information about the environmental consequences of meat consumption. This study therefore examines the hypothesis that a change in attitudes and intentions regarding meat consumption and environmental concern occurs more significantly when the information provided aligns with people's values.

To investigate what type of information would be more effective in lowering meat consumption given one's values, a quantitative study was conducted. Data was collected by means of an online survey, which gathered information on patterns of meat consumption, values and other relevant factors, such as environmental concern and food involvement. Participants were then either presented randomly with one of two messages: a message framed in terms of self-enhancement values or a message focused on self-transcendence values. Also, a control group of survey participants did not receive any message. The survey gathered data on the attitudes and intentions of participants regarding meat consumption to examine whether there were differences in these outcome measures between the three groups in relation to their value structures. This quantitative approach answered the research questions posed, which are outlined below.

1.4 Place of Research

The location for the current study is New Zealand, a country with a strong agricultural tradition and history. Through the country's reliance on agriculture, Potts and White (2008) suggest the attachment New Zealanders have to the livestock sector may be one reason for very low numbers of vegetarians. Only 1-2% of the population are known to identify as vegetarian (Bidwell & Alexander, 2002; University of Otago and Ministry of Health, 2011). This is low, even among industrialised countries (Potts & White, 2008). Moreover, New Zealand has one of the highest consumption rates of meat per capita among all countries, being ranked sixth in the world by the FAO (ChartsBin statistics collector team, 2013). The current study therefore well placed to identify whether appropriately targeted information can change attitudes about meat consumption in a setting where the population may be relatively resistant to such ideas.

1.5 Research Aims and Questions

This research aims to test whether or not people's values are a potential avenue for information campaigns to target in the reduction of meat consumption. By looking first at how people with varying value orientations respond to environmental information about meat production and secondly, actively appealing to self-enhancement or self-transcendence value types through specific message framing, it is postulated that one's attitude and intentions towards meat consumption and environmental concern will be altered more significantly than if this was not the case. Ultimately, with the goal of trying to understand the potential mechanisms that can facilitate a reduction of meat in the everyday diet of participants. The current scientific literature lacks a strong connection between values, information and meat consumption; consequently this research will speak to this association that has so far

gone relatively unaddressed. The research questions in Table 1.1 were identified as the key areas of interest. Following the research questions in Section 1.6 is an overview of how the thesis is laid out and illustrates the main objectives of each chapter (Table 1.2).

Table 1.1 Research questions

Research Questions	
1	How are different human values and environmental concern related to meat consumption?
2	Does providing a message about the environmental impacts of eating meat affect people's attitudes and intentions regarding meat consumption, compared to a control group?
3	What is the effect of message framing (individual or collective) on attitudes towards meat consumption, intention to reduce meat intake and attitudes to GHG emissions from meat production?
4	Given differences in people's value structure and environmental concern, does environmental information about meat production change attitudes and intentions about meat consumption, when looked at comparatively to a control group?
5	Does framing a message towards certain pre-existing value structures create a more effective message, therefore changing attitudes and intentions about meat consumption more significantly?

1.6 Thesis Preview

Table 1.2 Thesis chapters and objectives

Chapter	Objective
1. Introduction	Chapter 1 has laid out a statement of intent for the study and addresses how the research will be undertaken. It also provides a starting point for readers to understand the context of the problem and presents the research questions of the thesis. All areas within the introduction are expanded upon in the following chapters.
2. Extent of the Problem: the impact of meat on the Environment	Chapter 2 reviews the impact meat production is having on the environment, both globally and locally in New Zealand. It builds upon the introduction chapter and explains what is happening to the environment from meat production. The chapter is split into sections each relating to specific problems caused by meat production.
3. The Demand for Meat: why changing behaviour matters	The main objective of this chapter is to understand the drivers behind the increasing demand for meat and other animal products. This chapter provides evidence suggesting that human behaviour is a place where significant difference can be made in reducing meat consumption.
4. Theoretical Framework: values, information provision and message framing	Chapter 4 provides a full account of the theory behind the empirical research that has been undertaken for this thesis. How human values are studied and thought about in environmental psychology is explained, followed by the role information and framing plays in behaviour change. In consideration of the theory explored, hypotheses are posed for each research question providing a clear direction of investigation.
5. Methodology	The methodology chapter outlines the research design and the development of the survey is discussed in the context of the epistemological position taken. The chapter provides information on the sample population and statistical measures from the survey. The intention is to present a clear logic to what was done and how, allowing a transparent and open scientific approach that could be critiqued or replicated if necessary. The chapter concludes with a summary of the type of analysis used for the results.

6. Results	The key objective in this chapter is to present the results in a succinct, clear and understandable way. Each result section explains the statistical analysis conducted, addresses the assumptions of each test and then provides the actual results to the five research questions posed.
7. Discussion	The discussion chapter firstly interprets the results in the context of the literature and theory discussed in earlier chapters. Secondly, the results are considered in light of policy and future pro-environmental information campaigns, considering the wider implications of the findings. Lastly, how this research could be improved and areas for future research are identified.
8. Conclusion	The final chapter of the thesis summarizes the key findings of the study in a concise way with an outlook to the future. This chapter will tie the whole thesis together and provides some final remarks about the study as a whole.
References	Complete bibliography of all sources presented in APA 6 th style
Appendix A	Value type and questions – provides the questions for each of the 10 value types in the Schwartz Value Survey
Appendix B	The survey used in the research – including participant information sheet, consent form and messages used for each treatment.
Appendix C	Ethics application – ethical approval memorandum
Appendix D	Value results – Scale results from survey data for all 10 value types.

Chapter 2:   Extent of the Problem: the impact of meat on the environment

“The livestock sector emerges as one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global.”

~ Steinfeld H. et al, Livestock's Long Shadow (FAO Report), 2006, page xx ~

2.1 Introduction

Agriculture is considered one of the human activities with the most impact on earth's environment (Steinfeld et al., 2006). Tukker and Jansen (2006) have identified the single largest contributor to the environmental impact of an average household as its food consumption, with meat and dairy the most significant contributors. In the comprehensive report quoted above by the FAO in 2006 (Steinfeld et al.) entitled 'Livestock's Long Shadow', the authors' state that meat production is identified as having the greatest environmental impact of all food produced.

Meat production is a resource expensive activity and requires large amounts of land, energy, water, fertilisers and other chemicals. In terms of energy available for human consumption, livestock production is considerably more resource intensive compared to non-animal agriculture (Aiking et al., 2006; Marlow et al., 2009). This difference is due to the inefficient conversion of plant protein to animal protein; the conversion rate on average is about six to seven kilograms of plant protein to make one kilogram of animal protein (this estimate can vary depending on what measures are taken) (Aiking et al., 2006; Pimentel & Pimentel, 2003). Gold and Porritt (2004) provide a more realistic, yet still basic, rule of thumb estimating it takes two kilograms of feed to produce one kilogram of chicken, four for one kilogram of pork and at least seven for

one kilogram of beef. From this, it becomes clear that meat production has a disproportionate impact on the environment compared to other foods, making it a good starting point to effect change compared to other areas of agriculture. Furthermore, livestock farming is the world's biggest land user. Croplands for growing feed and direct land use for grazing represents about 80% of all agricultural land use (FAO, 2009).

As a result of the resource intensive nature of meat production, the industry plays a key role in many major environmental problems that we face as a society, both locally and globally. Key problems include; livestock's contribution to the anthropogenic GHG emissions profile which is leading to climatic instability; water use and pollution; land use change in terms of deforestation, soil erosion and desertification; and amplification of biodiversity loss over the planet (Steinfeld et al., 2006).

This chapter reviews the environmental impact of livestock. Initially, land use change will be looked at as this has an influence on the other areas of concern. Secondly, livestock's contribution to GHG emissions will be discussed, followed by water use and pollution and lastly biodiversity loss. The aim of this chapter is to provide a general impression of the current state of affairs and where the major environmental threats lie. The chapter will conclude by looking more specifically at the role livestock play in New Zealand's environment.

2.2 Land Use Change

Livestock farming is the single biggest land user on the planet; in land area this is estimated at 3.9 billion hectares (Asner, Elmore, Olander, Martin, & Harris, 2004; Steinfeld et al., 2006). How the land is used is varied; about 2 billion hectares are extensively managed with low productivity; 1.4 billion hectares are pasture with higher productivity; and 0.5 billion hectares are crops intensively farmed for feed, this accounts for 78% of agricultural land and 33% of the cropland worldwide (Steinfeld et al., 2006).

Land needed for livestock is continuing to increase through a rising demand for meat and other animal products (outlined in more detail in Chapter 3). Along with growth in the sector there is also a geographical transition where land change is occurring, with an increase in higher intensity land-use (Herrero, Thornton, Gerber, & Reid, 2009). Developing countries are now filling the demand for feed crops which are required for the growth of the industry, shifting pressure to these regions (Steinfeld et al., 2006).

Land degradation through the desertification and erosion of soils is common in poorly managed farmlands, resulting in a lowering of productivity over time (Weber & Horst, 2011). Poor farming practices such as overgrazing can destroy the vegetation and compact the soil, leading to less infiltration of water (Asner et al., 2004). In turn, this reduces the nutrient capacity of the soil and stops the creation of new soils. Since water cannot be absorbed into the ground there is an increase in surface runoff, speeding up soil erosion, increasing water pollution and reducing carbon fixation (Steinfeld et al., 2006). If farming practices are not well managed, productivity drops substantially leading to greater incentives to push agricultural expansion into other natural landscapes (Steinfeld et al., 2006).

Deforestation from livestock has the highest rates in the neotropics (Wassenaar et al., 2007). There are two main drivers of deforestation in this region. Firstly, the direct conversion of forests into pasture for cattle production, and the second being the increasing demand for soy products leading to more clearing of land for its plantation. As an example of livestock's direct impacts on deforestation, cattle production has contributed to more than two-thirds of the deforestation in the Amazon (Nepstad, Stickler, & Almeida, 2006). The major reason for deforestation can be attributed to government incentives, which have largely economic origins. As the international demand for beef continues to grow and trade restrictions between Brazil and other countries like the US and the EU are loosening, there is more money to be made from the expansion of beef production (Anderson & Martin, 2005).

In terms of indirect land use change, the late 1990s saw a large expansion of soy production in the Amazon. Expansion arose from new varieties of soy being developed that could tolerate climatic conditions in the Amazon. This was fuelled further because

of a worldwide shortage of animal feed protein that boosted soy prices (Fearnside, 2001; Hard, 2004). An annual expansion of soy production in closed canopy forest regions by 15% between 1999 and 2004 resulted (Nepstad et al., 2006).

In 2001 the European Union also imposed a ban on feeding livestock with animal based proteins as a result of the Bovine Spongiform Encephalopathy (BSE) outbreaks, leaving a feed shortage. The void left was filled primarily with soy products from Brazil because of its superior nutritional properties over other foods and the lack of genetically modified crops in this region (Nepstad et al., 2006). The Chinese market for imported soy, in large part from Brazil, has also grown significantly in the past two decades as an increasing middle class consume more soy fed poultry and pork (Naylor et al., 2005).

Expansion of farmland for grazing and feed crops occurs at the expense of native forests, destroying habitat for animals, reducing carbon absorption capabilities and increasing runoff pollution (Steinfeld et al., 2006). Land use change resulting from livestock farming is therefore considered to have a major impact on environmental quality.

2.3 Climate Change and Meat Production

The evidence behind anthropogenic influences on the climate system has been well established, as reported by the Intergovernmental Panel on Climate Change (IPCC):

“Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, positive radiative forcing, observed warming, and an understanding of the climate system” (IPCC, 2013, p. 15).

The earth is currently witnessing rising sea levels, rising ocean temperatures, ocean acidification, more frequent extreme weather, greater than average warming in the Arctic and a shift in the life cycle of plants and animals (Garnett, 2008; IPCC, 2014c). The major culprit in this change has been the rise in GHG concentrations throughout the atmosphere, primarily from human activities (IPCC, 2013).

Agriculture as a whole contributes significantly to world GHG emissions. Currently, the Agriculture, Forestry, and Other Land Use (AFOLU) sector is responsible for about 25-30% of all anthropogenic GHG emissions (FAO, 2013; IPCC, 2014a). The AFOLU sector far exceeds total transportation emissions and is comparable with the energy sector in terms of its GHG emissions (FAO, 2013). The IPCC estimate that GHG emissions from agriculture are about 10-12% of total emissions, although that percentage does not include figures associated with agriculturally induced land use change or transportation emissions from production and distribution (IPCC, 2014a). If these figures are included the contribution is thought to be between 17-32% of total human induced emissions; with the discrepancy in these estimates attributed to the difficulty in measuring emissions in land use change (Garnett, 2008). Although there can be disparity between total emissions, within the agricultural sector, livestock is one of the biggest contributors (Herrero et al., 2009).

Estimates from other major FAO studies, such as *Tackling Climate Change Through Livestock* (Gerber et al., 2013) and *Livestock's Long Shadow* (Steinfeld et al., 2006) suggest that livestock accounts for between 14.5% and 18% of total human induced GHG emissions in CO₂-eq terms respectively. Both figures include land use change and aim to represent a more comprehensive overview of meat products through Life Cycle Analysis (LCA). LCA is a technique where the environmental impacts associated with all stages of a products life are taken into account from cradle to grave (de Vries & de Boer, 2010).

Non CO₂ GHGs like CH₄ and N₂O are important in measuring livestock emissions. Roughly 75% of total livestock emissions come from ruminant animals and are non CO₂ gases (H. Clark, Kelliher, & Pinares-Patino, 2011). These gases are normally represented by converting them into CO₂-eq measures. This can be achieved in accordance with the IPCCs methods by analysing the Global Warming Potential (GWP) of each gas, generally over a 100 year time frame, (Brook & Russell, 2007; Myhre et al., 2013; Röös, Sundberg, Tidåker, Strid, & Hansson, 2013). The IPCC estimate with climate-carbon feedbacks that CH₄ is about 34 times more powerful as a GHG than CO₂ and N₂O is estimated to be 298 times more powerful than CO₂ (Myhre et al., 2013). Box 2.1 details specifics contributions of each gas.

Box 2.1 Livestock specific greenhouse gases

Methane (CH₄) contributes about 44% of livestock GHG emissions (3.1 Gt per annum) in CO₂-eq, which is generated primarily through enteric fermentation (Gerber et al., 2013). Enteric fermentation is a process which occurs in ruminant digestive tracts during the breakdown of plant material to simple molecules that can be easily absorbed by the animal (Lassey, 2007). Ruminants are animals such as cows, buffalo and sheep. Monogastric animals like pigs and chickens still release CH₄ but in much smaller quantities and thus have a smaller carbon footprint (Capper, 2011).

Nitrous oxide (N₂O) contributes around 29% of livestock GHG emissions (2 Gt per annum) in CO₂-eq (Gerber et al., 2013). N₂O emissions can be either direct, from the use of fertilizer for feed production, or from the direct spreading of manure on pasture. Indirect release of N₂O comes from the storage of animal waste in ponds or lagoons as nitrogen is released to the atmosphere in the form of ammonia that is then later transformed into N₂O (Gerber et al., 2013).

Overall, best estimates to date have placed livestock as an instrumental player in anthropogenic GHG emissions. If estimates from Gerber et al. (2013) are taken as the most current comprehensive figure, then livestock emissions alone are comparable to the transport sector, each responsible for approximately 15% of total human GHG emissions (IPCC, 2014b). This is significant, and with demand for meat growing, emissions will continue to rise.

2.4 Livestock and Water Use

Water is essential to all life on earth and is considered a renewable resource as the hydrological cycle is relatively short (S. Clark et al., 2007; Pimentel et al., 1997).

Despite this, fresh water is a finite resource that is unevenly distributed around the world (Turner, Georgiou, Clark, & Brouwer, 2004). Only about 2.5% of water on the planet is fresh and of this 70% is locked up as permanent ice or is in the atmosphere (Dompka, Krchnak, & Thorne, 2002; Steinfeld et al., 2006). The availability of and

access to fresh water is a major limiting factor on human activity, no more so than agriculture.

Agriculture relies heavily on a stable water supply and has developed systems to overcome droughts and increase year round efficiency through damming water sources and implementing irrigation schemes (FAO, 2013). These changes have aided in farm production and output, but poor water management has impacted negatively on ecosystems, water tables and reduced water quality worldwide (Steinfeld et al., 2006). Water use in livestock rearing is a significant issue, which like other inputs is disproportional to the amount of output compared to crop yields. Pimentel and Pimentel (2003) have concluded that it may require up to 100 times more water to produce one kilogram of animal protein compared to a kilogram of grain protein, largely because of indirect water use by livestock through the production of feed. Livestock use just over 1% of total agricultural water directly (Pimentel & Pimentel, 2003). A study by Hoekstra and Chapagain (2007) found that the higher up the food chain the higher the virtual water footprint (i.e. volume of water to produce a commodity). As an example, the global average virtual water content of one ton of maize, wheat and rice is 900, 1300 and 3000 cubic metres of water respectively, where as a ton of chicken, pork, lamb or beef requires 3900, 4900, 10400 and 15500 cubic metres of water respectively (Hoekstra & Chapagain, 2007; Mekonnen & Hoekstra, 2010).

The legitimacy of using virtual water content measures of meat products, especially across global averages is widely debated. Ridoutt, Sanguansri, Freer, and Harper (2012) argue that using virtual water content fails to describe the environmental relevance of water in a particular region; meaning one area may use a lot of water but not have as detrimental effect environmentally as in a region that uses less water, where availability may be low. Research by Zonderland-Thomassen, Lieffering, and Ledgard (2014) has emphasised the point that in low water-stressed environments there is a much smaller water footprint for the production of livestock if the LCA approach is taken. Although, these caveats do not change the fact that meat production is a water intensive activity, but care needs to be taken not to generalise environmental impacts of water use across all regions (Ridoutt et al., 2012)

The use of irrigation in agriculture is growing, placing more pressure on water resources around the world (FAO, 2011a). Mismanagement of water resources has led to problems such as water logging and salinization of soils, which can severely restrict the productivity of the land (FAO, 2013). Water logging occurs through over irrigation in poor draining soils and often precedes salinization, where there is a build up of dissolved mineral solids in the soil, like salt, leading to poor soil quality. The FAO (2011a) have estimated that worldwide 11% of irrigated land suffers from some level of soil salinization and potentially double that for water logging. Not all of this is attributable to meat production, but considering livestock farming uses nearly 80% of all agricultural land there is no doubt that the majority of water use problems are related to meat production (FAO, 2009; Steinfeld et al., 2006).

Taken as a whole, there is consensus that meat production is more costly in water use than crop production, but to what extent and how environmentally impactful is more debatable. It is clear however, from the literature reviewed that obtaining energy and protein from crop products is more efficient than animal products in terms of outright water use, and the environmental impact of water use is directly related to how water-stressed an environment naturally is.

2.5 Livestock and Water Pollution

As concluded in the previous section, actual water use may not be a problem per se if managed correctly. However, the quality of the water that is returned to a water catchment after agricultural use may be more environmentally problematic. Animal waste has high levels of nutrients like nitrogen and phosphorus, drug residues, heavy metals and pathogens (Steinfeld et al., 2006). If these waste materials get absorbed into soils or waterways then there can be serious environmental and ecological problems (Gerber & Menzi, 2006).

Nitrogen and phosphorus are the key nutrients that runoff or are leached through soils into rivers, lakes and coastal waters (Carpenter et al., 1998). Nutrient runoff can

have a serious effect on ecosystems through the eutrophication of waterways. Eutrophication is an overloading of nutrients in the water leading to a depletion of dissolved oxygen and algal blooms or other infestations that can stifle aquatic life, decimating the natural ecosystem and reducing biodiversity (FAO, 2011a; Smith, Tilman, & Nekola, 1999). The key drivers behind this type of pollution are increases in mineral fertilizers, animal wastes and higher concentrations of livestock (FAO, 2011a; Smith et al., 1999). Different farming systems can have varying impacts on nutrient runoff. In general, as one moves from less intensive farming to more intensive farming the greater the runoff of added nutrients is (Oenema, 2006). The depletion of water quality by livestock can be separated into point source and non-point source pollution. Box 2.2 outlines the difference in these pollution types.

Box 2.2 Water pollution types

Point Source Pollution – specific discharge of pollutants into a water body

- High concentrations of animals create large amounts of waste that needs to be dealt with effectively to avoid water contamination (Carpenter et al., 1998).
- The imbalance between land and livestock created by intensification makes dealing with the waste problematic. Compounding this effect, land availability makes the use of lagoons or storage uneconomical (Hooda, Edwards, Anderson, & Miller, 2000; Steinfeld et al., 2006).
- Regulatory frameworks can provide measures to mitigate point source pollution because the problem is easily identifiable. Yet, incidents of neglect for these rules appear to be growing, either due to a failure of overflow storage, deliberate actions and the growing of the industry (Osterberg & Wallinga, 2004; Steinfeld et al., 2006).

Non-Point Source Pollution – discharge of pollutants over large areas

- Non-point source pollution associated with livestock includes the distribution of animal waste as fertilizer on land, pesticides, mineral fertilizers and other chemicals that can find their way into water systems through runoff and leaching (Steinfeld et al., 2006).
- The extent that pollutants get in to waterways has a lot to do with local climatic conditions, how the land is used and how management of these materials is undertaken (Carpenter et al., 1998; Hooda et al., 2000)
- Application of mineral fertilizer for feed production has increased significantly in the last few decades; between 1980 and 2000 nitrogen and phosphorus use increased by 33% and 38% respectively. At this point in time human use is equivalent to all natural sources of both nitrogen and phosphorus (Steinfeld et al., 2006).

Along with fertilizers and animal waste, pesticides, antibiotics and dipping chemicals also get into waterways and reduce water quality (Hooda et al., 2000). Other facets of meat production contribute to the declining water quality; tanneries, slaughterhouses and other processing plants contribute a smaller but not insignificant amount to water pollution (Steinfeld et al., 2006). Although there is little global data about water pollution low water quality levels or high pollution are clearly associated with high densities of intensive livestock production (Steinfeld et al., 2006; Woli, Nagumo, Kuramochi, & Hatano, 2004).

2.6 Biodiversity Loss

Biodiversity is defined as “the number and diversity of genes, species, populations, and ecosystems” (Herrero et al., 2009, p. 118). High biodiversity and healthy ecosystems play an intricate role in providing services humans rely on for their lives and well-being (MEA, 2005). A large reduction in biodiversity from human activity has occurred over time. Human actions have fundamentally changed virtually all of earth’s ecosystems in a significant way and largely to an irreversible extent, through the loss of biodiversity (MEA, 2005). The most important drivers of biodiversity loss from livestock are through heavy grazing, soil compaction, forest loss and habitat fragmentation from pasture expansion, pollution of water ways and competition with wildlife (Herrero et al., 2009). Livestock and the increasing demand for animal products are continually placing strain on ecosystems and the biodiversity that support them. To meet the ever increasing demand for animal products there is a greater need to grow feed crops, clear grazing lands and harvest fish to feed livestock (Herrero et al., 2009). These activities will all result in the continued decline of biodiversity worldwide.

2.7 The Impact of Livestock in New Zealand

The agricultural industry in New Zealand creates many benefits economically and socially, but also causes issues surrounding environmental sustainability. Initially, as colonisation by Europeans occurred in the 19th century native vegetation was burnt and removed to provide areas of pasture for sheep to produce wool. With the invention of refrigerated ships the demand for meat and dairy products soared, leading to even more farming production (PCE, 2013). Over the past half century increases and intensification of production have occurred at a very high rate, putting pressure on natural systems to cope with the amplified pollution and waste (MacLeod & Moller, 2006). This has led to widespread concern over animal GHG emissions, water quality, soil loss and degradation, and threats to biodiversity. This section gives a snapshot of the current situation of livestock farming's environmental impact in New Zealand.

2.7.1 Greenhouse Gas Emissions

The economic importance New Zealand has placed on agriculture over the last two centuries has consequently led to an unusual GHG emissions profile. The level of GHG emissions from the agricultural sector is just under half (47%) of the country's total emissions, in CO₂-eq terms (MfE, 2013a). This is in contrast to most other developed countries where the average is around 12% of total emissions (Cooper et al., 2013; MfE, 2013b). Because of the unusual emission profile of New Zealand, H. Clark et al. (2011) have rightly pointed out that to reduce its overall emissions, the agricultural sector must be involved. The problem is made even more difficult to solve because of the country's economic reliance on livestock farming and production.

Between 1990 and 2012 emissions from the agricultural sector increased by 14.9%, primarily due to CH₄ released from a 26.7% increase in cattle numbers, and N₂O

emissions from soils, as a result of a 512% increase of nitrogen fertilizer (MfE, 2014b). It is estimated that about 70% of agricultural emission are CH₄ from enteric fermentation (MfE, 2014b). In total, livestock contribute about 84% of New Zealand's CH₄ and about 97% of N₂O emissions (MfE, 2014b). However, there have been some efficiency gains during this period as the emissions per kilogram of product have decreased by about 18% for dairy cattle, 23% by sheep and 27% in beef cattle (MfE, 2013b).

2.7.2 Water

Water use has continued to increase in New Zealand to support agriculture. This is not surprising given the move to more intensive farming practices that require a more stable and reliable water supply. Between 1965 and 2002 irrigated land increased 55% per decade (PCE, 2004). Increasing irrigation in New Zealand is not likely to slow either as the government has set targets to double the value of agricultural exports by 2025 (PCE, 2013).

As of 2010 the Ministry for the Environment (MfE) has reported irrigation is responsible for the largest proportion of water use in New Zealand (46%) followed by hydro power generation (41%) (MfE, 2014a). Internationally, New Zealand is the second highest water user per capita in the OECD, but measured as water withdrawals as a percentage of total availability New Zealand ranks very low (MfE, 2014a). Water use in New Zealand's case may not necessarily translate into an environmental problem because of the generally good overall availability, yet this does need to be managed correctly.

Water quality rather than actual use of water is considered more of a problem in New Zealand due to the local climate and rainfall (PCE, 2013). The major problems in water quality in New Zealand are high levels of nutrients, sediments and pathogens in water systems. Most of the nitrogen and phosphorus in freshwater originates from diffuse or non-point sources on farming lands, with the main cause being animal waste;

pathogens come from animal manure and sediments from erosion of livestock land (PCE, 2012). In a 2004 report by the Parliamentary Commissioner for the Environment (PCE) it was stated that:

“most rivers in farming areas, particularly in lowlands, generally fail to meet recommended guidelines as a result of contamination from increased nutrients, turbidity and animal faecal matter” (PCE, 2004, p. 45)

Overall, trends in New Zealand waterway quality show increasing levels of total phosphorus, dissolved reactive phosphorus, oxidised nitrogen and total nitrogen indicating deteriorating conditions (Ballentine & Davies-Colley, 2009; Davies-Colley et al., 2011). In a report to the MfE Ballentine and Davies-Colley (2009) attribute this to the expansion and intensification of pastoral agriculture. Although gains are being made in reducing point source pollution, indicated by an increase in visual clarity, these are being overshadowed by non-point source pollution. Latest results from Ballentine and Davies-Colley (2009) have backed up a similar but earlier analysis which was reported on in the state of the environment report ‘Environment New Zealand 2007’ released by the MfE (MfE, 2014c). Livestock farming is continuing to significantly adversely affect New Zealand waterways and the recent intensification of farming practices has played an important role in this escalating decline.

2.7.3 Soil Erosion

Soil loss is a significant issue in New Zealand, and it is estimated that between 200 and 300 million tonnes are lost into the ocean every year. This is about 10 times faster than the rest of the world (PCE, 2004). Soil erosion from farmland has a twofold effect, firstly, the loss of a valuable resource which reduces productivity and secondly, eroded sediment is a major water pollutant. It is hard to say how much of this is caused by livestock as there is a naturally high rate of erosion as a result of the topography (PCE, 2004). Nonetheless, erosion is accelerated by land clearing and poor management practices, like over stocking and steep slope grazing (PCE, 2004). Soil quality is also significantly affected by compaction from livestock (especially cattle),

changing pasture production, hydrology and nutrient movement. Houlbrooke, Paton, Littlejohn, and Morton (2011) have demonstrated this effect in New Zealand where the move to more intensive production farming methods has led to more animal numbers and higher levels of soil degradation.

2.7.4 Biodiversity Loss

New Zealand's biodiversity is rare and unique due to the country's prolonged isolation. As a result of this isolation there is a high proportion of endemism among the native flora and fauna (McGlone, Duncan, & Heenan, 2001), making New Zealand's native species extremely vulnerable to outside influences. Biodiversity loss has therefore been identified as a major issue in New Zealand, and is one with international significance (MfE, 1997). The land use change that has been mentioned earlier has led to large amounts of habitat loss and the introduction of new plants and animals has created new competition for existing species (PCE, 2004). Despite a large amount of evidence showing the negative impacts agriculture has on biodiversity, there has not been a comprehensive assessment of direct impacts in New Zealand or in most places in the world (Didham, Denmead, & Deakin, 2012). Nevertheless, it is obvious that livestock farming has had a major influence on land use in much of the country. Vast areas of lowland forests and wetland ecosystems have been cleared and drained resulting in major biodiversity loss (MacLeod & Moller, 2006). Though more recently for the most part, there has been a slowing to the destruction of native habitats (Didham et al., 2012).

2.8 Summary

The aim of this chapter was to provide an overview of livestock's impact on the environment. As we have seen, the farming of animals has far reaching effects globally and also more specific localised impacts. At this point in time the livestock sector is

one of the largest contributors to land use change, GHG emissions, water pollution and biodiversity loss. If a business-as-usual approach is taken the environmental impact will worsen. With a growth in demand for meat predicted, as explored in the next chapter, questions need to be asked about the sustainability of current practices and how we should proceed as a society into the future.

Chapter 3: The Demand for Meat: why changing behaviour matters

“Consumer behaviour is key to the impact that society has on the environment. The actions that people take and choices they make – to consume certain products and services or to live in certain ways rather than others – all have direct and indirect impacts on the environment, as well as on personal (and collective) well-being”

~ Jackson T., Sustainable Development Research Network, 2005, page iii ~

3.1 Introduction

The demand for meat all over the world is considerable and is expected to grow. Understanding why this is the case is important. Knowledge about what is creating demand increases the ability to make beneficial change. This chapter focuses on the drivers behind meat consumption, how these drivers can be managed and what outcomes can be achieved by changing people’s behaviour. A brief overview of New Zealand’s history with agriculture explains why there is such an affinity with livestock and meat eating in the country of research. The last section of this chapter then takes a brief look at the important issue of health and meat consumption, as this can be a concern for people when thinking about vegetarian diets.

3.2 The Increasing Demand for Meat

Since the middle of the twentieth century the demand for meat has increased four to five fold (L. Evans, 1998; Gold & Porritt, 2004). Alongside meat demand, consumption of eggs, dairy products and seafood are also continuing to rise (Gold & Porritt, 2004).

This rising demand for animal products does not look like abating in the near future. Global production of meat is projected to double between the turn of the 21st century and 2050, from 229 million tonnes to 465 million tonnes (Steinfeld et al., 2006). It is predicted demand will rise 73% from 2010 levels by 2050 (FAO, 2011b).

Consumption of meat is, in general, related to affluence. People living in countries with a higher per capita income tend to rely more heavily on meat in their diets (Steinfeld et al., 2006). Largely, this can be put down to dietary preference (e.g. taste) and other perceived benefits like better nutrition, health and value for money (Povey, Wellens, & Conner, 2001).

In Western countries meat has become ingrained in the food culture. It is expected by most people in developed countries that the majority of meals will contain at least some portion, if not a significant amount, of meat (Kearney, 2010). It has been estimated that people in developed countries consume between 10-20 times the amount of meat than that of a person in a developing nation, with this number continually increasing (FAO, 2009; Steinfeld et al., 2006). In terms of nutrition and health benefits most people in Western countries consume more than twice the daily recommended amount (90 grams per day) set by the World Health Organisation (WHO) (WHO, 2008). In coming years, as wealth increases in developing nations the majority of growth in meat consumption is expected to occur in these regions (Steinfeld et al., 2006).

Demand rather than supply is thought to contribute more significantly to the modern growth of the livestock industry (Delgado, Rosegrant, Steinfeld, Ehui, & Courbois, 1999). Traditionally, the market for livestock was based on the availability of local resources to feed the livestock which limited the supply. This situation is now reversed as increased trade, transportation and industrialisation of the industry have enabled a largely unlimited supply of feed resources for animals (Naylor et al., 2005). Now, through newly available resources, the meat industry can increase supply to match the rising demand (Steinfeld et al., 2006).

As income in countries increases through social and economic change, the demand for meat and other livestock products rises (Steinfeld et al., 2006). The adoption of more

westernised diets and the status symbol that meat can provide, due to its history as a luxury item, have contributed to this trend in dietary shift (Gold & Porritt, 2004). In comparison to other food groups in developing countries, increases in consumption of livestock products per capita have outpaced all other major commodities (FAO, 2009). Furthermore, urbanisation is occurring faster in developing nations than elsewhere and is aiding the demand for meat through altering patterns of food consumption (FAO, 2009; Kearney, 2010; Steinfeld et al., 2006). In the last decade alone, the demand for meat has doubled in poorer countries and has been actively encouraged by governments and international agricultural interests (Gold & Porritt, 2004). In some cases the promotion of meat consumption is for health benefits to alleviate malnutrition (FAO, 2011b).

While the demand for meat has clearly driven production there are also supply side factors that have also contributed to an increase in meat consumption. Factors such as lower feed costs, technological change, better distribution channels and efficiencies of scale have allowed the supply of animal products to rise, reducing prices (FAO, 2009). In turn, these changes have given wider access to consumers worldwide. What's more, new feeding technology and innovative breeding programs have fuelled the use of more intensive and resource exhaustive farming operations (Steinfeld et al., 2006). Over the past few decades the intensification of the industry has accounted for the majority of its expansion (Gold & Porritt, 2004; Steinfeld et al., 2006).

3.3 Significance of Market Feedback on Consumption

In the past century the food market has increasingly become a global and commercialised operation. This has had a major impact on what people eat and what expectations consumers have about food. As the industry has become more commercialised, pressure on food producers to improve profits and find more efficient forms of production has increased (Sundkvist, Milestad, & Jansson, 2005). The food system now has become more complex, larger in scale, more mono-cultured and higher in global trade (Conner, 2004; Mont & Bleischwitz, 2007; Sundkvist et al.,

2005). These changes have resulted in lower food prices with higher yields, which in turn have led to greater food supplies across the world. However, these changes have also led to some negative consequences (Reijnders & Soret, 2003).

A major adverse affect from commercialisation has been the ability of producers to externalise many of the costs that are incurred through agriculture onto society as a whole, further increasing profitability (Conner, 2004). Externalities can often be thought about in terms of the environmental or social damage that is not necessarily covered or compensated for by the commercial farmers, as their property rights or agricultural policy do not require this obligation (Common & Stagl, 2005).

Environmental problems such as those discussed in Chapter 2 could be considered outcomes of externalising costs. Socially, there can also be a loss of community and jobs when there is an exchange of capital for labour (Conner, 2004).

Externalities could be considered part of the economic process in modern day society. However, in effect, the full cost of food is not necessarily taken into account by the consumer. The lowering price of food gives signals to the consumer that those products are becoming less scarce and the environmental damage caused by agriculture is not significant enough to pay for (Gold & Porritt, 2004); whereas a rising price may provide the opposite effect. This feedback loop (i.e. production going up and prices going down) ensures that consumers do not necessarily realise the negative effects of their actions, especially as the complexity of the food chain increases, causing a greater divide between the consumer and knowledge about the ways in which their food is produced (Goldberg, 2008). The key argument here is that price signals are currently not accurately describing the cost of foods and as such, this does not result in a change of consumer behaviour. Consequently, there is need for other tools to make people more aware of the negative impacts that meat production can have on the environment.

The demand for meat in Western countries is already high and with a rising demand in developing countries total meat production will increase into the future. Economic change, social expectation and the globalised food market all contribute to the continually growing meat industry. The environmental problems outlined in Chapter 2

will become more pronounced with more extensive meat production. Evidently, there is also a lack of information relayed through the market mechanism for consumers to make more informed decisions about what they are eating.

3.4 What Will Cutting Meat Consumption Achieve?

Reducing meat consumption in developed countries has the potential to make a significant difference to the environmental footprints cast by society as a whole and people as individuals. Numerous studies have shown that a diet high in meat has more impact on the environment than one with less meat; emissions of GHGs, water use, energy use, fertilizer use, and other chemicals like pesticides are all higher in diets that favour meat (Berners-Lee, Hoolohan, Cammack, & Hewitt, 2012; Carlsson-Kanyama & González, 2009; Eshel & Martin, 2006; Pimentel & Pimentel, 2003; Reijnders & Soret, 2003).

Studies using the LCA approach have all shown lower GHG emissions for plant based foods than for animal products. A study by Berners-Lee et al. (2012) made a comparison between typical vegan (strictly no animal products), vegetarian (allows dairy) and omnivorous diets in the UK and concluded that a saving of 22% and 26% of GHGs could be made by a vegetarian and vegan diet respectively. Soret et al. (2014) produced similar figures in the US of 22% and 29%. Carlsson-Kanyama and González (2009) compared three meals in Sweden containing the equivalent amount of energy and protein that differed in the level of meat products. Greenhouse gas emissions rose by a factor of more than 10 when comparing the most vegetarian meal with the least. Furthermore, a study by Eshel and Martin (2006) concludes that the difference in GHG emissions between meat based and plant based diets was as much as the difference between driving a standard sedan and a sports utility vehicle, under standard driving conditions; this amounted to just over 6% of the United States total GHG emissions.

Not all types of meat production contribute equally to the GHG emissions of the industry as a whole. In a comprehensive meta analysis, de Vries and de Boer (2010)

looked at overall GHG contributions from livestock production. The study showed that beef production has the highest impact followed by pork and then chicken. Other studies have shown that lamb is similar to beef and in some cases can be even worse (Williams, Audsley, & Sandars, 2006). Box 3.1 gives a brief account of GHG emission estimates from beef and lamb in New Zealand.

Box 3.1 Carbon footprints of New Zealand beef and lamb

- * **Beef (Liebering, Ledgard, Boyes, & Kemp, 2012, pp. 7-8):**
*The total GHG footprint was calculated at **2.2kg CO₂-e for a 100g** portion of beef meat. This can be broken down into 90.3% for the on-farm stage, 2.1% for meat processing, 4.2% for transportation/storage and 3.3% for the consumption phase.*
  - * **Lamb (Ledgard, Liebering, McDevitt, Boyes, & Kemp, 2010, pp. 6-7):**
*The total carbon footprint was calculated at **1.9kg CO₂-e for a 100g** serving of lamb meat. This can be broken down into 80% for the on-farm stage, 3% for meat processing, 5% for the entire transportation phase and 12% for the consumer & retail phase.*
  - * *In comparison to **vegetable based meat substitutes**, it is estimated that they can average between **0.1 and 0.6 kg CO₂-e for a 100g** portion (Nijdam, Rood, & Westhoek, 2012). It must be noted that the comparison study was not done in New Zealand, but was provided here to give some sense of the differences between food products.*
- Note:** The overall breakdown of the carbon footprint and the dominance of the on-farm component are broadly consistent with other studies of products derived from pastoral farmed ruminant livestock. Figures based on 100 year GWP

In terms of direct resource use, meat production is more exhaustive than other foods. A study by Marlow et al. (2009) which examined the production differential between meat and vegetarian based diets found the non-vegetarian diet required 2.5 times more energy, 2.9 times more water and 13 times more fertiliser than the vegetarian diet. Energy use of this ratio has been backed up by Reijnders and Soret (2003), while others, such as Dutilh and Kramer (2000) have placed a higher value on energy inputs and set the ratio closer to ten to one.

Land use by livestock farming would also likely be reduced through a change towards a vegetarian diet. Stehfest et al. (2009) have estimated that if there was a global transition to a no meat diet, up to 2700 mega hectares of pasture and 100 mega hectares of cropland could be abandoned. With a healthy meat diet level as assessed by Willet (2001) of the Harvard Medical School, crop and pasture area could be

reduced by 1360 mega hectares. These now abandoned lands would become valuable carbon sinks, so much so that 2700 mega hectares is potentially enough land to reduce the global carbon stabilisation target by 50% (Stehfest et al., 2009). In addition, the rejuvenated land would create new ecosystems and habitat for wildlife. A scenario like this gives some indication of what could be achieved.

Improving productivity of farmlands is a strategy being pursued to reduce meat production's impact on the environment. Technological and managerial improvements are essential; however, doing this can only reduce environmental damage if productivity enhancements outpace consumer demand. In effect this means by 2050, when meat production is projected to double from the 2000 year baseline, that environmental impact per unit of livestock must be cut by 50% just to avoid damages beyond what is already occurring (Steinfeld et al., 2006). Strategies to improve farm and land productivity should be used alongside tactics aimed at managing the demand for animal products.

The reductions in environmental impacts discussed are not small contributions and it appears there is a consensus that a significant difference could be made through a dietary shift. There are also other more personal benefits like personal health from shifting to a less meat intensive diet; this will be explored in a later section. Next though, the prominence of meat in New Zealand society is looked at to understand the research setting and why it is an important place to research the questions posed in Chapter 1.

3.5 New Zealand's Relationship with Livestock

Agriculture is considered the backbone of New Zealand's economy. The farming landscape has evolved over time to reflect the demand of both domestic and world markets (PCE, 2004). Farming systems and methods have changed along with how the land is used and what is produced. Since the turn of the 20th century the amount of land under pasture has increased from 2 million hectares to about 14 million hectares

(PCE, 2004). Currently, this equates to over half of New Zealand's landscape being classified as farmland (PCE, 2004).

The dominance of agriculture in New Zealand's economy is reflected in the total goods export figures. By 2012 over half of total goods export value came from the agriculture sector; dairy products were the highest earning at \$12.6 billion followed by meat and meat products worth \$5.6 billion (MfE, 2013b). In direct reference to livestock, 70% of all agricultural sales came from animal sources in 2013 (The Treasury, 2013).

Moreover, New Zealand earned approximately six times more revenue from animal sources than from horticultural sources in previous years (Potts & White, 2008).

New Zealand's image domestically and internationally is one of being clean and green, with large natural landscapes alongside rolling hills of pasture grazed by sheep and cattle (Potts & White, 2008). For generations New Zealanders have worked on and made their living from the land, even today there is still a strong link to rural culture. As suggested in the introduction, this has been one reason for why there are so few vegetarians in New Zealand.

In a culture that has a rich history in farming and is so reliant on livestock and the products they produce, it comes as no surprise that there is little counter narrative against the predominant discourse of encouraging meat consumption. Potts and White (2008) have identified little empirical research on the matter of vegetarianism in New Zealand and have attributed this to the fact that farming remains a strong symbol of nationhood. New Zealand may not be unique in having a tradition of a meat centred diet but the history and culture has reinforced this mentality into society over many years. After acknowledging the importance placed on the livestock industry in New Zealand, this thesis does not intend to cover the economic or social issues surrounding the reduction of meat consumption in New Zealand; rather it attempts to consider New Zealand a highly appropriate place to conduct research about how people receive and process information regarding this topic. Consequently, results are likely to be of interest in other countries and benefit research elsewhere.

3.6 Health and Wellbeing

To reduce the demand for meat it is important to acknowledge the nutritional role meat plays in people's health. Health is widely acknowledged as a key aspect of having a good life and it is a strong correlate with a higher level of wellbeing (Frey & Stutzer, 2010). Allaying fears of nutrition deficiencies and emphasising the benefits from a reduced meat intake may help in lowering of consumption. This section is written from the perspective of a developed country, where it is assumed there is access to a broad range of foods.

It has been reported cardiovascular diseases, prevalence of hypertension, rates of obesity and diabetes, and levels of cancer are all lower among vegetarians (Craig, 2010; Eshel & Martin, 2006; McMichael, Powles, Butler, & Uauy, 2007; Orlich & Fraser, 2014). It is thought the main reasons behind the reduction of disease is that diets lower in meat have a reduced intake of saturated fats and cholesterol and a higher uptake of fibre, antioxidants and other phytochemicals, factors which are beneficial to one's health (Craig, 2010; Mangels, Messina, & Messina, 2011).

Nutritionally, there should be no reason for concern with a reduced intake of meat as there is no evidence to suggest a lack of vitamins, minerals or other dietary needs (Craig, 2010). The only case in which nutritional deficiency is more likely is with a complete vegan (strictly no animal products) diet, and unless there is specific use of fortified foods this can lead to deficiencies in some cases, especially in children (Craig, 2010). There is some evidence to suggest that bone density is lower with vegan diets, but this is not seen in people who consume some animal products, such as eggs and dairy (Craig, 2010). In a comprehensive book by Mangels et al. (2011, p. 43) it was stated: "it is clear that vegetarian eating patterns adhere more closely to guidelines for optimal diet and are similar to the diets of populations with reduced chronic disease risk". Furthermore, the WHO (2008) have suggested lowering meat intake in western countries for both health and environmental reasons.

Meat does have nutritional benefits; it contains quality protein and can be a key source of several readily available minerals like iron, zinc, potassium, phosphorus and magnesium (Gold & Porritt, 2004). These nutrients are found in concentrated forms in meat, which may be regarded as an important food to reduce malnutrition, particularly in children and pregnant and lactating women (FAO, 2011b).

Iron uptake is often cited as a key reason for including meat in one's diet, although there are other sources of iron abundantly available like beans and dark leafy greens (Mangels et al., 2011). Yet, even though non-meat eaters tend to have lower iron stores this does not cause greater incidence of iron deficiency in healthy people, as absorption increases in efficiency when stores are lower and can be increased by consuming vitamin C at meal times (Craig, 2010; Gold & Porritt, 2004). Nevertheless, the WHO has suggested that the mentioned key nutrients can be acquired with as little as 58 grams of meat per day (FAO, 2011b). This figure is below the 90 grams a day being recommended currently by the WHO and is significantly less than the average daily consumption in most developed countries.

A human pandemic caused by a livestock disease is considered one of the most serious threats to the health of the world's population (FAO, 2009). The intensification of farming creates conditions that allow this type of disease to develop. Diseases like foot and mouth, BSE, swine and avian influenzas and other zoonotic diseases have all arisen from farming systems that have high numbers of animals in close quarters (Aiking et al., 2006; Kearney, 2010). These types of diseases easily spread and can have significant impacts on human wellbeing; this may be directly through disease or indirectly with food shortages from the culling of stock. There is also the added fear that the overuse of antibiotics to control disease in livestock populations may impede the effectiveness with which we can control human illness (Gold & Porritt, 2004). With the intensification and geographic clustering of livestock production near urban populations, disease outbreaks are likely to increase, even though measures are being taken to avoid potential problems (FAO, 2009).

In sum, a well balanced diet high in grains and vegetables and low in meat is considered to be healthier than a diet rich in meat (Eshel & Martin, 2006; Godfray et

al., 2010). If the WHO recommendation of 90 grams a day is adhered to, as mentioned in the first section of the chapter, then there is a low likelihood of any nutritional deficiencies occurring, along with reduced disease risk and many positive benefits to both people's health and the environment.

3.7 Summary

In light of what has been outlined above and in Chapter 2 it seems clear that there are a number of problems with current levels of meat consumption. The developed world consumes a high level of meat and the developing world is catching up. If production does increase as predicted, this will have important implications for both environmental sustainability and global health. Even if meat consumption is reduced substantially rather than completely eliminated by most people, significant environmental and resource gains can be made. There are clear benefits, personally, socially and environmentally from reducing meat consumption in one's diet.

Chapter 4: Theoretical Framework: values, information and message framing

4.1 Introduction

The current research is underpinned by value and information provision theory. This chapter explains why and how these two fields of thought were applied. An overview of value theory in social psychology provides the context for the rest of the chapter. This is followed by the influence values have, firstly on pro-environmental behaviour and subsequently on the role values play in meat consumption. How individuals respond to information and the effect of message framing is then explored. From the theory outlined, the chapter concludes with a hypothesis for each of the questions posed in Chapter 1. These are outlined in Table 4.2.

4.2 Theoretical Approach to Values

As alluded to in Chapter 1, values help people make decisions when there are tradeoffs to be made. The current study takes its value theory from social psychology as opposed to ethical or economic fields, as this is where most of the research on environmental behaviour has occurred to date. Values are generally conceived of as guiding principles in people's lives (Rokeach, 1973; Schwartz, 1992). The definition of what a value is in social psychology has five main characteristics and has been summarised as follows:

“According to the literature, values are (a) concepts and beliefs, (b) about desirable end states or behaviours, (c) that transcend specific situations, (d) guide selection or evaluation of behaviour and events, and (e) are ordered by relative importance”
(Schwartz & Bilsky, 1987, p. 551).

The definition makes it clear that values can and do influence how people conduct their lives and make decisions. The nature of values being general, guiding principles means they may inform behaviour-specific beliefs and attitudes. For example, a person with strong altruistic values is more likely to engage in pro-environmental behaviours while, a person with stronger egoistic values may be less likely to engage in these behaviours (Schultz & Zelezny, 1998, 1999). Nevertheless, a value is not the only consideration when making a decision. Other factors come into play, like social context, perceived behavioural controls, elements outside of personal control and habits or routine (Gardner & Stern, 2002; Saba & Di Natale, 1998; Vermeir & Verbeke, 2008). However, these factors fall beyond the scope of this study.

The reason for looking at values rather than other influences on decision making is because values are considered antecedents to most other factors related to decision making, i.e. the fourth point in the aforementioned definition (Dietz, Fitzgerald, & Shwom, 2005; Karp, 1996; Schwartz, 1992, 2012a). Also, as the second point in the definition states, by transcending individual situations, values are broader in application and therefore fewer values come into play when understanding individual decision making processes, compared to say, attitudes or specific beliefs (Rokeach, 1973). A further point that follows is that values are relatively stable throughout a person's life, although they can change (Karp, 1996; Thøgersen & Ölander, 2002). In reflection of these key points, as values are a guiding principle in a person's life, they should have a measurable influence on behavioural choice (Karp, 1996). Schwartz (2012a, p. 17), in an overview of his value theory, has concluded with the statement "[v]alues are critical motivators of behaviours and attitudes", emphasising that values are important factors to be considered when attempting to explain behaviour.

Many scholars (de Boer et al., 2007; Dietz et al., 2005; Schultz et al., 2005; Stern, 2000) have given much weight to the importance of human values in explaining environmentally responsible behaviour. The evidence to support the theoretical background is examined further with regard to environmentalism later in the chapter. First though, how values are considered in the context of social psychology is reviewed. It is important to be aware of what is actually being measured and how this is

represented in studies looking into values and environmentalism, since this provides a starting point for understanding what is trying to be tested and achieved.

4.3 Value Structures

Over the past few decades there has been a significant amount of research conducted aiming to describe value structures among people. Rokeach's 1973 paper is widely cited as a seminal piece of work on the empirical research of values. The Rokeach Value System has been built upon since and extended by Shalom Schwartz (1992). The Schwartz Value Survey is now the most commonly used measure of values and contains a 56-item survey that asks participants to rank the importance of each item as a guiding principle in their lives on a nine point scale. The Schwartz Value Survey has been widely used and has proven to be nearly universal in structure and reliable across countries and cultures, although varying cultures may rank the importance of values differently (Bardi & Schwartz, 2003; Dietz et al., 2005; Schwartz, 1992).

In the majority of studies conducted worldwide, a clear pattern of values has emerged. Through analysis of the Schwartz items, ten value types appear to arrange themselves into four groups that reflect two dimensions; Figure 4.1 represents the model (the dimensions are the opposing quarters, which can be thought about as a sort of continuum). The ten value types are: power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity and security. A brief overview of the motivational emphasis of each value type is provided in Figure 4.2. For a more comprehensive account of how each value type is measured, see Appendix A or the survey in Appendix B. The underlying basis for the model is that the smaller the distance between value types the more conceptually similar they are (e.g. self-direction and stimulation), whereas a larger distance between values indicates that the values are perceived to be conceptually different (e.g. achievement and universalism).

Figure 4.1 Structural relations among the 10 values and two dimensions
(Davidov, Meuleman, Billiet, & Schmidt, 2008)

Figure 4.2 Schwartz 10 basic human value types and their motivational emphases (Davidov et al., 2008)

<i>Power</i>	Social status and prestige, control or dominance over people and resources
<i>Achievement</i>	Personal success through demonstrating competence according to social standards
<i>Hedonism</i>	Pleasure and sensuous gratification for oneself
<i>Stimulation</i>	Excitement, novelty, and challenge in life
<i>Self-direction</i>	Independent thought and action — choosing, creating, and exploring
<i>Universalism</i>	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature
<i>Benevolence</i>	Preservation and enhancement of the welfare of people with whom one has frequent personal contact
<i>Tradition</i>	Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide
<i>Conformity</i>	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms
<i>Security</i>	Safety, harmony, and stability of society, or relationships, and of self

One of the two dimensions displayed in Figure 4.1 is referred to as the self-enhancement versus the self-transcendence dimension. This dimension is characterised through the pursuit of self-interest or egoistic goals on one end, and the concern for the welfare of others or altruism at the opposite end (Dietz et al., 2005). The openness to change versus conservation/traditionalism dimension is characterised through the expression of a willingness to accept new ideas and try new experiences, as opposed to sticking to more conventional or established ways of thinking and behaving (Dietz et al., 2005). The term conservation can often be confusing in environmental research so is often referred to in the environmental field as traditionalism, which will be used henceforth in this thesis.

It is also important to note that the Schwartz model provides separate measures for the four higher value types (self-transcendence, self-enhancement, openness to change, traditionalism), meaning that individuals are not necessarily self-transcendent but rather have varying degrees of self-transcendence. What's more, the measures are not mutually exclusive ends of a continuum, as individuals can hold inconsistent values (Schultz & Zelezny, 2003). That is, scoring high on one end of a dimension, such as self-transcendence, does not mean a person cannot score highly on the self-enhancement end.

The framework Schwartz has provided suggests that self-transcendence values would be positively related to environmental concern, because this value type includes some key items that reflect these ideas, such as “protecting the environment” and “unity with nature”, which directly speak to the topic at hand (see appendix A for a full list of Schwartz items and values). Schwartz has also emphasised that self-transcendence is more than a focus on other people, and includes plants, animals and in a wider sense, the environment itself (Schultz & Zelezny, 2003; Schwartz, 1992, 2012a). How self-transcendence and the other values relate to environmentally responsible behaviour will be examined in the next section.

4.4 Values and Environmentally Responsible Behaviours

How values transfer into actual pro-environmental behaviour can be complex. As mentioned earlier behaviour is not thought to be linked to values directly; instead values are moderated through a pathway of causal links (Steg & de Groot, 2010). The Norm Activation Model of altruism proposes that an awareness of consequences (AC) and ascription of responsibility (AR) are key factors that explain why a person may act on their personal values. So if a person values the welfare of another, is aware that potential harm may come to that person (AC) and if they have decided that their actions are responsible (AR) for this harm, then they are more likely to act in manner intended to help that person (Schultz et al., 2005).

Stern et al. (1999) have built on this model and have proposed a Value-Belief-Norm (VBN) theory to explain how values influence pro-environmental behaviour. The theory links values to behaviours in a causal chain of five variables: values, the New Environmental Paradigm (NEP), based on work by Dunlap and Van Liere (1978), AC and AR beliefs about the environment, and personal norms for pro-environmental actions (Stern, 2000), see Figure 4.3. The added layer of complexity can offer a deeper explanation of how values translate into behaviour but it also means that values will only have a moderate effect on environmental decisions directly (Dietz et al., 2005).

The causal link between values and behaviour is still not fully understood and continues to be debated in scientific literature. The models mentioned are similar in that the underlying premise of values being indirectly related to behaviour is the same. There are other models of behaviour that do not explicitly use values, so will not be looked at in this study; most notably though, the Theory of Planned Behaviour (TPB) has also been used to explain environmentally responsible behaviour. The TPB will briefly be mentioned in the methods chapter, as a component of this (attitudes and intentions) has been used in the current research to measure potential outcomes of the treatments studied.

Figure 4.3 A schematic representation of variables in the VBN theory of environmentalism (Stern, 2000)

There is a significant amount of research that provides evidence of values relating to environmentally responsible behaviours. Research has shown that the self-transcendence/self-enhancement value dimension is closely linked to positively and negatively influencing pro-environmental behaviour (de Groot & Steg, 2007; Karp, 1996; Nordlund & Garvill, 2002; Schultz et al., 2005). Studies that have looked at environmental concern and self-transcendent values have found positive correlations between these two factors (Schultz et al., 2005; Stern et al., 1999); implying that people with stronger self-transcendence values generally have a higher environmental concern, compared to those with lower levels of self-transcendence values. Other studies have found a similar relationship with self reported pro-environmental behaviour (Karp, 1996; Nordlund & Garvill, 2002). Environmental concern in this instance is defined as a positive attitude toward protecting and preserving the natural world (Minton & Rose, 1997). Given the importance placed on the NEP in the VBN and as a result of the close association between environmental concern and values, the present study will investigate this relationship further in regards to meat consumption and information provision. Environmental concern will be captured through the NEP scale, which has now become the most widely used measure of environmental concern (Dunlap, 2008). How the NEP is measured is expanded on in the next chapter.

To add strength to the argument that values influence pro-environmental behaviour, Thøgersen and Ölander (2002) have studied the direction of causation and report that

values do influence environmentally responsible behaviour, rather than pro-environmental behaviour affecting values. The study suggests that people with stronger self-transcendence values tend to engage more readily in this behaviour. Self-transcendent values like altruism and universalism are thought to be especially important in promoting these behaviours, whereas their antithesis, self-enhancement or egoistic values have the opposite effect (Nordlund & Garvill, 2002). The relationship here has been understood in the way environmental issues often involve a trade off between immediate individual gains and longer term collective payoffs, meaning that people with values which show concern for non-individual, or altruistic gains will be more likely to want to participate in those mutually beneficial activities (de Groot & Steg, 2007).

This is not to say egoistic values cannot achieve a positive environmental outcome. For instance, a person may choose to buy a fuel efficient car on the basis that it will save them money through the reduced fuel cost (de Groot & Steg, 2010). However, studies do show that egoistic values are most strongly related to negative environmental attitudes and lower engagement in pro-environmental behaviours (Nordlund & Garvill, 2002; Schultz et al., 2005). Most likely this is because many environmentally responsible behaviours require individuals to restrain egoistic tendencies (Stern, 2000; Thøgersen & Ölander, 2002).

While self-transcendent values are often theoretically linked to environmentalism through altruism, the other value dimension, openness to change/traditionalism can also have an influence, albeit a lesser one. Some studies have found that traditionalism values are negatively correlated with pro-environmental behaviour (Karp, 1996; Schultz & Zelezny, 1999; Stern, Kalof, Dietz, & Guagnano, 1995). However, other research has shown this to be a non-significant relationship, and in fact Schultz (2001) found the opposite result. Openness to change is said to have little effect on environmentalism, but has been found in one instance to be slightly correlated with vegetarianism (this will be discussed further on in the chapter) (Dietz et al., 2005; Lindeman & Sirelius, 2001).

Research on the relationship between values and sustainable consumption (here meaning the purchasing of products that are more environmentally responsible) appears to be similar to that of other pro-environmental behaviours. People with self-transcendence values are more likely to purchase products that are environmentally friendly (Sener & Hazer, 2008). More specifically, the value-type universalism has the strongest influence in the decision process, between brands and products (Thøgersen & Ölander, 2002). A study by Dreezens, Martijn, Tenbült, Kok, and de Vries (2005) which looked at how values influence attitudes on genetically modified and organically grown foods, reveals that respondents who scored highly on the power values tended to have a positive attitude towards genetically modified foods and a negative attitude towards organics. On the other hand, people who scored highly on the universalism value had a positive view on organics and a negative view on genetically modified foods. It is also necessary to note that factors such as, affordability, availability, convenience, habit, empowerment and identity can also influence a purchase decision (Seyfang, 2006). But when other factors are equal there appears to be a tendency for people with higher levels of self-transcendent values to favour the more environmentally responsible product or service.

4.5 How Values Influence Meat Consumption

Having established what values are and how they can influence behaviour, the relationship between values and meat consumption is now examined. It is probable that there are some fundamental differences in values between people who consume significant quantities of meat and those who choose to eat less or abstain entirely (de Boer et al., 2007; Kalof et al., 1999). Previous research postulates that dietary choice is driven by values, at least in part, and therefore is an area that deserves further research (Kalof et al., 1999). This section outlines the links to meat consumption through the two value dimensions that have been described above.

4.5.1 Self-transcendence/ Self-enhancement

Self-transcendence values have often been associated with people who choose to consume little or no meat. In a study by Dietz et al. (1995) people with altruistic, or greater self-transcendence values were more likely to be vegetarian than others. Their research also provided evidence that demographic factors are not as important as social-psychological factors, like beliefs and values in dietary choice. A study by de Boer et al. (2007) found the value-type universalism to have a significant positive association with a diet higher in free range meat or a diet with less meat altogether. Further research by Kalof et al. (1999), also places high importance on altruism as a strong predictor of a vegetarian diet. These findings were consistent with Lindeman and Sirelius (2001) who also looked at beliefs of people within different diet categories and concluded that vegetarians endorsed a stronger ecological ideology more than omnivores. Overall, the research on the self-transcendence dimension is generally consistent and is the most common value dimension associated with low levels of meat consumption.

With regard to self-enhancement, there is empirical evidence to suggest a link between power values and higher meat consumption. A study conducted in New Zealand by Allen, Wilson, Ng, and Dunne (2000) concluded that people who see themselves as, or self-identify as meat eaters, have a value orientation more in favour of hierarchical domination and social power. In comparison, people who viewed themselves as vegetarians valued things like equality and social justice more highly, which aligns with other self-transcendent results mentioned above. Further research from Allen and Ng (2003) has corroborated these results, remarking that positive attitudes towards eating red meat were highest when meat identification and self-enhancement values were high. It was therefore argued that individuals consume meat in ways consistent with their self-image (Allen et al., 2000). Self-enhancement values are generally about exercising one's dominance or power over others, including animals and the environment, hence eating meat will reinforce these beliefs.

4.5.2 Traditionalism/Openness to Change

Traditionalism has been identified along with self-transcendence values as having a significant influence on meat consumption. Where, traditionalism is positively associated with meat consumption, meaning strong traditionalism values correlate with high meat consumption. In the same study that placed importance on altruism influencing vegetarianism, Dietz et al. (1995) found that people with traditional values were more likely to be meat eaters, and mentioned that this was the strongest predictor of the four value types. They postulated that vegetarianism may be perceived as a non-traditional lifestyle and is therefore something to avoid (Dietz et al., 1995). Kalof et al. (1999) share similar sentiments from their research, saying only traditionalism and altruism influenced beliefs about vegetarianism. Allen and Ng (2003) have also endorsed these results, saying that the symbolism of meat aligns with traditionalist values.

There is little evidence that links openness to change values to environmentalism; this is also true of vegetarianism or meat consumption. However, as mentioned previously in the chapter, one study has found a positive correlation between stimulation and self-direction value types and the tendency to be a vegetarian (Lindeman & Sirelius, 2001). Even so, relatively few studies have examined the relationship between openness to change and meat consumption; therefore it is difficult to draw any firm conclusions. It may also be important to note that because this field of research is generally focused on changing behaviour towards more environmentally responsible actions, people who have higher openness to change values may in fact be more willing to change if an alternative is put in front of them.

4.6 Review of Values

It is clear from the literature that values do have a role to play in explaining pro-environmental behaviours and meat consumption. The value dimension of interest for the current study lies in the self-enhancement/self-transcendence dimension as both ends of the spectrum are theoretically linked to meat consumption in contrasting ways. Tradition was found to have an influence on meat consumption, but openness to change did not appear to have any substantial link, meaning that looking at these two value types may not yield a result on one end of the dimension. By choosing to focus on two opposing value types (self-enhancement/self-transcendence) on one dimension it is more likely that a clearer result will emerge.

Understanding the relationship between values and environmentally sustainable choices (and in particular to this research about the consumption of meat) can shed some light on how to encourage more sustainable behaviour. If in the long run as Thøgersen and Ölander (2002) suggest, stimulating change in one's values and attitudes may help encourage positive changes in behaviour, then outcomes for pro-environmental programs could be more successful if this is taken into account. How people with different values might respond to information that is promoting more sustainable practices and behaviour is a logical next step in understanding pro-environmental behaviour change. How information provision and framing theory can be used to achieve change will be covered in the upcoming sections.

4.7 Information, Behaviour Change and Food Choice

The provision of information about environmental problems is a vital part of changing one's behaviour to protect the environment. A lack of understanding about a problem can be a significant barrier to change, as individuals are often not aware of the consequences of their actions. The knowledge-deficit theory argues that there is a

causal relationship between knowledge and behaviour; with the key assumption being people will not change their behaviour until they understand how and or why they should make a change (Schultz, 2002). This is particularly relevant to environmental problems and actions because of the sometimes complex links between an action and a consequence. As such, expert analysis and scientific data is an important way to help quantify the extent to which a person's behaviour may be impacting the environment (Gardner & Stern, 2002). Once this is established the public can be informed to bring about change.

Many studies have investigated how information provision can change behaviour. Simple provision of straightforward information can make some difference, particularly in relation to behaviours that can be changed easily and with low cost (Gardner & Stern, 2002). Information campaigns have been shown to increase knowledge and concern but this does not necessarily relate to a change in behaviour (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Nolan, 2010). One reason put forward for the apparent lack of effectiveness of information in changing behaviours is that it often ignores a person's motivation for engaging in this behaviour (Barr & Gilg, 2007). Understanding people's environmental motivations through their value structure and the way in which information can be tailored to these underlying beliefs may provide insight into how best to use information to change behaviour.

Changes in people's diets have been studied more for health reasons than environmental ones, but parallels can be drawn. In a review of the literature about nutritional labels and dietary choice, Drichoutis, Lazaridis, and Nayga (2006) stipulated that the provision and use of nutritional information can improve dietary patterns. Another study by Aikman, Min, and Graham (2006) has produced similar findings, indicating that an increase in knowledge about nutritional value whilst also trying to reduce the importance of other factors could effectively promote a healthier diet. Similar information campaigns about the detrimental effects of meat production on the environment could also potentially lead to a greater understanding of some of the problems occurring.

Motivation for eating certain foods is also thought to be moderated by involvement or perceived personal importance. In this context, involvement in food is generally thought about as how important a product is perceived to be in meeting a person's goals, values or needs (Vermeir & Verbeke, 2006). One consequence of the increased importance is related to how much cognitive effort is used to decide what to buy and eat (Bell & Marshall, 2003). More specifically to this research, involvement influences how much effort a person will put into becoming informed about a product before deciding to buy it. Food involvement may therefore influence people's perception of meat. Providing someone who is highly involved in food with information regarding the negative effects of meat production may result in a greater response through being more open to the information provided.

With the knowledge that information provision can make a difference, but is not altogether successful in changing behaviour, leads to questions of how information can be made more effective. This thesis hypothesises that information that is in accordance with a person's value structure may be more effective in changing attitudes and subsequently behaviour. By appealing to the strengths of self-enhancement and self-transcendence values through an informational message it is proposed that people will respond more strongly to the information that they identify with the most. This hypothesis will be tested through message framing which is targeted at either self-enhancement or self-transcendence values.

4.8 Message Framing

Relaying information in different ways can have an effect on how a message is used and interpreted by the audience receiving it; this is known as framing (Chong & Druckman, 2007). Framing a message in specific ways has been shown to have an effect on the intended outcome of a message (Davis, 1995; Spence & Pidgeon, 2010). For instance, one could frame an environmental issue in terms of a gain or a loss to an individual or group, giving the audience a different perspective or take on an issue. Depending on how loss-averse a person is, the gain or loss frame of the message could

have a significant effect. Spence and Pidgeon (2010) found for example, that when the same information about climate change was framed in terms of gains (e.g. “by mitigating climate change, we can prevent further increases in winter floods” p. 664), it was more effective compared to a message framed in terms of a loss (e.g. “without mitigating climate change, we will see further increases in winter floods” p. 664).

Research also suggests that framing does not have the same impact on everyone. The effect of a message frame is thought to depend on individual differences in beliefs, values and pre-existing attitudes (Shen & Edwards, 2005). So when personal relevance is high, the effect of information content is more significant (Petty & Wegener, 1999). People have a tendency to use heuristics or cognitive shortcuts when processing information; effectively meaning most people only process enough relevant information to render a suitable judgement, thus basing a decision on information that is most accessible to them (Chong & Druckman, 2007; Shen & Edwards, 2005). In a study concerning humanitarian and individualistic media frames on welfare reform, Shen and Edwards (2005) demonstrated that an individual’s values did have important implications on the outcomes given different message frames. Individuals who scored highly on individualism and humanitarianism had a greater response to the message that resonated with those values respectively. By the same token, an article by Taylor (2000) describes a process of value amplification as one effect of framing, where a message elevates or idealises a value by emphasising certain aspects of a message, thereby inspiring greater relevance of an issue by connecting it to someone’s life through pre-existing beliefs. Shen and Edwards (2005) explain these results through the social cognitive theory of accessibility. They argue that a value which is accessed regularly has a higher activation potential and when primed by the right information can play a stronger role in the decision making process. Therefore, providing the ‘right information’ that is congruent with a person’s predisposing values is thought to make a greater impact on the person receiving it.

Considering the relationship between values and pro-environmental behaviour explored previously, Schultz and Zelezny (2003) have argued that it may be pertinent to relay an environmental message framed towards the salient values relating to the particular context or culture in question. The nature of most environmental problems

leads to environmental messaging that is often framed as a societal issue that needs to be tackled by everyone changing certain behaviours; this may appeal to people who are more altruistic but is not conducive to other more egoistic tendencies (Schultz & Zelezny, 2003).

Understanding the differences in how people with differing value structures interpret information may achieve better environmental outcomes through a more targeted message approach. By appealing to values which are salient to an individual through a specifically framed message a more effective outcome can be expected. Due to its relevance to meat consumption, appealing to either extreme of the self-transcendence/self-enhancement value dimension through different message frames will expand this area of research and make it more compatible to the environmental studies field.

4.9 Research Questions and Hypotheses

After deliberation on the theories discussed, a hypothesis evolved for each of the research questions posed in the opening chapter. Table 4.2 lists each research question and its associated hypothesis.

Table 4.1 Research questions and hypotheses

Hypotheses for research questions derived from theoretical literature	
1. How are different human values, environmental concern and food involvement related to meat consumption?	H₁: <i>Self-transcendence values will be negatively related to meat consumption, self-enhancement values will be positively associated with meat consumption. Tradition and openness to change will be correlated positively and negatively respectively as the theory predicts. Environmental concern and food involvement will have a negative association with meat eating.</i>
2. Does providing a message about the environmental impacts of eating meat affect people's attitudes and intentions regarding meat consumption, compared to a control group?	H₂: <i>Information will change attitudes and intentions about meat consumption because of a greater knowledge about the problems associated with meat production, as postulated by the</i>

knowledge deficit theory.

- 3. What is the effect of message framing (individual or collective) on people's attitudes towards meat consumption, intention to reduce meat intake and attitudes to GHG emissions from meat production?**

H₃: *When values are not taken into consideration, there will be no significant difference between the individually and collectively framed message on attitudes and intentions.*

- 4. Given differences in people's value structures and environmental concern does environmental information about meat production change attitudes and intentions about meat consumption, when looked at comparatively to a control group?**

H₄: *The information as a whole pushes the idea of reducing meat consumption; as a result there will be a more positive response by people who place greater weight on self-transcendence values compared to those that favour self-enhancement values, because overall the information aligns more closely to those beliefs.*

- 5. Does framing a message towards certain pre-existing value structures create a more effective message, therefore changing a person's attitudes and intentions about meat consumption more significantly?**

H₅: *A greater change in attitudes and intentions will occur when the message frame aligns with one's values. The individual message will appeal to people with stronger self-enhancement values and the collective message will appeal to those with stronger self-transcendence values.*

4.10 Summary

Bringing value and information theory together has led to the central questions of this thesis. When knowledge about a) how people make decisions through values and b) how they receive new information is brought together, better pro-environmental outcomes may result. Specifically with regard to this thesis, a potential reduction in meat consumption will be the test case. The results will not only be applicable to diet change and sustainable consumption, but could have wider ranging implications for other environmental problems where there is a deficit of knowledge about a problem or where information campaigns have failed in the past. The process of answering the key research questions is discussed in the following chapter.

Chapter 5: Methodology

5.1 Introduction

This chapter starts by explaining why a quantitative approach has been employed for this study. The overall research design is discussed next, explaining the study method in detail along with how participants were recruited. Subsequently, the section on survey development outlines the questions used in each aspect of the survey, going over the sample characteristics and addresses some of the statistical measures that need to be established before moving on to the main analysis. A brief section on ethical obligations and approval is included. The final section of the methodology chapter considers what type of analysis will be used to answer the key questions of the thesis.

5.2 Epistemological Position

This research uses a quantitative approach to examine the questions posed at the outset of the thesis. Quantitative research has historically been rooted in positivism, where research has been focused on establishing an objective truth about the world through empirical studies (Wheeldon & Åhlberg, 2012). More recently there has been a move towards postpositivism. Postpositive study is based within the notions of positivism but sees knowledge as more speculative, therefore, truths about reality can only be known imperfectly or only in a probabilistic fashion (Creswell, 2012; Wheeldon & Åhlberg, 2012). Consequent to knowledge being imperfect, in the postpositive sense, is that claims about studying human behaviour or actions cannot be one hundred percent accurate or 'positive', only that there is a certain likelihood of outcomes (Creswell, 2012). In essence, postpositivism is a deterministic viewpoint, in which social phenomena is explained by observing a cause that probably determines an

effect or outcome. Through a reductionist framework, postpositivists try to understand the world by developing numeric measurements of observation to assess the theories put forward to explain certain phenomena (Creswell, 2012).

5.3 Quantitative Survey Research

To understand the world in a postpositivist or probabilistic fashion, an amount or quantity of certain behaviour (in this instance) needs to be measured. Surveys are one of the ways in which this can be done. Surveys collect information to create a structured or systematic data set that measures variables across many cases or individuals (de Vaus, 2014). Measuring the same variables across individuals allows for comparative analysis that can lead to conclusions about how a phenomenon may come about (de Vaus, 2014). This study makes comparisons between certain individuals in relation to how they may receive new information regarding their behaviour based on pre-existing preferences. A survey tool was therefore employed for data collection, enabling the comparison of groups of people before and after an intervention (i.e. the provision of information).

5.4 Research Design

The data collection for this research was conducted via an online survey consisting of three main sections. Initially, section one gathered information about participants' demographics, meat consumption, food involvement, environmental concern and value structures. Section two of the survey provides the intervention or treatment condition; a short piece of information about the impact of meat consumption on GHG emissions within the New Zealand environment, and what can be achieved by adopting a low meat diet. The information was framed in two ways and gave estimates of reduction figures by adopting a low meat diet as either an individual or as a society; there was also a control group who received no information. Participants

were randomly assigned to the information or control groups via the survey tool to ensure there were no significant differences between the groups at the outset (e.g. one group having significantly more meat eaters than another group), which could account for the differences in the outcome variables. The third part of the survey recorded the outcome variables of interest, namely attitude and intentions to reduce meat consumption. See Figure 5.1 for a visual representation of the survey structure. The different components of the survey will be discussed in the next section.

Figure 5.1 Model of survey structure

The information was framed in two different ways: an individually focused message and a society focused message. The assumption underlying the message framing manipulation was that the individually focused message would appeal more to those with strong self-enhancement values and that the society focused message would appeal more to those with strong self-transcendence values. The self-enhancement/self-transcendence dimension was chosen because of its relationship to pro-environmental behaviour and meat consumption, over and above the openness to change/traditionalism dimension. Theory suggests that people with high self-enhancement values are focused on the self more than people with high self-transcendence values who are more concerned with the welfare of others. Thus, a message that is focused on individual benefits of reducing meat consumption was expected to appeal more to those with high self-enhancement values as the message should be more in line with their values. In contrast, a societal or collectively framed message that emphasised societal benefits of reducing meat consumption was

considered to appeal to people with high self-transcendence values, as they are by and large more concerned with impacts that effect not just themselves, but other individuals as well.

Participants were recruited through convenience and snowball sampling, as these are the most practical and cost effective methods for a research project this size. The sample initially included anyone who wished to participate, to encourage a large sample size. Ideally, a representative sample of the New Zealand population would be used in such a study. Nevertheless, convenience sampling is the most common form of sampling within psychology and behavioural science research and is an accepted method, as long as the frame of reference is clearly stated and inferences are not drawn too widely (A. Evans & Rooney, 2011; Gravetter & Forzano, 2012). For example, it would not be feasible to draw conclusions about the New Zealand population as a whole because the sample is not representative of the population.

The use of an online tool was chosen as the most effective and efficient way of gathering the information required. The Qualtrics web survey software was used to conduct the survey as this service is provided by Victoria University for students free of charge and has a wide range of options and settings that can be applied to surveys of this kind. Reasons cited for the use of online surveys include: ease of access and use, time efficiencies, recruitment advantages and cost (Sue & Ritter, 2007). Conversely, there are pitfalls with online survey tools that can limit the applicability of results to a whole population. The main concern is sample bias as not all people have access to the internet and even when people do there is a discrepancy between users, with how often or how willing they are to spend time filling in online surveys (de Vaus, 2014; Sue & Ritter, 2007).

The survey was open throughout the period of 24th of June until the 2nd of August 2014 and was advertised primarily through email and social media. Use of Victoria University's emailing lists was used via school administrators at their discretion. The researchers email and Facebook page was also employed to reach a wider non-university audience. In addition, over a 1,000 flyers were posted into letter boxes in local suburbs around Wellington and posters were placed around Victoria University's

Kelburn campus, again trying to attract a larger, wider range of participants. All advertisements were accompanied by an invitation for participants to pass the survey link along to anyone else who may wish to complete it. As an encouragement for participation in the survey, every survey completed was placed into a draw to win \$200 worth of grocery vouchers. One respondent was then drawn randomly at the close of the survey as the winner of the prize.

5.5 Research Sample

In total 1,131 people accessed the survey online. Of those, 923 completed the survey. A number of participants were removed for the purposes of this research. A question concerning New Zealand residency was used to identify people living in the country of interest, so participants residing outside New Zealand were excluded from the data analysis. The survey also included a knowledge question about the contents of the information provided. The assumption was that if a participant answered the question incorrectly, they had not read or understood the message. Their responses were then excluded from further analysis. A total of 848 cases were ultimately included in the analysis. A more detailed description of the sample is provided under the section on demographics.

5.6 Survey Development and Initial Data Inspection

The survey development outlined here imparts how and why specific questions for the survey were used. Additionally, a preliminary data inspection allowing for further analysis accompanies each relevant section. The order of each section is as presented in the survey. Two pilot studies were undertaken prior to the final survey being released; one was conducted on paper and the other online. Conducting the two pilot surveys provided valuable feedback, and helped gain insight into whether the questions were understandable, logical and understood in the manner they were

intended. The data gathered with the online pilot survey was tested for data analysis, logical progression and accessibility. The results of the pilot survey will be discussed in relation to each sub section if relevant. For the most part however, the pilot survey was deemed too long and convoluted which led to a consolidation of questions. For the full survey used in the research, refer to Appendix B.

5.6.1 Demographics

The initial questions regarding personal characteristics of participants were used to describe the characteristics of the sample population. Standard questions about gender, age, income, ethnicity, education, childhood background and place of residence were employed to gather the information necessary to establish characteristics of those being surveyed.

The sample consisted of 581 females (68.5%) and 267 males (31.5%); with the largest portion (315, 37.1%) in the 21 to 30 age bracket. Other age groups were relatively evenly distributed: under 20: 13.9% (118), 31-40: 17.7% (150), 41-50: 13.9% (118), 51-60: 10% (85) and 61 years and over at 7.3% (62). Most respondents identified as New Zealand European (617, 72.8%). The next largest group was Other (159, 18.8%), followed by Asian (43, 5.1%), Maori (20, 2.4%) and Pacific Peoples (7, 0.8%); two people did not respond to this question. The sampled population ended up being highly educated with 43.3% (367) of people having some form of postgraduate qualification, 28.2% (239) of people had completed a Bachelors degree, 28.3% (239) of participants having some other form of education, and 0.2% (2) had no formal qualification. Income distribution was skewed towards lower incomes. 38.7% (328) of people were earning below \$19,999 per annum, with each successive \$20,000 bracket increasing after that had progressively less respondents, 18.6% (158), 15.6% (134), 10.8% (92), 7% (59), 7.9% (67) for each bracket respectively. Ten people chose not to respond. These demographics are not surprising given that the mailing lists used throughout the university were predominantly available to university students and staff.

5.6.2 Meat Consumption

Meat consumption was measured by asking participants how many days a week they ate meat. The answering options ranged from zero to seven days a week. To make it less obvious that the survey was about meat consumption this question also asked about seven other food types and the frequency of daily consumption. For the purposes of this study fish was excluded from the meat category and placed in the seafood group. The pilot study included a question about portion size and included an example of how much a typical beef patty would weigh, revealing that many people did not know reliably how much meat they may typically eat at each meal. From follow up discussions it appeared that portion size was generally under estimated so it was decided not to include a question about how much meat people ate with their meals as this would have led to inconsistencies in personal estimations. Additionally, it would have also alluded to the survey's key purpose of acquiring meat consumption levels.

Figure 5.2 Daily meat consumption of sample population

Figure 5.2 shows how often people ate meat in a week, on a daily basis. The majority of people ate meat most days of the week as expected, however there was a large number of people who never ate meat. These figures are not in line with the

vegetarian percentages for New Zealand as estimated earlier in the thesis. An important reason is that because of the sampling method used, the study sample is not representative of the New Zealand population. People who consumed no meat may have been more likely to participate in this study as they may already have an interest in this topic.

5.6.3 Food Involvement

Food involvement or level of perceived personal importance in food is thought to be a key predictor in food choice (Verbeke & Vackier, 2004). Typically, people with high involvement make more informed decisions about what they consume and are more receptive to new information regarding food (de Boer et al., 2007). To control for this effect a modified version of Bell and Marshall's (2003) food involvement scale was used. This scale asks questions about how much someone may think about food, how important food choices are and how often one may do the cooking. To reduce the survey length, the original scale of 12 questions was reduced to six, while ensuring that the key aspects of the scale being investigated were still covered. The measure was a seven point Likert scale ranging from 1 = 'disagree strongly' to 7 = 'agree strongly'.

Upon analysis of the food involvement scale a mean of 5.11 ± 1 (results are mean $\pm$ standard deviation unless otherwise stated) out of 7 ($n = 832$) was found. The sixth question in the scale was removed as this lowered the alpha figure. Removing unreliable items is standard procedure when creating scales (de Vaus, 2014). The scale had an internal consistency of $\alpha = .68$. For an established scale, an alpha of at least .70 and desirably over .80 would be ideal (de Vaus, 2014). This outcome may have occurred because of the modified version of the scale used in this survey.

5.6.4 Measuring Values

To measure values, the widely cited and validated Portrait Value Questionnaire (PVQ) was used. The original Schwartz Value Survey, represented in Appendix A, was not used because it was designed to be an interview questionnaire, and its structure makes it less conducive to an online format (Schwartz, 2009). Initially, the pilot survey used the full 40 question PVQ developed by Schwartz et al. (2001), but due to time considerations a revised 21-item version used in European Social Survey (ESS) was adapted for use. An extra item was added to ESS version of the PVQ in the power dimension because of the importance placed on the difference between self-enhancement and self-transcendence values in this research, taking the total item count to 22. Since the development of the PVQ, it has been extensively tested and validated across various disciplines worldwide to analyse value structure within and among populations (Krystallis, Vassallo, Chryssohoidis, & Perrea, 2008).

The PVQ is based on short statements or portraits of different people describing a person's "goals aspirations or wishes that point implicitly to the importance of a value" (Schwartz et al., 2001, p. 523). For example, portrait one states "thinking up new ideas is important to her. She likes to do things her own original way", which describes a person who rates self-direction values as important (note there is a male and female version of each set of questions). Respondents are then asked to rate the extent to which they are like the person described in the portrait on a six-item scale consisting of 1 = 'very much like me', 2 = 'like me', 3 = 'somewhat like me', 4 = 'a little like me', 5 = 'not like me' or 6 = 'not like me at all'. From the self-reported similarity the importance of each value can be inferred (Schwartz et al., 2001). For each of the ten value dimensions there are two items, except power and universalism, where there are three.

The internal reliabilities for each of the four higher value types (self-transcendence, self-enhancement, openness to change and tradition) were calculated and are shown in Table 5.1. For a full list of value results refer to Appendix D. The alpha figures for the

four higher values are consistent with other relevant literature and are considered acceptable (Schwartz, 2003; Verkasalo, Lönnqvist, Lipsanen, & Helkama, 2009). Lower internal reliability compared to the other scales (i.e. $\alpha < .80$) was expected because some values have conceptually broad definitions that cover several factors. Key literature has cited that low reliability and low discriminability were built into the values model because it is best to cover the diversity and full motivational continuum of each value rather than maximising homogeneity (Caprara, Schwartz, Capanna, Vecchione, & Barbaranelli, 2006; Schwartz, 2012b). This means that instead of looking only for questions that consistently generate similar responses, it is better to use questions that encompass most aspects of each value-type. For example, universalism covers both equality and caring for the environment, which do not necessarily relate to one another, although they should have underlying similarities. For analysis, Schwartz (2002) suggests that because people differ in their use of the response scale it is best to correct this via individual mean centring. Centring here is done by calculating each individual's mean score across all items and then subtracting this score from each of the 10 value type scores. In line with Schwartz, the centred scores were used for this analysis.

Table 5.1 Higher value type scale information

Higher Order Values	<i>N</i>	Mean score (out of 7)	<i>SD</i>	Cronbach's alpha coefficient (α)
Self-enhancement	828	3.67	.82	.78
Self-transcendence	830	4.92	.66	.66
Tradition	831	3.53	.82	.68
Openness to change	840	4.31	.84	.67

5.6.5 Environmental Concern

Concern for the environment was also thought to be an explanatory variable for food choice and was measured using a modified version of the NEP scale. The NEP, first developed in 1978 and since revised, has been shown to be a reliable measure of pro-environmental orientation and is used widely across the world (Dunlap, 2008). The

scale is focused around beliefs about anthropogenic limits and impacts on the environment and humanity's right to rule over nature (Dunlap, Van Liere, Mertig, & Jones, 2000). The questions were asked in the context of "how much do you agree or disagree with the following statement", with responses ranked on a seven point Likert scale ranging from 1 = 'strongly agree' to 7 = 'strongly disagree'. For example, statements like, "we are approaching the limit of the number of people the earth can support" and, "humans have the right to modify the natural environment to suit their needs" were included. The revised version of the NEP was cut down to seven questions from the original 15, to reduce the time taken for survey completion.

The mean NEP score from the sample was 5.43 ± 0.94 out of 7 ($n = 834$), with an acceptable internal reliability, $\alpha = .81$. The removal of questions did not result in an alpha increase, so all seven items were left in for analysis. In comparison to a cross country study done by Schultz and Zelezny (1999) this is a very high NEP average, with none of the 14 countries studied scoring over five. Reasons for this again are likely to do with the sampling method and one cannot say that the New Zealand population as a whole would show the same result.

5.6.6 Information Intervention

The messages to test how different participants responded to differently framed information were developed with four major premises in mind. Firstly, the information had to be transferrable between two frames of reference (individually and collectively focused) without compromising the core message. Secondly, the message had to relate specifically to a New Zealand context regarding what would happen if meat consumption was reduced. Thirdly, the information had to appear credible to the reader. Lastly, the length of the message needed to be kept as short as possible for ease of reading and time considerations.

To achieve the objectives above, figures about meat consumption in New Zealand were used in conjunction with LCA of carbon footprints for grass fed meat. A

comprehensive study by Williams et al. (2006) was used for carbon emissions per kilogram of dead weight, which had average figures compared to other estimates (de Vries & de Boer, 2010; Rööß et al., 2013). Two further studies using the LCA approach conducted in New Zealand were found (Ledgard et al., 2010; Lieffering et al., 2012) and were also compared to the Williams et al. (2006) study; the figures specific to lamb and beef were slightly higher but comparable. For reasons of consistency between all meats (poultry, pork, beef and lamb) the Williams et al. (2006) study was chosen. New Zealand meat consumption figures were obtained through the 'Compendium of New Zealand Farm Facts 2014' published by Beef + Lamb New Zealand (2014).

Carbon footprints were calculated at a personal level and as a country. The different messages were created from these figures and stayed exactly the same apart from the use of language to indicate whether the information was targeted at an individual or at society. The message can be read in the survey (see Appendix B). To make the figures more relevant, the US Environmental Protection Agency equivalency calculator¹ was used to estimate how much potential mitigation will be avoided to sequester the carbon released by the production of meat. All sources were provided as a footnote at the bottom of the information page to aid credibility.

The message treatment was randomly allocated for participants. The control group (no message) consisted of 317 participants (37.4%), the individual information group had 267 participants (31.5%) and the collective message had 264 participants (31.1%) allocated. The difference in number comes from the incomplete or discarded surveys.

To ensure that all three treatment groups had been randomly allocated participants with similar average characteristics a Kruskal-Wallis H test was conducted to determine if there were differences between treatment groups. Distribution of characteristics was similar for all groups, as assessed by visual inspection of box plots. Median scores for all groups were statistically similar (refer to Table 5.2), meaning random allocation was successful.

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¹ EPA equivalency calculator found at <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

Table 5.2 Tests for randomness between treatment groups

Characteristic	<i>N</i>	Degrees of Freedom	<i>H</i> Test Statistic	<i>p</i> value
1. Age	848	2	.974	.614
2. Gender	848	2	1.493	.474
3. Ethnicity	846	2	1.413	.493
4. Education Level	847	2	1.354	.508
5. Income	838	2	.906	.636
6. Food Involvement	832	2	1.993	.369
7. Environmental Concern	834	2	.785	.675
8. Meat Consumption	839	2	1.771	.412

5.6.7 Manipulation and Credibility Checks

A manipulation check is designed to test whether or not the treatment or manipulation of an independent variable has had the desired effect on the participant (Gravetter & Forzano, 2012). To test whether or not the treatment had the required result on the audience some checks were placed after the message for participants to answer. First, a question relating to the content of the message was asked to ensure people had read it. Participants were presented with the statement “what issue was talked about in the article?” and then given four answering options, 1 = ‘New Zealand’s meat exports’, 2 = ‘water contamination from livestock’, 3 = ‘animal welfare and factory farming’, and 4 = ‘meat production and climate change’. The participants who gave the correct answer, option four, were assumed to have read the message. It turned out that 6.5% of participants gave an incorrect answer; as indicated earlier, these participants were removed from further data analysis because it was assumed that they had either not read or understood the message.

Second, to test whether or not there was a difference in the message framing intervention three questions were used to allow participants to identify who they thought the message was targeted at. The three questions are listed in Table 5.3. The measurement scale ranged from negative 100 (individual) to positive 100 (collective).

A check was then carried out to ascertain whether participants who had read the individual or societal message also rated the message as such; thus helping to ensure the message framing had been successful. To test the difference in messages a Mann-Whitney *U* test was run because of the non-normality of the data. The distribution of results for the individual group and collective group were dissimilar for all three questions, as assessed by visual inspection. There was a statistically significant difference between the two intervention groups for all three checks, as shown in Table 5.3. As the mean for those in the individual message group was statistically lower than the collective mean for all three questions it was deemed that the messages had been interpreted in the correct way.

Table 5.3 Manipulation check results

Question	<i>N</i>	Individual Mean	Collective Mean	Mann-Whitney <i>U</i>	<i>Z</i> score	<i>p</i> value
1. Did you feel the message was more about your meat consumption or New Zealand's meat consumption?	512	7.18	42.60	21,555.5	-6.698	<.0005
2. Did you feel the message was more about individual responsibility or society's responsibility?	504	-37.48	-2.34	19,983.0	-7.180	<.0005
3. Was the message targeted at you or everyone?	504	17.49	49.91	22,572.5	-5.614	<.0005

Note: The measurement scale ranged from negative 100 being entirely individual to positive 100 entirely collective

The final information check was a credibility test created to assess how much a person believed the information presented. Making a message credible is an important part of information provision. If the message is not believed then the outcomes are unlikely to be successful (Ratner & Riis, 2014). Credibility was measured with a semantic differential scale and was stated as follows "after reading the message did you think the information it contained was... credible, valuable, worthwhile, meaningful, and understandable, with answering options one to seven as the extremes for each option. The scale had a reliable internal consistency ($\alpha = .83$) and an overall mean of 5.64 out of seven. Credibility was also checked across messages to

make sure one was not more credible than the other. Due to the non-normality of the data a Mann-Whitney U test was run to determine if there was a difference in credibility scores for the collective and individually framed messages. Median credibility score was not statistically different between the two messages, $U = 34,572$, $z = -.082$, $p = .934$, meaning one frame was not considered more credible than the other. These results indicate that most people thought that both messages were indeed a credible source of information.

5.6.8 Attitudes and Intentions

The outcome or dependent variables chosen were attitudes and intentions. The TPB advances the idea that attitudes and intentions are strong antecedents of actual behaviour (Ajzen, 1991). The TPB is considered one of the best models available to describe how behaviour comes to fruition in an individual. Many studies have tested the model, particularly within the environmental and sustainable consumption fields (Kothe, Mullan, & Butow, 2012; Sparks & Shepherd, 1992; Vermeir & Verbeke, 2008). These studies have shown that both attitudes and intentions can predict behaviour to varying degrees.

To measure attitude, it is most common to use semantic differential scales (Ajzen, 2002). The scale generally has four or more scale items consisting of two components; one component being of an instrumental nature (harmful – beneficial) and the other a more experiential quality (pleasant – unpleasant) (Ajzen, 2002). The survey used two attitude scales, one, attitude to having meat in the diet (Table 5.4), and two, attitude towards the problem of GHG emissions from meat production (Table 5.5). Both questions had answering options of 1 to 7 as the extremes at each end of the scales.

Table 5.4 Attitude to having meat in the diet question

For me personally, having meat as part of my weekly diet is...								
	1	2	3	4	5	6	7	
Unimportant								Important
Preferred								Not preferred
Necessary								Unnecessary
Bad								Good
Beneficial								Harmful
Indispensable								Dispensable

Table 5.5 Attitude towards the problem of GHG emissions from meat production question

For you personally, are the greenhouse gas emissions from meat production...								
	1	2	3	4	5	6	7	
Of concern								Of no concern
An unimportant issue								An important issue
Significant								Insignificant
Overstated								Understated
Cause for alarm								Not cause for alarm
Avoidable								Unavoidable

Intentions to reduce meat consumption were measured via a series of questions with a Likert scale (1-7) as suggested by Ajzen (2002), asking “how much do you agree or disagree with the following statement”. The four questions posed tried to encapsulate a potential change in behaviour towards a lower meat diet. The four intention scale questions were:

1. “I intent to eat meat most days of the forthcoming month”
2. “in the forthcoming month I would be willing to reduce my meat intake”
3. “I plan to use more alternative protein sources than that of meat (such as beans, lentils, peas and nuts) in the forthcoming month”
4. “In the forthcoming month I am likely to eat meat on relatively few or no occasions”.

The reliabilities of the attitude and intention scales were assessed and can be reviewed in Table 5.6. Intention to eat meat was measured with only three of the four questions, removing question 2 from the scale to obtain a greater reliability; another reason for this was to ensure all participants were accounted for in the analysis. People who stated they ate little or no meat were not presented with question 2, as they could not reduce their meat intake to lower levels. Question 6 was removed from the GHG attitude scale also to increase reliability. Overall, the internal reliability of these three scales is good, with alphas all over the .80 accepted threshold.

Table 5.6 Attitude and intention scales

Scale	<i>N</i>	Mean score (out of 7)	<i>SD</i>	Cronbach's alpha coefficient (α)	Questions removed
Meat consumption attitude	826	3.81	1.71	.93	None
GHG attitude	833	4.96	1.30	.88	Q6
Intention to eat meat	846	3.95	1.98	.85	Q2

5.7 Ethical Obligations

Ethics approval was sought via the Human Ethics Committee of Victoria University for this study. The major consideration for ethical approval was to provide all participants with assurances that the information they gave would be treated anonymously and confidentially so no personal identification was possible. The data gathered was also aggregated for analysis so results are not attributable to individuals. Ethical approval was granted on the 7th of June 2014; ethics approval number 21005 (Appendix C). The information sheet for participants about the study was included at the start of the survey and was followed by a question regarding consent to participate in the research. Refer to Appendix B for this information at the beginning of the survey.

5.8 Analysis

After data cleaning, variables were recoded when necessary so that higher values of scores reflected higher levels of that construct. The scales used were then tested for internal reliability, which have been reported in this chapter. Initially a correlation analysis was conducted to assess variable relationships. Analysis between treatment groups was done through simple group comparisons (i.e. independent-samples *t*-tests) at the outset to answer research questions 2 and 3. The more complex analysis of taking predisposing characteristics, like values, into account was tackled through moderation analysis using hierarchical regression models. A brief overview of this process follows.

5.8.1 Moderation Analysis

To test whether information and framing has a different effect and outcome given participants varying value structures, a moderation analysis was conducted. Moderation is where the effect of one variable on the outcome depends on a third variable that influences the initial interaction pathway in a significant way (Hayes, 2013). Figure 5.3 represents the process in which a moderator variable influences the outcome by moderating the independent variable. Moderation is also known as an interaction effect when conducted via a factorial analysis of variance and is mathematically the same, but the regression procedure is more flexible and can be more accurate, which is why it is used in this study (Hayes, 2013).

Figure 5.3 Conceptual moderation model. Adapted from Hayes (2013, p. 209)

To achieve a moderation analysis, a new variable, the interaction term, is created. Finding the product of the independent variable and moderator variable allows the two regression lines to have different slopes as well as intercepts (Hayes, 2013). The new variable is then added to the regression model to predict the dependent variable as illustrated in Figure 5.4.

Figure 5.4 Regression model for moderation analysis. Adapted from Hayes (2013, p. 215)

To test whether or not there is a moderation effect, the interaction term was tested for statistical significance in a hierarchical regression. This test was done for all of the bullet points in Figure 5.3. Significant interactions are presented in graphical format through the use of an Excel based programme, ModGraph-I version 3.0 (Jose, 2013). Other variables can be added to the regression model as covariates. In this instance,

covariates such as NEP, food involvement, and the other value types which are not being tested in the interaction were included to mitigate the confounding effect these factors may have on the moderation. As an example of why this is necessary, the VBN predicts that NEP is subsequent to values in the decision making process, so may mask the result of values interacting with the treatment condition. By controlling for NEP the effect of values on the outcomes should theoretically be more apparent.

5.9 Summary

Upon establishment of the method, research sample, reliabilities of the measurement scales and effectiveness of the message, further analysis proceeded to obtain the results. The analysis was conducted on IBM's Statistical Package for Social Sciences (SPSS) where the differences between test groups were investigated via the appropriate statistical method. Each result section is accompanied by a brief account of what was done and why, laying out the results for interpretation in the discussion chapter.

Chapter 6: Results

6.1 Introduction

The results chapter is organised in accordance with the research questions of the thesis. The initial question starts with the basic results building a picture that describes the relationships between the key variables measured in part 1 of the survey. Upon establishing these relationships, analysis of how information and message framing has affected people's attitudes and intentions is addressed. The key questions of the thesis are answered next and describe how people with varying values and environmental concern respond to the information provided, and if the different message frames are more effective given these predisposing differences among participants. As a brief reminder and for quick reference of what has been measured and what will be compared in this chapter, the survey model illustrated in Chapter 5 is again presented here.

Figure 5.1 Model of survey structure

6.2 Factors Relating to Meat Consumption

Research Question 1: How are different human values, environmental concern and food involvement related to meat consumption?

H₁: *Self-transcendence values will be negatively related to meat consumption, self-enhancement values will be positively associated with meat consumption. Tradition and openness to change will be correlated positively and negatively respectively as the theory predicts. Environmental concern and food involvement will have a negative association with meat eating.*

A Pearson's product-moment correlation analysis was run to assess the relationship between values, environmental concern, food involvement and the amount of meat consumed. Table 6.1 lists the correlations between these factors. Preliminary analysis showed relationships to be linear in nature as assessed by scatter plots with the data consisting of a small number of outliers, particularly in the value measures. The analysis was run twice, with and without the inclusion of the outliers; this made little or no difference to the results, so the outliers were included. The four higher values were evaluated to be normally distributed by Kolmogorov-Smirnov test ($p > .05$); however the other three variables were not. To assess whether the non-normality of the data affected the results, a Spearman's rank order correlation analysis was run, but resulted in little change to the coefficients. Additionally, the Pearson test is believed to be relatively robust to non-normally distributed data in large samples (>30) (Levin & Fox, 2011), so was proceeded with for the data presentation here.

Initially, a key point to note is that the value measures that oppose each other on the two value dimensions have strong negative relationships, self-enhancement/self-transcendence $r = -.61$ and tradition/openness to change $r = -.67$. These results align with the theory surrounding values discussed in Chapter 4 and indicate that having strong preferences on one end of the dimension is correlated with having weaker ones at the other.

Table 6.1 Pearson correlation statistics between variables

	<i>M</i>	<i>SD</i>	<i>N</i>	1	2	3	4	5	6
1. Meat Consumption	5.09	2.40	839						
2. Environmental Concern	5.43	.94	825	-.30**					
3. Food Involvement	5.11	1.00	823	-.08*	.12**				
4. Self-Enhancement	-.36	.55	794	.18**	-.20**	.01			
5. Self-Transcendence	.89	.57	794	-.27**	.36**	.07*	-.61**		
6. Tradition	-.51	.69	794	.12**	-.15**	-.15**	-.44**	-.19**	
7. Openness to Change	.28	.71	794	-.15**	.13**	.13**	-.10**	.10**	-.67**

Note: Numbers in the top row correspond to the numbers in the first column. Meat consumption was measured in days per week. Environmental concern was assessed through the NEP scale. Values were measured via the Portrait Value Questionnaire and have been individually mean centred as described in the methods chapter.

* $p < .05$ | ** $p < .01$

How meat consumption relates to values is as follows. Higher self-enhancement ($r = .18$) and tradition ($r = .12$) values were associated with a greater meat consumption. On the other hand, having high self-transcendence ($r = -.27$) and openness to change ($r = -.15$) values corresponded to having a lower meat intake. These results were consistent with the literature, particularly with respect to the self-transcendence values which had the strongest relationship of the four value types. Interestingly, in contrast to existing research, openness to change was correlated slightly more strongly with meat consumption compared to tradition values.

Environmental concern correlated to values in accordance with previous research also, but in the opposite direction to that of meat consumption. A higher level of environmental concern correlated with stronger self-transcendence values ($r = .36$), this being the strongest relationship of the four higher value measures. Openness to change also had a positive relationship ($r = .13$) to environmental concern, whereas self-enhancement correlated negatively with environmental concern ($r = -.20$), along with tradition ($r = -.15$). What's more, environmental concern had a moderate negative association with meat consumption ($r = -.30$), meaning that as a person's concern for the natural environment rises they are less likely to consume meat.

The correlation between food involvement and meat consumption was $r = -.08$, effectively meaning there was a significant but minor relationship between these two constructs. Correlations between food involvement and values were weak overall but strongest with tradition $r = -.15$ and openness to change $r = .13$.

In relation to research question 1 the hypothesis was largely confirmed. All four higher value types showed similar results to the existing literature in terms of their relationships with meat consumption and environmental concern. Environmental concern had a negative relationship with meat consumption, again as predicted. But food involvement seemed not to matter in predicting meat eating habits, contrary to what was expected.

6.3 Information Provision

Research Question 2: Does providing a message about the environmental impacts of eating meat affect people's attitudes and intentions regarding meat consumption, compared to a control group?

H₂: *Information will change attitudes and intentions about meat consumption because of a greater knowledge about the problems associated with meat production, as postulated by the knowledge-deficit theory.*

To answer research question 2, independent-samples *t*-tests were done to find out whether a message describing the negative consequences of meat consumption would affect people's attitudes and intentions. By comparing the means of the control and information groups, for the outcomes of, 'attitude towards meat consumption', people's 'future intentions to consume meat' and 'concern about GHG emissions from meat production' (Figure 5.1 survey part 3) would reveal if the message had a significant effect on the group which received the information.

A key point to keep in mind when reading the results is that a higher score on the attitude and intention scales means a more favourable attitude towards this behaviour. For example, this means that a higher score on the 'attitude towards meat consumption' and 'intention to eat meat' scales indicate a person is more favourably

inclined to that idea (i.e. eating more meat) and equally, a higher score on the 'attitude to GHG emissions' scale shows a greater concern for that issue. Note data is presented as mean $\pm$ standard deviation, unless otherwise stated.

People's attitude towards meat consumption did not significantly differ between the control group ($n = 303$, 4.20 ± 1.72) and the information group ($n = 523$, 4.18 ± 1.71). The mean difference was $-.02$ (95% CI, $-.27$ to $.22$), $t(824) = -.193$, $p = .847$. The message therefore was not successful in affecting people's attitude towards meat consumption. The same result was borne out with participants' intention to eat meat, between the control group ($n = 317$, 4.19 ± 1.97) and information group ($n = 529$, 3.97 ± 1.98), with a mean difference of $-.22$ (95% CI, $-.50$ to $.05$), $t(844) = -1.62$, $p = .106$. Notably though, for both dependent variables the mean difference was trending in the direction of favouring less meat consumption, but the difference was not large enough to reject the null hypothesis of the means being the same (see Figure 6.1).

Homogeneity of variance was assumed for both outcomes through Levene's test for equality of variance $p = .988$ and $p = .776$ respectively. Normality of the data was an issue generally because of the unequal distribution of meat consumption, as mentioned in the methods chapter (Figure 5.2). However, t -tests are relatively robust to non-normality (Howell, 2011; Levin & Fox, 2011) and non-parametric results did not differ from those already shown.

The other outcome measured was people's attitude towards the impact of GHG's from the production of meat and whether or not it is of concern. Again an independent-samples t -test was conducted between the control group ($n = 306$) and the information group ($n = 527$). The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variance ($p = .013$), so the results from an unequal variance or Welch t -test were used. The group that received the information (5.04 ± 1.23) had a greater concern for the problem of GHG emission from meat production than those people in the control group (4.81 ± 1.40), with a statistically significant difference of $.22$ (95% CI, $.03$ to $.41$), $t(571.4) = 2.30$, $p = .022$. Figure 6.1 shows this difference. Once more normality of the data was violated, but Mann-Whitney U results confirmed the significant difference between the two groups, $U = 88445.5$, $z = 2.34$, $p = .019$.

Figure 6.1 Attitude and intention mean scale scores with 95% CI error bars

Based on these results, it appears that the provision of information about the environmental impacts of eating meat affected people's attitudes towards the problem, but it did not affect people's attitudes towards eating meat, nor their intentions to reduce meat consumption (although mean scores were in the expected direction). Question 4 builds on these results and tries to find out if changes in outcomes are more pronounced groups of people with different value orientations.

6.4 Message Framing

Research Question 3: What is the effect of message framing (individual or collective) on people's attitudes towards meat consumption, intention to reduce meat intake and attitudes to GHG emissions from meat production?

H₃: When values are not taken into consideration, there will be no significant difference between the individually and collectively framed message on attitudes and intentions.

Looking at the results from research question 2 naturally leads to asking what type of message could be more effective at changing attitudes and intentions. To test this,

participants were randomly assigned to either receive a message emphasising the individual or societal (collective) benefits that can be gained from reducing meat consumption. An independent-samples *t*-test was run between groups who received each message. Again, this was done for the three outcome measurement scales from part 3 of the survey. There was homogeneity of variance across all groups, as tested by Levene's test of equality of variance ($p > .05$).

As the information supplied had a significant effect on the concern for GHG emissions from meat production, this makes a good starting point for the analysis. People who received the collective message ($n = 261$) had a mean of 5.02 ± 1.27 and those who received the individual message ($n = 266$) had a mean of 5.05 ± 1.20 on the GHG emission attitude scale. The mean difference between the two groups of .03 (95% CI, -.18 to .24) was non-significant, $t(525) = .269$, $p = .788$. Therefore the framing of the message did not appear to have an effect on attitudes towards GHG emissions from meat consumption. Attitude to having meat in a person's diet and intention to eat meat also showed no difference in terms of how the message was framed; refer to Table 6.2 for statistical results. No statistical difference in mean scores indicates that the way the message was framed did not have an effect in changing attitudes and intentions.

Table 6.2 Message framing effect results

Measure	Collective Mean $\pm SD$ (n)	Individual Mean $\pm SD$ (n)	Mean difference	T-Statistic (df)	p value
1. Attitude towards having meat in diet	4.16 ± 1.67 (259)	4.20 ± 1.76 (264)	.04	.262 (521)	.794
2. Intention to eat meat in the next month	3.92 ± 1.98 (262)	4.01 ± 1.98 (267)	.09	.530 (527)	.596
3. Concern for GHG emissions from meat production	5.02 ± 1.20 (261)	5.05 ± 1.27 (266)	.03	.269 (525)	.788

Note: 95% CI for measure 1: -.26 to .33, measure 2: -.25 to .43, measure 3: -.18 to .24

In response to hypothesis 3, the results confirm that framing of the message had no effect on the dependent variables when the sample was taken as a whole. Since it has been established that one frame is not more compelling than the other in changing

attitudes and intentions, it is possible to find out if the audience targeted by the different message frames responds in accordance with the literature described in Chapter 4. Question 5 addresses this issue.

6.5 Value Structures and Response to Information Provision

Research Question 4: Given differences in people's value structure and environmental concern, does environmental information about meat production change attitudes and intentions about meat consumption, when looked at comparatively to a control group?

H₄: *The information as a whole emphasises the idea of reducing meat consumption. As a result of this, there will be a more positive response by people who place greater weight on self-transcendence values and have higher environmental concern, compared to those that favour self-enhancement values; because overall the information aligns more closely to those beliefs.*

Research question 4 essentially tries to tie the two fields of thought, the role of values and information provision, together. Given that a person has a certain philosophy on life, represented here by values and environmental concern, does that change the way in which information is processed, received and potentially enacted into one's daily decisions? To answer this question, a moderation analysis was conducted through a hierarchical regression model. The moderation analysis was used to assess whether the effect of information would be different for people with different values, as predefined by the theory literature in Chapter 4 and as measured in the outcome variables in part 3 of the survey. Through performing a hierarchical regression model the added difference in explainable variation can be calculated by adding an interaction term as described in the methods chapter, this being the difference between Model 1 and Model 2 in the tables to follow. By detecting if there was a significant increase in variation (R^2) explained by adding the interaction term, this would mean there was a moderation effect.

The continuous variables (i.e. attitudes and value scale scores) were standardized² to make each scale more comparable and can also help avoid multicollinearity, although this has been debated (Cohen, Cohen, West, & Aiken, 2003; Hayes, 2013). The categorical variable (i.e. information/control) was not standardized, as it is dichotomous, meaning it would make no difference to the outcome. The assumptions for multiple regression analysis were tested for in the data. Linearity was acceptable as assessed by scatter plot and outliers were left in; again they were not significant in altering the results. The assumption of multicollinearity was not violated and there was homoscedasticity, as assessed by visual inspection of the studentized residuals plotted against the predicted values for information and control groups, but the studentized residuals were not normally distributed. However, analysis went ahead as the normality assumption is considered to be one of the least important assumptions of regression (Weisberg, 2014).

The results for this question and the next (question 5) are organised into separate tables, each relating to a specific dependent variable, which have been placed in the order of 'attitude towards meat consumption', 'intention to eat meat in the coming month', and then 'attitudes about the GHG emissions from meat production'.

Following on from these results in a separate section, another regression model is presented with added covariates. Including other factors measured in the survey building on the previous models.

Research question 1 highlights the importance of NEP as a correlate for meat consumption and appears to have a significant effect in the prediction of this behaviour. It has therefore been included in this analysis alongside the targeted value dimension (self-enhancement/self-transcendence); providing a greater understanding of the role NEP may play in how environmental information is received.

The first step (model 1) in the regression analysis included the value of interest and the treatment variable (information or control). In the second step (model 2), the interaction term was added to examine whether the effect of information depended

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² Note that standardization took place on all data before analysis, so there is some discrepancy on mean values when looking at the graphical results because not all analysis used all data points.

on the value of interest. This was done for self-enhancement, self-transcendence and NEP for all three dependent variables. The interaction term has been highlighted in grey and significant results are more closely examined in graphical form following each table.

Table 6.3 sums up the results for the dependent variable ‘attitude towards meat consumption’. The major thing to note from Table 6.3 is that the main effects of values and environmental concern significantly predict the outcome without the information variable. These relationships are explained in question 1. Adding the information and interaction variables does not significantly alter the R^2 value, revealing these two factors do not add to the model’s effectiveness. The results presented in Table 6.3 do not add anything to the outcomes from question 2, where the information treatment did not change people’s attitudes towards meat consumption.

Table 6.3 Moderation effect of information: dependent variable - attitude towards meat consumption

Model	Int. Var.	N	R^2	$R^2 \Delta$	B	t	p-value
SE Model 1	SE	782	.057	.057***	.242	6.864	<.0005***
	Info				-.016	-.223	.823
SE Model 2	SE		.061	.004	.329	5.610	<.0005***
	Info				-.016	-.224	.823
	SE x Info				-.136	-1.852	.064
ST Model 1	ST	782	.119	.119***	-.348	-10.255	<.0005***
	Info				-.001	-.019	.985
ST Model 2	ST		.120	.001	-.399	-6.825	<.0005***
	Info				-.002	-.026	.980
	ST x Info				.077	1.074	.283
NEP Model 1	NEP	815	.111	.111***	-.336	-10.051	<.0005***
	Info				-.025	-.360	.719
NEP Model 2	NEP		.111	.000	-.318	-5.921	<.0005***
	Info				-.025	-.363	.716
	NEP x Info				-.030	-.433	.665

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Info refers to if information was provided (coded 1) or not (coded 0).

* $p < .05$ | ** $p < .01$ | *** $p < .001$

The results for participants’ intention to eat meat in the coming month are similar in terms of the interaction effects of those relating to attitude towards meat consumption, where there is no significant effect of predisposing values when

information is provided. Table 6.4 displays the results. However, in contrast to Table 6.3 and the original results in question 2, here, information does lower intentions to eat meat significantly, when either NEP or self-enhancement are controlled for. Thus these two variables, self-enhancement values and environmental concern, had a significant effect on how the information presented was received with regards to someone's intention to eat meat.

Table 6.4 Moderation effect of information: dependent variable - intention to eat meat in the forthcoming month

Model	Int. Var.	N	R ²	R ² Δ	B	t	p-value
SE Model 1	SE Info	800	.058	.058***	.233	6.752	<.0005***
					-.150	-2.113	.035*
SE Model 2	SE Info		.058	.000	.259	4.612	<.0005***
					-.151	-2.117	.035*
	SE x Info				-.043	-.597	.551
ST Model 1	ST Info	800	.098	.098***	-.305	-9.103	<.0005***
					-.133	-1.907	.057
ST Model 2	ST Info		.098	.000	-.321	-5.584	<.0005***
					-.133	-1.908	.057
	ST x Info				.024	.339	.735
NEP Model 1	NEP Info	832	.146	.146***	-.378	-11.761	<.0005***
					-.137	-2.075	.038*
NEP Model 2	NEP Info		.147	.001	-.344	-6.657	<.0005***
					-.137	-2.075	.038*
	NEP x Info				-.055	-.838	.402

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Info refers to if information was provided (coded 1) or not (coded 0).

* $p < .05$ | ** $p < .01$ | *** $p < .001$

Table 6.5 looks at how participants' concern about GHG emissions from meat production changes with information, given predisposing values and environmental concern. The main effects (values, NEP and information) all help explain the variation in attitudes about GHG emissions and, as question 2 showed, information does make a difference for this outcome. There is no moderation effect for either of the two value models, although, there is a significant moderation effect for the NEP Model 2, $F(1, 816) = 4.452$, $p = .035$. This suggests that the effectiveness of the message on attitude towards GHGs emissions from meat production depends on participants' level of environmental concern. The interaction accounts for only a small amount of change in

variance explained (R^2 change = .003), but because of its significance, was looked into further.

Table 6.5 Moderation effect of information: dependent variable - concern about GHG emissions from meat production

Model	Int. Var.	N	R^2	$R^2 \Delta$	B	t	p-value
SE Model 1	SE Info	788	.066	.066***	-.238 .230	-6.775 3.205	<.0005*** .001**
SE Model 2	SE Info		.066	.000	-.264 .230	-4.481 3.202	<.0005*** .001**
	SE x Info				.040	.549	.583
ST Model 1	ST Info	788	.184	.184***	.417 .220	12.926 3.277	<.0005*** .001**
ST Model 2	ST Info		.185	<.001	.407 .220	7.202 3.275	<.0005*** .001**
	ST x Info				.015	.214	.831
NEP Model 1	NEP Info	820	.368	.368***	.605 .190	21.599 3.284	<.0005*** .001**
NEP Model 2	NEP Info		.371	.003*	.680 .189	15.001 3.273	<.0005*** .001**
	NEP x Info				-.122	-2.110	.035*

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Info refers to if information was provided (coded 1) or not (coded 0).

* $p < .05$ | ** $p < .01$ | *** $p < .001$

A simple slopes analysis using the 'pick a point' approach was used to determine the relationship between environmental concern and information provision at differing levels of environmental concern. For this and the graphical analysis to follow the points used were one standard deviation below the mean, the mean, and one standard deviation above the mean, corresponding to the high/med/low constructs on the graphs respectively. Figure 6.2 shows the relationship between different levels of environmental concern and the effect the information had on attitude towards GHG emissions from meat. When NEP is low there was a significant difference between the two groups, $B = .311$, $t = 3.824$, $p < .0005$, but when NEP is high the difference is no longer significant, $B = .068$, $t = .828$, $p = .408$. The result here seems to imply that a message emphasising environmental impacts was mainly effective in changing attitudes about GHG emissions among participants with relatively low levels of environmental concern, a disagreement with hypothesis 4. Potentially, this might have something to do with prior knowledge of the issue at hand, where participants with

high environmental concern may have already been aware of the environmental impacts of meat production. As Figure 6.2 shows, people with high NEP do have an overall greater concern for the issue discussed.

Figure 6.2 Environmental concern and information moderation effect: dependent variable - meat GHG emission concern

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

6.5.1 Further Analysis: Information Provision

Based on the results reported so far, it appears that people with differing values do not respond differently to information provided about the harm meat production does to the environment. The moderation effect was non-significant for both self-enhancement and self-transcendence for all dependent variables. However, because the level of environmental concern seems to make a difference when interpreting a message and the high R^2 values in most models that included NEP – in comparison to both self-transcendence and self-enhancement values – a more complete regression model was tested. By making NEP a covariate and controlling for the effect of this variable, people's values may reveal a further influence that was not detected on first glance. The values 'openness to change' and 'tradition' were also added to this model,

along with food involvement to find out if they added explanatory power over and above the value dimension already explored.

Further analysis was conducted using the hierarchical regression technique, again, to understand the added value for each new variable added to the model. Model 1 provides information about how influential environmental concern is as a standalone predictor of attitudes and intentions about meat consumption and production. Food involvement was placed in Model 1 as a covariate also, but after analysis food involvement was proven to not have any effect on the significance of the interaction terms so was removed from the model presented. Essentially, this means food involvement does not play a role in how accepting an individual is of information about meat consumption.

Model 2 initially included all four higher value types of 'self-enhancement', 'self-transcendence', 'tradition' and 'openness to change' to reveal how much additional variation can be explained through both value dimensions. However, upon running the regression model both openness to change and tradition did not add substantially enough to the model to alter results, so were removed from the model used here, as with food involvement. Model 3 includes the treatment condition, information or control. The final and fourth regression model includes the interaction terms to see if moderation is stronger whilst controlling for the other variables.

Table 6.6 shows the analysis for the information treatment. The addition of self-transcendence adds predictability to the model over and above environmental concern, yet self-enhancement does not for all three dependent variables (Model 2). While controlling for environmental concern and values, information does provide a significant drop in intention to eat meat ($F(1, 784) = 4.829, p = .028$), and attitude towards concern for GHG emissions from meat production ($F(1, 773) = 14.878, p = <.0005$) (Model 3), emphasising results in Tables 6.4 and 6.5. However, attitude towards meat consumption did not change ($F(1, 768) = .004, p = .950$), suggesting that information does not decrease a favourable attitude to meat consumption, even if environmental concern and values are held constant, corroborating the results in Table 6.3.

Table 6.6 Full regression analysis for information provision effect – all dependent variables

M.	Int. Var.	Meat Attitude (n = 773)			Intention (n = 789)			GHG Attitude (n = 778)		
		$R^2 \Delta$	B	t	$R^2 \Delta$	B	t	$R^2 \Delta$	B	t
1	NEP	.116***	-.343	-10.047***	.146***	-.381	-11.585***	.368***	.610	21.249***
2	NEP	.060***	-.251	-7.094***	.036***	-.314	-9.101***	.047***	.527	17.818***
	SE		.005	1.315		.074	1.808		.016	.441
	ST		-.226	-5.220***		-.147	-3.443**		.244	6.689***
3	NEP	.000	-.251	-7.090***	.005*	-.315	-9.142***	.011***	.527	17.985***
	SE		.055	1.316		.077	1.891		.012	.346
	ST		-.226	-5.214***		-.144	-3.388**		.242	6.697***
	Info		-.004	-.063		-.146	-2.197*		.220	3.857***
4	NEP	.005	-.202	-3.478**	.002	-.266	-4.691***	.006*	.626	12.887***
	SE		.155	2.120*		.113	1.593		-.036	-.594
	ST		-.213	-2.702**		-.132	-1.715		.135	2.040*
	Info		-.006	-.083		-.148	-2.222*		.215	3.777***
	NEP x Info		-.075	-1.028		-.078	-1.085		-.153	-2.512*
	SE x Info		-.017	-1.689		-.052	-.596		.070	.937
	ST x Info		-.151	-.178		-.016	-.177		.154	1.954 [†]

Note: M. is model number, Int. Var. is independent variable, B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Info refers to if information was provided (coded 1) or not (coded 0).

* $p < .05$ | ** $p < .01$ | *** $p < .001$ | [†] $p = .051$

The interaction terms added in Model 4 provide some additional evidence of moderation for GHG attitudes but not in the other two dependent variables. How the information was accepted is moderated to some degree through self-transcendence values on GHG attitude, $B = .154$, $t = 1.954$, $p = .051$; this result is of borderline significance and is illustrated in Figure 6.3. Note, the significant moderation remains from Table 6.5, for NEP and information provision on GHG attitude, $B = -.153$, $t = -2.512$, $p = .012$.

Figure 6.3 shows that upon presentation of a message about the impacts of GHG emissions from meat production, when environmental concern and other values are held constant, a person with high levels ($B = .369$, $t = 3.822$, $p < .0005$) of self-transcendence is more likely to respond favourably (i.e. increase concern about GHGs) to this message, compared to a person with lower levels of these values ($B = .061$, $t = .623$, $p = .534$). Effectively, at lower levels of self-transcendence there is no difference between groups, meaning the information has no effect.

Figure 6.3 Self-transcendence and information moderation effect: dependent variable - meat GHG emission concern

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

In summary, the information provided appears to have had the greatest effect on concern towards the GHG emissions from meat production. The most favourable response is found when NEP is low and self-transcendence is high. The results presented in Figure 6.3 need to be thought about in the context of what the message was trying to convey, because it is likely that the response is due to what the message was asking people to do, i.e. forgoing something for the benefit of everyone, therefore, aligning with self-transcendent values, confirming part of hypothesis 4.

6.6 Value Structures and Response to Message Framing

Research Question 5: Does framing a message towards certain pre-existing value structures create a more effective message, therefore changing a person's attitudes and intentions about meat consumption more significantly?

H₅: A greater change in attitudes and intentions will occur when the message frame aligns with one's values. The individual message will appeal to people with stronger self-enhancement values and the collective message will appeal to those with stronger self-transcendence values.

Considering that message framing did not have a significant effect on its own, research question 5 asks does this effect become significant if people's values are taken into account, and does the group that the message frame was aimed at respond more favourably to the message? For this analysis, only those participants who received a message (either focusing on individual or societal impacts) were included. A moderation analysis was again conducted to find out if there was a significant interaction between the independent variables on the three outcome measures of interest. A hierarchical regression was performed for each independent variable and environmental concern was also included for reasons explained in the previous section.

Each model was assessed against the assumptions for performing a regression model. The assumptions were met in general, but normality of the studentized residuals was violated to some degree, yet analysis was proceeded with as in the previous section. Following on from the preceding analysis, for consistency, standardized values of the continuous variables were used to allow for a more direct comparison between scales. The independent variables of values and environmental concern contributed to the variance explained for all three dependent variables, again providing evidence of their varying importance in the prediction of the outcomes measured.

Table 6.7 Moderation effect of message frame: dependent variable - attitude towards meat consumption

Model	Int. Var.	N	R ²	R ² Change	B	t	p-value
SE Model 1	SE	501	.036	.036***	.195	4.305	<.0005***
	Frame				-.046	-.517	.605
SE Model 2	SE		.036	.000	.184	2.849	.005**
	Frame				-.047	-.525	.600
	SE x Frame				.021	.229	.819
ST Model 1	ST	501	.104	.104***	-.323	-7.606	<.0005***
	Frame				-.058	-.673	.501
ST Model 2	ST		.116	.012**	-.443	-7.104	<.0005***
	Frame				-.060	-.702	.483
	ST x Frame				.222	2.613	.009**
NEP Model 1	NEP	517	.115	.115***	-.348	-8.145	<.0005***
	Frame				-.053	-.639	.523
NEP Model 2	NEP		.115	.000	-.375	-5.965	<.0005***
	Frame				-.051	-.621	.535
	NEP x Frame				.050	.582	.561

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Frame refers to how the message was worded, collectively (coded 1) or individually (coded 0) focused.

* $p < .05$ | ** $p < .01$ | *** $p < .001$

Table 6.7 outlines the results for the dependent variable of attitude towards meat consumption. The only significant result found was that the message frame was moderated by self-transcendence values increasing total variance explained by 1.2%, $F(1, 497) = 6.829, p < .0005$. The addition of the interaction term does not change the variance explained for the other independent variables. For statistical details refer to Table 6.7.

To probe the nature of the relationship found between self-transcendence and the message frame a simple slopes analysis was conducted, as in question 4. Figure 6.4 has plotted the relationship between the two variables. A higher score on the Y axis indicates a more favourable view of meat consumption; the negative gradient shows that as self-transcendent values increase in importance a decrease in a favourable attitude towards meat consumption occurs. The difference between the two lines is the effect of how the message was framed.

Figure 6.4 Self-transcendence and message frame moderation effect: dependent variable - attitude towards meat consumption

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

When self-transcendence is low there is a significant impact of the collective message being more effective at reducing a favourable attitude towards meat consumption, $B = -.281, t = -2.331, p = .020$. Furthermore, at high levels of self-transcendence the effect

appears to be reversed, meaning that an individual message is more effective, but this difference is not significant, $B = .162$, $t = 1.354$, $p = .176$. The result here does not support the idea that people who hold self-transcendence values in high esteem will be influenced more by a message that is targeted at these values through the language used (i.e. collective frame). In fact, the opposite appears to be true, disconfirming hypothesis 5.

The results for the dependent variable ‘intention to eat meat in the forthcoming month’, Table 6.8, replicate the results from Table 6.7 in most ways. Only the main effects of values and environmental concern predict the dependent variable in any significant way. The way the message was framed appears to make no real difference given people’s pre-existing values on their intention to eat meat, as the tested moderation between the two variables are all insignificant.

Table 6.8 Moderation effect of message frame: dependent variable - intention to eat meat in the forthcoming month

Model	Int. Var.	N	R^2	R^2 Change	B	t	p-value
SE Model 1	SE Frame	507	.047	.047***	.219	4.933	<.0005***
					-.077	-.885	.376
SE Model 2	SE Frame		.047	.000	.225	3.530	<.0005***
					-.077	-.879	.380
	SE x Frame				-.013	-.144	.886
ST Model 1	ST Frame	507	.093	.093***	-.298	-7.144	<.0005***
					-.080	-.936	.350
ST Model 2	ST Frame		.098	.005	-.379	-6.122	<.0005***
					-.082	-.959	.338
	ST x Frame				.148	1.765	.078
NEP Model 1	NEP Frame	522	.157	.157***	-.401	-9.794	<.0005***
					-.081	-1.002	.317
NEP Model 2	NEP Frame		.157	.000	-.414	-6.791	<.0005***
					-.080	-.993	.321
	NEP x Frame				.025	.307	.759

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Frame refers to how the message was worded, collectively (coded 1) or individually (coded 0) focused.

* $p < .05$ | ** $p < .01$ | *** $p < .001$

The information provided directly spoke to the issue of GHG emissions from meat production and framed the issue by explaining how much this can be reduced by changing diet, either as a society or as an individual. Given this, the measure of ‘attitude towards the concern for GHG emissions from meat production’ may be able

to reveal something more. However, once again there is little evidence here to show that the different message frames affect the outcome for people with varying values. Table 6.9 outlines the results for this regression analysis.

Table 6.9 Moderation effect of message frame: dependent variable - concern about GHG emissions from meat production

Model	Int. Var.	N	R ²	R ² Change	B	t	p-value
SE Model 1	SE Frame	505	.054	.054***	-.233 .000	-5.334 -.002	<.0005*** .998
SE Model 2	SE Frame		.060	.006	-.144 .006	-2.399 .068	.017* .946
	SE x Frame				-.155	-1.857	.064
ST Model 1	ST Frame	505	.207	.207***	.423 .016	11.454 .214	<.0005*** .830
ST Model 2	ST Frame		.208	.001	.405 .016	7.377 .213	<.0005*** .831
	ST x Frame				.032	.430	.667
NEP Model 1	NEP Frame	520	.338	.338***	.559 .024	16.252 .356	<.0005*** .722
NEP Model 2	NEP Frame		.339	.001	.522 .026	10.164 .385	<.0005*** .701
	NEP x Frame				.068	.978	.328

Note: Int. Var. is independent variable. B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Frame refers to how the message was worded, collectively (coded 1) or individually (coded 0) focused.

* $p < .05$ | ** $p < .01$ | *** $p < .001$

The self-enhancement model 2 is close to significant, $F(1, 501) = 3.449$, $p = .064$, with an R^2 change of .006, equating to .6% of variance. But at high ($B = -.152$, $t = -1.477$, $p = .140$) and low ($B = .120$, $t = 1.163$, $p = .245$) levels of the self-transcendence construct there was no significant change between the two message frames.

6.6.1 Further Analysis: Message Framing

In a replication of what was done for the information/control analysis the data from the frame treatment was investigated further to find out if controlling for NEP and other values would yield further significant results. Models 1 and 2 from Table 6.10 are essentially the same as Table 6.6, but there are differences in results because of the sample sizes. The addition of the information framing variable results in the same

outcome as in research question 3, even when controlling for values and environmental concern. The differences in results come in Model 4 where some of the interaction terms have now become significant. In addition to the message frame being moderated by self-transcendence for the outcome of meat consumption attitude, as discovered in Table 6.7, self-enhancement is now a significant moderator, $B = .231$, $t = 2.246$, $p = .025$, leading to an additional 1% of variation explained (R^2 change = .022, $F(3, 489) = 4.425$, $p = .004$) over just the self-transcendence model in Table 6.7 (R^2 change = .012). Self-enhancement is also now a significant moderator for the outcome of GHG attitude, $B = -.165$, $t = -2.2024$, $p = .043$. Yet this result does not significantly change the explained variance from the previous model, $F(3, 492) = 1.726$, $p = .161$.

Table 6.10 Full regression analysis for message frame effect – all dependent variables

M.	Int. Var.	Meat Attitude($n = 497$)			Intention ($n = 502$)			GHG Attitude ($n = 500$)		
		$R^2 \Delta$	B	t	$R^2 \Delta$	B	t	$R^2 \Delta$	B	t
1	NEP	.119***	-.360	-8.180***	.158***	-.406	-9.697***	.346***	.568	16.232***
2	NEP	.048***	-.278	-6.088***	.033***	-.344	-7.852***	.075***	.473	13.501***
	SE		.005	.090		.061	1.199		.034	.823
	ST		-.230	-4.350***		-.148	-2.882**		.288	7.021***
3	NEP	.001	-.278	-6.102***	.003	-.345	-7.893***	.001	.474	13.511***
	SE		.006	.122		.063	1.246		.032	.794
	ST		-.231	-4.362***		-.149	-2.896**		.289	7.029***
	Frame		-.070	-.846		-.103	-1.274		.050	.760
4	NEP	.022**	-.271	-4.116***	.011	-.324	-5.059***	.006	.435	8.453***
	SE		-.107	-1.479		.011	.149		.113	1.971*
	ST		-.424	-5.622***		-.281	-3.860***		.348	5.928***
	Frame		-.084	-1.021		-.111	-1.376		.058	.889
	NEP x Frame		-.026	-.283		-.050	-.567		.076	1.086
	SE x Frame		.231	2.246*		.112	1.107		-.165	-2.024*
	ST x Frame		.373	3.550***		.260	2.533*		-.122	-1.491

Note: M. is model number, Int. Var. is independent variable, B is unstandardized regression coefficient, SE is self-enhancement, ST is self-transcendence, NEP is environmental concern and Frame refers to how the message was worded, collectively (coded 1) or individually (coded 0) focused.

* $p < .05$ | ** $p < .01$ | *** $p < .001$

The frame is also moderated by self-transcendence values for ‘intention to eat meat in the coming month’, $B = .260$, $t = 2.533$, $p = .012$, but again the variance explained is not significantly different, R^2 change = .011, $F(3, 494) = 2.213$, $p = .086$. Having significant moderation with a non-significant change in R^2 means it is unclear what the

added predictive utility of the model is as a whole. However, for investigative purposes these significant interactions were looked at further.

Figure 6.5 illustrates the moderation effect between self-enhancement values and the message frame with the dependent variable of 'attitude towards meat consumption' in regression Model 4. In contrast to the results involving self-transcendence previously, the result here appears to be in accordance with the theory provided in Chapter 4. As the graph displays, when self-enhancement is low, a collectively framed message is responsible for a larger, statistically significant, drop in favourable attitudes to meat consumption, $B = -.315$, $t = -2.331$, $p = .020$. Thus corroborating the hypothesis derived from the literature reviewed; that being a person low on the self-enhancement scale theoretically scores higher on self-transcendence scale, therefore, the collective message should be more appealing. In contrast, an individually focused message appears to be more effective at lowering attitudes towards eating meat when self-enhancement values were high, $B = .147$, $t = 1.147$, $p = .252$, but the difference here is not statistically significant.

Figure 6.5 Self-enhancement and message frame moderation full regression model: dependent variable - attitude towards meat consumption

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

The message frame also interacts with self-transcendent values when the other variables are controlled for on people's intention to eat meat in the coming month, $B = .260$, $t = 2.533$, $p = .012$. Figure 6.6 shows the now significant interaction where a collective message significantly lowers the intentions to eat meat more than an individually framed message when a person has low self-transcendence values, $B = -.371$, $t = -2.778$, $p = .006$. On the other hand, when high self-transcendence values are present the difference is no longer significant, $B = .148$, $t = 1.162$, $p = .246$. The result presented here seems to substantiate the findings in Figure 6.4 and disagree with the idea that a message aimed at the individual, rather than a broader social message would appeal to a person with low self-transcendence values; since theoretically the person would generally have stronger self-enhancement values and therefore prefer the individual message.

Figure 6.6 Self-transcendence and message frame moderation effect full regression model: dependent variable - intention to consume meat

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

Looking at the third dependent variable in Table 6.10, concern about GHG emissions from meat production, one significant interaction occurs. Self-enhancement values moderate how the message frame is received when the full regression model is used, Figure 6.7 exhibits this relationship. Providing a collective message significantly

increases concern for GHG emissions from meat production over an individual message when self-enhancement is low, $B = .223$, $t = 2.089$, $p = .037$. Conversely, high self-enhancement values appear to be influenced more by the individually focused message, but once again this difference is not statistically significant, $B = -.107$, $t = -1.050$, $p = .294$. As in accordance with the result in Figure 6.5, people with low self-enhancement levels respond more effectively to a collective message than the individual one.

Figure 6.7 Self-enhancement and message frame moderation full regression model: dependent variable - meat GHG emission concern

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

A final point to note from Table 6.10 is that the significant result reported between self-transcendence and the message frame about attitude towards meat consumption in Table 6.7 and, graphically presented in Figure 6.4, is repeated here. But now, controlling for the other variables, the interaction at high levels of self-transcendence has become significant ($B = .289$, $t = 2.220$, $p = .027$), along with a stronger result present at low levels ($B = -.457$, $t = -3.341$, $p = .001$). Figure 6.8 displays these results. Importantly, this outcome provides the first significant difference at high levels of a value construct (self-transcendence), where the individual message is more effective at lowering attitude toward meat consumption than the collective one.

Figure 6.8 Self-transcendence and message frame moderation full regression model: dependent variable - attitudes towards meat consumption

Note: Low is one standard deviation below the mean, med is the mean and high is one standard deviation above the mean.

Reviewing the framing results as a whole, the way the message was framed did influence how people reacted to the information given. This effect was most pronounced when controlling for environmental concern. The collective message appealed more at lower levels of both self-enhancement and self-transcendence value types. These results were mixed in comparison to the hypothesis proposed. The self-enhancement results were in line with what was expected, where a collective message was more effective at low levels of the value types because these people were expected to be more altruistic and therefore relate better to a societal message. On the contrary, people with low self-transcendence values were thought to respond more readily to an individual message because of the alignment with more individualistic values, but this was proven not to be the case.

6.7 Results Summary

Table 6.11 Research questions and results summary

Research Question and Results Summary	
1	How are different human values, environmental concern and food involvement related to meat consumption?
	The results for all four higher value types matched the preceding literature and fit with hypothesis 1. Self-enhancement and self-transcendence had the strongest correlation, positive and negative respectively, with meat consumption. Tradition was positively related to meat consumption, whereas, openness to change had a negative association; both were significant but weaker than the other value dimension. Environmental concern was negatively related to meat consumption as predicted, but food involvement seemed not to matter as much as predicted, having just a slight negative relationship.
2	Does providing a message about the environmental impacts of eating meat affect people's attitudes and intentions regarding meat consumption, compared to a control group?
	The provision of information increased people's concern about the problem of GHG emissions from meat production, but did not significantly alter a person's attitude toward meat consumption or their intention to eat meat in the forthcoming month. Hypothesis 2 was partly confirmed with these results.
3	What is the effect of message framing (individual or collective) on people's attitudes towards meat consumption, intention to reduce meat intake and attitudes to GHG emissions from meat production?
	The framing results matched the hypothesis proposed. There was no significant difference between the two message frames when the sample was taken as a whole.
4	Given differences in people's value structure and environmental concern, does environmental information about meat production change attitudes and intentions about meat consumption, when looked at comparatively to a control group?
	Given people's differences in values and environmental concern there were some significant findings. A greater attitude shift in concern for GHG emissions from meat

	production occurred when environmental concern was low. On top of this, when environmental concern was accounted for, people with high self-transcendence values responded more favourably compared to people who placed less emphasis on these values. Intention to eat meat in the coming month was lowered significantly when self-enhancement values and environmental concern were controlled for, adding to the results from question 2. However, attitude towards eating meat was not affected by the information at all.
5	Does framing a message towards certain pre-existing value structures create a more effective message, therefore changing a person's attitudes and intentions about meat consumption more significantly?
	The framing of the message did make a difference when interacting with values. However, the differences only occurred when environmental concern and other values were controlled for as covariates. Nonetheless, the collective message was better at changing attitudes and intentions at low levels of both the value constructs targeted, which matched the hypothesis for self-enhancement values but not self-transcendence. Additionally, at high levels of values there was only one statistically significant difference between groups, this being an individual message having a greater effect when self-transcendence was high in an individual on attitude towards meat consumption, again going against the hypothesis posed.

Chapter 7: Discussion

7.1 Introduction

Until now there has been relatively little research which has examined the relationship between an individual's values and the effectiveness of information provision about the environmental impacts of meat consumption. The aim of the present study was to remedy this situation and provide a basis for further research into the topic by adding to the current scientific discourse. Through this research, a greater understanding of how people with predisposing values respond to information provision and message framing was established. The results found in the previous chapter and discussed in context of the surrounding literature, below, could provide environmental information campaigns with more effective communication tools in the future.

To start, the discussion considers the relationship between the variables measured, and then moves onto the more significant results of information provision and framing effects. Then, how the results fit in the wider context of policy will be discussed, along with implications for promoting sustainable consumption and increasing the success of other pro-environmental campaigns. Finally, the chapter concludes by mentioning limitations of the research, with future directions of study in mind.

7.2 Relationships of Variables

The relationship between variables measured in the survey was explored in research question 1 through a correlation analysis. As mentioned in the results chapter, most measures followed the theory proposed by the literature in Chapter 4. The two ends of each value dimension opposed each other in negative relationships in accordance with Schwartz's (1992) value structure. Therefore, it is more likely that a person will have stronger feelings about self-enhancement values rather than self-transcendence

values or vice versa. The value results also give weight to the use of the short PVQ survey, as this questionnaire seems to provide the necessary response to compare value types whilst saving on survey time for participants. The use of the short PVQ has been debated by various researchers, generally in the context of the European Social Survey, making the point that the measurement scale may be less than reliable (Knoppen & Saris, 2009). Nevertheless, the reliabilities of the four major value types were consistent with other comparable studies (Schwartz, 2003; Verkasalo et al., 2009). Most researchers agree it is best to cover the full diversity and motivational continuum of each value, rather than maximising homogeneity (Caprara et al., 2006; Schwartz, 2012b). Based on this presumption, the current research provides adequate results to test the hypotheses proposed.

The relationship between the self-enhancement/self-transcendence value dimension and meat consumption provided a good theoretical basis for the study at hand and emphasised the findings in the literature reviewed in Chapter 4. Hypothesis 1 was confirmed in this respect. Self-transcendence was the most strongly correlated value type to meat consumption, where a higher level of self-transcendence related to a lower intake of meat. Oppositely, self-enhancement was positively related to meat consumption. Many studies have provided empirical evidence that corroborates these findings (de Boer et al., 2007; Dietz et al., 1995; Kalof et al., 1999). Establishing the relationship between values and meat consumption in the sample population was a key aspect of this research. From this, potentially more meaningful responses would come from providing differently framed messages, appealing to self-transcendent and self-enhancement values, because of how the different groups view meat consumption.

The importance placed on NEP or environmental concern, as it is called here, on environmentally responsible behaviour by Stern et al. (1999) in the VBN theory appears to also hold significance with regard to meat consumption. Environmental concern was found to be positively correlated to self-transcendence and on the other hand, negatively correlated to self-enhancement and meat consumption. However, this is not surprising given past studies such as Schultz and Zelezny (1999) have provided similar evidence. Through the measurement of the NEP it is clear that people

with higher environmental concern tend to eat less meat and already seem to have a greater knowledge or awareness surrounding the environmental problems that meat production poses.

In contrast to the expectations, food involvement was not related to meat consumption. It was predicted that food involvement would play a part in reducing meat consumption in one's diet, as people who score highly on this scale are considered to make more informed decisions about what they eat (Vermeir & Verbeke, 2006). Making an informed decision about meat was thought to increase one's awareness of the negative aspects of meat production and potentially sway someone not to eat so much. Yet this was not the case. The slight negative correlation between food involvement and meat consumption was considered negligible, especially in light of results further on. Upon reflection, a reason for the lack of explanatory power of the food involvement scale could be that it had no specific emphasis on meat, implying it may not have captured what was intended.

Through assessment of the measurement constructs used for this research and how they interact with each other, the theoretical framework applied in this study was reflected in the sample population. Establishing the relationship between values, NEP and meat consumption provided the platform for further analysis. The results here are consistent with the relevant literature and provide further evidence for current thoughts on the topic and the scientific field at large.

7.3 Information Provision

By providing the sample population with information about the negative ramifications of meat production on the climate system, it was hoped to increase awareness of the consequences of this practice and seed the idea that lowering the amount of meat in one's diet would be beneficial. The results showed that providing information increased concern for the impact meat production has on GHG emissions, decreased

intentions to eat meat when NEP was controlled for, but did not change attitudes about meat consumption significantly.

Studies have indicated that increasing awareness of a problem is one thing that can be achieved through information alone, drawing on the knowledge-deficit model (Nolan, 2010). This appears to be the case here, as the effect on attitude towards the concern for GHG emissions from meat production was the strongest result present in the information analysis. It may be that providing information increased awareness or knowledge about the problem, which has been captured here by expression of concern. Previous studies have shown that an increase in knowledge about a problem typically generates a greater concern for the issue (Nolan, 2010). Through raising concern about an issue, Minton and Rose (1997) have argued that this can help change behaviour, especially when other efforts are used in conjunction. Therefore informing people about the environmental issues of meat production and raising knowledge and hence concern, could be one avenue to reduce demand.

Another possible explanation for the greater expression of concern for GHG emissions from meat production is that the message spoke directly about this topic in the title and first and last paragraphs of the message, outweighing the paragraph on meat intake. Potentially, participants could have taken more information about this topic onto the following questions than about actual meat consumption; consequently creating a stronger concern about GHG emissions.

Intention to eat meat was significantly reduced after presentation of the message when other factors, like NEP were controlled for, but attitude to meat consumption was not. This result was unforeseen, as it was thought, via the TPB, that a behavioural intention was further down the decision line than the attitude towards that behaviour, denoting that attitudes should change first, subsequently influencing intention (Ajzen, 1991). The implication is that intention should be the last behavioural antecedent to change, yet this was not the case. One potential reason why intentions but not attitude could change is that one may still have a favourable attitude towards meat for separate reasons (taste, nutrition) compared to those behind the intention to eat less

meat (environmental impact). The intention result deserves attention in future research to identify why this may have occurred.

The lack of effect on attitude about meat consumption is possibly attributable to the importance of meat in some people's self-identity. Allen et al. (2000) have described how eating meat reflects a person's values and self-concept. Thus, trying to affect an attitude about a behaviour that is integral to self-identity, such as eating meat, could be construed as a personal attack, making a change less likely. Research has also shown that changing ingrained habits and values is a task which takes time and effort (Karp, 1996; Thøgersen & Ölander, 2002), so providing a single message was not enough to sway these beliefs associated with meat consumption. Allen and Ng's (2003) study shows a similar finding to this research, where presenting meat eaters with information about the nutritional deficiencies of meat did not change attitudes in high meat identifiers, but did slightly for low meat identifiers. The current study was not able to examine the role of identification with being a meat eater, because participants were not explicitly asked to identify how they view meat, as was the case in the Allen and Ng (2003) study.

Upon further analysis, two other findings became evident. The first was the observed interaction effect between NEP and the message provided. When people who scored low on the NEP scale were presented with information about the GHG emissions from meat, they responded with proportionally greater concern than those people who scored higher on the NEP scale, in comparison to the control group. The reason for the difference here may have something to do with prior awareness or knowledge of the problem discussed. It is likely that a person with a higher environmental concern would already have knowledge of the environmental problems related to meat consumption, meaning that no new information was presented and concern could not increase further.

The second point to come out of the information analysis was that when controlling for other key factors (e.g. NEP) an interaction effect between self-transcendence values and the message occurred. People with high self-transcendence values responded with proportionally more concern for the GHG emissions from meat

production following the message, compared to people with low self-transcendence values. The literature about values predicts this result to some extent because of what the self-transcendence value-type represents; a key feature being universalism, which concerns itself with the welfare of other people and the environment (Dietz et al., 2005; Schwartz, 1992). This could mean that people with these values are more likely to be receptive to the ideas presented in the message, leading to the conclusion that people with high self-transcendence values who do not know about an environmental problem will respond best to information about an issue.

Establishing that environmental concern can be raised and people with high self-transcendence values respond more readily to the information provided suggests that people with varying values do respond in different ways to information about environmental messages. Furthermore, in response to the information provided, people with low environmental concern increased their concern about the issue of GHG emissions from meat production proportionately more than people with high levels of concern. The implications are twofold; one, that information alone can make a difference in raising concern about the problems of meat production and potentially other environmental issues; two, varying the type of message may well be important. Based on these findings, it may be worthwhile to target a range of diverse values with different kinds of information. Further research is needed to examine what messages or types of information appeals most to other value groups to encourage further change in attitudes.

7.4 Framing Effects

In the initial analysis, when people's values and environmental concern were not taken into account, the message framing appeared to have no consequence on outcomes. It is thought that the message frame would lose its effect when the group of people (self-transcendent or self-enhancement) targeted were not specifically singled out. In contrast to the null result from question 3 just mentioned, there were

interaction effects between people's predisposing values and the message frame, when NEP and other value types were controlled for.

Most notably, both value types had similar results. Participants with low levels of self-transcendence or self-enhancement values who read the collectively framed message tended to have more negative attitudes towards meat consumption, compared to those who read the individual message. At high levels of self-transcendence the individual message was more effective than the collective at lowering a positive attitude to meat consumption. This was the only significant result at high levels of either value construct.

Further framing results show that intention to eat meat was also reduced more by a collective message at low levels of self-transcendence, but not significantly at high levels. Additionally, for the final dependent variable, concern for GHG emissions from meat production, people with low self-enhancement values were, again, affected more by the collective message, with an increase in concern. Whereas people with high self-enhancement values showed no significant difference between how they interpreted the different message frames. As discussed in the methods chapter there was no difference in credibility and the manipulation check showed that the two messages were interpreted in the way intended. So what was it about the collective message that seems to make more of a difference, and only at low levels of each value construct?

It was hypothesised that an individual message would align with low self-transcendence values because this would effectively mean it was appealing to someone scoring higher on the self-enhancement scale, yet this was not the case. On the other hand, a collective message was proposed to align with low self-enhancement values (or higher self-transcendence) because the wider more social issue that the message was addressing would support the self-transcendence ideals. The results reported lead to the conclusion that the collective message is more compelling to people who score lower on either value scale. One reason for this may be that the scope and scale in the collective message could be thought of as more dramatic because of the larger impact and hence a bigger issue, thus providing a more

compelling or important argument, but only when a person does not have strong predispositions from their value structure to sway their opinion. Spence and Pidgeon (2010) have in fact argued a similar point, that distant frames may highlight the importance of climate change mitigation. Their study has shown that focusing on social aspects of climate change mitigation related to a more positive attitude to climate change mitigation being expressed, compared to when participants were asked to consider other more personal aspects of the problem. These results also suggest that there is a difference in how a collective or individually framed message is received by people, but does not give any indication of why. The present outcome here is similar to that of Spence and Pidgeon (2010), but has been taken one step further, where there appears to be other influences relating to a person's value structure and how strongly they emphasise related value types.

A compelling argument for the greater differences at lower levels of value types has been put forward by Chong and Druckman (2007). When an individual has a strong predisposition to an issue, such as values, this reduces the framing effect. In contrast, when the predisposition is weak the message frame has a greater effect. Chong and Druckman (2007) believe that having a strong view on an issue increases one's resistance to non-aligning information, meaning the opposite may be true as well. In the present study, the significant interactions mainly occur at lower or less strong values, meaning the message framing might have had a greater effect because participants did not have strong views on the topic in the message so had less resistance to the information. However, there was an exception to this rule, where an individual message had a greater effect on people with high self-transcendence values.

Further reasoning about the inconsistency of results in relation to the predicted outcomes (as noted in Chapter 4 by Schultz and Zelezny (2003)) is that the value types used here are measured separately and may not be mutually exclusive, meaning that people may hold inconsistent values. In other words, someone scoring low on self-transcendence does not necessarily score high on self-enhancement. The reason why this might be important is that if a person does not have strong value inclinations either way the collective frame may play on the importance factor of the scale of the message (i.e. country impacts, not personal), as mentioned above. For example,

nationhood or patriotism may be elicited as the collective message mentions New Zealand regularly. If there is another factor that has been overlooked in the study design, as suggested, it would be prudent to test this further by conducting similar studies with varying information contexts.

The exception to the previous results showed the individual message was significantly more effective at changing people's attitude to meat consumption when self-transcendence values were high. The high self-transcendence result is more difficult to reconcile theoretically, but again could be to do with how the messages were viewed by people with stronger ideals. People with stronger values either way might consider the matter of meat consumption a personal problem rather than a society wide one, which deserves action by the individual. Following this line of reasoning, people with stronger values at either end of the self-transcendence/self-enhancement dimension might be more highly invested personally in such an issue because of the strength of values they hold, and therefore find the individual message more compelling.

Considering these results more generally, there may be one caveat with the self-transcendence/message frame interaction. Given that the information did not change attitude towards meat consumption compared to the control group (question 2 and 4), it is unclear whether the difference found here in the framing results could significantly influence the general response of such an information campaign.

However, the small effects measured here were likely to be modest because of the research design and the difficulty in changing attitudes and intentions. Conversely, the results from the other two dependent variables, intention to eat meat and concern about GHG emissions, both had significant changes upon receiving the information.

From the framing research conducted here, it is clear that people with diverse values interpret message frames in different ways. How specific messages are or will be interpreted appears to be harder to predict than originally thought when conducting this study. People's response to information and framing effects is a complex psychological phenomenon where many factors may come into play. It is thought that interpretation of some message frames is heuristic in nature meaning no active progressive thought occurs, but rather mental shortcuts are taken to obtain the

information quickly (Chong & Druckman, 2007). This being the case, one may not always be able to predict exactly how a frame will be interpreted. Therefore several different frames should probably be used in tandem for environmental messaging to cover the difference in beliefs, values and interpretation. By and large, it appears the effects of message framing are complex and highly nuanced. Research on how certain frames are interpreted deserves more attention in future.

7.5 Results Discussion Summary

This study has demonstrated that pre-existing values have a role to play in how information is received alone and through different frames. The impacts are small but statistically significant, providing a good basis for further research into this area. Environmental concern about the negative impacts of meat production may be heightened through information messaging and its effectiveness may also be dependent on predisposing values, such as self-transcendence. Framing is important for creating a message that appeals to different people, as a singular strategy may not provide the most effective communication to the entire audience or public. This research has demonstrated changing attitudes and intentions about meat consumption is not an easy task and will require a more prolonged effort than demonstrated here.

The key finding from this study is that a varied information campaign is most likely to be the best approach in influencing change to people's attitudes, intentions and potentially their behaviour. By understanding that everyone is slightly different yet hold an array of values that are somewhat limited in number, environmental information campaigns can draw on this knowledge to try and extract the best result possible for the amount of time and effort expended.

7.6 Implications for Policy and Other Sustainable Consumption Campaigns

Table 7.1 outlines what the main research findings mean in the wider context of implicating policy and other pro-environmental campaigns. There are five key recommendations, in no particular order.

Table 7.1 Policy recommendations

Research and Policy Implications
1. It is worthwhile to provide information to the public about environmental harms. This research has shown that concern about environmental issues can change through information provision. Vermeir and Verbeke (2006), among others, agree that public access to clear and straightforward information is important for consumers making purchasing decisions, such as whether to buy meat or not.
2. Environmental concern about the impacts of meat production could be raised in people who do not know about the issues surrounding it. People with generally low environmental concern respond proportionately more than those people with high levels of environmental concern. It is therefore effective to provide information for those people who may lack an understanding of an issue, in this case meat production, especially if they place importance on self-transcendent values.
3. Promoting self-transcendent values in general may make the public more receptive to messages about the impacts people are having on the environment. The results show that people that have higher self-transcendence values respond more readily to messages about the environmental problems of meat production. Schultz and Zelezny (2003) have also suggested that influencing values would be an ideal situation for many pro-environmentalists and is the only way to affect long term sustainability.
4. The ways in which information is communicated is important. It appears from this research people respond differently to information framed in different ways, depending on a person's underlying value structure. Values hold important implications in shaping the interpretation of pertinent information and ensuing judgement about certain problems. Providing different or varied messages may be more likely to appeal to a wider

range of people with varying value orientations. Public information campaigns could therefore be broad in approach and provide messages framed in many different ways. Or, if there is a specific group of interest, understanding their characteristics may allow for a more targeted approach. Minton and Rose (1997) have suggested that if policymakers identify who is more or less concerned about an issue it will help them to provide the right information to the right people. Indeed, this seems obvious, but considering people's values may provide an insight into how to think about presenting specific messages to certain groups. As there are relatively few core human values, certain values could be targeted through an array of message frames.

5. Information programs can play a crucial role in the public debate about issues as significant as meat consumption. Specifically, in reducing meat consumption, information campaigns are needed to raise environmental concern and change attitudes towards meat consumption, highlight that lower levels of meat consumption are healthy, and counter the effect of market signals such as price. If this can be achieved over a long period of time a greater understanding of the environmental damage meat production is having on the planet will occur.

Making information campaigns more effective by using studies such as this one, which try and identify where gains can be made provides environmental policymakers a greater platform to achieve benefits for society. Drawing on theory about information provision and framing effects, greater success can come out of using basic information to inform the public. People respond to and interpret messages in many different ways and it is important to recognise this fact.

7.7 Limitations and Future Research

This section addresses some of the problems and limitations that were faced in conducting this study and provides some ideas for future investigation.

Firstly, there were limitations due to the sampling technique used. Convenience sampling places restrictions on drawing too wide a conclusion about the general

population; yet provides an easily accessible sample population to do preliminary testing of theoretical application, as achieved here. The sample of 848 people was relatively large but was characterised by a big university faction of mainly post graduate students and staff, with a high proportion of women. The sample therefore, was not representative of the New Zealand population. Future research may address this problem through a probabilistic sampling technique or a survey tool that could reach a wider more representative sample.

The message framing had various challenges, particularly in terms of ensuring both messages conveyed the same information, but addressed the problem at different scales. The intention was to present an individual and collective message to align with the values of self-enhancement and self-transcendence respectively. This was only partially achieved. Essentially, both frames used could be defined as loss frames, where the message was asking the participant to reduce or give up meat to some degree. By doing this there was a potential bias towards self-transcendence values because they tend to embody a loss prevention perspective (de Boer et al., 2007). Multiple frames could be used to overcome this deficiency. Both loss and gain frames could be included in future research, along with messages that introduce the idea via different topics or contexts. However, a difference in results was found between messages so understanding why the collective message frame was more effective at low levels of both self-enhancement and self-transcendence values would be a good place to start. If there were other factors at play, like country identity or identification with being a meat eater then it would be important to identify the psychological mechanism that were used by different groups.

In addition to the loss frame issue, some people may have interpreted both messages in a collective way. The messages were about the reduction of greenhouse gases in New Zealand, even though the language used was directed in different ways (i.e. individual and society). As the issue of climate change through global warming is a worldwide problem, the individual message may have still been seen as addressing a collective issue nullifying the potential difference interpreted by the researcher.

Mentioned in a large number of the comment sections in the survey was the issue of animal rights and questions of ethics/morality not being taken into consideration. The current research aimed to address the problem of high levels of meat consumption through an environmental lens, rather than through an ethical perspective. However, looking into people's values means moral topics are never too far away. For this reason there may have been an overlap in motive for low meat consumption between people who value animal rights and environmental issues; as these two problems would seem to logically side on the self-transcendence dimension this difference would not show. By not measuring one's perspective on animal rights reasons may have been missed for lower meat consumption.

Other limitations to this research were the timeframe of the thesis and length of the survey. The timeframe limited the survey length so as to encourage a higher participation rate in a shorter period of time. This reduced the amount of potential data that could have been gathered, both in terms of depth (i.e. a longer survey) and number of participants.

Measures that were considered which were not included in the survey were: the full PVQ questionnaire, a perceived behavioural control measure, to find out if people thought they could change diet readily; a social norm measure, to explore whether people believed a change would be acceptable given social pressures; an attitude question on vegetarianism; a more specific question about meat consumption, in terms of portion size and meals within a given day; whether or not someone identifies as vegetarian; a measure of knowledge about the subject at hand, and also questions relating to other motivations in regards to meat consumption. Some of these questions deserve research in their own right and could encompass qualitative data to generate a broader picture of motivations to eat meat and what could influence these.

The results of this thesis provide a good starting point for further research into how values influence the acceptance, processing and action of information; both generally for other environmental campaigns and specifically about meat consumption. The results presented here are a first exploration as little prior evidence has been presented in relation this topic.

7.8 Chapter Summary

After examining the results in context of the theoretical literature surrounding this research, a number of conclusions have been drawn. This chapter has discussed the role information can play in increasing concern about an environmental issue, and that framing of a message can play a role in how people respond to the information provided, given their predisposing values. These results have been examined with regards to policy advice for environmental campaigns, what lessons can be learned to increase the effectiveness of future information programs and how these help create more sustainable behaviour among wider society. The study was limited in some respects but it has also opened up and identified new avenues of research where improvements can be made in future studies.

Chapter 8: Conclusion

To conclude this thesis entitled “Encouraging Sustainable Food Choices: the role of information and values in the reduction of meat consumption” a brief overview of the main aims and findings will ensue, followed by the wider implications of the research in regards to the literature reviewed in earlier chapters. To close, some final thoughts will be shared in wrapping up the research with an outlook to the future.

There were two main aims of this thesis. The first aim of the study was to evaluate if information about the environmental impacts of meat production could increase concern about the issue, lower intention to eat meat and change attitudes about meat consumption. It was hypothesised that the effect of the information would depend on pre-existing values and levels of environmental concern. The second aim was to identify whether a message framed in alignment with these pre-existing values along the self-transcendent/self-enhancement value dimension would sway attitudes and intentions about meat consumption towards being less favourable in a more successful way than the opposite message. This was undertaken with the future hope of reducing the demand for meat and lessening the impact livestock agriculture has on the planet. Through the use of an online survey tool a quantitative study was undertaken to detect differences in outcomes among various treatment groups.

The key outcomes for the first aim can be summarised as follows. People with different value orientations and levels of environmental concern did not respond in homogenous ways to the information provided. That being, people with low environmental concern responded proportionately more (compared to a control group) than those with high concern. In addition, people with high levels of self-transcendent values increased concern about the problems of meat production more than people with low levels of these values, compared to the control group. These results imply information can increase concern and thereby, raise awareness among the public about the environmental issues of meat production. Also, certain messages may be more effective in reaching specific groups of people, meaning a varied

information strategy may be best. In addition, potentially promoting self-transcendence values in a more general sense could help society in adopting a more sustainable mindset if information like what was provided here is used for educational purposes.

In regards to the second aim, people with diverse value structures or orientations responded differently to information framed in either self-transcendent or self-enhancing ways. People with low levels of self-enhancement and self-transcendence responded more effectively to the collective message and people with an orientation of higher self-transcendent values responded to the individual message more favourably. In general, the collective message was deemed to be more successful when people did not have strong value orientations either way. This result was unexpected. Because of the heuristic shortcuts that are thought to help people deal with information of this sort, predicting which message would be more effective for which group was not as easy as hypothesised. With these results in mind, it may be important for future information campaigns to have a variety of message frames to appeal to the largest number of people, even if it is not clear who would benefit most from each message. More work in the future could identify what type of message frames more successfully appeal to people with a strong sense of value orientation.

Chapter 2 of this thesis highlighted the environmental problems that the world and New Zealand face with large scale animal production. Chapter 3 then went on to explain why there is a rising demand for meat and why this demand will not be reduced if a business-as-usual model is taken. Potential benefits of reducing meat consumption with regard to the environmental impact from livestock were also covered. The results found in Chapter 6 can help aid in the reduction of meat consumption by providing ways in which information can be used to effect this change. Changing attitudes and intentions about meat consumption is not a simple task and will require time and effort. However, by providing varied messages framed in multiple ways an increase in public concern is likely, which is a significant gain.

If future information campaigns use studies like this to inform the public debate on important environmental topics such as meat consumption, through increasing

awareness and concern initially and potentially swaying attitudes and values in the long run, then greater environmental protection is possible. By protecting our environment and managing our resources in a sustainable way a more prosperous society is achievable. Through research like this the public's awareness of the issues faced by society in feeding the seven billion plus people on the planet today can be debated more readily. If public debate is increased and there is a willingness to ask the question about the best ways to feed the world's population the opening quote used at the start of this thesis from the National Geographic may not be such a prevalent reality.

"When we think about threats to the environment, we tend to picture cars and smokestacks, not dinner. But the truth is, our need for food poses one of the biggest dangers to the planet."

~ Foley J., National Geographic, May 2014, page 35 ~

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Appendix A: Value Types and Questions

Adapted from Dietz et al. (2005) and Schwartz (1992) – Value type and corresponding questions from Schwartz Value Survey. Value structure averaged over 20 countries.

Value Type	Question Number in SVS - Item on Scale
Conformity	11. Politeness (courtesy, good manners) 20. Self-discipline (self-restraint, resistance to temptation) 40. Honouring of parents and elders (showing respect) 47. Obedient (dutiful, meeting obligations)
Tradition	18. Respect for tradition (preservation of time-honoured customs) 21. Detachment (from worldly concerns) 32. Moderate (avoiding extremes of feeling and action) 36. Humble (modest, self-effacing) 44. Accepting my portion in life (submitting to life's circumstances) 51. Devout (holding to religious faith and belief)
Benevolence	6. A spiritual life (emphasis on spiritual not material matters) 10. Meaning in life (a purpose in life) 19. Mature love (deep emotional and spiritual intimacy) 28. True friendship (close, supportive friends) 33. Loyal (faithful to my friends, group) 45. Honest (genuine, sincere) 49. Helpful (working for the welfare of others) 52. Responsible (dependable, reliable) 54. Forgiving (willing to pardon others)
Universalism	1. Equality (equal opportunity for all) 2. Inner harmony (at peace with myself) 17. A world at peace (free of war and conflict) 24. Unity with nature (fitting into nature) 26. Wisdom (a mature understanding of life) 29. A world of beauty (beauty of nature and the arts) 30. Social justice (correcting injustice, care for the weak) 35. Broadminded (tolerant of different ideas and beliefs) 38. Protecting the environment (preserving nature)
Self-direction	5. Freedom (freedom of action and thought) 14. Self-respect (belief in one's own worth) 16. Creativity (uniqueness, imagination) 31. Independent (self-reliant, self-sufficient) 41. Choosing own goals (selecting own purposes) 53. Curious (interested in everything, exploring)
Stimulation	9. An exciting life (stimulating experiences) 25. A varied life (filled with challenge, novelty, and change) 37. Daring (seeking adventure, risk)
Hedonism	4. Pleasure (gratification of desires) 50. Enjoying life (enjoying food, sex, leisure)
Achievement	34. Ambitious (hard-working, aspiring) 39. Influential (having an impact on people and events) 43. Capable (competent, effective, efficient) 48. Intelligent (logical, thinking) 55. Successful (achieving goals)
Power	3. Social power (control over others, dominance)

	12. Wealth (material possessions, money)
	23. Social recognition (respect, approval by others)
	27. Authority (the right to lead or command)
	46. Preserving my public image (protecting my “face”)
Security	7. Sense of belonging (feeling that others care about me)
	8. Social order (stability of society)
	13. National security (protection of my nation from enemies)
	15. Reciprocation of favours (avoidance of indebtedness)
	22. Family security (safety for loved ones)
	42. Healthy (not being sick physically or mentally)
	56. Clean (neat, tidy)

Appendix B: Participant Information and Survey

People's Values and Food Choice Survey

Welcome!

Thank you for your interest in taking part in our survey. We are interested to find out more about the relationship between people's values and their food choices. With your help we hope to add to the current literature on food choices and inspire a new way to implement policy programs that will benefit New Zealand. Your participation is most appreciated and will contribute greatly to our ongoing research on food choices.

Each set of questions is accompanied by instructions, please read these instructions carefully. There is no right or wrong answers; we are interested in your opinion. When you think a question is not relevant to your situation, please try to provide an answer that is most appropriate to your situation. If you do not wish to answer a question just move on to the next.

Also, by completing this survey you will have the opportunity to go into the draw to win \$200 worth of grocery vouchers. Good luck!

PARTICIPANT INFORMATION AND CONSENT

© Victoria University of Wellington

Values and Food Choice Survey

Researcher: Thomas Graham, School of Geography, Environment and Earth Sciences, Victoria University of Wellington

Dear Participant,

Thank you for your interest in participating in this survey. Please read the following for the consent process and further information on the survey and data that will be collected. This research will provide the data for my Master's degree at Victoria University of Wellington, which will lead to the production of a thesis. This research project has received approval from the Victoria University Human Ethics Committee (application number 0000021005).

Purpose of the Research

The research area I have selected is about people's values and how this may influence their food choices. This will be looked at from an environmental perspective. Different foods have varying impacts on the environment and as such, understanding why and how people choose certain products is important. From the survey data I hope to build on the existing literature

surrounding this topic and produce a quality piece of research that will be useful and informative for both further research and future policy implementation.

What's involved?

I am inviting anyone to participate in this study. This online survey will take about 15 minutes and consists of two parts. First, we will ask you some questions about your food choices and values, then you will then be asked to answer some questions regarding your attitudes towards certain food choices. You can complete the survey anytime and at your convenience, but preferably in one go, although you can come back to it if needed.

Privacy/Confidentiality

As an individual you will not be identifiable in the thesis. The data will be grouped, meaning the data will be analysed statistically as a whole and not as individual responses. All material will be kept confidential. No other person besides myself and my supervisor, Dr. Wokje Abrahamse, will see the raw data. However, if you should feel the need to withdraw from the study, you may do so without question anytime before 31/8/2014.

Findings

The final research thesis will be submitted for assessment to the School of Geography, Environment and Earth Sciences, and will later be deposited in the University Library. It is also possible that the results will be published in an academic journal or presented at a conference. The data collected via the survey will be destroyed within five years of the study's completion. Questions If you have any questions or would like to receive further information about the project, please contact the researcher at tom.graham@vuw.ac.nz or Dr Wokje Abrahamse, at the School of Geography, Environment and Earth Sciences at Victoria University by email wokje.abrahamse@vuw.ac.nz. or by phone on +64 4 4635217.

Sincerely,
Thomas Graham

CONSENT TO PARTICIPATE IN RESEARCH

If you would like to continue and complete the survey, please answer the question below making sure you understand the terms and conditions stated in the information section and below. Do you understand that any information you provide will be kept confidential to the researcher and the supervisor. Do you understand the published results will not use your name, and that no opinions will be attributed to you in any way that will be identifying to you.

Do you consent to take part in this research and proceed with the survey?

Yes

No

If no is selected, then skip to end of survey

BACKGROUND INFORMATION

Firstly, we would like to know a bit more about your background and personal context. Please answer the following background questions.

What age group do you belong?

- Under 18
- 18 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 and over

What is your gender?

- Male
- Female

What is your ethnicity?

- New Zealand European
- Maori
- Pacific Peoples
- Asian
- Other (such as Dutch, Japanese, Tokelauan) Please State: _____

What is your highest qualification gained?

- No formal qualifications
- Secondary school qualifications
- Occupational certificates and diplomas
- Bachelors degree
- Postgraduate degree

Did you grow up in New Zealand?

- Yes
- No

Do you reside in New Zealand?

- Yes
- No

For the majority of your youth (before the age of 18), what setting did you grow up in?

- Urban
- Rural

How much did you, yourself earn in the past 12 months before tax?

- Less than \$19,999
- \$20,000 - \$39,999
- \$40,000 - \$59,999
- \$60,000 - \$79,999
- \$80,000 - \$99,999
- \$100,000 and over

YOUR FOOD CHOICES

To gain a better understanding of your food choices, we would like to know how often you eat a number of food groups. For each of the food groups listed please indicate how many days a week you eat these products.

In an average week, how many days a week do you consume...

	0 Days	1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
Fresh produce (fruits and vegetables)								
Dairy products								
Meat (excluding fish)								
Fish or other seafood								
Beans (any sort)								
Cereals								
Breads								
Sugary snacks, like lollies and chocolate								

YOUR FOOD CHOICES

We would like to know how important food is to you. Please read the following statements and select the answering option that most closely resembles your opinion.

How much do you agree or disagree with the following statements...

	Disagree Strongly	Disagree	Somewhat disagree	Neither agree or	Somewhat agree	Agree	Agree Strongly
1. I don't think much about food all day.							
2. Talking about what I ate or am going to eat is something I like to do.							

3. Compared with other daily decisions, my food choices are not very important.							
4. When I travel, one of the things I anticipate most is eating the food there.							
5. I enjoy cooking for others and myself.							
6. I do most or all of my own food shopping.							

YOUR VALUES

Only show if: Gender - female is selected

This section is about your personal values. Answering these questions will provide us with a better understanding of the views that are important to you personally. Here we briefly describe some people.

Please read each description and think about how much each person is or is not like you. Please indicate how much the person in the description is like you on the scale.

	Very much like me	Like me	Somewhat like me	A little like me	Not like me	Not like me at all
1. Thinking up new ideas and being creative is important to her. She likes to do things in her own original way.						
2. It is important to her to be rich. She wants to have lots of money and expensive things.						
3. She thinks it is important that every person in the world be treated equally. She believes everyone should have equal opportunities in life.						
4. It's important to her to show her abilities. She wants people to admire what she does.						
5. It is important to her to live in secure surroundings. She avoids anything that might endanger her safety.						
6. She likes surprises and is always looking for new things to do. She thinks it is important to do lots of different things in life.						
7. She believes that people should do what they are told. She thinks people should follow the rules at all times, even when no-one is watching.						
8. It is important to her to listen to people who are different from her. Even when she disagrees with them, she still wants to understand them.						
9. It is important to her to be humble and modest. She tries not to draw attention to herself.						
10. Having a good time is important to her. She likes to spoil herself.						
11. It is important to her to make her own decisions about what she does. She likes to be free to plan and to choose her activities for						

herself. 12. It is very important to her to help the people around her. She wants to care for their well-being. 13. Being very successful is important to her. She hopes people will recognise her achievements. 14. It is important to her that the government insures her safety against all threats. She wants the state to be strong so it can defend its citizens. 15. She looks for adventures and likes to take risks. She wants to have an exciting life. 16. It is important to her to always to behave properly. She wants to avoid doing anything people would say is wrong. 17. It is important to her to get respect from others. She wants people to do what she says. 18. It is important to her to be loyal to her friends. She wants to devote herself to people close to her. 19. She strongly believes that people should care for nature. Looking after the environment is important to her. 20. Tradition is important to her. She tries to follow the customs handed down by her religion or her family. 21. She seeks every chance she can to have fun. It is important to her to do things that give her pleasure. 22. She always wants to be the one who makes the decisions. She likes to be the leader.						

YOUR VALUES

Only show if: Gender - male is selected

This section is about your personal values. Answering these questions will provide us with a better understanding of the views that are important to you personally. Here we briefly describe some people.

Please read each description and think about how much each person is or is not like you. Please indicate how much the person in the description is like you on the scale.

	Very much like me	Like me	Somewhat like me	A little like me	Not like me	Not like me at all
1. Thinking up new ideas and being creative is important to him. He likes to do things in his own original way. 2. It is important to him to be rich. He wants to have lots of money and expensive things. 3. He thinks it is important that every person in the world be treated equally. He believes everyone should have equal opportunities in life. 4. It's important to him to show his abilities. He wants people to admire what he does. 5. It is important to him to live in secure surroundings. He avoids anything that might endanger his safety. 6. He likes surprises and is always looking for new things to do. He thinks it is important to do lots of different things in life. 7. He believes that people should do what they are told. He thinks people should follow the rules at all times, even when no-one is watching. 8. It is important to him to listen to people who are different from him. Even when he disagrees with them, he still wants to understand them. 9. It is important to him to be humble and modest. He tries not to draw attention to himself. 10. Having a good time is important to him. He likes to spoil himself. 11. It is important to him to make his own decisions about what he does. He likes to be free to plan and to choose his activities for himself. 12. It is very important to him to help the people around him. He wants to care for their well-being. 13. Being very successful is important to him. He hopes people will recognise his achievements. 14. It is important to him that the government insure his safety against all threats. He wants the state to be strong so it can defend its citizens. 15. He looks for adventures and likes to take risks. He wants to have an exciting life. 16. It is important to him to always to behave properly. He wants to avoid doing anything people would say is wrong. 17. It is important to him to get respect from others. He wants people to do what he says. 18. It is important to him to be loyal to his friends. He wants to devote himself to people close to him. 19. He strongly believes that people should care for nature. Looking after the environment is important to him. 20. Tradition is important to him. He tries to follow the customs handed down by his religion or his family.						

21. He seeks every chance he can to have fun. It is important to him to do things that give him pleasure.						
22. He always wants to be the one who makes the decisions. He likes to be the leader.						

YOUR OPINION ABOUT THE ENVIRONMENT

We would like to know your opinion about environmental issues. For each statement, please select the answering option that most closely resembles your opinion.

How much do you agree or disagree with the following statements...

	Disagree Strongly	Disagree	Somewha t disagree	Neither agree or	Somewha t agree	Agree	Agree Strongly
1. We are approaching the limit of the number of people the earth can support.							
2. Humans have the right to modify the natural environment to suit their needs.							
3. When humans interfere with nature it often produces disastrous consequences.							
4. Humans are severely abusing the environment.							
5. The balance of nature is strong enough to cope with the impacts of modern industrial nations							
6. The so-called "ecological crisis" facing humankind has been greatly exaggerated.							
7. If things continue on their present course, we will soon experience a major ecological catastrophe.							

INFORMATION ABOUT FOOD CHOICES

Only show if: Randomly selected – Collective Message

In this section we would like to know how people respond to information about food choices. Please read the following passage carefully as you will be asked some questions about the information it contains in the next section.

NOTE: You will not be able to return to this page once you move onto the next section.

Meat Consumption and Our Greenhouse Gas Emissions

Did you know that New Zealand has one of the highest proportions of greenhouse gas emissions from agriculture in the developed world? Nearly 50% of New Zealand's total greenhouse gas emissions come from agriculture, with the majority of this coming from

livestock. Having a diet with lower meat consumption can be an effective way of reducing New Zealand's carbon footprint. The latest report by the Intergovernmental Panel on Climate Change (IPCC) indicates that plant based foods are associated with substantially lower greenhouse gas emissions than animal products.

On average New Zealanders consume about 90 kilograms of meat a year. That is an average of approximately 246 grams per day. A report by the United Nations Food and Agricultural Organisation (FAO) in 2009 has placed New Zealand the sixth highest meat consumers per capita in the world. The World Health Organisation (WHO) is urging developed countries to reduce meat consumption for both health and environmental reasons down to around 90 grams per day.

If, as a country we reduce our meat intake to the recommended level of 90 grams per day this will reduce New Zealand's carbon emissions by about 1.77 million tons a year (in carbon equivalent terms), which is the equivalent of all 4.5 million of us driving an average car for 7837 kilometres each. To mitigate this output an estimated 237 million trees need to be grown from seedlings for 10 years or just over 3 million hectares of forest need to be set aside to absorb that carbon over a year; this is two and a half times the size of Fiordland National Park. Together we can make a difference.

Notes (Not required to be read):

New Zealand Population was approximated at 4.5 million. Statistics New Zealand population clock at time of writing was 4,529,426. http://www.stats.govt.nz/tools_and_services/population_clock.aspx

All meat carbon emissions figures are based on 2006 government funded British study by Williams et al. entitled "Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities. Defra project report ISO205". This can be found at: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=11442> The Williams et al. study was used to keep consistency between different meats. New Zealand figures were available for export lamb and beef and were slightly higher than the figures in the study by Williams et al. The New Zealand studies can be found at: http://www.mia.co.nz/docs/press_releases/greenhouse_gas_footprint_study_for_exported_nz_lamb_march_2010.pdf and: <http://www.beeflambnz.com/Documents/Farm/A%20greenhouse%20gas%20footprint%20study%20for%20exported%20New%20Zealand%20beef.pdf>

New Zealand meat consumption figures were from 2009 obtained through the Beef + Lamb New Zealand on page 14 of the "Compendium of New Zealand Farm Facts 37th Edition". This can be found at: <http://www.beeflambnz.com/Documents/Information/Compendium%20of%20New%20Zealand%20farm%20facts.pdf>

Equivalency calculations were done through the US Environmental Protection Agency Greenhouse Gas Equivalency Calculator, which can be found at: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

For further details on the information above feel free to contact the researcher conducting this study.

INFORMATION ABOUT FOOD CHOICES

Only show if: Randomly selected – Individual Message

In this section we would like to know how people respond to information about food choices. Please read the following passage carefully as you will be asked some questions about the information it contains in the next section.

NOTE: You will not be able to return to this page once you move onto the next section.

Meat Consumption and Your Greenhouse Gas Emissions

Did you know that New Zealand has one of the highest proportions of greenhouse gas emissions from agriculture in the developed world? Nearly 50% of New Zealand's total greenhouse gas emissions come from agriculture, with the majority of this coming from livestock. Having a diet with lower meat consumption can be an effective way of reducing your carbon footprint. The latest report by the Intergovernmental Panel on Climate Change (IPCC) indicates that plant based foods are associated with substantially lower greenhouse gas emissions than animal products.

On average New Zealanders consume about 90 kilograms of meat a year. That is an average of approximately 246 grams per day. A report by the United Nations Food and Agricultural Organisation (FAO) in 2009 has placed New Zealand the sixth highest meat consumers per capita in the world. The World Health Organisation (WHO) is urging developed countries to reduce meat consumption for both health and environmental reasons down to around 90 grams per day.

If, as an individual you reduce your meat intake to the recommended level of 90 grams per day this will reduce your carbon emissions by about 561 kilograms a year (in carbon equivalent terms), which is the equivalent of driving your car 7837 kilometres. To mitigate this output an estimated 53 trees need to be grown from seedlings for 10 years or 0.7 hectares of forest need to be set aside to absorb that carbon over a year; that is the same size as a rugby field. Individually you can make a difference.

Notes (Not required to be read):

New Zealand Population was approximated at 4.5 million. Statistics New Zealand population clock at time of writing was 4,529,426. http://www.stats.govt.nz/tools_and_services/population_clock.aspx

All meat carbon emissions figures are based on 2006 government funded British study by Williams et al. entitled "Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities. Defra project report ISO205". This can be found at:

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=11442> The Williams et al. study was used to keep consistency between different meats. New Zealand figures were available for export lamb and beef and were slightly higher than the figures in the study by Williams et al. The New Zealand studies can be found at: http://www.mia.co.nz/docs/press_releases/greenhouse_gas_footprint_study_for_exported_nz_lamb_march_2010.pdf and: <http://www.beeflambnz.com/Documents/Farm/A%20greenhouse%20gas%20footprint%20study%20for%20exported%20New%20Zealand%20beef.pdf>

New Zealand meat consumption figures were from 2009 obtained through the Beef + Lamb New Zealand on page 14 of the "Compendium of New Zealand Farm Facts 37th Edition". This can be found at: <http://www.beeflambnz.com/Documents/Information/Compendium%20of%20New%20Zealand%20farm%20facts.pdf>

Equivalency calculations were done through the US Environmental Protection Agency Greenhouse Gas Equivalency Calculator, which can be found at: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

For further details on the information above feel free to contact the researcher conducting this study.

CONTROL

Only show if: Randomly selected – Control: No Message

Please proceed to the next section

RESPONSE AND THOUGHTS TO THE INFORMATION

Only show if: Provided collective or individual information

This section is about finding out your thoughts about the issue discussed in the information you have just read. Thinking about the message you have just read, please answer the questions below.

What issue was talked about in the article?

- New Zealand's meat exports
- Water contamination from livestock
- Animal welfare and factory farming
- Meat production and climate change

Please indicate where you think the message you just read placed on the continuum scale.
Did you feel the message was more about...

Your meat consumption _____ New Zealand's meat consumption

Please indicate where you think the message you just read placed on the continuum scale.
Did you feel the message was more about...

Individual responsibility _____ Societies responsibility

Please indicate where you think the message you just read placed on the continuum scale.
Was the message targeted at...

You _____ Everyone

Please answer the following by indicating on the scale below for each item which answer most closely resembles your opinion.

After reading the message did you think the information it contained was:

	1	2	3	4	5	6	7	
Not credible								Credible
Of no value								Of value
Worthwhile								Not worthwhile
Not meaningful								Meaningful
Understandable								Not understandable

YOUR OPINION ON FOOD CHOICES

The following questions are about your attitude towards meat consumption. Please answer the following by indicating on the scale below the question how you feel about each statement.

For me personally, having meat as part of my weekly diet is...

	1	2	3	4	5	6	7	
Unimportant								Important
Preferred								Not preferred
Necessary								Unnecessary
Bad								Good
Beneficial								Harmful
Indispensable								Dispensable

For you personally, is the greenhouse gas emissions from meat production...

	1	2	3	4	5	6	7	
Of concern								Of no concern
An unimportant issue								An important issue
Significant								Insignificant
Overstated								Understated
Cause for alarm								Not cause for alarm
Avoidable								Unavoidable

YOUR FUTURE FOOD CHOICES

We would like you to think about your potential choices in regards to your meat consumption (excluding fish). Please think about the coming month, and for each statement, please indicate how likely it would be that you will make the following food choices:

I intend to eat meat most days of the forthcoming month.

	1	2	3	4	5	6	7	
Strongly Disagree								Strongly Agree

In the forthcoming month I would be willing to reduce my meat intake.

Only show if: Over 3 days of meat consumption is selected

	1	2	3	4	5	6	7	
Definitely true								Definitely false

I plan to use more alternative protein sources than that of meat (such as beans, lentils, peas and nuts) in the forthcoming month.

	1	2	3	4	5	6	7	
Very probable								Very improbable

In the forthcoming month I am likely to eat meat on relatively few or no occasions

	1	2	3	4	5	6	7	
Extremely likely								Extremely unlikely

FINAL SECTION! THANK YOU!

If you have any comments that you would like to share about the preceding topics please write them here. _____
_____

Would you like to receive a summary of the results of the research when it is completed?

Yes

No

If you would like to enter the prize draw or receive a summary of the results, please enter your email address (only one entry per person is allowed)

Email Address: _____

Thank you for your time, your participation is very much appreciated!

If you have entered the draw for the prize, this will be drawn at the conclusion of the survey at the end of August 2014. The winner will be notified by email. Participants wanting to receive a summary of the results will be emailed towards the conclusion of the research near the end of this year.

Appendix C: Ethical Approval

Phone 0-4-463 5676
Fax 0-4-463 5209
Email Allison.kirkman@vuw.ac.nz

MEMORANDUM

TO	Thomas Graham
COPY TO	Wokje Abrahamse
FROM	Dr Allison Kirkman, Convener, Human Ethics Committee
DATE	7 June 2014
PAGES	1
SUBJECT	Ethics Approval: 21005 Human Values and Their Role in Sustainable Food Choice

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 28 February 2015. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Allison Kirkman
Human Ethics Committee

A handwritten signature in blue ink, appearing to read "Allison Kirkman".

Appendix D: Value Scale Results

Value Scale	N	SD	Mean score (out of 6)	Cronbach's alpha coefficient (α)
Self-direction	842	0.88	4.63	0.42
Power	836	0.93	3.25	0.60
Universalism	841	0.74	4.95	0.54
Achievement	844	1.16	4.06	0.75
Security	843	1.10	3.66	0.52
Stimulation	845	1.11	3.98	0.74
Conformity	839	1.14	3.27	0.70
Tradition	841	0.99	3.66	0.27
Hedonism	840	1.06	3.91	0.70
Benevolence	834	0.85	4.87	0.63
Higher Order Values				
Self-enhancement	828	0.82	3.67	0.78
Self-transcendence	830	0.66	4.92	0.66
Tradition	831	0.82	3.53	0.68
Openness	840	0.84	4.31	0.67